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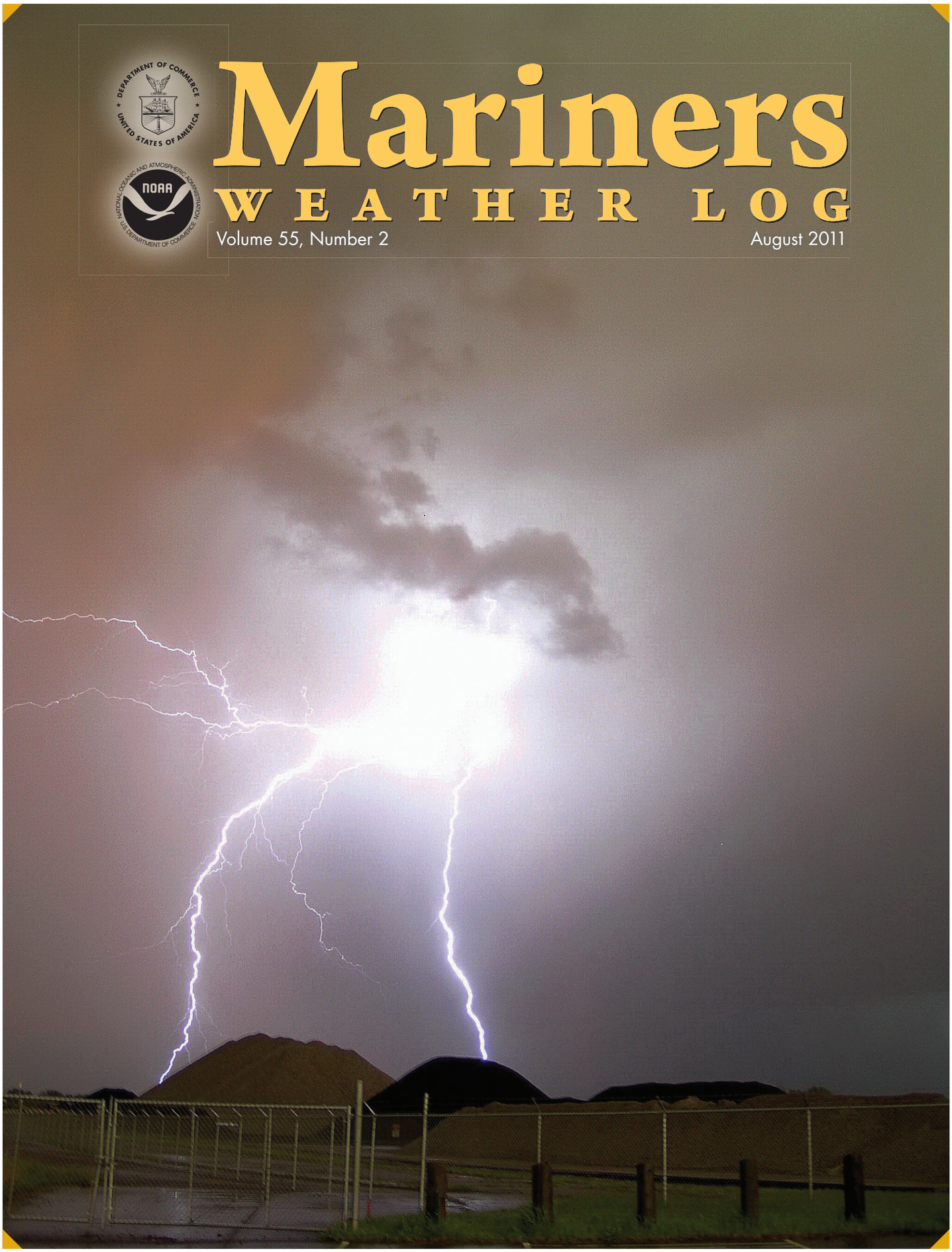

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Marine Dissemination
http://www.nws.noaa.gov/om/marine/home.htm

U.S. Coast Guard Navigation Center
http://www.navcen.uscg.gov/marcomms/

See these Web pages for further links.

From the Editor

John Wasserman

Greetings shipmates and friends!

I have just returned from a quick visit from with my family in Chicago and realized that by the time you read this 2011 will be half over. It's always great to return and look at the observation numbers for the year and see them growing. I want to thank all of our hard working ships that continue to provide observation data to the National Weather Service. Your continued support dedication to the VOS program is an immense help to the marine forecasters who are providing the US and the world with the best possible forecast products.

I usually take the opportunity in this missive to tell of new personnel and changes in the program, I am happy to report that there are no major changes since last issue, I am hoping that this is a good sign!

You may have noticed in this and the April issue of the Mariners Weather Log the lack of ship awards. This is not an indication of poor performance by the VOS ships. On the contrary as mentioned previously, the observation counts have never been better. There was a slight delay in getting the awards, however I am happy to report they will be "on the streets" before the next issue.

One last note before I sign off. I may have mentioned in past issues that we are currently working on a new version of SEAS (9.0) we are still going through some testing on this to ensure we provide you with the best possible product. The new version will have a different look and feel but we are confident you will be happy with the software we provide.

That's all for now folks! Please enjoy!

John

On the cover:
June Storm, lightning strike over coal & limestone storage at Reiss Coal Company's Duluth Dock.
Photo Courtesy of Barb Fuller

Mariners WEATHER LOG

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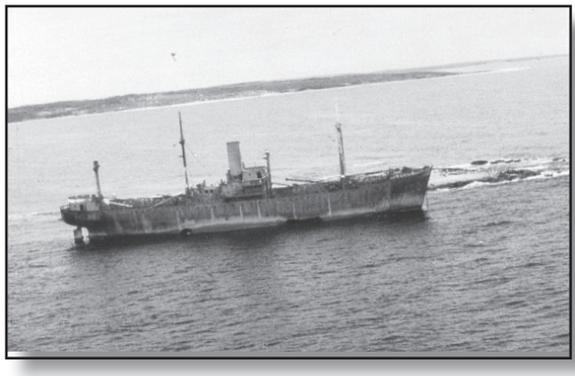

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Marine Weather Review

VOS Program

Dangerous Rip Currents On Beaches

By: Dr. C.-S. Wu, Coastal Wave Specialist, National Weather Service, cs.wu@noaa.gov
B. Chris Brewster, President, United States Lifesaving Association, president@usla.org

Rip currents are a significant hazard at surf beaches. They run away from shore and can easily pull swimmers from shallow water away from shore. The United States Lifesaving Association (USLA) reports that rip currents are the primary source of distress in over 80% of swimmer rescues beaches where surf is present (e.g. ocean beaches and the Great Lakes). Rip currents are particularly powerful in larger surf conditions created by swells produced by distant storms, when there is little wind in the local beach environment. United States Lifesaving Association estimates that over 100 deaths can be attributed to rip currents in the United States in a typical year.

Originally called riptides, rip currents were first reported in the US media in the early 20th century. On May 5, 1918, at Ocean Beach, in San Diego, rip currents pulled many bathers off their feet and 13 men, including soldiers on leave, were swept offshore to their deaths. As a response, the City of San Diego appointed three municipal lifeguards. Notably, the ocean conditions and hazards in 1918 and today are essentially the same, but beach attendance is greatly increased (estimated at+18 million annually in San Diego beaches). Clearly, the number of drowning deaths could therefore be much greater without the presence of lifeguards. Similar circumstances exist elsewhere in the US.

Rip current deaths were been reported by local offices of National Weather Service as early as the 1960s, but Lushine (1991) first demonstrated that annual rip current drowning deaths are greater than from any other natural hazards in Florida. Gensini and Ashley (2009) examined records of rip fatalities from the National Storm Center for the entire U.S. coasts. While it is not comprehensive in nature, the top two states having higher rip current fatalities in the U.S. are Florida and California States.

Rip currents can turn a pleasant beach tour into a perilous trip. For example, in Panama City Beach, Florida on the 25th of July, 2008, a father attempted to save his son caught in a rip current, but both died. On June 5, 2005, two high school teens were missing separately on New Jersey and Long Island Beaches, just after their high school graduation examination. Two boys lost their lives in a swimming class at Indiana Dunes State Park Beach on Lake Michigan on August 4, 2008. And on June 29, 2009 a single mother tried to rescue her two daughters at Montara Beach (south of San Francisco), but the mother died and only one daughter survived. Tragedies of this sort are reported around the USA every year.

Lifeguards at surf beaches are skilled in identifying the subtle clues that indicated the rip currents, since they are the primary cause of distress and rescues to which lifeguards respond. Predicting the likelihood that rip currents will occur on the day has proven more challenging. Scientific studies of rip currents and operational tools are needed to reliably forecast rip current severity so that the public can be informed and rip current drowning can be minimized.

Spotting a rip current – A first step

There are some common signs to look out for to identify rip currents:

1. Seawater in brownish color or covered by white foam moving offshore;
2. isolated patches of water moving offshore or alongshore;
3. a break in the line of breaking waves where the waves are calm.

Rip currents take on many forms and are subject to many different influences, but always involve water moving away from shore in a concentrated manner. A schematic diagram is shown, but no two rip currents are identical. More pictures of rip currents are on the NOAA web page http://www.ripcurrents.noaa.gov

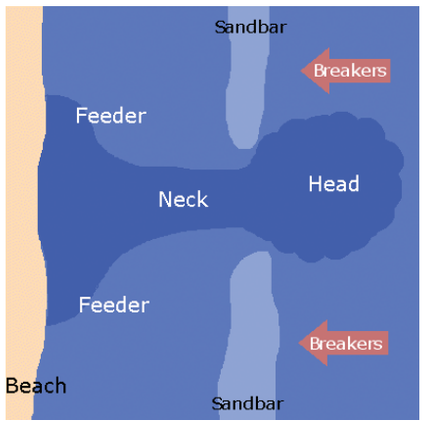

Figure 1: Rip currents on a sandy beach

Early surf zone research was conducted by Bascom and Isaacs of the University of California from 1945 to 1950. They conducted the "Waves" project using an amphibious truck, in the waters off Carmel, CA. They noted that when higher-than averaged waves would break in fast succession, they would raise the water level inside a bar, and a patch of water would rush back in a narrow channel.

Rip classification and Operation

Scientists and ocean engineers classified rips into various categories. The United States Lifesaving Association Manual (Brewster, 1995) defines four types of rip currents classified by lifeguards observing the sea surface on beaches:

Fixed Rip Currents –on sandy beaches as in *Figure 1.* A fixed rip may lie in a given spot for hours, days or months. It is characterized as "wave piling up" between the shore and offshore sandbars.

Permanent Rip Currents – these rips are present year round at a coastline with headland or jetty or a rock as illustrated in *Figure 2*.

Flash Rip Currents – or transient rips, often present during the low tides.

Traveling Rip Currents – these rips migrate along the beach and usually occur by long periods of strong swells. They can pull a large number of swimmers to half mile offshore.

A review of rip currents fundamental is summarized as training material for marine forecasters at http://deved.meted.ucar.edu/marine/ripcurrents/NSF/.

Beaches are an economic driver for coastal communities, attracting tourists and providing jobs. To help ensure that they can be safely enjoyed, in addition to providing lifeguards, it is valuable to provide sufficient information about risk levels that can be anticipated. In an effort to classify the likelihood and intensity of rip currents, the National Weather Service presently applies a Rip Current Outlook based on specific factors in three tiers: LOW, MODERATE and STRONG as seen on the NOAA web site. The threshold of each level can vary at different sites, since local human acclimation to conditions varies. The reliability of this product is evolving, in part utilizing observations of lifeguards and back-testing the prediction to the outcome.

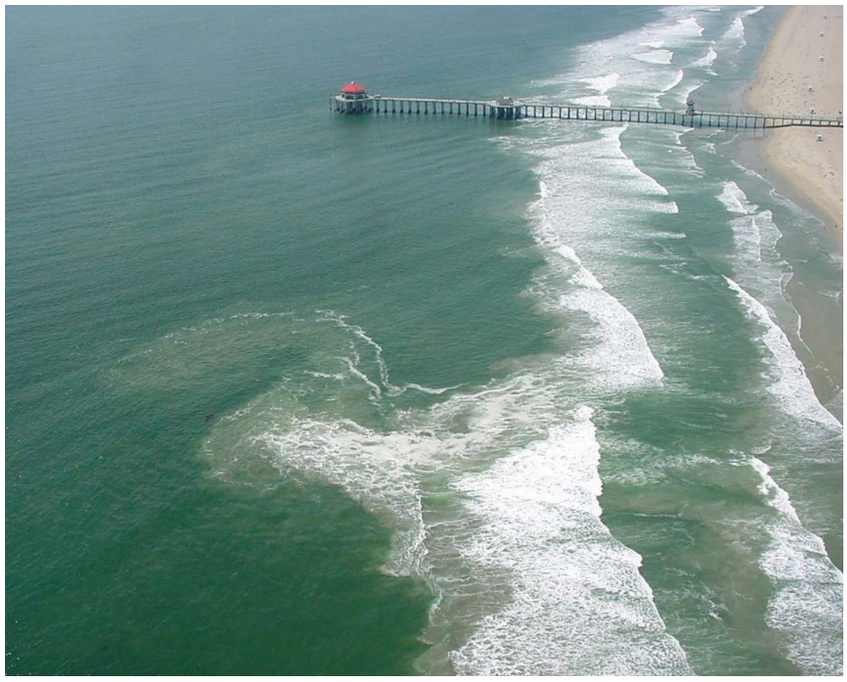

Figure 2: Rip currents taken by Huntington Marine Safety Division, California.

The greatest number of rescues from rip currents by lifeguards in the USA (+40,000/yr) is reported in Southern California. This may be due to a combination of consistently strong Pacific Ocean swells, causing strong rip currents, combined with high year-round beach attendance. Fewer, but consistent rip current rescues are reported along the coasts of the Atlantic Ocean and Gulf of Mexico.

Rips can be more prevalent and in some cases more intense during certain times of the year. On Southern California coasts, spring to summer is the most hazardous time when the prevailing swell changes directions from northerly to southerly and causes holes and channels that foster rip current formation. In Wu et al. (2011) rip current characteristics are given, and a lifeguard based series of observations are conducted with collaboration with local Weather Forecast Office to monitor daily surf and rip currents on beaches.

Tools for Prediction of Rip Currents and Data needed

Rip currents can occur under various marine weather conditions. A product of the National Weather Service is to issue Surf Zone Forecasts, in an effort to identify the risk level when rip currents are likely to be high and pose a threat to beachgoers. To ensure reliability in forecasting the threat of rip currents, there is a need to develop a roadmap as was done in wind wave forecasting: field observations direct theoretical analysis and then empirical formula is derived to apply to the field with proper tuning parameters.

In the beach reports, we have noted that the rescues activities can increase with when strong rip currents occur at lower tide levels. This suggests that rip current intensity may be influenced, in part, by tides. Observations also indicate strong correlation between rip current strength and incoming surf heights. Along the southeast coast of Florida, where seasonal surface winds create local wind waves, rip currents and alongshore currents are observed

at wind speeds higher than 10-15 kts for 3-5 hours. Rip currents can occur under various marine weather and geophysical conditions.

Although the incoming waves may come from hundreds or thousands of miles away, rip currents are considered to be determined by **local** parameters, which includes: water waves near shore, coastal water levels, *coastline* orientation variations, beach bottom condition, and promontories (both natural and human made). Local winds can affect waves at different time/spatial scales. A brief introduction of some tools is given below:

Tools	Data Used	Output Product
1. Marine weather charting	Surface wind system	Potential of rip occurrence
2. Empirical worksheet	Wind, swells, rescue record	Rip risk factors (Ref. 3)
3. Diagnostic analysis	Waves, beach sands and tides	Rip risk scale (Ref. 4)
4. Regression formula	Wind, waves and tides	Rip currents threat level (**)
5. Computer modeling	Coastal waves on a beach basin	Entire current field (Ref. 5)

** Personal communication and see papers in http://www.ripcurrents.fiu.edu

Method (1) reads the synoptic-scale winds and gives hints where rip currents might be occurring where the winds are on-shore toward coasts. Methods (2), (3), (4) make use of NDBC wave buoy data at different water depths or output data of wind wave models. Tide levels can be obtained from tide prediction or tide gauge observation. The beach properties include beach slope and beach sand size. Thus, the rip risk formula developed is expected site-specific for different beaches, except for the full scale numerical model. ⚓

Summary

In this note, dangerous rip currents on beaches are introduced. Recent efforts by the National Weather Service in partnership with the United States Lifesaving Association have greatly promoted the public awareness of the threat of rip hazards in the U.S. Local marine forecasters now have access to various online information to better understand rip current causes and to offer community outreach activities. Rip hazards need multiple efforts to mitigate its effect. Surf height appears to be the key variable, but there are many other marine influences.

Forecasting skill is in advancing as more and more remote sensing field data and numerical techniques are developed. At the 1st Symposium on Rip Current held in Miami in February 2010, scientists and engineers offered practical tools and empirical worksheets for use. Further research to better understand and predict rip currents is needed in the interest of reducing death and injury from this natural hazard.

Acknowledgments

Dr. C-S Wu is sponsored under the Storm-Scale Prediction of the Meteorological Development Laboratory of the Office of Science and Technology. He is indebted to the Los Angeles District of the US Army Corps of Engineers, for their beach data and the Weather Forecast Office at San Diego, CA with special thanks to Noel Isla for his earnest assistance. This note is dedicated to numerous marine forecasters in California and Florida coasts for their comments and motivations.

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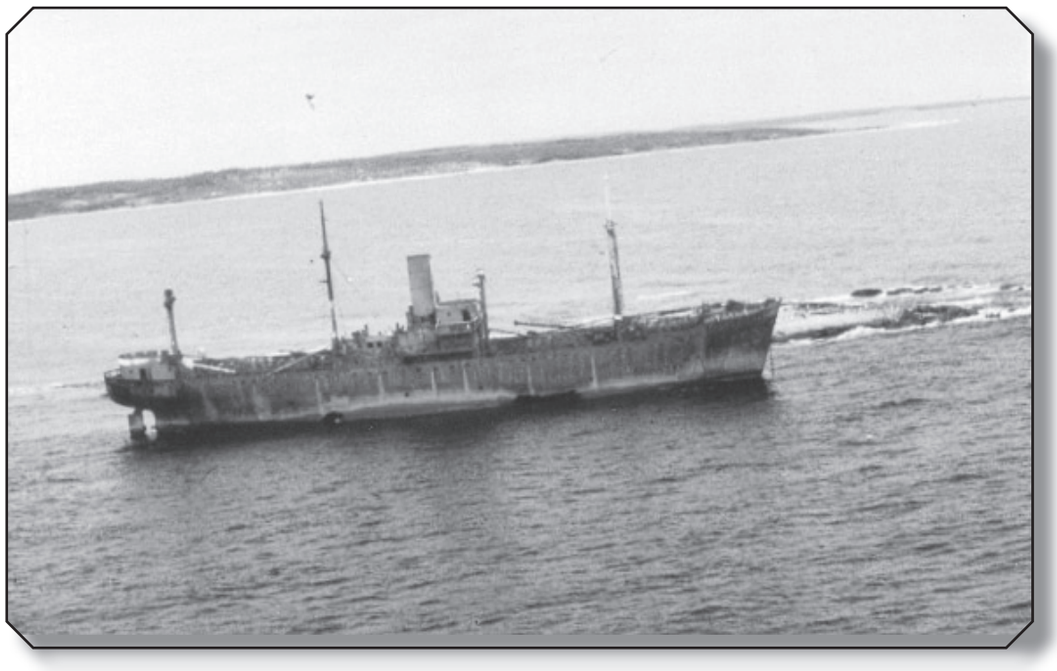
Shipwreck: Fury

By Skip Gillam
Vinland, Ontario, Canada



Fury

The Fury had a short operating career under this name. The ship stranded at Barachois Point, off Wedge Island, 100 miles east of Halifax, Nova Scotia, on December 1, 1964. The vessel had recently been sold and was traveling in ballast on its delivery voyage.

The vessel had encountered a late fall storm while en route from Quebec City to Halifax and apparently had some steering problems. The Captain elected to go to anchor but the anchors failed to hold and the 20 year old ship drifted aground.

Fury had been built at Hamburg, Germany, and launched on December 14, 1944. It entered service under German registry as **Weserwehr** on February 15, 1945. The 301 foot (overall) long by 44 foot wide vessel was designed to work on behalf of Nazi Germany in World War Two but was soon captured by British forces.

The steam powered freighter was registered at 1,942 gross tons and was equipped with a Lentz engine and two water tube boilers.

Weserwehr was renamed **Empire Gangway** by the Allies and operated for the British Ministry of War Transport until 1950. It came to Canada that year for the Clarke Transportation Company.

Renamed NOVAPORT, it operated between Montreal and Newfoundland. It was now registered in Canada at 2,858 gross tons and able to carry 3,475 tons of cargo. Eastbound, the ship handled a variety of freight but on the return leg, it often loaded fluorspar at a Newfoundland port for Port Alfred, Quebec, on the beautiful Saguenay River. It frequently took two days to load the cargo and another two to discharge. During the winter of 1960-1961, the ship saw some service between Halifax and St. John's.

Following a sale to Tiaunfo Cia. Navigation in 1964, the vessel was re-registered in Liberia for further deep sea service. It was on the delivery voyage, with a Greek crew, when it got into trouble. All on board reached shore safely.

Over the years, an estimated 500 tons of fuel has been burned off to protect the environment. The remains of **Fury** are still somewhat intact and visible. The hull is shown on June 21, 2010, from a photo by Hubert Hall. ⚓

Mean Circulation Highlights and Climate Anomalies

January through April 2011

By Anthony Artusa, Meteorologist, Climate Operations Branch, Climate Prediction Center NCEP/NWS/NOAA

All anomalies reflect departures from the 1981-2010 base period.

January-February 2011

The 500 hPa circulation pattern over the Northern Hemisphere during January featured above average heights in the polar region and the eastern Pacific, and primarily below average heights in the middle latitudes *(Figure 1).* The sea level pressure (SLP) pattern largely mirrored the 500 hPa pattern, and to a significant degree projects onto a negative North Atlantic Oscillation (NAO)*(Figure 2).*

The mid-tropospheric circulation pattern during February 2011 featured above average heights across the high latitudes of the North Pacific and portions of the polar region, and below average heights extending from western North America to central Asia *(Figure 3.)* The SLP map again largely mirrored the mid tropospheric pattern, and projected strongly onto the negative phase of the Pacific North America (PNA) teleconnection pattern. It is notable that for the first month since September 2009, the monthly 500 hPa circulation did not project strongly onto the negative phase of the NAO *(Figure 4).*

Of special significance was a historic winter storm that developed over the southern Great Plains and tracked northeastward into the central and eastern Great Lakes region, between January 31st and February 2nd. This powerful storm brought up to 61 cm of snow, blizzard or near blizzard conditions, wind gusts as high as 50 kts, and ice accumulations of 2.5 cm to areas along its path. Chicago O'Hare Airport reported nearly 54 cm of snow with this storm, making it the third highest snowfall accumulation on record (*Reference 1*).

The Tropics

Negative sea surface temperature (SST) anomalies continued across the equatorial Pacific Ocean during January, with some weakening in the La Nina during February 2011. The latest monthly SST indices for the Nino 3.4 region were -1.7C and -1.3C, respectively. The oceanic thermocline, measured by the depth of the 20C isotherm, was shallower than average across the central and eastern equatorial Pacific. Atmospheric convection was enhanced over Indonesia, and suppressed across the western and central equatorial Pacific. Equatorial low level easterly trade winds remained stronger than average over the western and central Pacific. Collectively, the atmospheric and oceanic anomalies signal a slowly weakening La Nina.

March-April 2011

The 500 hPa circulation pattern during March 2011 featured above average heights over the central North Pacific, Alaska, the southern United States, and northern Europe, and below average heights over the western North Pacific, the Gulf of Alaska, the southeastern North Atlantic, and the polar region (*Figure 5).* The sea level pressure and anomaly map (*Figure 6*) records well below average SLP over much of the polar region and Siberia.

The month of April was characterized by above average heights across the southern United States, Europe, and Siberia, and below average heights extending from Canada to Greenland, over western Russia, and across the western North Pacific (*Figure 7).* This pattern projected strongly onto several main teleconnection patterns, including the positive phase of the NAO, and the negative phases of the West Pacific and PNA patterns. The SLP and anomaly field (*Figure 8*) was largely dominated by well below average SLP over the polar region.

Of particular significance was a major severe weather outbreak from the deep South northeastward into the interior mid Atlantic and Northeast U.S., during April 27-28 (*Reference 2*). Pending further assessment, this event may very well exceed the April 1974 event, both in terms of the number of tornadoes that occurred, and the number of tornadoes for any 24 hour period in U.S. history. Preliminary reports collected by the Storm Prediction Center in Oklahoma indicate at least 250 tornadoes, over 400 high wind reports (50 kts or greater), and 200 instances of severe hail (at least 2.5 cm in diameter).

Elsewhere, a major cyclonic storm moved across the Bering Sea April 6-7, causing high winds throughout the Aleutian Island chain. The National Weather Service in Anchorage estimated peak wind gusts of 80-95 kts in the village of False Pass, 80 kts at Cold Bay, and nearly 70 kts at Dutch Harbor. At one point while traversing the Bering Sea, the storm's central pressure bottomed out near 936 hPa (*Reference 3*).

The Tropics

La Nina continued to weaken during March and April 2011 as the magnitude of the negative SST anomalies continued to decrease across much of the equatorial Pacific Ocean. The latest monthly SST indices for the Nino 3.4 region registered -1.0C and -0.8C, respectively. The oceanic thermocline (measured by the depth of the 20C isotherm) became slightly deeper than average across the eastern equatorial Pacific. Deep cloudiness and thunderstorm activity near the equator was enhanced over Indonesia, and was suppressed over the western and central equatorial Pacific.

Equatorial low level easterly trade winds remained stronger than average over the western and central Pacific. Collectively, these atmospheric and oceanic anomalies reflect a weakening La Nina. ⚓

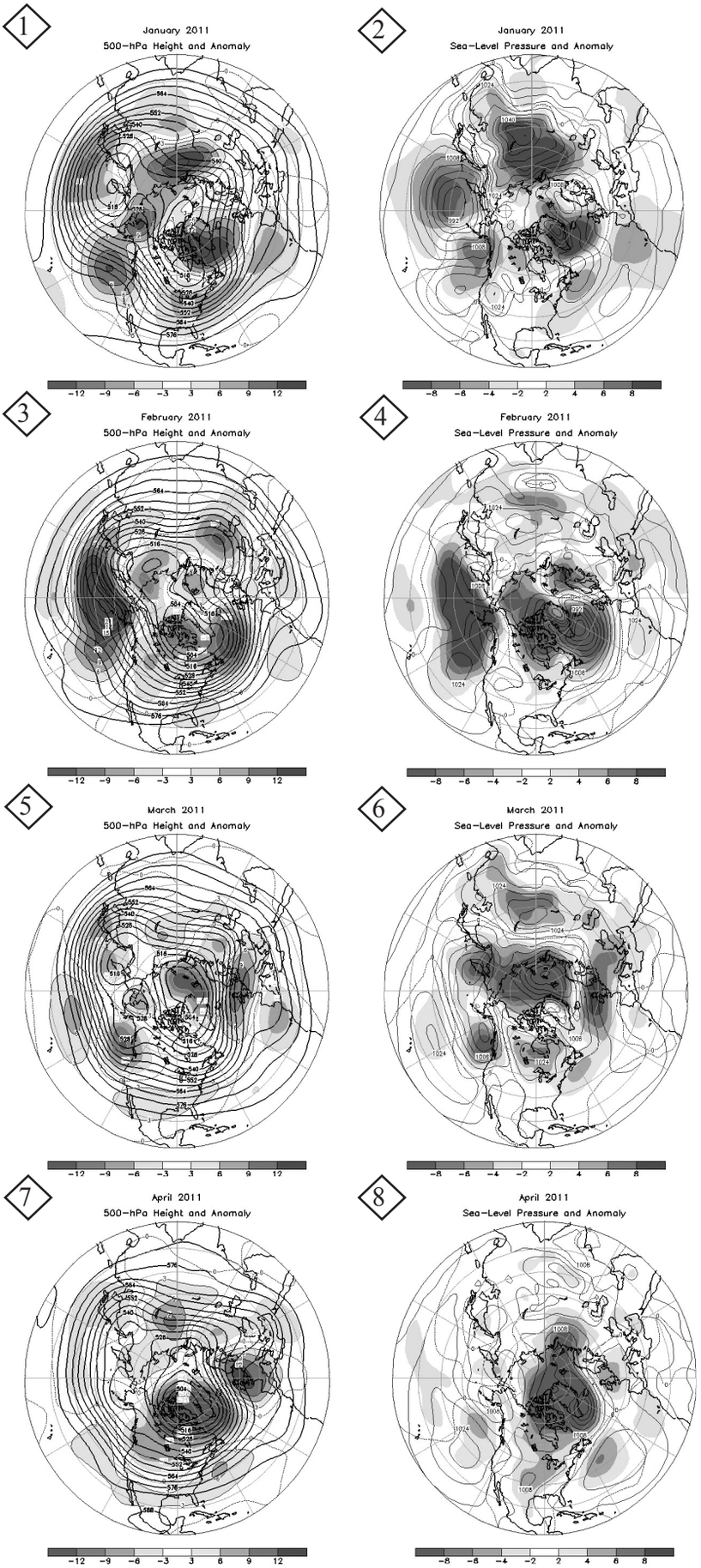
References

1. Historic Snowstorm in the Midwest (January 31 - February 2, 2011) (http://www.crh.noaa.gov/news/display_cmsstory.php?wfo=lot&storyid=63971&source=0). Additional information about this storm can be found at: www.crh.noaa.gov

2. Historic Tornado and Severe Weather Outbreak (April 27-28, 2011) (http://www.erh.noaa.gov/er/rnk/events/2011/April27_outbreak/summary.php)

3. Major Bering Sea Storm affects Aleutians (http://climate-of-the-west.com/2011/04/07/47/)

Much of the information used in this article originates from the Climate Diagnostics Bulletin archive: (http://www.cpc.ncep.noaa.gov/products/CDB/CDB_Archive_html/CDB_archive.shtml)



Figures 1,3,5,7
Northern Hemisphere mean and anomalous 500-hPa geopotential height (CDAS/Reanalysis). Mean heights are denoted by solid contours drawn at an interval of 6 dam. Anomaly contour interval is indicated by shading. Anomalies are calculated as departures from the 1981-2010 base period monthly means.

Figures 2,4,6,8
Northern Hemisphere mean and anomalous sea level pressure (CDAS/Reanalysis). Mean values are denoted by solid contours drawn at an interval of 4 hPa. Anomaly contour interval is indicated by shading. Anomalies are calculated as departures from the 1981-2010 base period monthly means.

Marine Weather Review – North Atlantic Area

September through December 2010

By George P. Bancroft
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NOAA National Center for Environmental Prediction

Introduction

The period of September to December 2009 included a period of increasing activity of extratropical cyclones as late summer gave way to fall and then early winter. From September to late October cyclones traveled mainly in a northeastward direction from the U.S. East Coast or Atlantic Canada through the northeast Atlantic, with some of them originating over the central waters. As winter approached there was increasing high latitude blocking high pressure forcing low pressure centers to move erratically or stall over the southern waters. There were 10 cyclones producing hurricane force winds during the four month period based on hurricane force labels appearing on six hourly OPC surface analyses, concentrated in the months of October and November. September and December each had only one, with the September event having tropical origins. The author included three other cyclones that likely were close to hurricane force, with two in November. The maximum frequency of hurricane force lows in the North Atlantic has been found to occur later, in January (Sienkiewicz and Von Ahn, 2005). Two cyclones developed central pressures below 950 hPa over the central waters or near Great Britain, with the lowest 946 hPa occurring in early November.

This four month period includes the peak of the Atlantic hurricane season in early September. Hurricanes Earl and Igor and Tropical Storms Fiona and Julia affected OPC's high seas area north of 31N during September, followed by Hurricanes Otto and Shary in October. Of these, only Igor underwent transition into an intense post tropical low. Other tropical systems occurred during the period but remained south of OPC's area.

Tropical Activity

Hurricane Earl: Earl entered OPC's waters south of Cape Hatteras as a major hurricane on the morning of September 2 with maximum sustained winds of 120 kts with gusts to 145 kts, placing it in Category 4 on the Saffir-Simpson scale of 1 to 5 (highest). *Figure 1* shows a weakening Earl passing east of the Outer Banks before it passed across Nova Scotia and onshore over Nova Scotia as a strong tropical storm with maximum sustained winds of 60 kts with gusts to 75 kts. The infrared satellite image in *Figure 2* shows the Category 4 Earl entering OPC's marine area with its colder cloud tops computer enhanced, revealing the central eye wall. The second part of *Figure 1* shows Earl still a tropical storm but the text box issued by NHC/TPC indicates Earl has become post tropical (or extratropical) since it is based on the advisory time, three hours after map time. Earl subsequently weakened to a gale over the Labrador Sea where it stalled on the 6th before weakening to sub gale strength on the 8th. The remains of Earl then tracked east then northeast across the Atlantic and passed through the Norwegian Sea late on the 11th. Some notable ship and buoy reports during passage of Earl are listed in *Table 1.*

Tropical Storm Fiona: Fiona (*Figure 1*) approached OPC's marine area as a minimal tropical storm near 30N 66W on the afternoon of September 3 with maximum sustained winds 35 kts with gusts to 45 kts. The cyclone then weakened to a remnant low the following evening and dissipated the next morning.

Hurricane Igor: Igor followed Fiona into OPC's high seas area on the afternoon of September 19 with maximum sustained winds of 70 kts with gusts to 85 kts. Igor passed near Bermuda where the airport reported southeast winds of 59 kts with gusts to 81 kts at 0222 UTC on the 20th and a pressure of 964 hPa at 0255 UTC on the 20th. Igor then more or less maintained its intensity until extratropical transition and beyond, when Igor reached the Labrador Sea as a hurricane force low (*Figure 3*). St. John's Newfoundland reported northwest winds of 50 kts with gusts to 68 kts at 1800 UTC on the 21st and a peak gust of 74 kts. Some notable ship, buoy and oil platform observations are listed in *Table 2*. At 2100 UTC on the 21st, just before being declared extratropical, Igor developed maximum sustained winds of 70 kts with gusts to 90 kts and a lowest central pressure of 950 hPa. The ASCAT image in *Figure 4* shows the wind retrievals around Igor as it was passing near Newfoundland, with numerous winds in the 50 to 60 kts range. *Table 2* reveals some higher winds than indicated by ASCAT imagery. Post tropical Igor then moved into the northern Labrador Sea and maintained hurricane force winds late on the 22nd before drifting east and weakening to a gale on the 24th and then becoming absorbed by an intensifying cyclone passing to the east early on the 27th.

Tropical Storm Julia: Julia (*Figure 3*) entered OPC's marine area near 31N 52W late on September 18 with maximum sustained winds of 45 kts with gusts to 55 kts and moved northeast with a slow weakening trend, becoming an extratropical gale near 35N 46W late

OBSERVATION	POSITION	DATE/TIME (UTC)	WIND	SEA(m/f)
Veendam (PHEO)	35N 68W	04/0400	SW 45	6.5/21
Madeleine (VCRG)	47N 62W	05/0000	SW 45	12/39
Buoy 41001	34.7N 72.7W	03/0900	S 51 G62 Peak gust 64	12/39
Buoy 41025	35N 75.4W	03/1100 03/0600 03/0900	NW 49 G60 Peak gust 66	6/20 Maximum 8.5/28
Buoy 44150	42.5N 64W	04/1300 04/1400	SW 45 G64	10/33 Maximum 13/43
Buoy 44137	42.2N 62 W	04/1500 04/1800	SW 37 G49	8.5/28 Maximum 10.5/34
Buoy 44258	44.5N 63.4W	04/1500 04/1900	S 47 G66	6.5/21 Maximum 10/33

Table 1. Selected ship and buoy observations taken during passage of Tropical Cyclone Earl.

OBSERVATION	POSITION	DATE/TIME (UTC)	WIND	SEA(m/f)
Courage (WDC6907)	40N 51W	15/1000	SW 45	
Undine (SHJC)	47N 46W	15/1800	SE 50	
BATFR43	46N 57W	16/0400	W 45	
A8BZ6	57N 51W	17/0000	NW 40	6.7/22
Hibernia Platform (VEP717)	46.7N 48.7W	15/1500	SE 70 (height 139 m)	
GSF Grand Banks (YJUF7)	46.7N 48W	15/1800	SE 50 (height 82 m)	
Terra Nova (VCXF)	46.4N 48.4W	15/1800	SE 45 (height 53 m)	

Table 2. Selected ship, buoy and oil platform observations taken during passage of Hurricane Igor.

on the 20th. The remains of Julia then moved slowly around the subtropical high during the next week before finally dissipating near Bermuda on the 28th.

Hurricane Otto: Otto, originally a subtropical storm south of the area, entered OPC's high seas area near 56W on the morning of October 9 as a Category 1 hurricane with maximum sustained winds 65 kts with gusts to 80 kts. The cyclone tracked northeast ahead of an approaching cold front and slowly weakened, becoming a tropical storm on the evening of the 9th and an extratropical storm the next afternoon near 39N 39W. Post tropical Otto weakened to a gale force low shortly thereafter, reaching 43N 29W early on the 11th before turning southeast and dissipating near the coast of Morocco on the 16th.

Hurricane Shary: The last tropical cyclone to affect OPC's marine area in 2010 crossed 31N near 65W on the evening of October 29 as a tropical storm with maximum sustained winds 60 kts with gusts to 75 kts (*Figure 8*). Shary moved northeast ahead of an approaching cold front, briefly reaching minimal hurricane strength early on the 30th near 34N 59W before weakening to a post tropical gale later that day and becoming absorbed by a rapidly intensifying cyclone to the north early on the 31st.

Other Significant Events of the Period

North Atlantic Storm, October 2-5: This developing hurricane force low, the first of the season without tropical origin, tracked from near Cape Hatteras early on October 1 to the southeast Labrador coast late on the 2nd before turning more east and rapidly intensifying. *Figure 5* shows the later stage of development when the central pressure fell 31 hPa in twenty four hours. The lowest central pressure, 954 hPa, occurred six hours later. An ASCAT high resolution pass from 1332 UTC on the 3rd revealed west winds to 50 kts near 54N 42W implying winds approaching hurricane force as ASCAT tends to under report the higher winds. The **Polarstern** (DBLK, 59N 9W) reported south winds of 45 kts at 2100 UTC on the 5th, the highest reported from a ship. The **Sea Land Mercury** (WKAW) near 58N 21W encountered northwest winds of 35 kts and 11 m seas (36 ft) at 1800 UTC on the 5th. At 0900 UTC on the 4th the ship WDD3825 (47N 23W) encountered northwest winds of 30 kts but 12.8 m seas (42 ft). The cyclone subsequently passed northwest of Great Britain with its highest winds lowering to storm force on the 4th, before turning north and passing north of Iceland on the 6th.

Eastern North Atlantic Storm, October 6-9: The development of this cyclone, the second deepest of the period in terms of central pressure, is depicted in *Figure 6.* The center developed a lowest central pressure of 948 hPa before the system turned southeastward and began to weaken. The ASCAT image in *Figure 7* is unusual, revealing strongest winds of 50 kts on the east side of the center rather than the south or west sides in the cold air. The **Philadelphia Express** (WDC6736) reported northwest winds of 50 kts and 9.8 m seas (32 ft) at 1200 UTC on the 8th, followed three hours later by a report of seas to 11.6 m (38 ft) near 40N 23W. The cyclone subsequently turned southeast and weakened to a gale west of France on the 9th before dissipating near Morocco on the 11th.

North Atlantic Storm, Greenland area, October 24-26: Low pressure formed near 52N 40W at 0600 UTC October 24 and moved north toward Greenland, intensifying to 976 hPa as the center reached 59N 41W at 1200 UTC on the 25th. A high resolution ASCAT pass on the morning of the 25th revealed a band of north to northeast winds to 55 kts between the cyclone's occluded front and the southern tip of Greenland. OPC analyzed this system as a hurricane force low on the 25th. The **Mary Artica** near 59N 43W reported northeast winds of 50 kts at 0700 UTC on the 26th. The winds weakened as the low then drifted south then east away from Greenland late on the 25th and the 26th and becoming absorbed by another cyclone passing northeast toward Iceland on the 27th.

North Atlantic Storm, October 30-November 1: *Figure 8* depicts a complex area of low pressure over the south of the Canadian Atlantic provinces consolidating into a hurricane force low over a thirty six hour period while absorbing the remains of Tropical Cyclone Shary. During the twenty four hour period ending at 0600 UTC on the 31st the central pressure fell 34 hPa. *Figure 9* is a high resolution ASCAT pass from the morning of the 31st revealing west to southwest winds 50 to as high as 55 kts south of the center. The platform **Hibernia** (VEP717, 46.7N 48.7W) reported west winds of 65 kts and 6 m seas (20 ft) at 0600 UTC on the 31st, while **Terra Nova FPSO** (VCXF, 46.4N 48.4W) reported southwest winds of 50 kts. Hibernia's anemometer height is 139 m *(Reference 3).* The **Newfoundland Lynx** (VAAZ, 54N 53W) encountered northeast winds of 50 kts at 0500 UTC on the 31st. Thirteen hours later the **Maersk Pembroke** (PDHY, 47N 42W) encountered west winds of 40 kts and 10.5 m seas (34 ft).

The cyclone subsequently moved out over the North Atlantic with winds lowering to storm force late on the 31st and to gale force late on November 1 when passing between Scotland and Iceland. The system then passed north of Iceland late on November 2.

North Atlantic Storm, November 6-9: A gale force low moved from the U.S. mid Atlantic coast on November 4 north-northeast to Greenland late on the 6th. *Figure 10* shows the subsequent rapid redevelopment east of Greenland in which the central pressure fell 30 hPa in only a 12 hour period ending at 1200 UTC on the 7th. The second part of *Figure 10* shows the cyclone at maximum intensity. An ASCAT high resolution pass from 2257 UTC on the 7th revealed a swath of northwest winds of 50 kts southwest of the low center. Hurricane force winds lasted from early on the 7th until 1800 UTC on the 8th. At 0500 UTC on the 8th the ship BATFR29 (45N 4W) reported west winds of 55 kts. Five hours later the St. Louis Express (WDD3825) reported northwest winds of 50 kts and 15.5 m seas (51 ft) at 49N 19W while a nearby buoy 62442 (49 N 16.4W) reported northwest winds of 35 kts and 12.5 m seas (41 ft). At 2000 UTC on the 8th the St. Louis Express encountered northwest winds 50 kts and 16.2 m seas (53 ft). The vessel TBWUK35 reported north winds of 50 kts and 15.5 m seas (51 ft). The cyclone subsequently dropped southeast inland over France on the 9th (*Figure 11*).

Northeast Atlantic Storm, November 10-12: The next major storm originated as a frontal wave of low pressure in the southern Labrador Sea which rapidly intensified out over the North Atlantic *(Figures 11 and 12).* The central pressure fell 42 hPa in the twenty four hour period ending at 0000 UTC on the 11th. The second part of *Figure 12* shows the cyclone at maximum intensity, 946 hPa, making it the most intense of the period in the North Atlantic. The Don Quijote (SFQP) near 59N 3W reported southeast winds of 50 kts at 0600 UTC. Six hours later the Loch Rannoch (MYJG2) encountered southeast winds of 50 kts and 7.3 m seas (24 ft) near 60N 1W. Buoy 62023 (51.4N 7.9W) reported west winds of 57 kts with gusts to 71 kts and 7 m seas (23 ft) at 1800 UTC on the 11th. The buoy 62095 (53.1N

15.9W) reported maximum seas of 11 m (36 ft) at 1100 UTC on the 11th. Another buoy, 62123 (56.3N 2.2E) reported southeast winds of 50 kts one hour later. Hurricane force winds lasted for part of the 11th before the cyclone crossed the British Isles and into the North Sea as a storm force low. Winds diminished to gale force as the system passed east of Denmark on the 12th.

Southwestern North Atlantic Storm of November 10-12: A wave on a north-south front off the U.S. east coast moved north to the New England coast from the 6th to the 8th as a gale before looping southeast, blocked by high pressure building to the north. It intensified to a storm on the 10th, attaining a lowest central pressure of 992 at 1200 UTC on the 11th near 38N 60W. *Figures 11 and 12* show the final development of this cut off storm. *Figure 13* is a high resolution ASCAT image revealing some wind retrievals of 50 kts north of an occluded frontal boundary. The ship V7SX3 (39N 71W) reported northeast winds of 45 kts and 10.7 m seas (35 ft) at 0200 UTC on the 12th. The buoy 44137 (42.2N 62W) developed northeast winds of 43 kts with gusts to 54 kts and 9.5 m seas (31 ft) at 1400 UTC on the 11th, and one hour later reported 10 m seas (33 ft). Building high pressure to the north forced the low to meander southeast and weaken, and then pass south of the area on the 17th.

Northeastern Atlantic Storm, November 15-17: This cyclone originated as a secondary low forming on the frontal system associated with the cutoff storm mentioned above, on the morning of the 14th. It moved northeast to west of Great Britain and briefly developed hurricane force winds late on the 16th when the cyclone developed a lowest central pressure of 966 hPa near 54N 15W. The Atlantic Cartier (SCKB, 50N 20W) reported west winds of 60 kts and 7.3 m seas (24 ft) at 1800 UTC on the 16th. Six hours prior, the Al Moshtaree (HZGH, 48N 15W) encountered southeast winds of 45 kts and 10.7 m seas (35 ft), the highest reported by a ship. The buoy 62023 (51.4N 8W) reported southeast winds of 50 kts and 4.3 m seas (14 ft) at 2000 UTC on the 16th followed five hours later by a report of 6 m seas (20 ft). Buoy 62081 (51N 13.5W) reported maximum seas of 11 m (36 ft) at 1300 UTC on the 17th. The cyclone subsequently drifted northeast on the 17th before turning northwest on the 18th and weakening to a gale. It then dissipated by the 24th as a strong ridge developed in the Greenland/Iceland area.

Northwestern Atlantic Storm, Greenland area, November 20-22: The development of this cyclone is depicted in *Figure 14*. Hurricane force winds developed near the southwest Greenland coast as the occluded front associated with the low approached. *Figure 15* shows east winds to 65 kts ahead of a front which is south of the chart area. The Maersk Palermo (PDHW) near 53N 42W encountered southwest winds of 45 kts and 6.5 m seas (21 ft). The cyclone then tracked northwest through the Davis Strait before moving inland over Canada by the 22nd.

North Atlantic Storm, November 21-23: *Figure 14* shows a developing storm expected to move out of the Atlantic provinces of Canada and pass south of Newfoundland before turning northeast. The second part of *Figure 14* shows the storm southeast of Newfoundland. The cyclone crossed the Grand Banks on the 21st before stalling near 51N 44W on the 22nd and developing a lowest central pressure of 977 hPa at 0000 UTC on the 23rd. A high resolution ASCAT pass from 2308 UTC on the 21st revealed west winds to 50 kts south of the low center. A vessel using the call sign SHIP reported west winds of 50 kts and 5.8 m seas (19 ft) near 42N 51W at 1200 UTC November 21. The ship DCFB2 (41N 44W) reported northwest winds of 45 kts and 10 m seas (33 ft) at 1200 UTC on the 23rd. The platform Henry Goodrich (HP6038, 46.7N 48.4W) reported northwest winds of 55 kts and 8.2 m seas (27 ft) at 1800 UTC on the 22nd. The cyclone subsequently drifted southwest and dissipated near Newfoundland on the 24th.

North Atlantic Storm, December 20-26: The initial rapid development of this cyclone is shown in *Figure 16.* The cyclone developed hurricane force winds during its initial rapid intensification. *Figure 17* is a high resolution ASCAT image showing winds to 55 kts on the south and west sides of the cyclone. These winds support hurricane force conditions. Although the system developed a lowest central pressure of 964 hPa southeast of Newfoundland late on the 22nd, its top winds weakened to storm force. The ship DCFB2 (43N 64W) reported north winds of 50 kts and 10.7 m seas (35 ft) at 0600 UTC on the 22nd. The Albemarle Island (C6LU3, 39N 47W) encountered southwest winds of 50 kts and 12.8 m seas (42 ft) at 0000 UTC on the 23rd. The Henry Goodrich (HP6038) reported east winds to 70 kts near 46.7N 48.4W at 1500 UTC on the 22nd. The cyclone subsequently re-formed to the northeast as a new storm over the central waters late on the 25th, which passed north of Iceland on the 26th.

Southwestern North Atlantic Storm, December 26-28: This event was the coastal storm that caused blizzard conditions from the mid Atlantic states to New England. Originating in the Gulf of Mexico on the 25th, the cyclone rapidly intensified as it moved along the coast to New England on the 26th and early on the 27th *(Figure 18*), with the central pressure dropping 32 hPa in the twenty four hour period ending at 0000 UTC on the 27th. The second part of *Figure 18* shows the cyclone at maximum intensity. The **Hood Island** (C6LU4) reported northwest winds of 55 kts and 5.2 m seas (17 ft) near 37N 74W at 0000 UTC on the 27th. The **Sea Land Meteor** (WDB9951) encountered southwest winds of 60 kts and 15.5 m seas (51 ft) near 41N 67W at 1500 UTC on the 27th. The vessel V7SX3 (34N 65W) reported southwest winds of 45 kts and 12.2 m seas (40 ft). The buoy 44066 (39.6N 72.6W) reported north winds of 45 kts and 8.2 m seas (27 ft). The cyclone subsequently elongated northeast when passing over the Canadian Atlantic provinces with the primary center weakening and a new storm center forming in the Labrador Sea late on the 28th. The new center then stalled as a gale near the southern Labrador coast by the 31st. ⚓

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2. Tropical Cyclone Reports, 2010 Atlantic Hurricane Season, National Hurricane Center http://www.nhc.noaa.gov/2010atlan.shtml
3. E-mail communication, Thomas, Bridget, Climate Data and Analysis Section (Environment Canada) through Robert Luke (NDBC), September 17, 2007.
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5. Saffir-Simpson Scale of Hurricane Intensity, http://www.nhc.noaa.gov/aboutsshs.shtml
6. http://www.nrl.navy.mil/WindSat

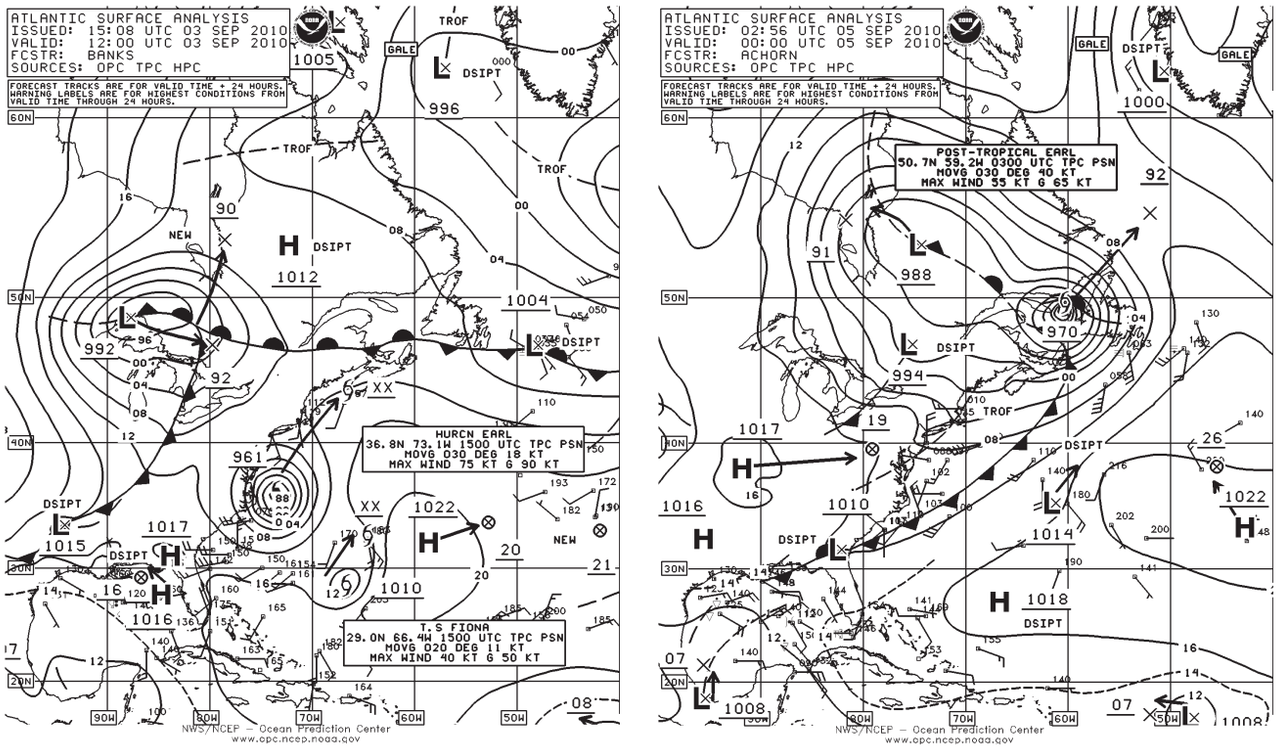

Figure 1. OPC North Atlantic Surface Analysis charts valid 1200 UTC September 3 and 0000 UTC September 5, 2010. Twenty-four hour forecast tracks are shown with the forecast central pressures given as the last two whole digits in millibars except XX for tropical cyclones.

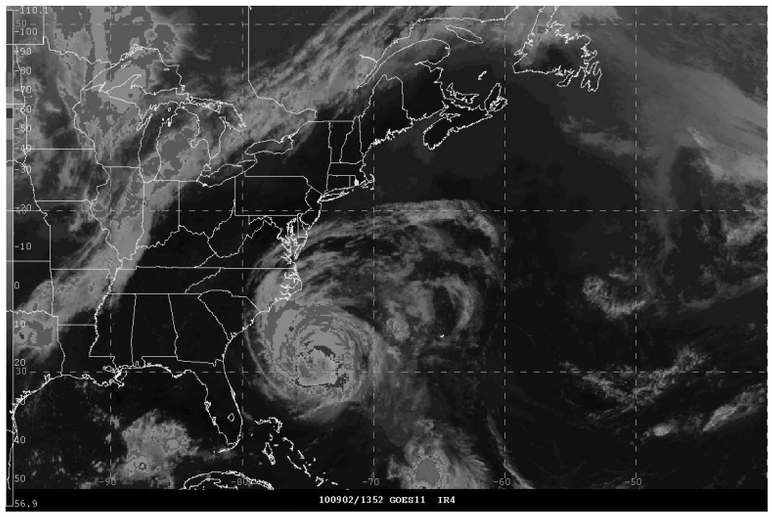

Figure 2. GOES-11 enhanced infrared satellite image valid 1352 UTC September 2, 2010. The satellite senses temperature on a scale ranging from black (warm) to gray (colder) with the colder clouds color-enhanced in this type of imagery.

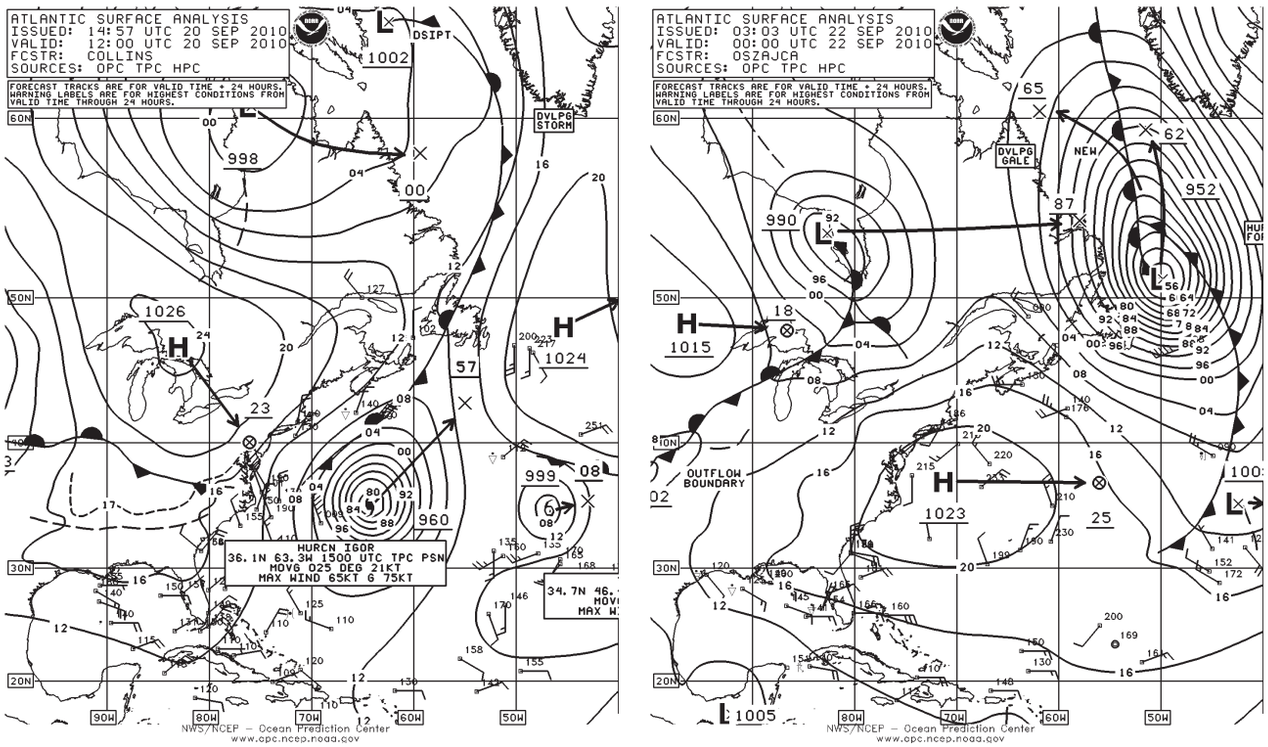

Figure 3. OPC North Atlantic Surface Analysis charts valid 1200 UTC September 20 and 0000 UTC September 22, 2010. The tropical storm east of Hurricane Igor with the text label partially obscured is Julia.

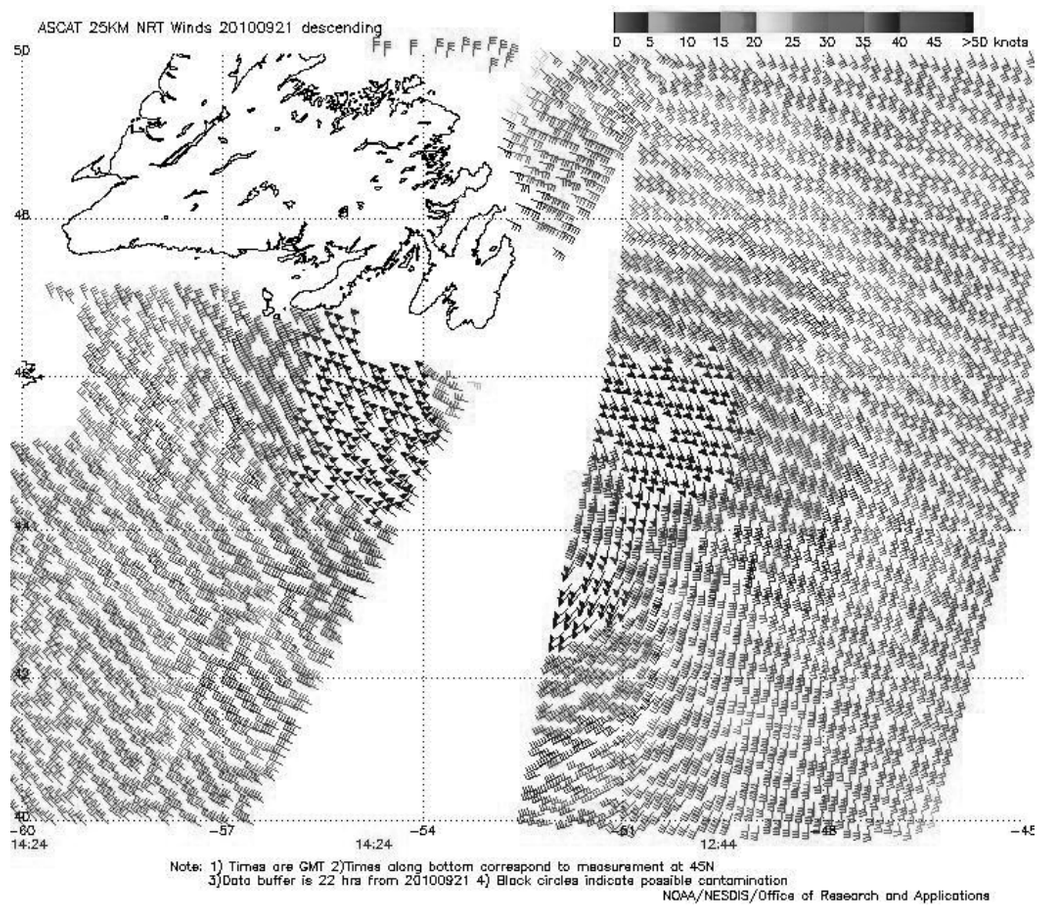

Figure 4. 25 km ASCAT (Advanced Scatterometer) image of satellite sensed winds around Hurricane Igor which was undergoing extratropical transition at this time. This is the higher resolution version of the imagery. Portions of two passes (1424 UTC and 1244 UTC September 21, 2010) are shown.

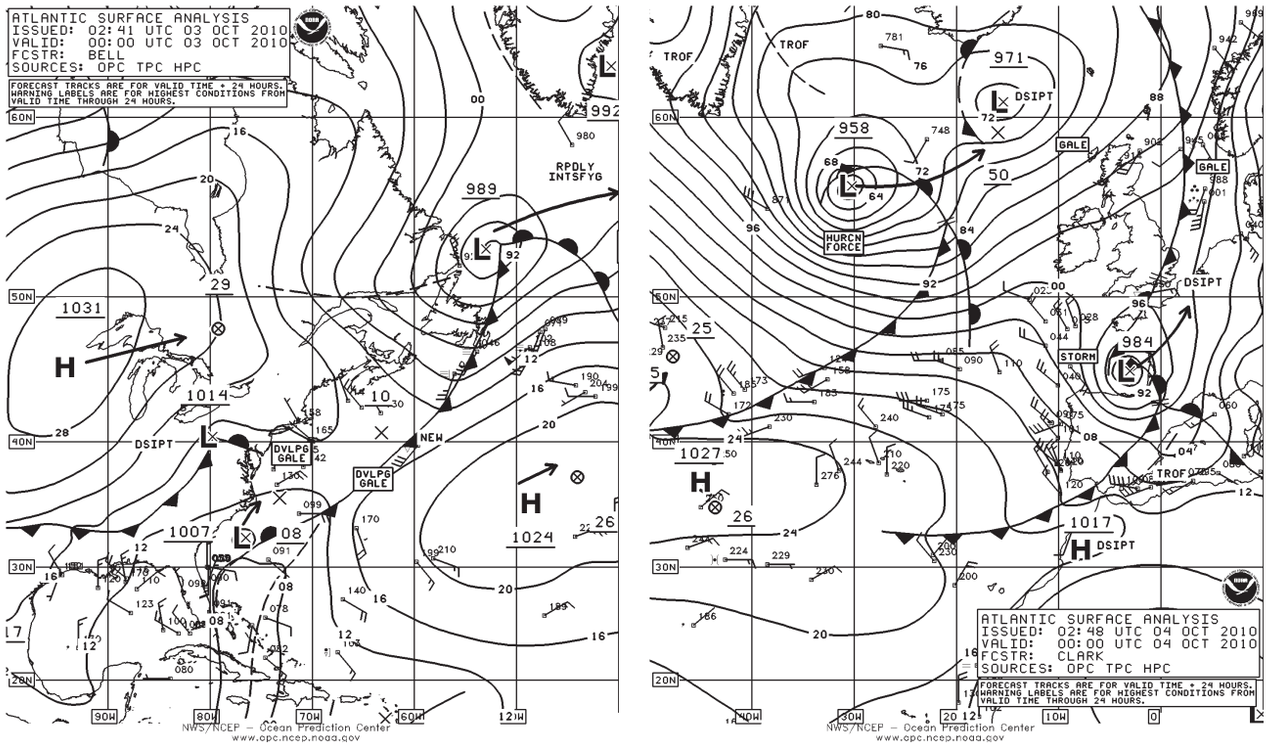

Figure 5. OPC North Atlantic Surface Analysis charts valid 0000 UTC October 3 October 4, 2010.

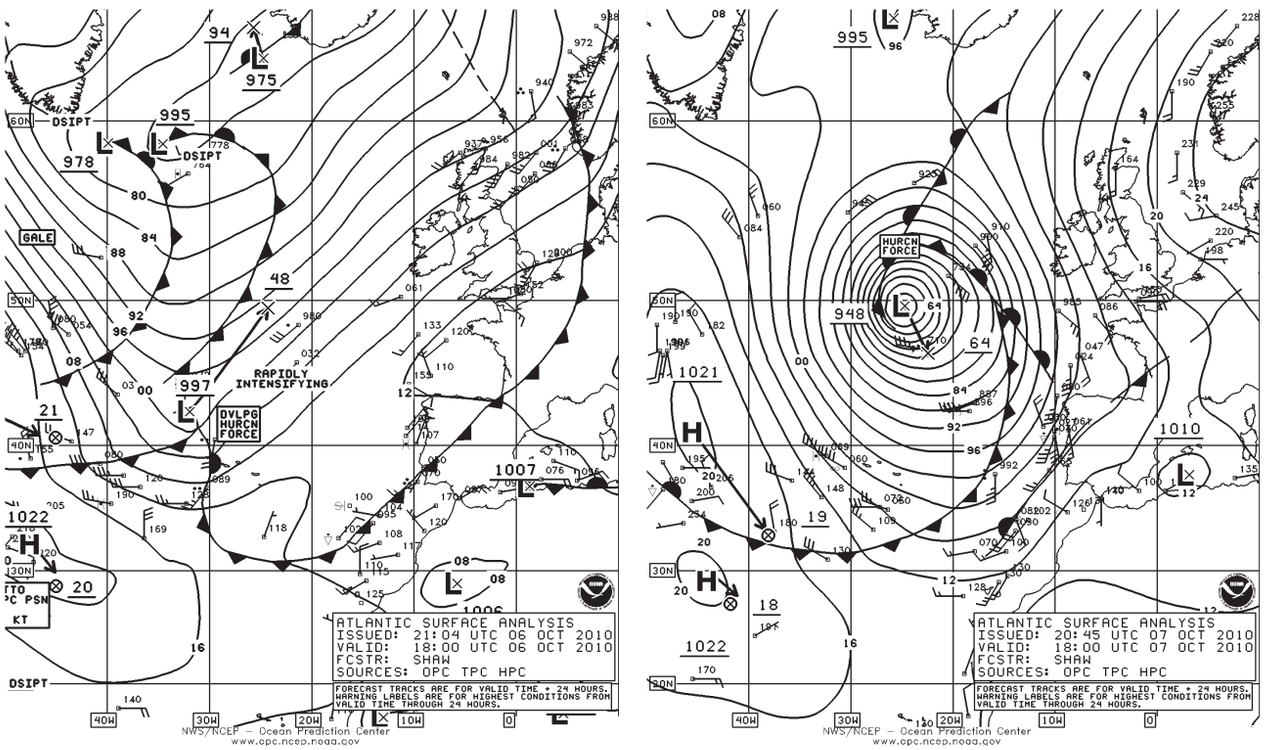

Figure 6. OPC North Atlantic Surface Analysis charts valid 1800 UTC October 6 and 7, 2010.

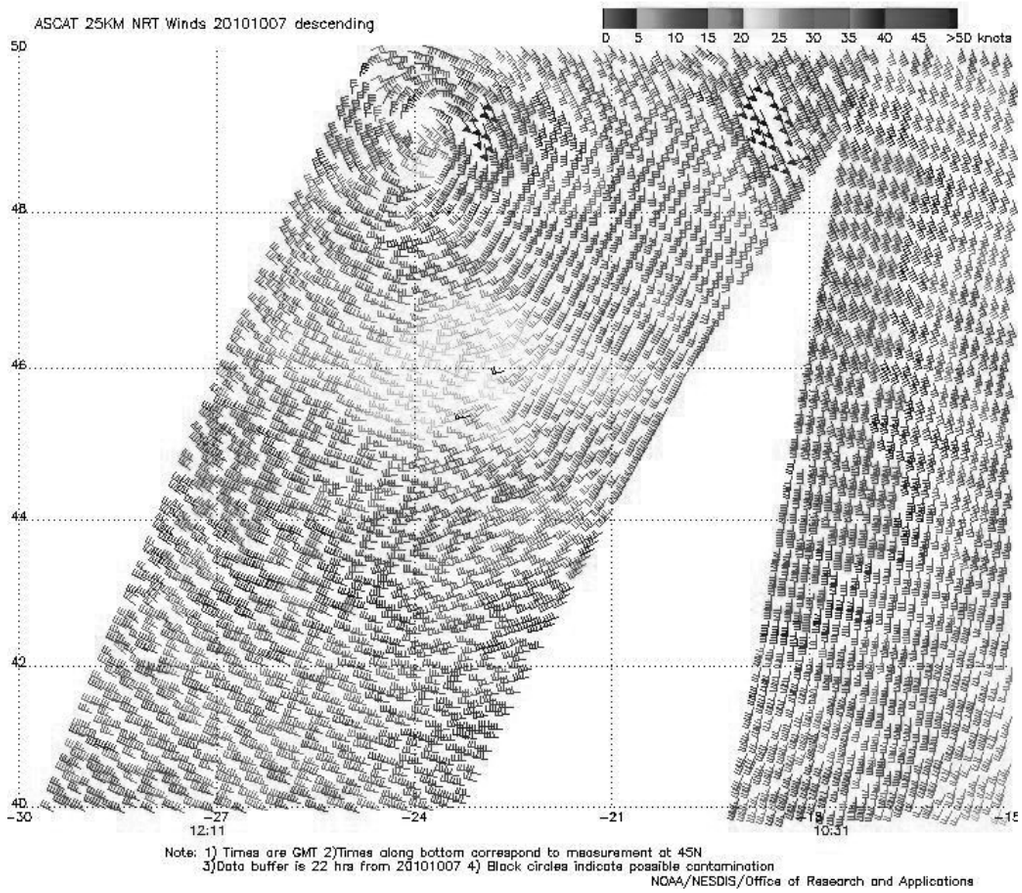

Figure 7. 25 km ASCAT image of winds around the cyclone shown in Figure 6. The valid time of the pass is 1211 UTC October 7, 2010 or about six hours prior to the valid time of the second part of Figure 6.

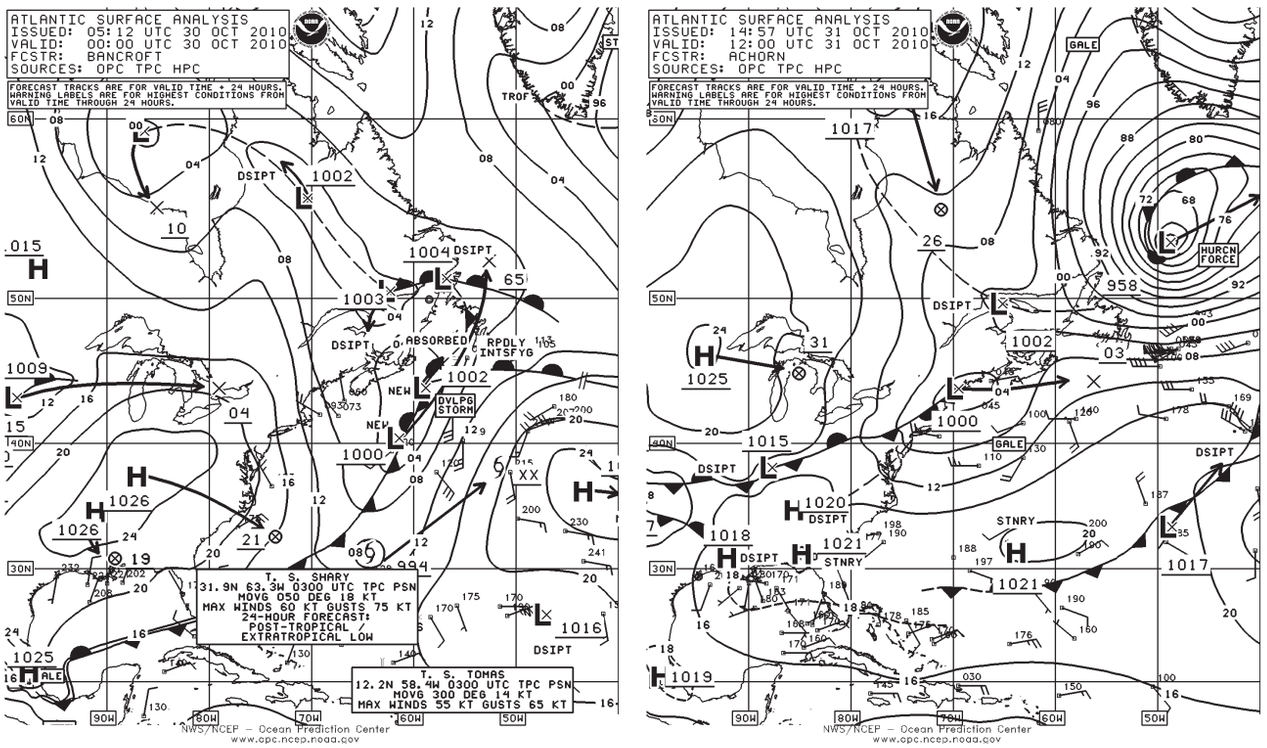

Figure 8. OPC North Atlantic Surface Analysis charts valid 0000 UTC October 30 and 1200 UTC October 31, 2010.

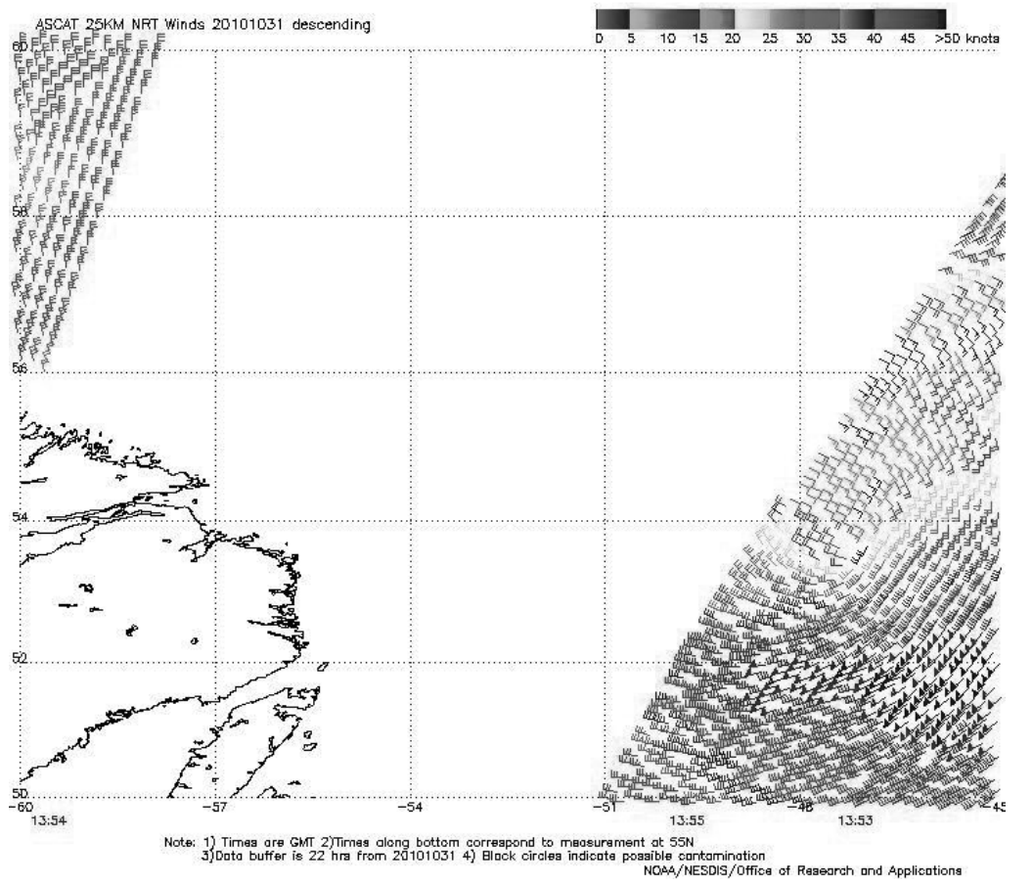

Figure 9. 25 km ASCAT image of winds around the cyclone shown in Figure 8. The valid time of the pass is 1355 UTC October 31, 2010 or about two hours after the valid time of the of Figure 8. The center of the cyclone appears near 54N 48W in the lower right side of the image.

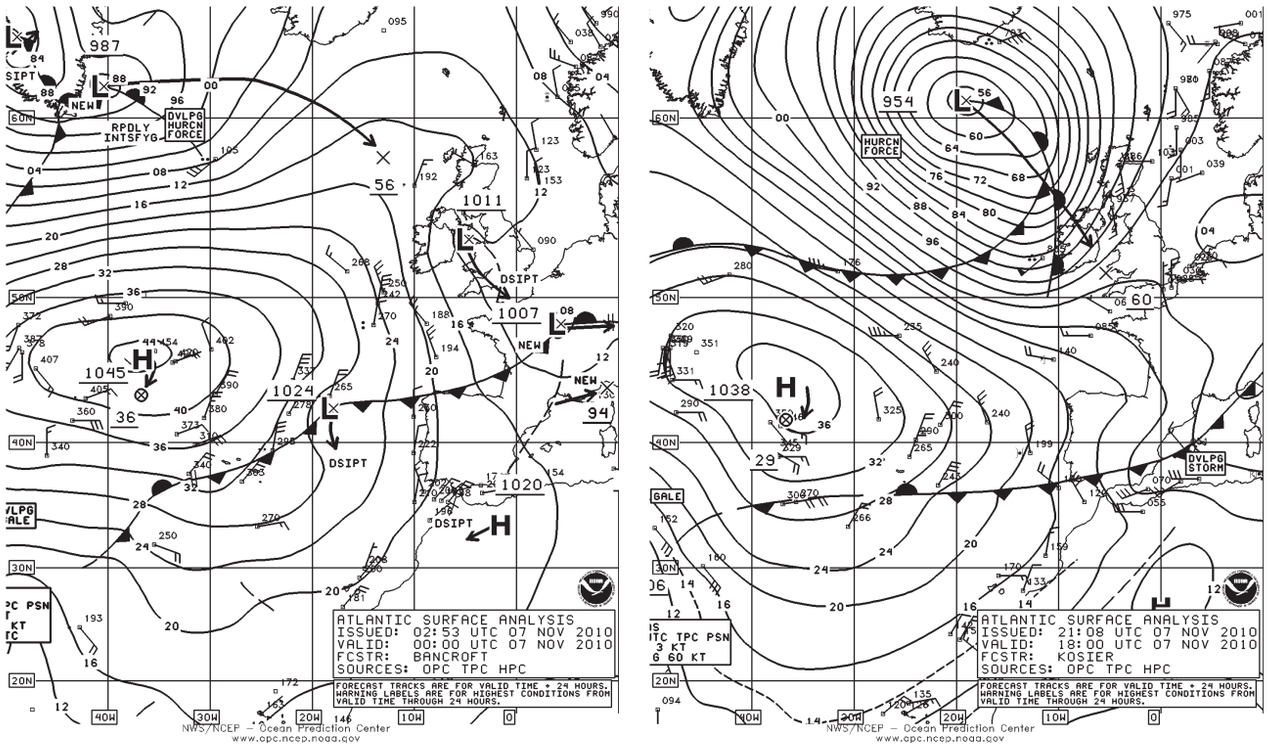

Figure 10. OPC North Atlantic Surface Analysis charts valid 0000 UTC and 1800 UTC November 7, 2010.

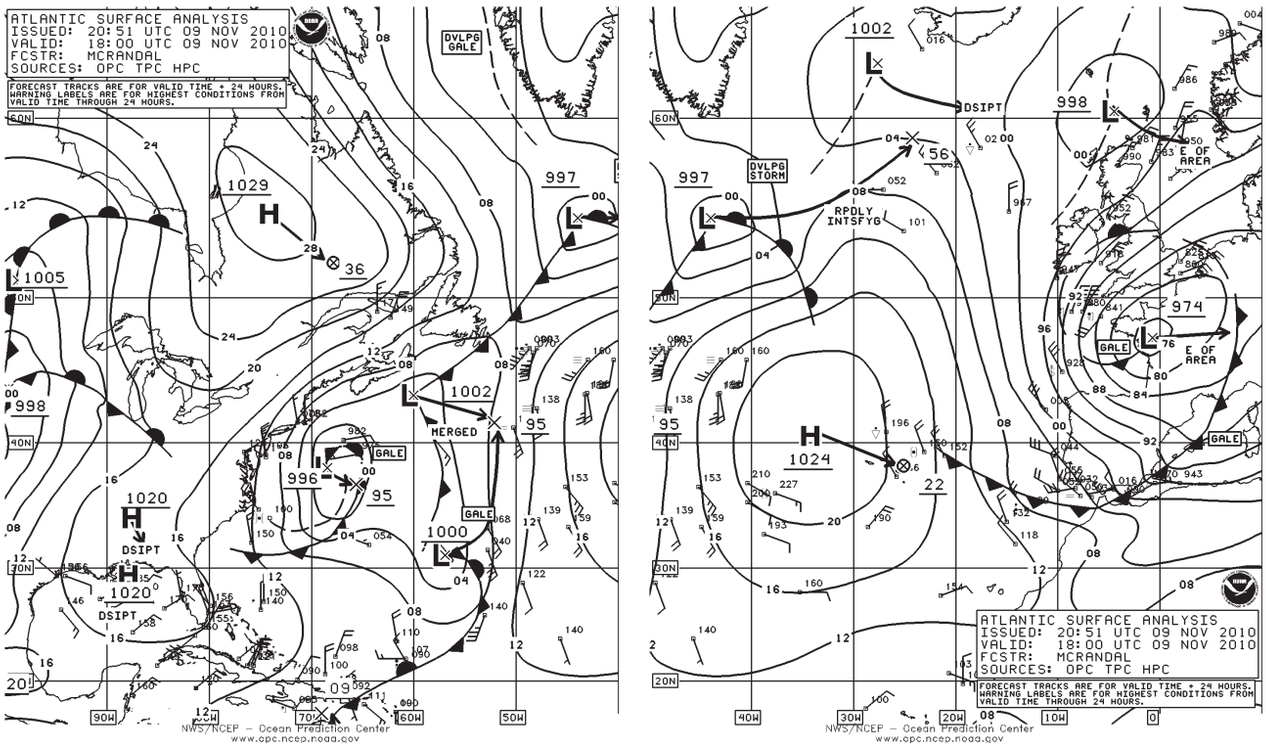

Figure 11. OPC North Atlantic Surface Analysis charts valid 1800 UTC November 9, 2010.

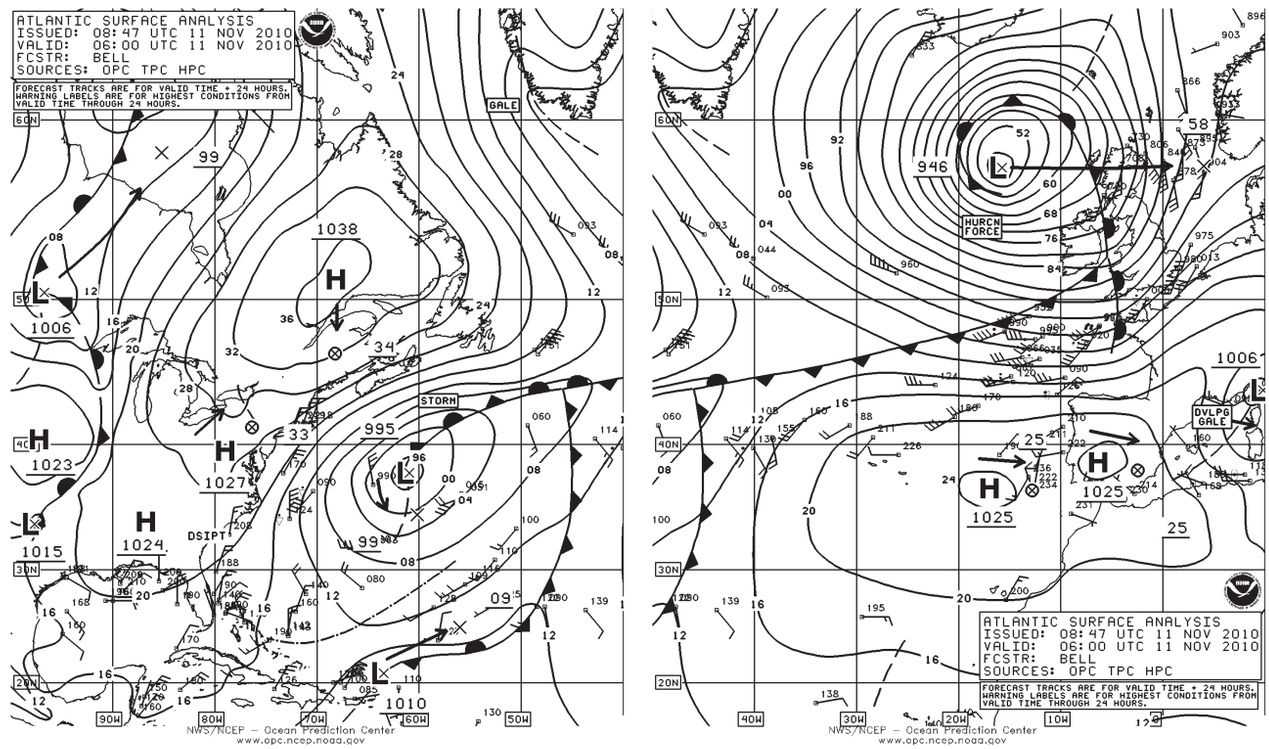

Figure 12. OPC North Atlantic Surface Analysis charts valid 0600 UTC November 11, 2010.

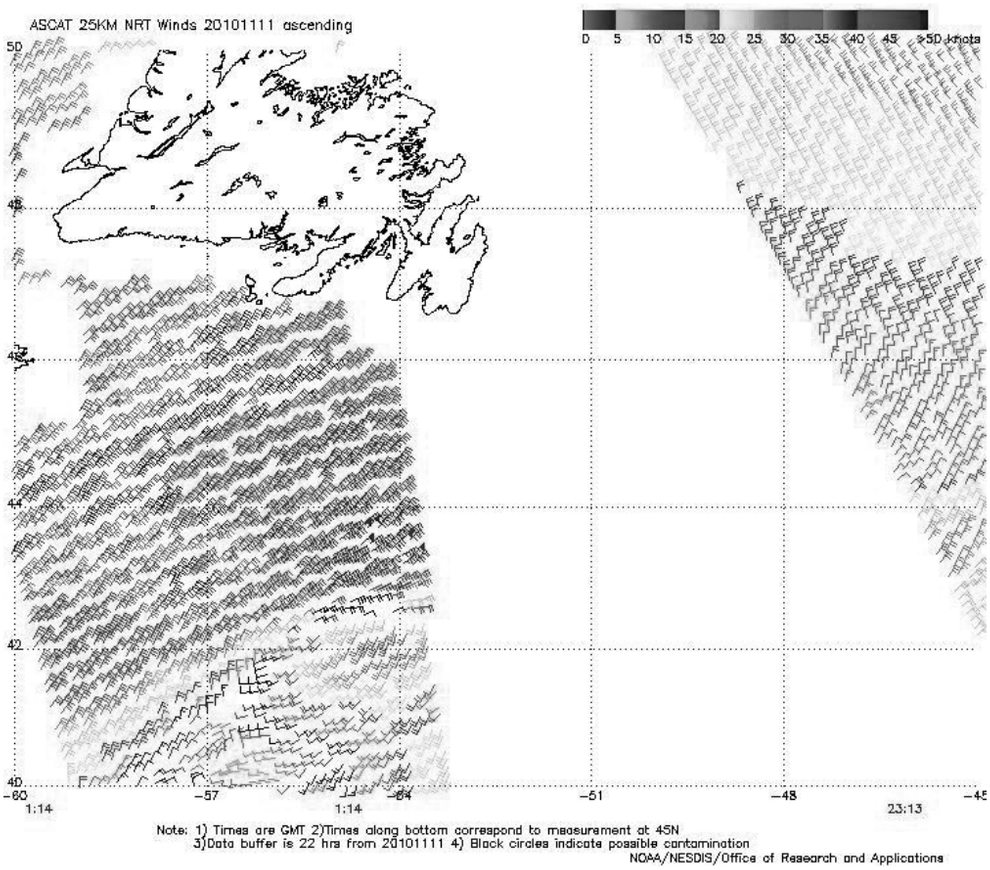

Figure 13. 25-km ASCAT image around the north side of the cyclone shown in Figure 11. The valid time of the pass is 0114 UTC November 11, 2010, or about five hours prior to the valid time of Figure 11. The occluded front appears in the lower part of the image with winds shifting from northeast to southwest across it.

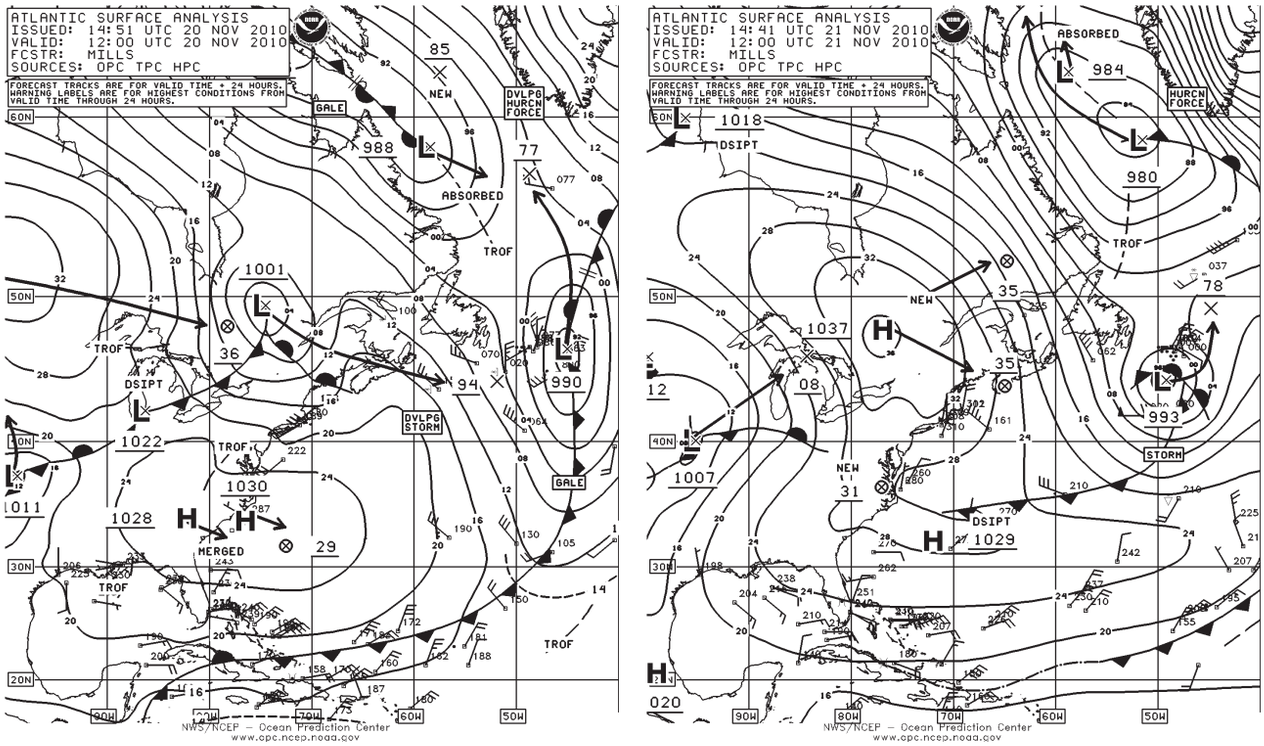

Figure 14. OPC North Atlantic Surface Analysis charts valid 1200 UTC November 20 and 21, 2010.

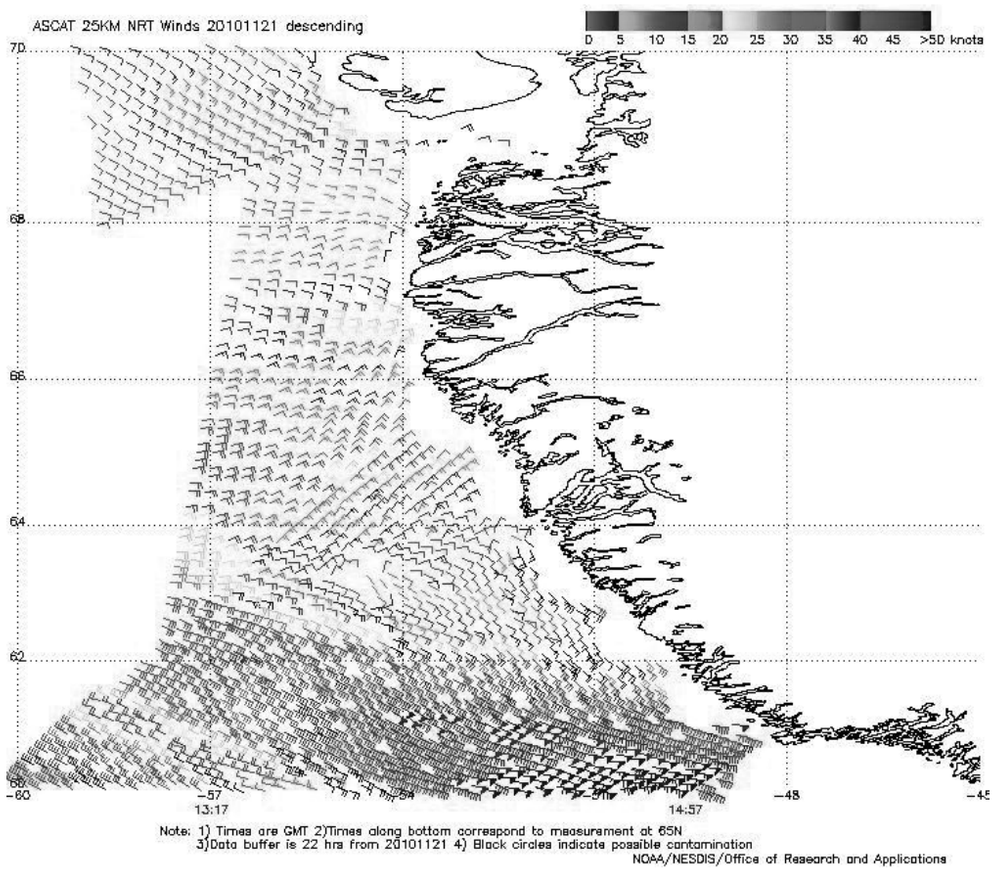

Figure 15. 25-km ASCAT image of winds around the north side of the hurricane force low shown in the second part of Figure 14.

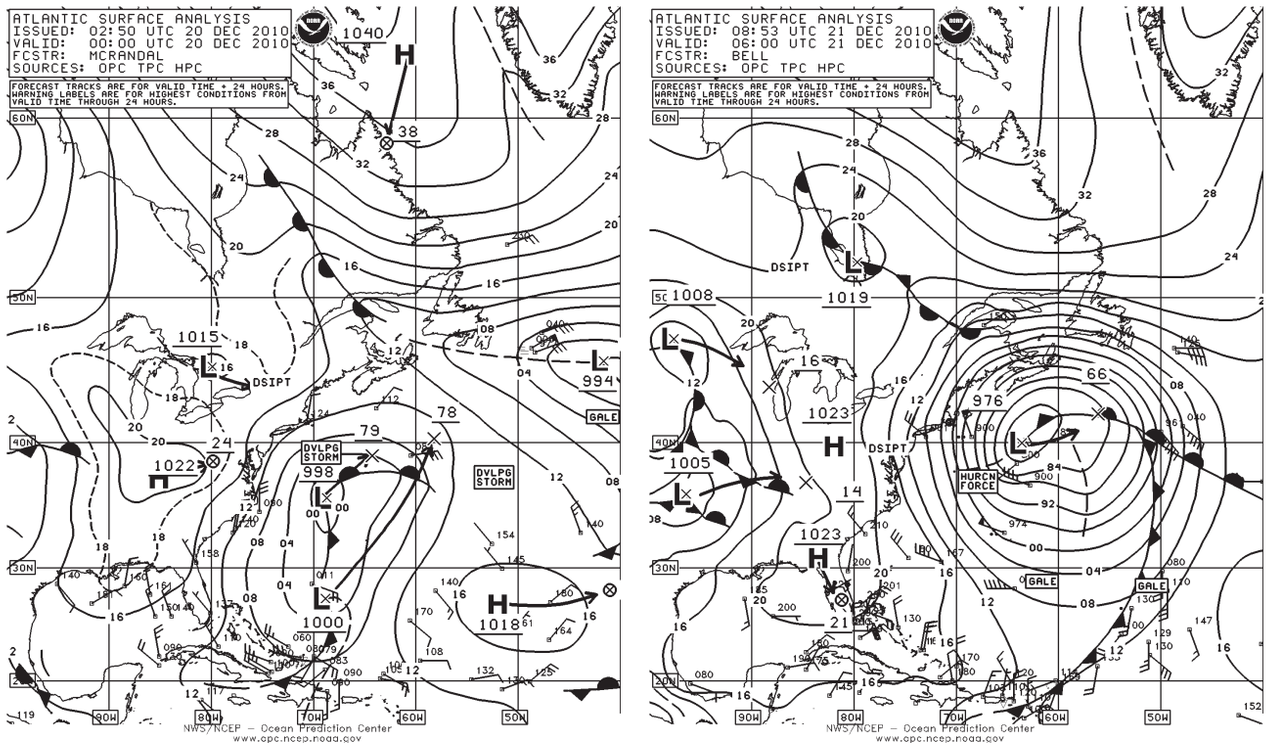

Figure 16. OPC North Atlantic Surface Analysis charts valid 0000 UTC December 20 and 0600 UTC December 21, 2010.

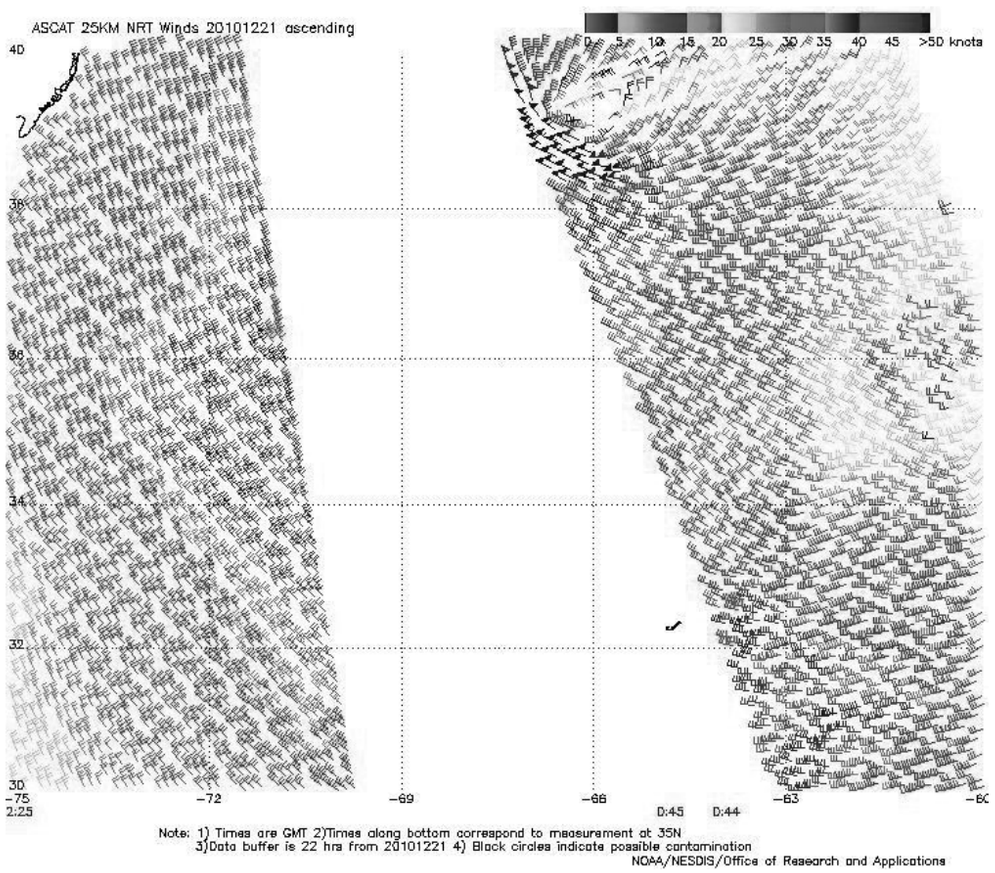

Figure 17. High resolution ASCAT (25-km resolution) image of winds around the hurricane force low shown in Figure 16. The stronger winds in the upper-right side of the image are from the earlier pass, about five hours prior to the valid time of the second part of Figure 16.

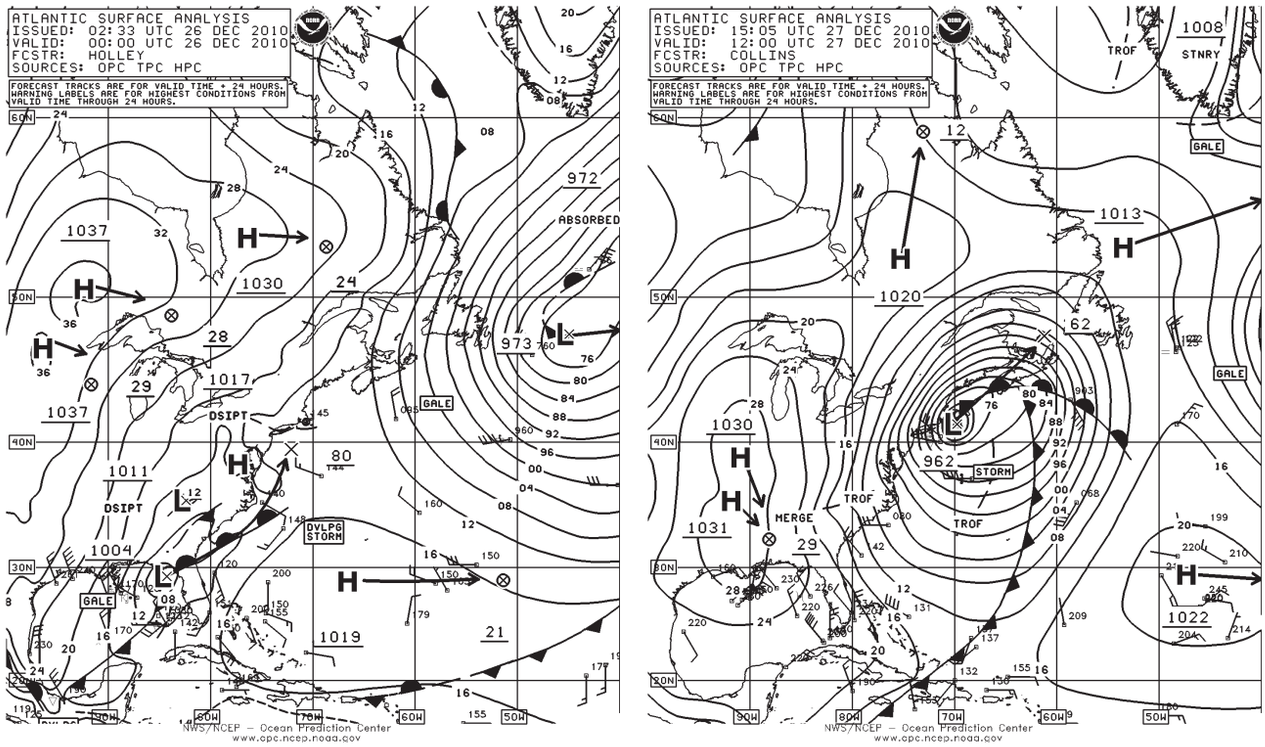

Figure 18. OPC North Atlantic Surface Analysis charts valid 0000 UTC December 26 and 1200 UTC December 27, 2010.

Marine Weather Review – North Pacific Area
September to December 2010

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NOAA National Center for Environmental Prediction/ Ocean Prediction Center

Introduction

The weather pattern became increasingly active in September as summer gave way to fall. Three cyclones developed hurricane force winds late in the month, with one of them having tropical origin. A fourth event originated in late September but did not develop hurricane force winds until early in October. October was the most active month with the Ocean Prediction Center (OPC) analyzing five hurricane force cyclones in its six hourly surface analysis charts. October also featured the most intense lows of the period, with two developing central pressures below 950 hPa. This active period continued through the first half of November when three cyclones developed hurricane force winds. The majority of the strong cyclones through early November originated in the central or western North Pacific near Japan and tracked northeast toward the Gulf of Alaska. The pattern became less active after the middle of November as high latitude blocking developed. Two hurricane force events occurred during this time in the far western North Pacific.

Three typhoons, three tropical storms, and two tropical depressions appeared on or near OPC's oceanic analysis area on radio facsimile charts. One of these, Typhoon Malakas, redeveloped as an intense extratropical cyclone near the Kurile Islands.

Tropical Activity

Tropical Storm Kompasu: Tropical Storm Kompasu, in the Sea of Japan early on September 2 with maximum sustained winds of 50 kts with gusts to 60 kts, tracked east and weakened to an extratropical low with winds below gale force while crossing Japan late on the 2nd. Post tropical Kompasu later re-intensified to a gale force frontal wave out over the North Pacific early on the 4th and briefly developed storm force winds while approaching the western Aleutians early on September 5. The cyclone then expanded in size and became a large gale in the Bering Sea with the central pressure as low as 977 hPa early on the 6th before dissipating over Western Alaska two days later. The ship 3EVH3 (48N 176W) reported a southeast wind of 38 kts at 1200 UTC on the 5th.

Tropical Storm Malou: Tropical Depression 10W formed near 19N 137E at 0600 UTC September 2 with maximum sustained winds 30 kts with gusts to 40 kts. The depression passed west of the area where it became Tropical Storm Malou early on the 3rd. Malou then passed over western Japan as a minimal tropical storm with maximum sustained winds 35 kts with gusts to 45 kts early on the 7th and became extratropical that day. The remains of Malou then passed east of Japan on the 8th with winds below gale force before turning northeast and re-intensifying, following a track similar to that of Kompasu across the western Aleutians. The cyclone developed storm force winds on the 12th while passing through the western Bering Sea, with the central pressure as low as 980 hPa late on the 12th. The **Ever Ulysses** (9V7962) near 54N 173W reported south winds of 50 kts and 6.0 m seas (20 feet) at 1800 UTC on the 12th. The buoy 46035 (57.1N 177.9W) reported southeast winds of 37 kt with gusts to 45 kts (peak gust 51 kts) and 5.5 m seas (18 ft) at the same time. Six hours later reported seas at 46035 were 6.5 m (21 ft). The cyclone then moved inland over Russia and weakened later that day.

Typhoon Malakas: Tropical Depression 13W formed well southeast of Japan near 18N 146E at 0600 UTC September 20 and moved northwest, becoming Tropical Storm Malakas later that day with maximum sustained winds of 35 kts with gusts to 45 kts. Malakas then intensified to a typhoon near 20N 141E at 0000 UTC on the 23rd, and developed a maximum strength of 90 kts sustained with gusts to 110 kts near 26N 141E at 0600 UTC on the 24th. This intensity is Category 2 on the Saffir-Simpson intensity scale (*Reference 5*). The cyclone then approached a stationary frontal zone and transitioned into an intense extra tropical hurricane force low as depicted in *Figure 1* and *Figure 2* which cover a thirty-six hour period. Six hours later, at 0600 UTC on the 26th, post tropical Malakas developed a lowest central pressure of 958 hPa. A weakening trend then set in, with the peak winds diminishing to storm force late on the 26th as the center approached the southwest Bering Sea. The center then crossed the southern Bering Sea with the winds diminishing to gale force by the 8th before dissipating over southwest Alaska late on the 30th. Some notable ship and buoy reports during this event are listed in *Table 1. Figure 3* is a high resolution ASCAT image showing wind retrievals of 50 to 60 kts in the south semicircle of the cyclone, indicating hurricane force winds because of the low bias of ASCAT winds.

Typhoon Megi: Megi made a brief appearance, passing near the southwest corner of OPC's oceanic chart area near 16N 136E at 1200 UTC October 15 with maximum sustained winds of 90 kts with gusts to 110 kts, similar to

OBSERVATION	POSITION	DATE/TIME(UTC)	WIND	SEA(m/f)
APL England (9VDD2)	35N 145E	24/0600	N 40	8.5/28
Everest Spirit (C6FY8)	33N 138E	24/0600	NE 45	5.0/17
Alaskan Navigator (WDC6644)	37N 152E 39N 154E	25/1200 26/0000	S 50 W 50	9.0/29 10.0/33
APL Philippines (WCX8884)	47N 153E 45N 151E	26/0600 26/1200	N 40	9.5/31 Maximum 13.0/43
Buoy 28401	32.4N 144.5E	24/2200	S 50	
Buoy 46035	57.1N 177.9W	27/1100	E 35	4.0/13

Table 1. Selected ship and buoy observations taken during passage of Typhoon Malakas both before and after extra tropical transition.

the maximum intensity of Malakas. Typhoon Megi then passed west of the area later that day, where it became a major typhoon early on the 16th.

Typhoon Chaba: Tropical Depression 16W formed near 17N 140E south of Japan at 1800 UTC October 21 with maximum sustained winds 25 kts with gusts to 35 kts. The cyclone tracked west at first, passing west of the area the next day before recurving northeast re-entering the area near 30N 136E early on the 29th as a typhoon with maximum sustained winds of 80 kts with gusts to 100 kts. After becoming a major typhoon west of the area on the 28th, Chaba weakened rapidly while tracking northeast, becoming an extratropical storm near 33N 139E late on the 29th and a gale force low near 37N 147E by 0000 UTC on the 31st. The **APL Belgium** (9VKQ3) near 34N 139E reported east winds of 45 kts and 9.0 m seas (30 ft) at 0000 UTC on the 30th. Twenty-four hours later the **APL Philippines** (WCX8884) encountered seas of 11.5 m (37 ft) along with southeast winds at 35kts near 37N 152E. The cyclone then dissipated on October 31.

Tropical Depression 17W: This cyclone formed near 21N 156E at the same time as and to the east of T.D. 16W described above, with 30 kts sustained winds and gusts to 40 kts. Unlike 16W, T.D. 17W did not intensify and instead drifted northwest over the next two days before dissipating as a remnant low near 23N 155E late on October 23rd.

Tropical Storm Omeka: Omeka formed unusually late in the season west of Hawaii near 21N 177W early on December 20 as a tropical storm. The cyclone reached its maximum strength at this time, with sustained winds at 45 kts and gusts to 55 kts. This is in the area covered by the Central Pacific Hurricane Center. Omeka weakened to a minimal tropical storm later that day while moving northeast, before merging with a stationary front near 28N and becoming extra tropical early on the 21st.

Other Significant Weather of the Period

North Pacific Storm, September 14-16: The developing cyclone as depicted in *Figure 4* was the first to develop storm force winds and not have tropical origins. It originated as a low pressure wave near 40N 160E at 0000 UTC on the 14th, and the second part of *Figure 4* shows the cyclone at maximum intensity. Ships in the area reported winds not exceeding 35 kts, including the Shanghai Express (DPCK) near 53N 179E which also reported 6.5 m seas (21 ft) at 2300 UTC on the 16th. The 25 km ASCAT pass in *Figure 5* reveals a swath of winds to 45 kts south of the well defined center, which supports storm force of at least 55 kts. The cyclone subsequently weakened to a gale and stalled near the central Aleutians on the 16th before drifting east and becoming absorbed by a stronger system approaching from the west late on the 18th.

Northeastern Pacific Storm, September 23-25: A developing primary storm system tracked east-southeast from the central Aleutians on the 22nd and 23rd and then formed a secondary center on the front to the east by the 24th as depicted in *Figure 1.* Six hours later the secondary center developed the lowest central pressure of 953 hPa near 55N143W with hurricane force winds before turning northwest and weakening to a gale in the Gulf of Alaska as shown in *Figure 2.* The Zuiderdam (PBIG) near 52N 130W reported southeast winds of 60 kts and 6.5 m seas (21 ft) at 1400 UTC on the 24th, while the Horizon Anchorage (KGTX) encountered southeast winds of 55 kts and 8.0 m seas (27 ft) near 53N 134W. The buoy 46205 (54.2N 134.3) reported sustained southeast winds of 50 kts and 6.0 m seas (19 ft) at 1500 UTC on the 24th. Later, at 0300 UTC on the 25th the Horizon Anchorage encountered seas of 10.5 m (35 ft) along with south winds at 35 kts.

North Pacific Storm, September 24-26: This event occurred farther west, originating as a frontal wave of low pressure near Japan late on September 22 which moved rapidly east-northeast while intensifying. The final stages of development of this system are shown in

OBSERVATION	POSITION	DATE/TIME(UTC)	WIND	SEA(m/f)
APL Thailand (WCX8882)	47N 154W	01/0600	NW 40	8.5/28
Buoy 46085	55.9N 142.6W	01/2000 01/2300	SE 40	5.5/18 Maximum 10.0/33
Buoy 46001	56.3N 148.2W	01/1800 01/2100	NE 33 G45	6.0/20 Maximum 9.0/30
Buoy 46061	60.2N 146.8W	02/0400 02/0500 02/0800	E 39 G49 Peak gust 54	3.5/11 Maximum 5.0/16
Buoy 46085	55.9N 142.6W	01/2000 01/2200 01/2300	SE 41 G45 Peak gust 58	5.5/18 Maximum 10.0/33
Buoy 46246	50.0N 145.1W	01/1600	SW 35	9.8/32
Augustine Island (AUGA2)	59.4N 153.4W	01/1300 01/1400	NE 46 G53 Peak gust 59	

Table 2. Selected ship, buoy and C/MAN platform observations taken during passage of the northeastern Pacific storm of September 30 to October 2, 2010.

Figures 1 and 2, leading to a relatively compact hurricane force low near 46N160W. The central pressure fell 28 hPa in the twenty-four hour period ending at 0000 UTC on the 26th. A 25 km ASCAT pass from 2127 UTC on the 25th revealed west winds 40 to 50 kts south of the center about two and one half hours prior to the valid time of *Figure 2*. With the low bias of ASCAT at high wind speeds this cyclone likely attained marginal hurricane force strength briefly before a weakening trend began on the 26th. The cyclone weakened to a gale late on the 26th while tracking northeast and dissipated over Southeast Alaska late on the 27th.

Northeastern Pacific Storm, September 30 to October 2: Originating as a weak 1014 hPa frontal wave of low pressure near 42N 160W at 1200 UTC September 29, this cyclone underwent rapid intensification in the twenty-four hour period ending at 1200 UTC October 1 as shown in *Figure 6*, when the central pressure dropped 32 hPa. The system is shown at maximum intensity in the second part of *Figure 6*. The 25 km ASCAT image in *Figure 7,* taken about five hours prior to the time in the second part of *Figure 6,* shows the cyclone's center on the lower left with a swath of winds to the southeast at 50 kts. *Table 2* lists some conventional surface observations taken during this event. The cyclone subsequently turned toward the northwest and weakened to a gale near the Kenai Peninsula early on the 2nd and dissipated inland shortly thereafter.

Northeastern Pacific Storms, October 8-14: Several cyclones developed in the eastern North Pacific and moved toward Southeast Alaska and the eastern Gulf of Alaska in close succession during this period, and were relatively compact and short lived events. The strongest of these are shown in *Figure 8*. One cyclone is shown in the first part of *Figure 8* off Southeast Alaska near maximum intensity. It originated as a frontal wave of low pressure well south of the eastern Aleutian Islands at 1800 UTC October 10 and developed over the next two days, including a twenty-four hour period ending at 1200 UTC on the 12th when the central pressure dropped 31 hPa. The **Marit Maersk** (OUJN2) near 41N 153W reported south winds of 52 kts and 6.5 m seas (21 ft) at 1800 UTC on the 11th, and **Igarka** (UIFC) near 50N 135W eighteen hours later encountered south winds of 50 kts near 50N 135W. The buoy 46084 (56.6N 136.1W) at 2100 UTC on the 12th reported south winds of 47 kts with peak gusts of 64 kts and 8.0 m seas (27 ft), followed three hours later by a report of seas 9.5 m (31 ft). By comparison a high resolution ASCAT pass at 2031 UTC on the 12th showed southwest winds to 50 kts in this area. To the northwest the buoy 46083 (58.2N 138.0W) reported east winds of 43 kts with peak gusts to 60 kts and 5.0 m seas (16 ft) at 0000 UTC on the 13th, followed two hours later by a report of seas 6.0 m (20 ft). This cyclone then turned toward the northwest and weakened rapidly, and dissipated near the Alaskan coast late on the 13th. Meanwhile the next system developed from the wave near 40N 147W as depicted in *Figure 8*. The central pressure dropped 28 hPa in the twenty-four hour period ending at 0600 UTC October 14. The buoy 46004

(50.9N 136.1W) reported west winds sustained at 51 kts and gusts to 64 kts and 6.0 m seas (19 ft) at 2200 UTC on the 13th, followed one hour later by a report of 7.0 m (23 ft). The buoy 46205 (54.2N 134.3W) reported at 0100 UTC on the 14th southeast winds of 47 kts with gusts to 58 kts and 4.0 m seas (13 ft), followed four hours later by a report of 9.5 m seas (31 ft). The same buoy reported a lowest pressure of 972.0 hPa at 0300 UTC on the 14th, indicating that this storm was at least as intense in terms of central pressure as its predecessor. The cyclone then moved inland over Southeast Alaska and weakened rapidly early on October 14.

Northeastern Pacific Storm, October 22-24: Another significant event, again affecting the eastern waters, occurred about a week later and was more intense, as shown in *Figure 9*. The origin of this system was a weak frontal wave of low pressure just south of Japan late on October 20 which crossed the Pacific in less than four days. The second part of *Figure 9* shows the cyclone near maximum intensity. A WindSat image (*Figure 10)* off the U.S. Pacific Northwest coast revealed winds as high as 75 kts south of the storm center just west of the Washington offshore waters at 0225 UTC on the 24th. See *Reference 6* for more information on WindSat. Some ship, buoy and coastal C/MAN observations taken in this storm are listed in *Table 3.* The cyclone developed a lowest central pressure of 958 hPa at 1200 UTC on the 24th before starting to weaken and moving inland north of Vancouver Island on the 25th.

Northwest Pacific and Bering Sea Storm, October 25-28: The next significant weather event to be described is the first of back to back cyclones that developed central pressures below 950 hPa. *Figure 11* depicts the twenty-four period of most rapid development of this northwestern Pacific cyclone, during which the central pressure dropped 32 hPa. Six hours later the cyclone developed a lowest central pressure of 948 hPa near 58N 170E. At 0600 UTC on the 28th while the storm center was near the Russian coast, the **Maersk Delano** (MSDM7) encountered west winds of 50 kts and 4.0 m seas (12 ft). The buoy 46073 (55.0N 172.0W) reported southeast winds of 35 kts and 2.0 m seas (7 ft) at 2200 UTC on the 26th, followed by a report of seas as high as 7.0 m (23 ft) at 0800 UTC on the 28th. The 25 km ASCAT image in *Figure 12* reveals wind retrievals of 50 kts both north and south of the cyclone center in the northwest Bering Sea. Hurricane force winds occurred mainly on the 26th. The system subsequently moved northeast and weakened. *Figure 13* shows the cyclone weakening in the northern Bering Sea while the next intense low passed to the south.

North Pacific Storm, October 29-November 1: *Figure 13* shows the development of the most intense cyclone of the four month period from a frontal wave of low pressure over a forty-eight hour period. The central pressure dropped 56 hPa in the twenty-four hour period ending at 1800 UTC October 30, or more than one millibar per hour. The second part of *Figure 13* shows the cyclone at maximum intensity with a central pressure of 939 hPa. An infrared satellite image valid at that time *(Figure 14)* reveals cloud bands of great vertical extent (cold tops) wrapping completely around a well defined center and broad well developed frontal features. *Figure 15* is a broader view of the cyclone in high resolution ASCAT imagery with two adjacent passes covering much of the storm circulation. The darker color

OBSERVATION	POSITION	DATE/TIME(UTC)	WIND	SEA(m/f)
Polar Resolution (WDJK)	44N 127W	24/0400	SE 45	9.0/30
Sierra (WSNB)	45N 136W	24/2100	NW 55	13.0/42
Buoy 46005	46.1N 131.0W	24/0200 25/1200	SW 39 G49 Peak gust 52	6.0/20 Maximum 13.0/43
Buoy 46207	50.9N 129.9W	24/0700 24/1400	SE 41 G52	6.5/21 Maximum 9.5/31
Buoy 46036	48.4N 133.9W	25/0400 25/0700	W 41 G54	9.5/31 10.5/34
Buoy 46147	51.8N 131.2W	24/1400 24/1600	E 41 G54	6.0/20 Maximum 9.0/30
Destruction Island (DESW1)	47.6N 124.4W	24/0300	SE 44 G47 Peak gust 54	

Table 3. Selected ship, buoy and C/MAN platform observations taken during passage of the northeastern Pacific storm of October 22-24, 2010.

or gray shades appearing south of the cyclone center near the center of the image indicate winds in the 48 to 63 kts range, impressive for this type of imagery with its low bias especially at high wind speeds. The more notable conventional surface observations taken during this event are listed in *Table 4*. Hurricane force winds with this system lasted from early on the 30th through much of October 31st. The cyclone subsequently moved east over the following day before turning north into the Gulf of Alaska as a gale force low on November 1. The first part of *Figure 16* shows the cyclone dissipating near the Alaskan coast.

Northeastern Pacific Storm, November 2-4: *Figure 16* depicts the development of this hurricane force low from an open frontal wave over a thirty-six hour period. This period included a drop in central pressure of 32 hPa in the twenty-four hour period ending at 1800 UTC November 3. The central pressure dropped to as low as 958 hPa at 0600 UTC on the 4th when the center was near 58N 147W, but the cyclone's top winds were down to storm force at that time and the system began to weaken, with rapid weakening occurring as the center passed inland over Alaska on the 4th. The **Cosco Seattle** (A8LG9) near 54N 141W reported southeast winds of 65 kts and 7.0 m seas (23 ft) at 1800 UTC on the 3rd. Buoy 46082 (59.7N 143.4W) reported southeast winds of 45 kts with gusts to 56 kts and 8.5 m seas (28 ft) at 0600 UTC on the 4th, and a peak gust of 62 kts was reported one hour later. At 1100 UTC on the 4th this buoy reported 12.0 m seas (39 ft). Buoy 46085 (55.9N 142.6W) reported similar winds at 0100 UTC on the 4th along with 9.5 m seas (31 ft) followed four hours later by a report of 13.0 m seas (43 ft).

North Pacific Storm, November 6-8: This cyclone developed out of a merger of a low pressure wave and a weaker low to the northwest during a thirty-six hour period as depicted in *Figure 17.* The cyclone is shown with its lowest central pressure of 974 hPa in the second part of *Figure 17.* The system developed hurricane force winds by the 8th and an ASCAT high resolution pass from 0923 UTC November 7 *(Figure 18)* reveals a swath of northwest winds 50 kts on the southwest side of the center which is in a data free gap between passes. The cyclone had gained much of its intensity by then. The **Paranagua Express** (A8HQ7) encountered south winds of 60 kts and 7.3 m seas (24 ft) at 1500 UTC on the 9th. The **Kobe Express** (DGSE) near 53N 149W reported east winds of 40 kts at 1800 UTC on the 8th followed three hours later by a report of 7.9 m seas (26 ft) near 53N 147W, the highest reported by a ship. The buoy 46246 (50N 144.5W) also reported 7.9 m seas at 1000 UTC on the 9th. The system subsequently tracked east and weakened on the 8th and 9th with its winds diminishing to gale force late on the 8th, and then dissipated inland over the U.S. Pacific Northwest on November 10.

Northeastern Pacific Storm, November 9-11: This development originated as a weak frontal wave of low pressure near 31N 175W early on November 8, on the front trailing from the preceding cyclone described above. Rapid intensification occurred later on the 9th and on the 10th as the cyclone tracked northeast, leading to a hurricane force low near 53N 153W with a central pressure of 956 hPa at 0000 UTC on the 11th. The central pressure fell 34 hPa in the twenty-four hour period ending at that time. Two vessels reported near hurricane force east winds ahead of the storm's occluded front, the **Sea Voyager (**WCX9106) near 60N 147W at 1200 UTC on the 11th and **Alaskan Navigator** (WDC6644) near 60N 145W at 0600 UTC on the 12th, with both reporting 60 kts. At 1200 UTC on the 10th , the **Igarka** (UIFC) near 52N 146W encountered east winds of 50 kts. Buoy 46080 (58N 150W) reported 8.5 m seas (28 ft) at 0500 UTC on the 11th. The Augustine Island C/MAN station (59.4N 153.4W) reported northeast winds of 50 kts at 0700 UTC on the 11th. A 25 km ASCAT image from 0622 UTC on the 11th showed west winds of 45 kts south of the center as it was passing south of Kodiak Island. The cyclone weakened as it moved north into the Gulf of Alaska later on the 11th, and then dissipated onshore in southern Alaska the next day.

Northwestern Pacific Storm, December 13-15: *Figure 19* shows the development of this relatively compact, intense system from a complex low pressure system near Japan and merger with the front to its north. The central pressure fell 36 hPa in the twenty-four hour period ending at 0000 UTC December 15. The lowest central pressure was 952 hPa at 0600 UTC on the 15th when the center was near 57N 148E. The 25 km ASCAT pass in *Figure 20* shows the cyclone's well defined center in the northern Sea of Okhotsk with wind retrievals to the east of the center at 50kts. This was the most intense low of the period west of the Kamchatka Peninsula and the only one with hurricane force winds in this area north of the Kurile Islands. The cyclone then weakened rapidly as it passed inland over Russia on the 15th.

Western North Pacific Storm, end of December: This cyclone originated from the merger of low pressure in the Sea of Japan and a low pressure wave to the south as shown in *Figure 21.* It was one of a series of relatively strong systems that moved east or northeast out over the North Pacific late in December and featured the strongest winds, as revealed in the ASCAT image of *Figure 22*. Winds of 55 kts appear in the image on the northwest side of the storm center which is in the data free gap between passes. The **YM Anping** (DDJR2) near 41N 136E reported northeast winds of 45 kts and 9.0 m seas (30 ft) at 0500 UTC on the 31st. A vessel reporting with the SHIP identifier near 36N 132E well west of the center encountered northeast winds of 50 kts and 5.0 m seas (16 ft) late on the 31st or 0300 UTC January 1, 2011. This system subsequently redeveloped eastward as a new cyclone well to the east in early January. ⚓

OBSERVATION	POSITION	DATE/TIME(UTC)	WIND	SEA(m/f)
Overseas Joyce (V7NV4)	40N 177E 42N 179W	30/1200 31/0000	NW40 NW35	9.8/32 13.5/44
Zim San Diego (A8SI7)	51N 178W 51N 176W	30/1800 31/0000	NW 50 NW 45	9.0/30 10.5/35
Polar Spirit (C6WL6)	50N 180W	30/2100	NW 60	
Horizon Anchorage	54N 151W	31/0700	NE 50	
Buoy 46085	55.9N 142.6W	31/1200 31/1800 31/1900	SE 35 SE 43 G56 SE 45	10.4/34 6.5/21 7.9/26
Buoy 46004	50.9N 136.1W	01/1100 01/1200	SW 39 G54	9.0/30 11.0/36
Buoy 46246	50.0N 145.1W	01/0100		12.0/39
Buoy 46207	50.9N 129.9W	01/0200 01/0300	SE 45 G54	8.0/27 9.0/30
Buoy 46084	56.6N 136.1W	01/0400 01/0500	SE 47 G58 Peak gust 64	10.0/33

Table 4. Selected ship and buoy observations taken during passage of the North Pacific storm of October 29-November 1, 2010.

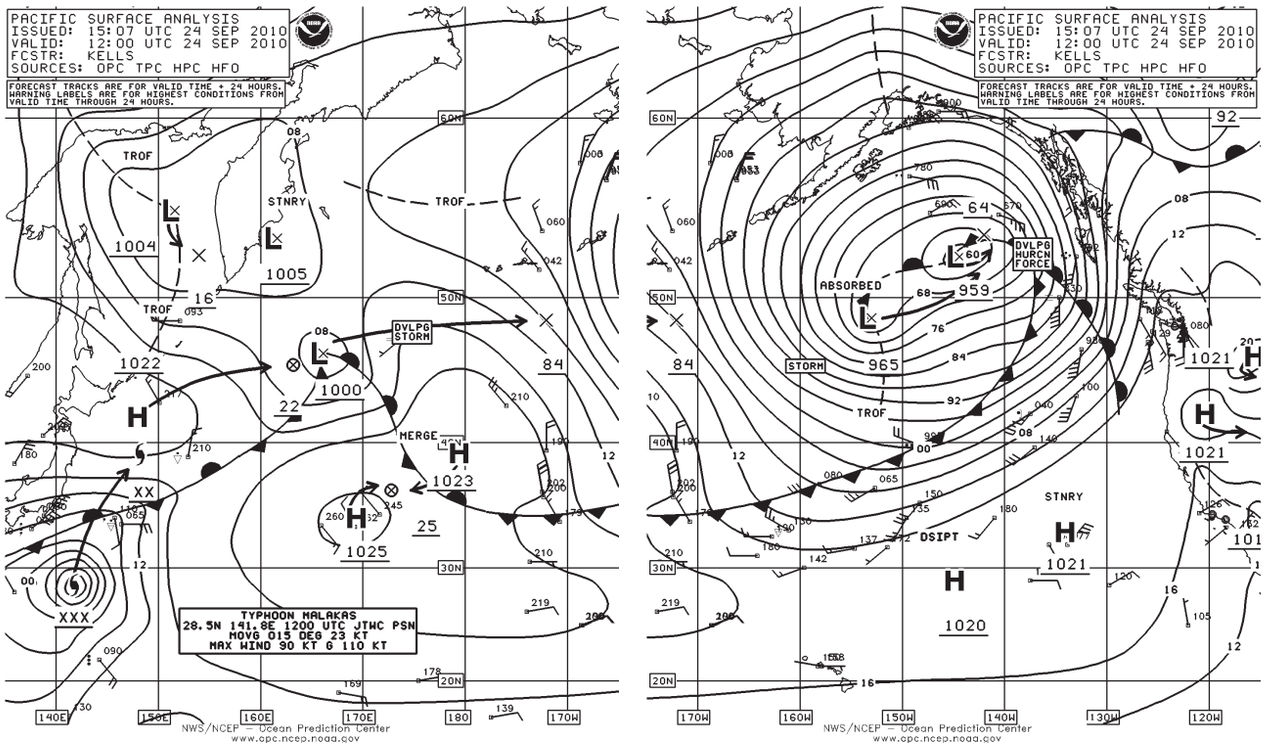


Figure 1. OPC North Pacific Surface Analysis charts valid 1200 UTC September 24, 2010. Twenty-four hour forecast tracks are shown with the forecast central pressures given as the last two whole digits in millibars, except XX for tropical cyclones.

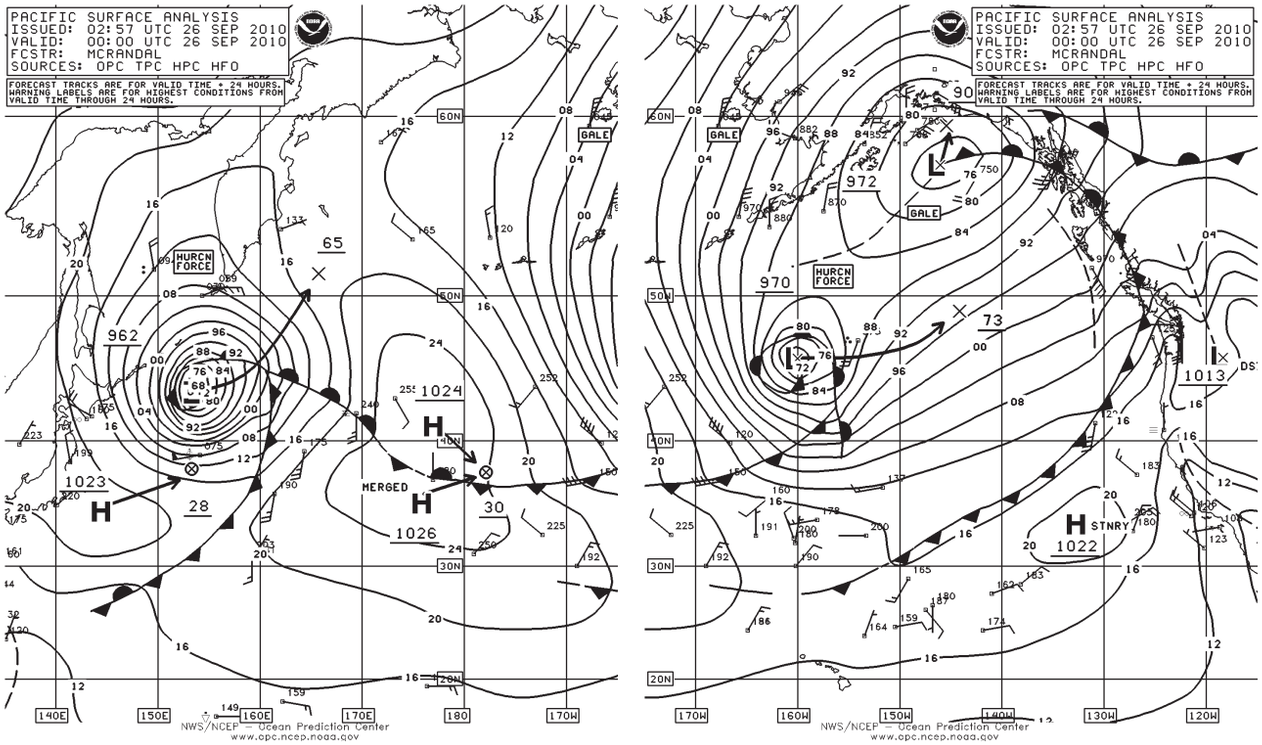


Figure 2. OPC North Pacific Surface Analysis charts valid 0000 UTC September 26, 2010.

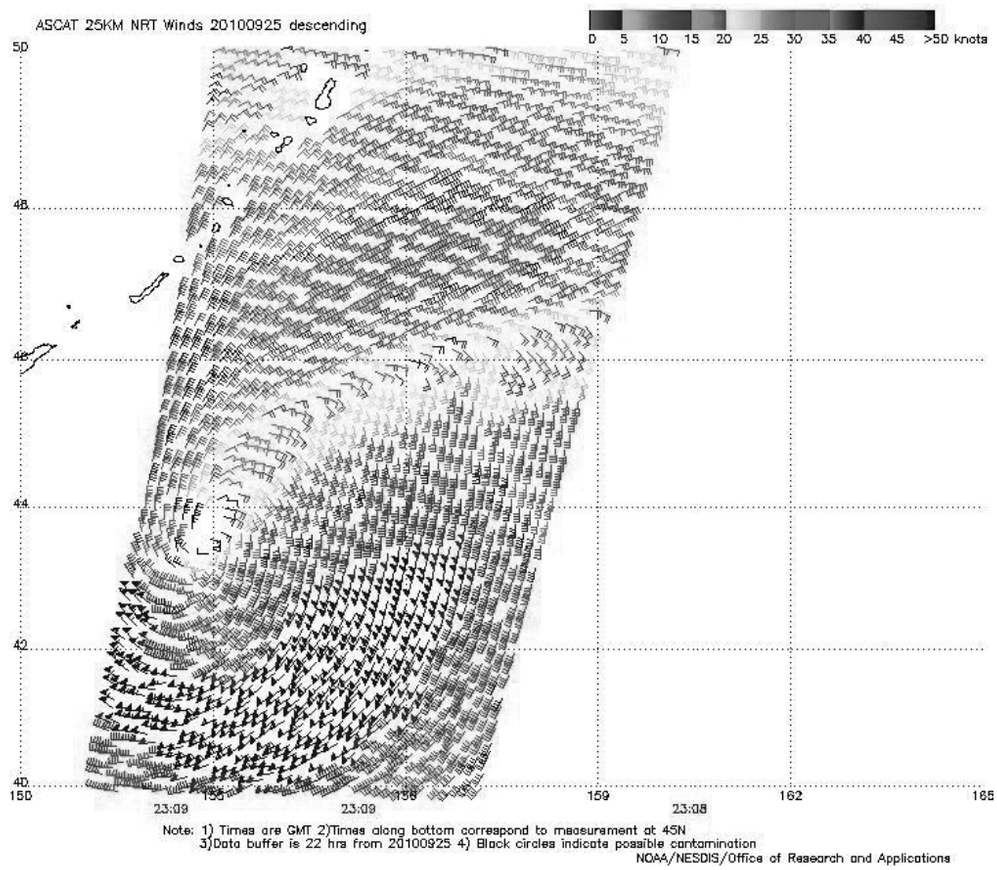


Figure 3. ASCAT (Advanced Scatterometer) image of satellite sensed winds around the hurricane force low shown in the first or western portion of Figure 2. The resolution is 25 km in this high resolution version of the imagery. The valid time of the pass is 2309 UTC September 25, 2010, or less than one hour prior to the valid time of Figure 2. The well defined center of the cyclone appears near 44N 153E and a portion of the Kurile Islands is in the upper-left side of the image. Image is courtesy of NOAA/NESDIS/ Center for Satellite Application and Research.

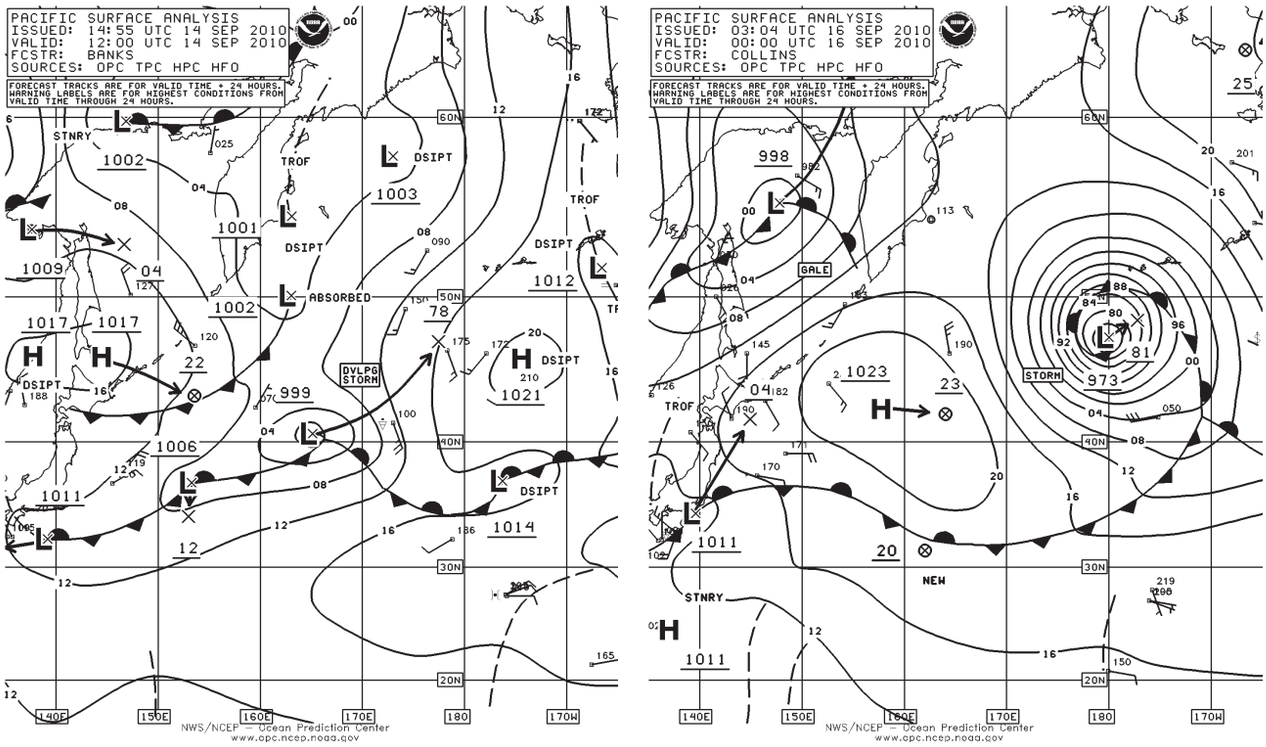


Figure 4. OPC North Pacific Surface Analysis charts valid 1200 UTC September 14 and 0000 UTC September 16, 2010.

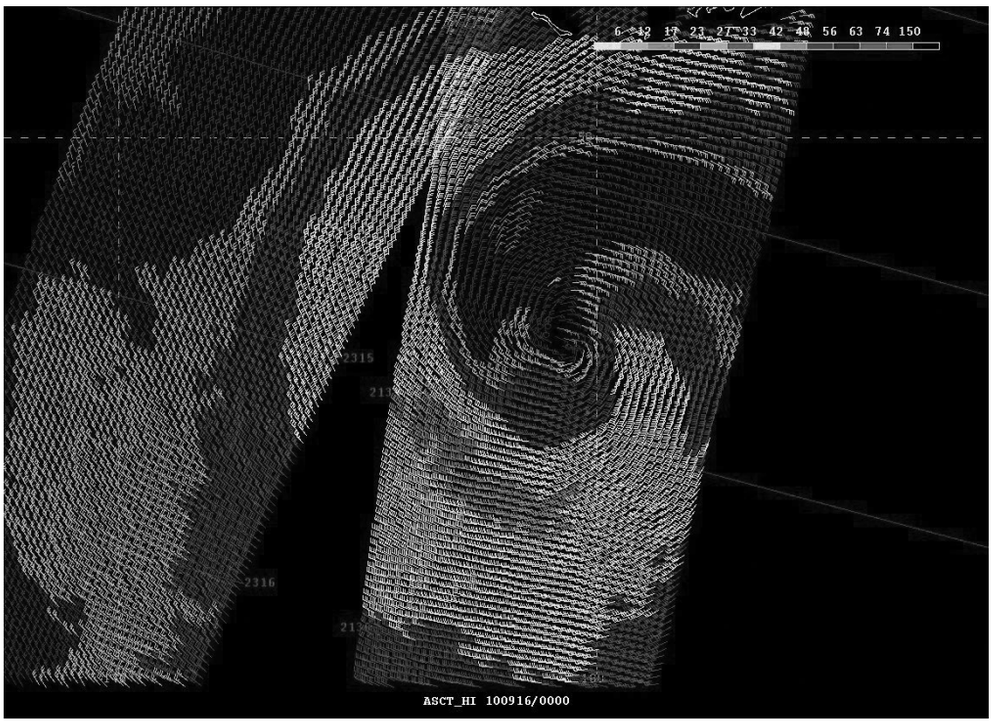


Figure 5. High resolution (25 km) ASCAT image of satellite sensed winds around the storm shown in the second part of Figure 4. The valid time of the eastern pass, is approximately 2135 UTC September 15, 2010, or two and one-half hours prior to the valid time of the second part of Figure 4. The well defined center of the cyclone is near the center of the image. A portion of the western Aleutian Islands appears near the top of the image.

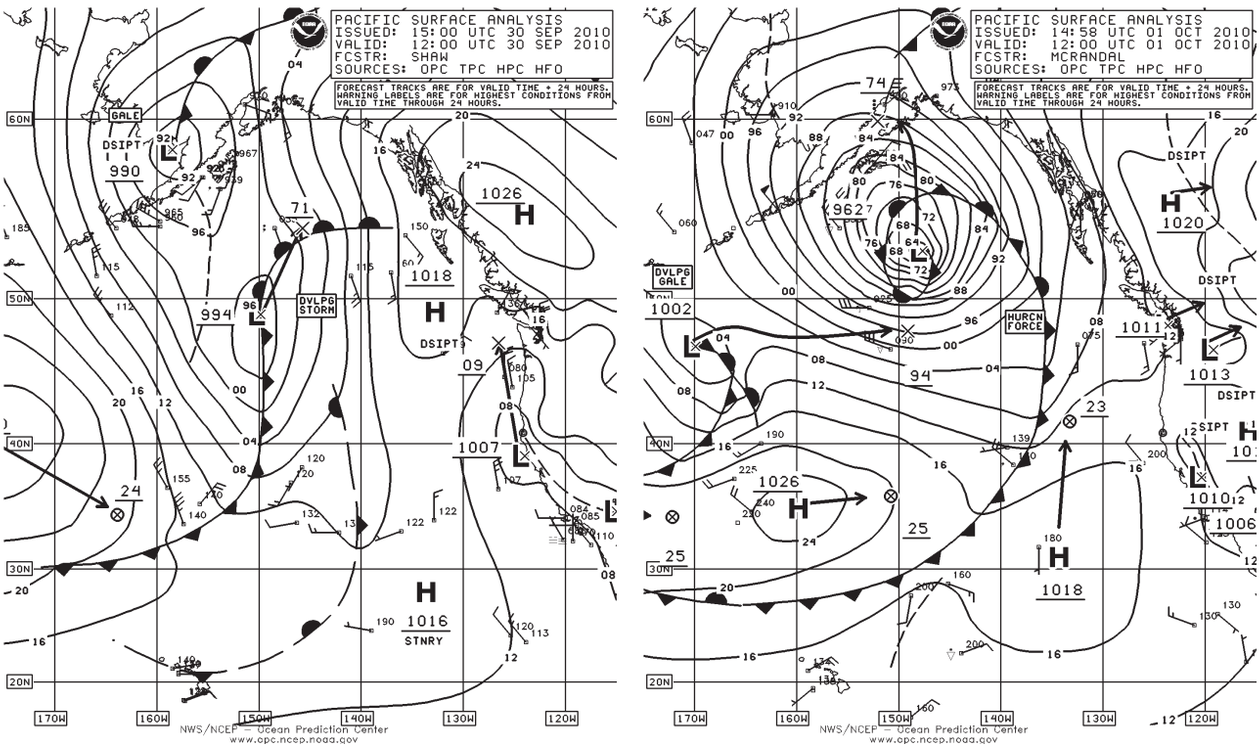


Figure 6. OPC North Pacific Surface Analysis charts valid 1200 UTC September 30 and 1200 UTC October 1, 2010.

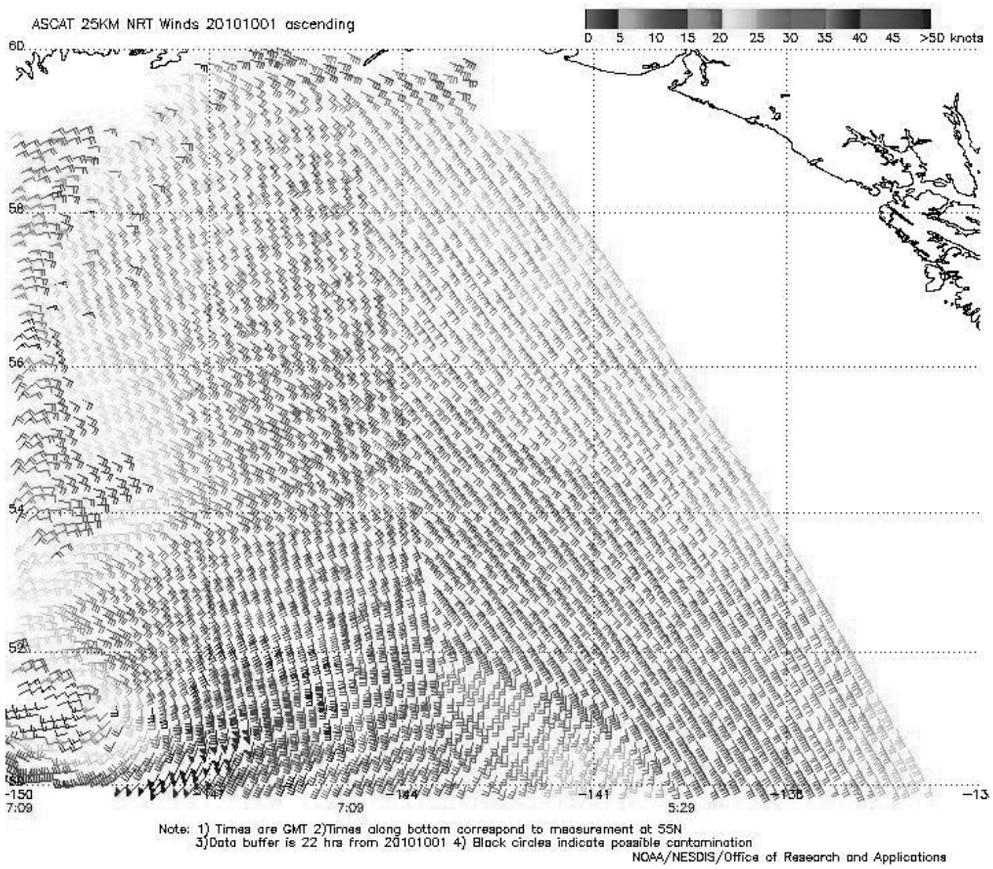


Figure 7. 25 km ASCAT image of satellite sensed winds around the hurricane force low shown in the second part of Figure 6. Adjacent passes overlap in this image, with the western pass valid 0709 UTC October 1, 2010, or about five hours prior to the valid time of the second part of Figure 6. The center of the cyclone appears near the lower-left edge of the image.

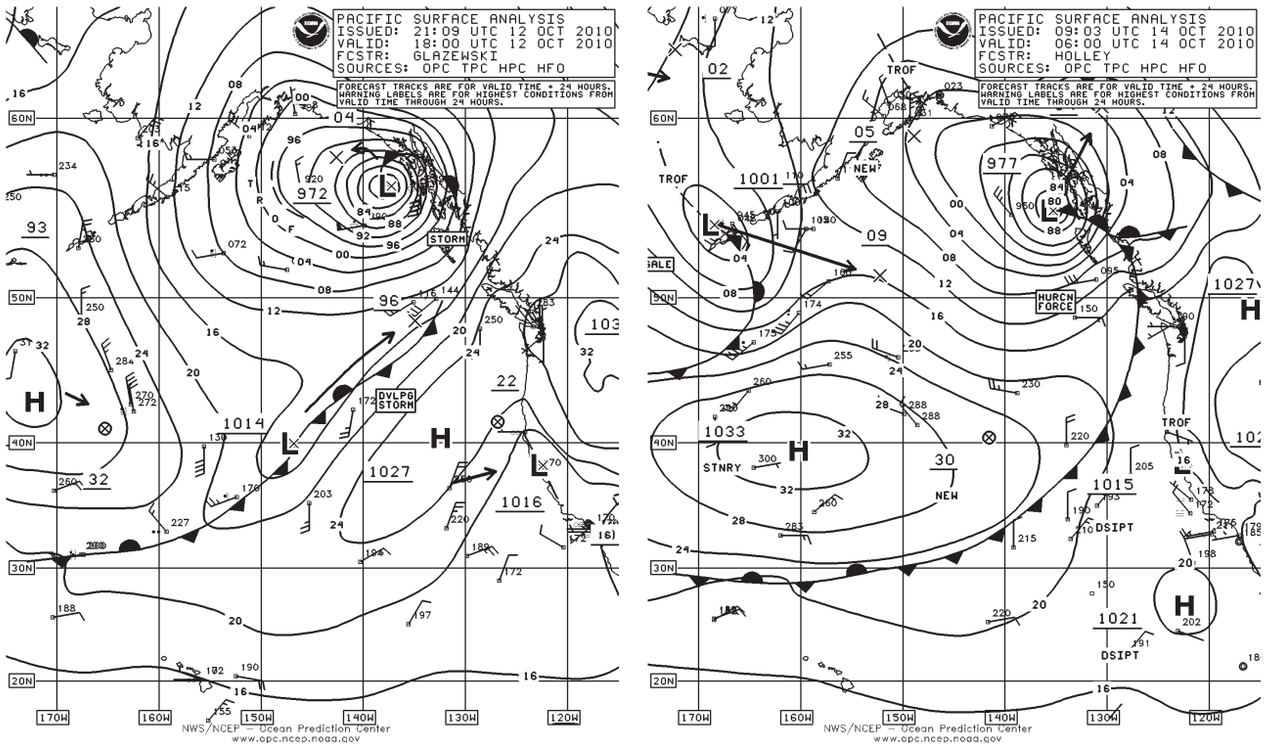


Figure 8. OPC North Pacific Surface Analysis charts valid 1800 UTC October 12 and 0600 UTC October 14, 2010.

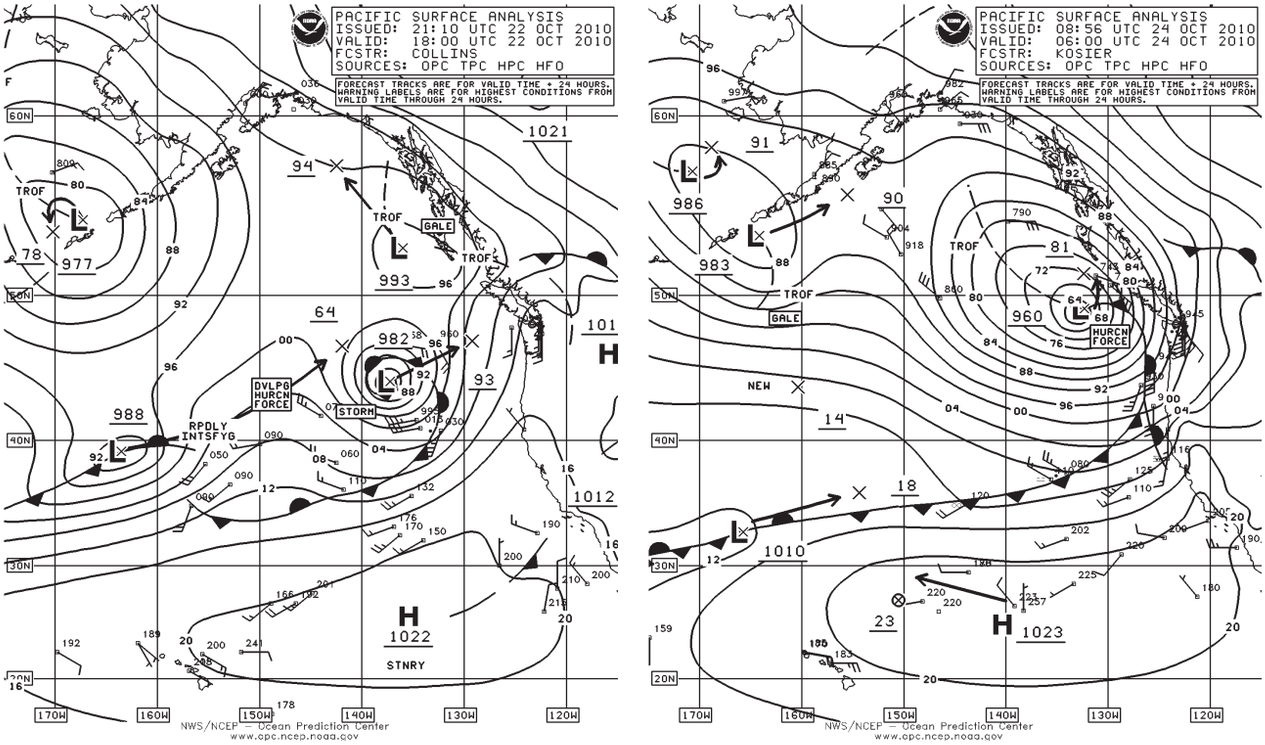


Figure 9. OPC North Pacific Surface Analysis charts valid 1800 UTC October 22 and 0600 UTC October 24, 2010.

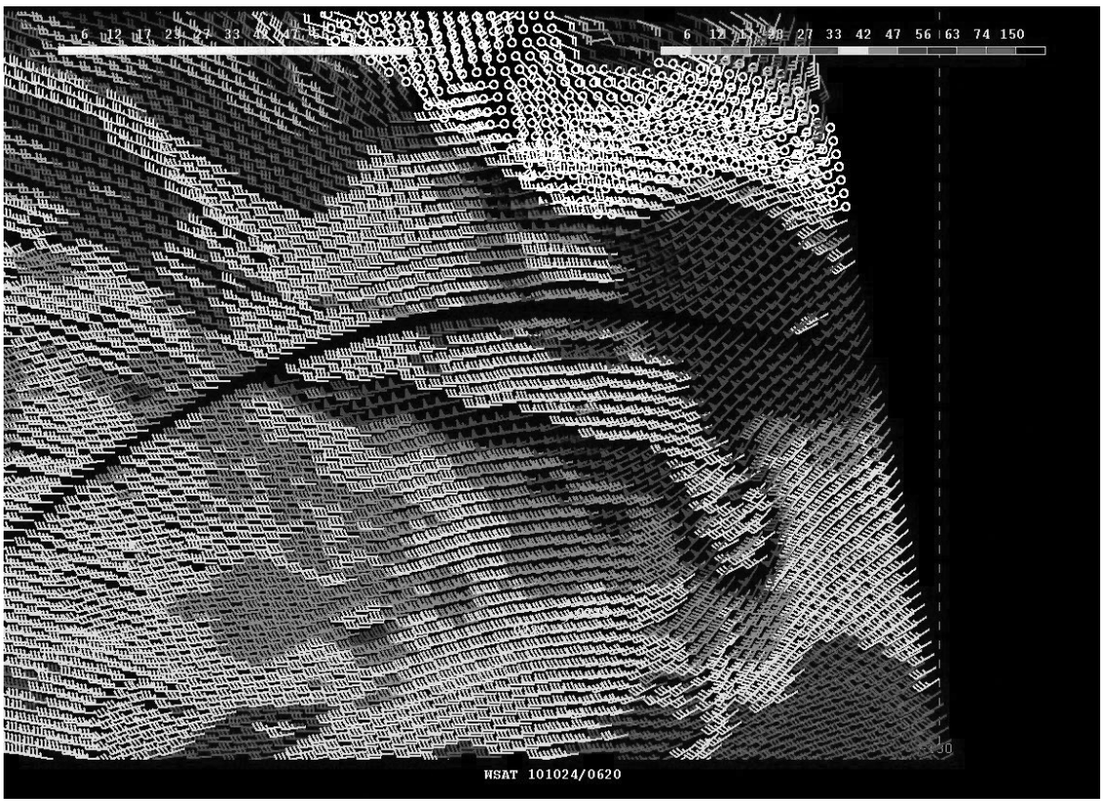


Figure 10. WindSat passive microwave image of remotely sensed winds from an area mainly south of the hurricane force low shown in the second part of Figure 9. The time of this ascending pass is 0223-0228 UTC October 24, 2010 or about three hours prior to the valid time of the second part of Figure 9. The center of the image is near 45N 135W. Credit: NRL Remote Sensing Division and Naval Center for Space Technology, and National Polar-orbiting Operational Environmental satellite System Integrated Program Office.

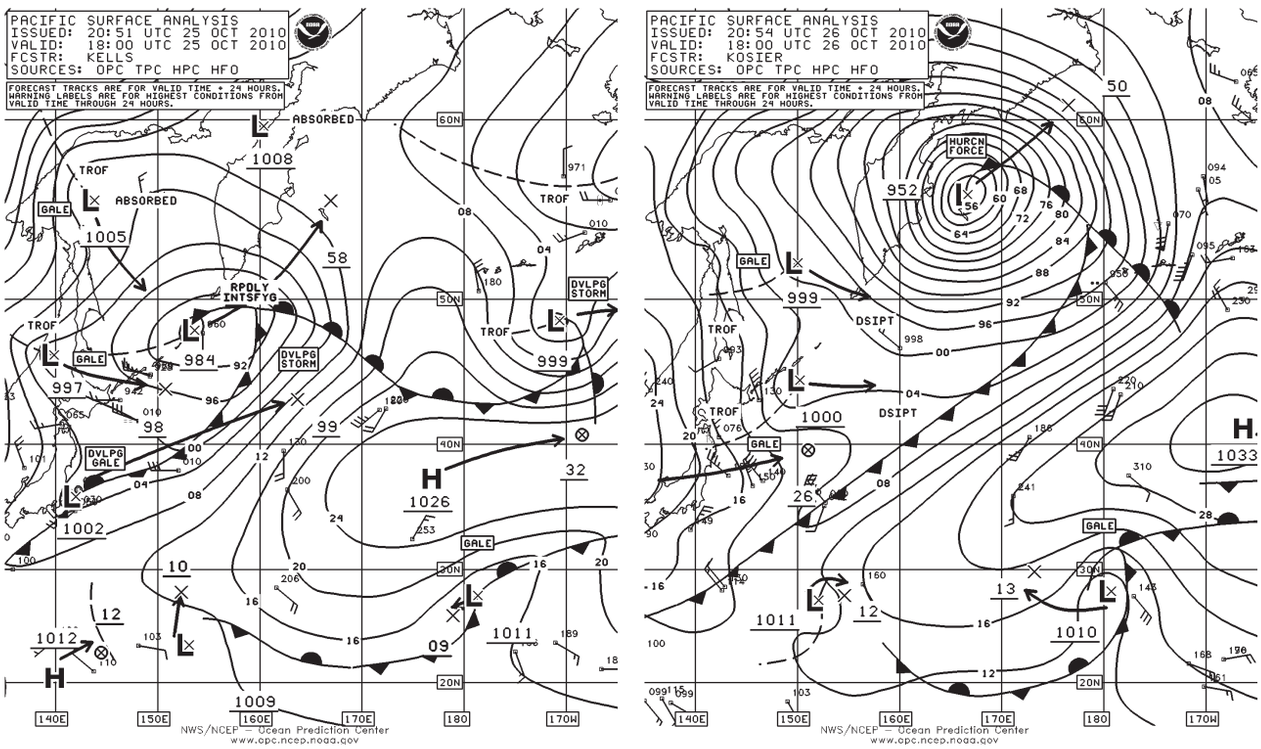
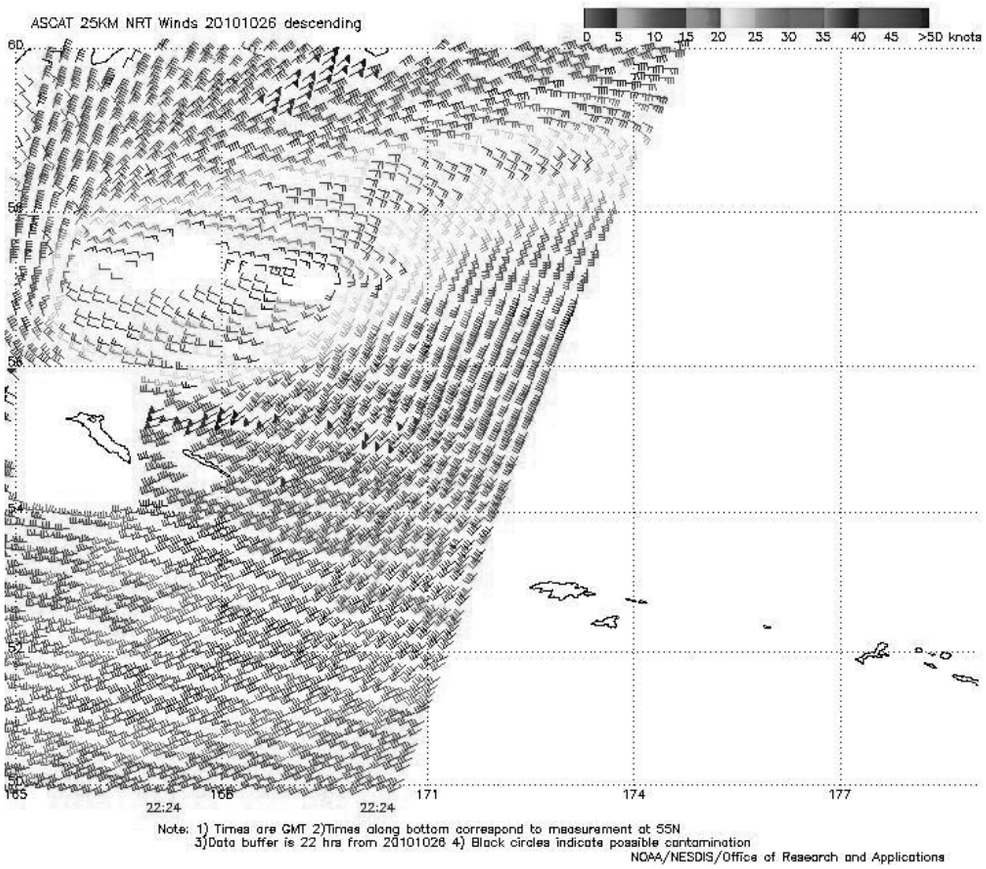


Figure 11. OPC North Pacific Surface Analysis charts valid 1800 UTC October 25 and 26, 2010.

Figure 12. 25 km ASCAT image of satellite sensed winds around the hurricane-force low shown in the second part of Figure 11. The valid time of the pass is 2224 UTC October 26, 2010, or four hours later than the valid time of the second part of Figure 11. The center of the cyclone appears near 57N 169E and the westernmost Aleutian Islands appear in the lower-right side of the image.



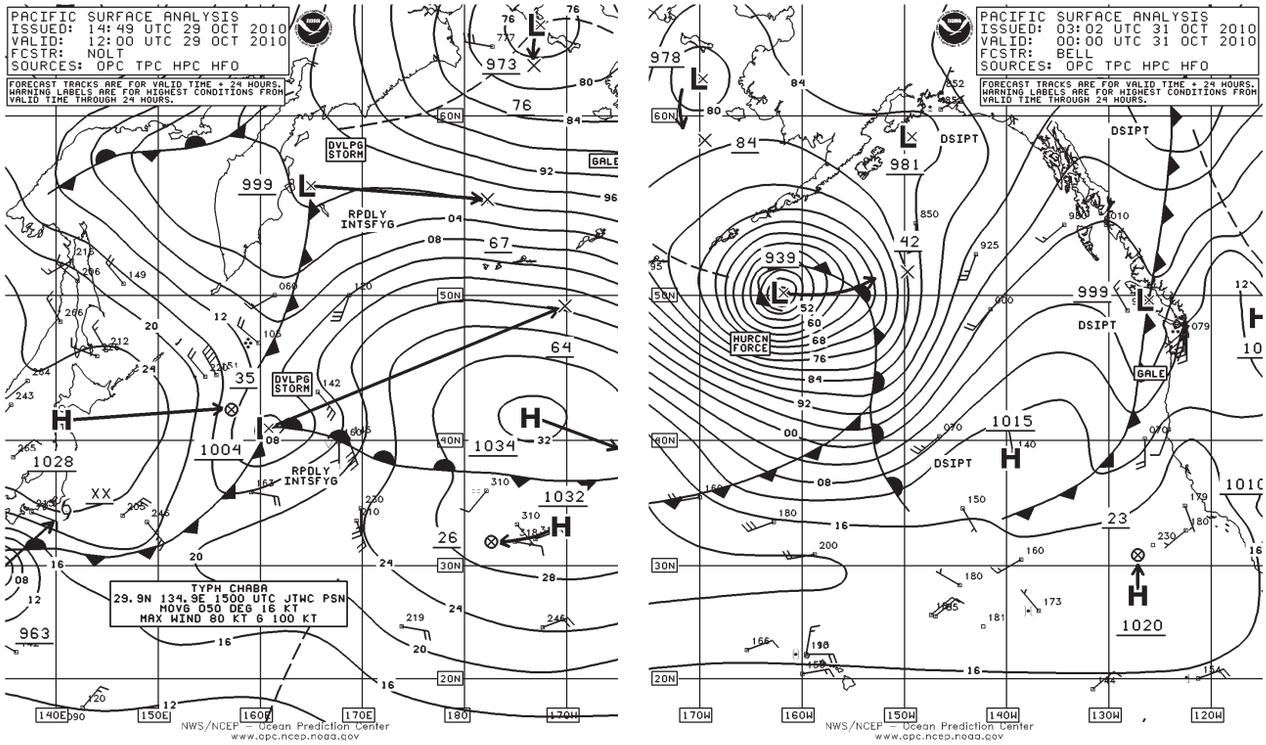


Figure 13. OPC North Pacific Surface Analysis charts valid 1200 UTC October 29 and 0000 UTC October 31, 2010.

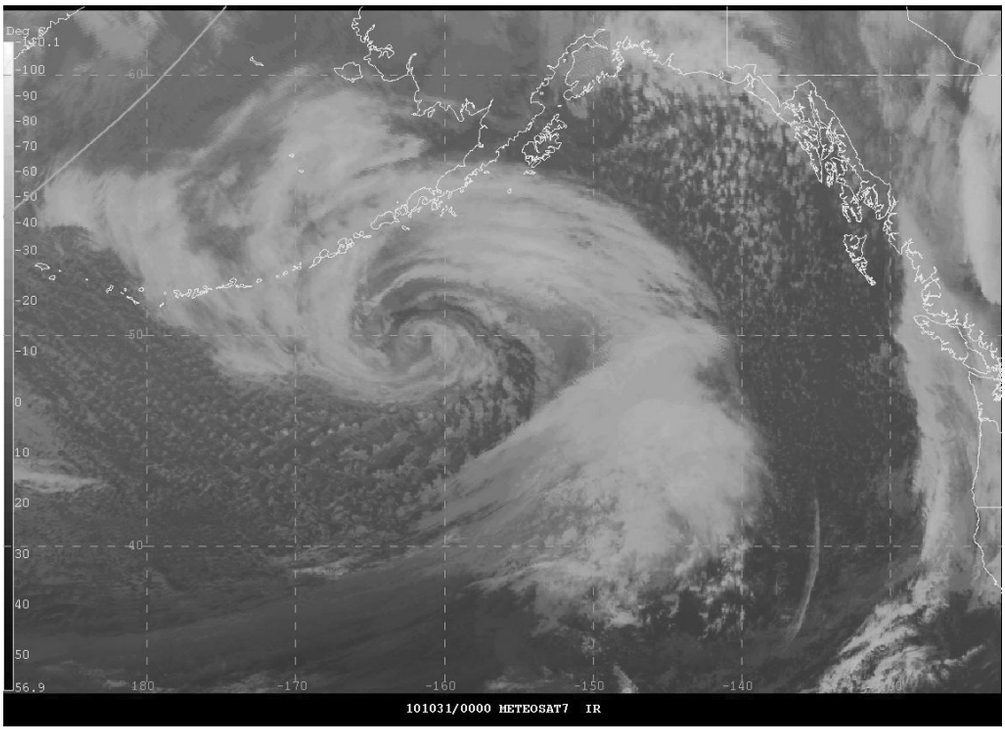


Figure 14. Mosaic of GOES west and MTS infrared satellite imagery valid 0000 UTC October 31, 2010, the valid time of the second part of Figure 13.

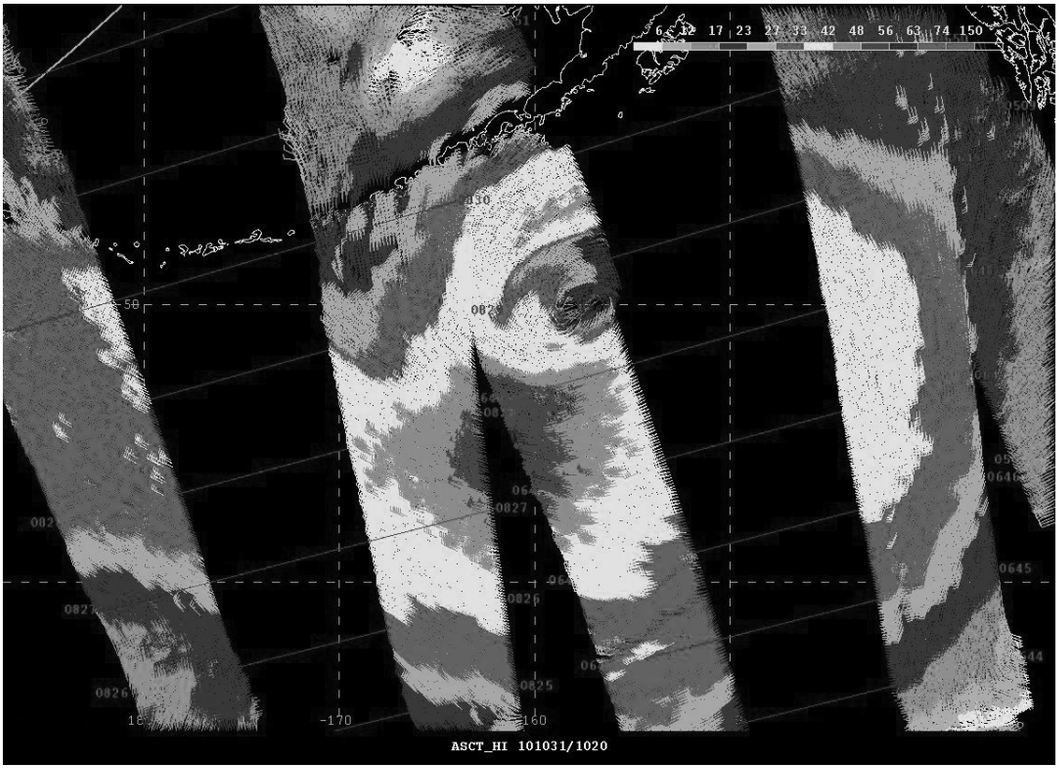


Figure 15. High resolution ASCAT image of satellite sensed winds around the storm shown in the second part of Figure 13. The valid times of the passes containing much of the cyclone and the strongest winds are approximately 0647 and 0827 UTC October 31, 2010, or about seven hours later than the valid time of the second part of Figure 13. The well-defined center of the cyclone is near the center of the image with the strongest winds to the south.

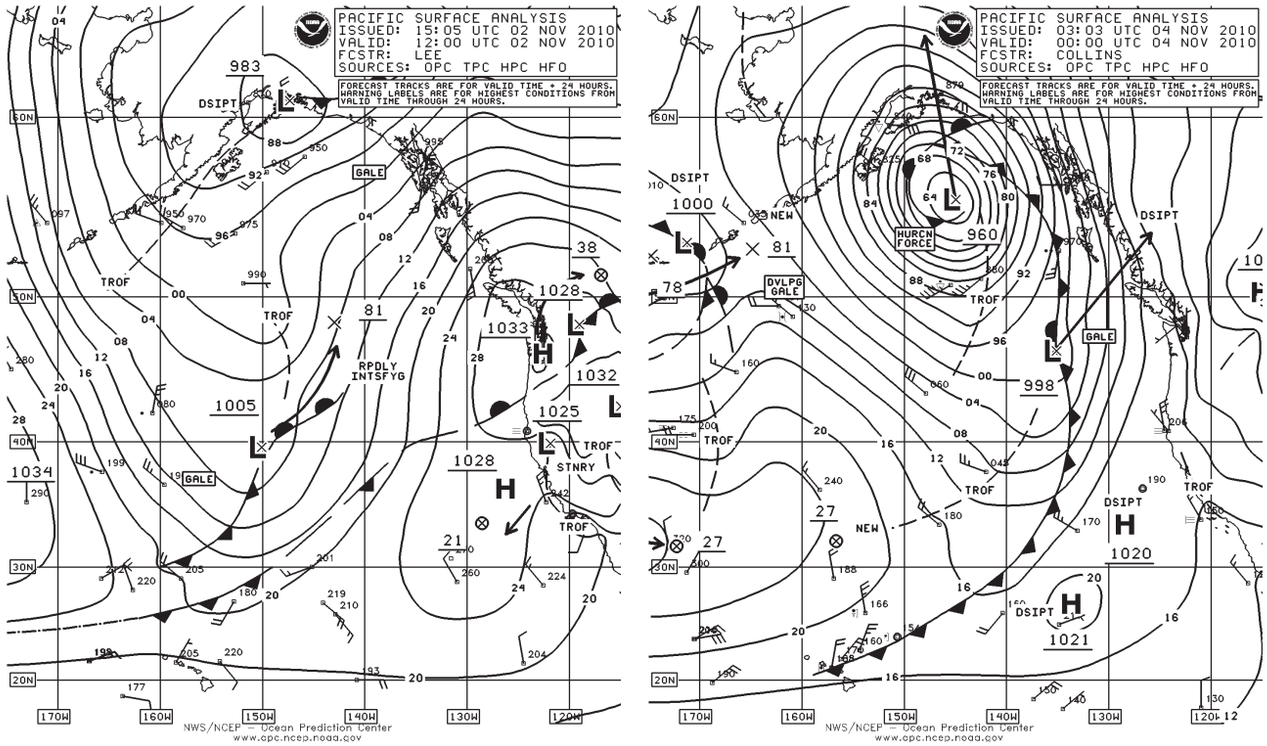


Figure 16. OPC North Pacific Surface Analysis charts valid 1200 UTC November 2 and 0000 UTC November 4, 2010.

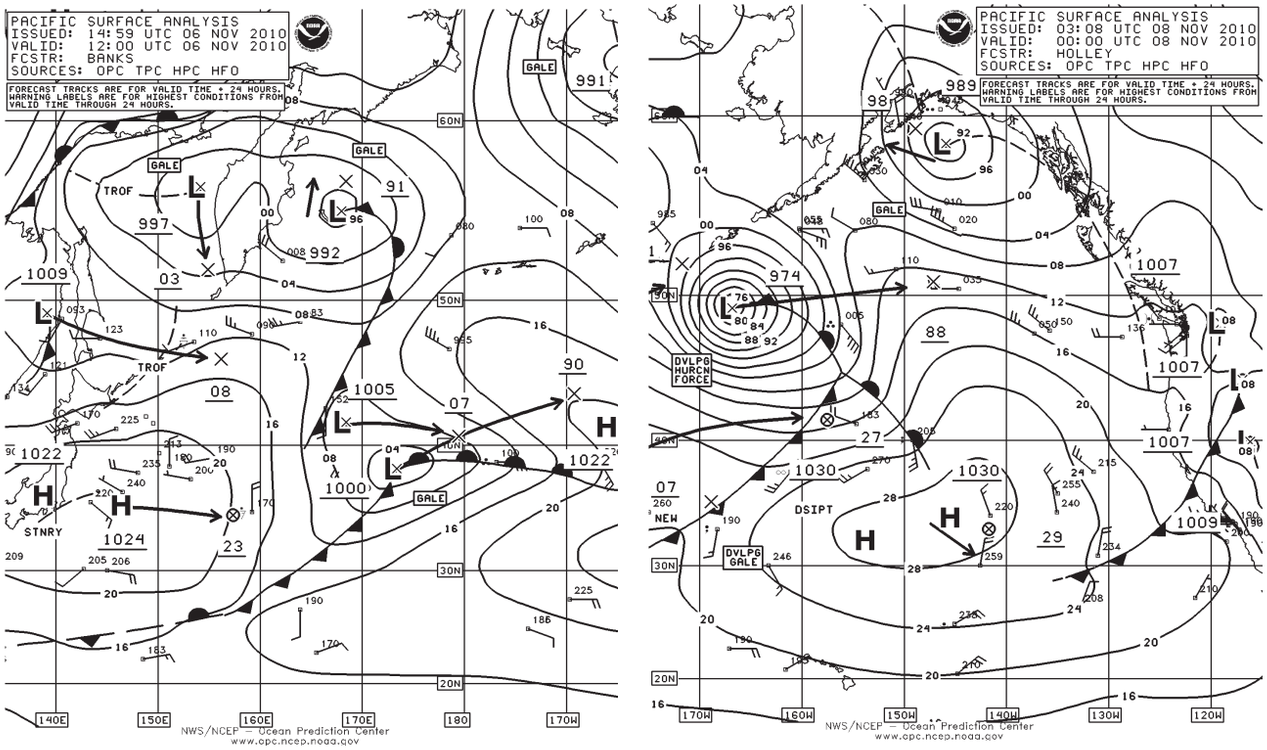


Figure 17. OPC North Pacific Surface Analysis charts valid 1200 UTC November 6 and 0000 UTC November 8, 2010.

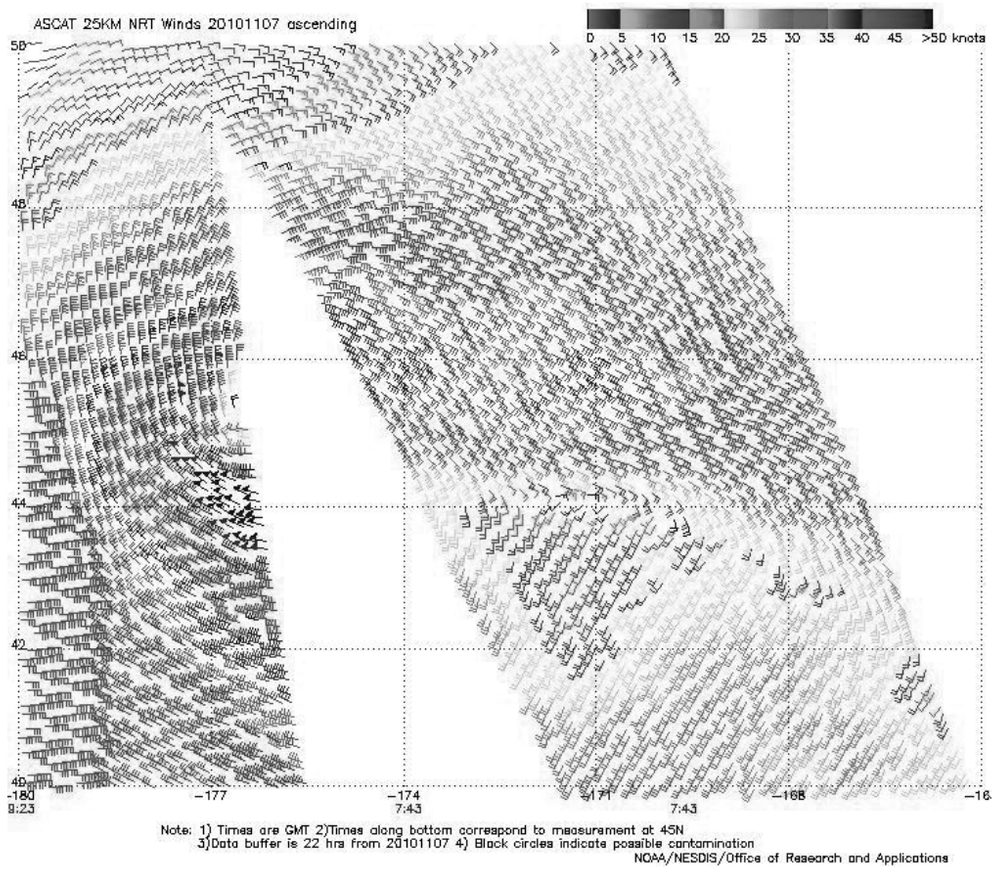


Figure 18. 25 km ASCAT image of satellite-sensed winds around the cyclone shown in the second part of Figure 17. Portions of two adjacent passes are shown, valid 0743 and 0923 UTC November 7, 2010, with the later pass less than fifteen hours prior to the valid time of the second part of Figure 17.

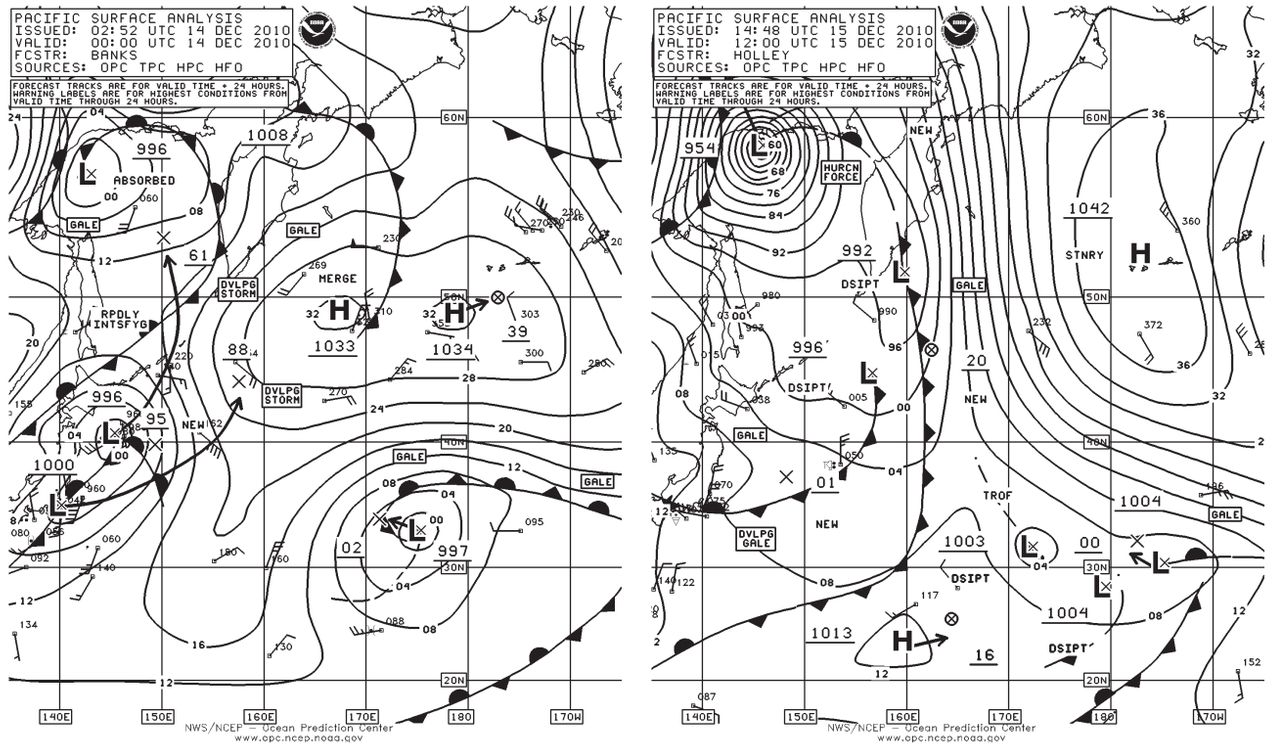


Figure 19. OPC North Pacific Surface Analysis charts valid 0000 UTC December 14 and 1200 UTC December 15, 2010.

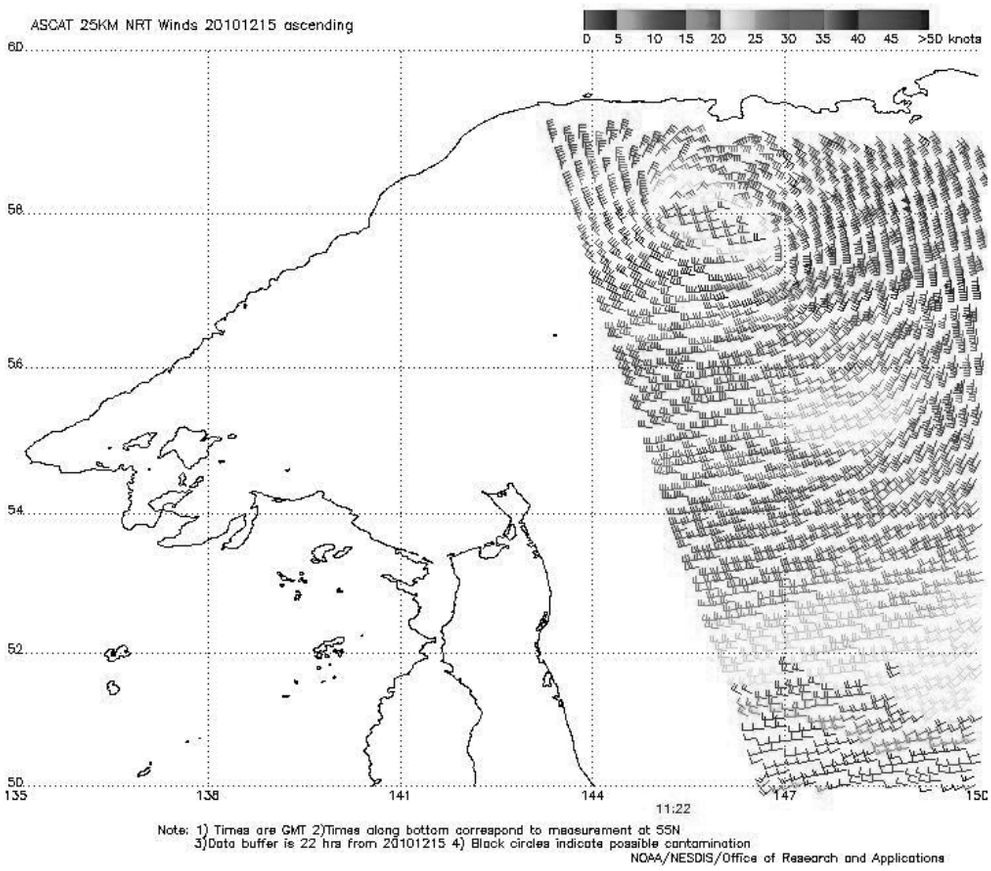


Figure 20. 25 km ASCAT image of satellite sensed winds around the hurricane force low shown in the second part of Figure 19. The valid time of the pass is 1122 UTC December 15, 2010. The well-defined center of the cyclone appears near 58N 146E.

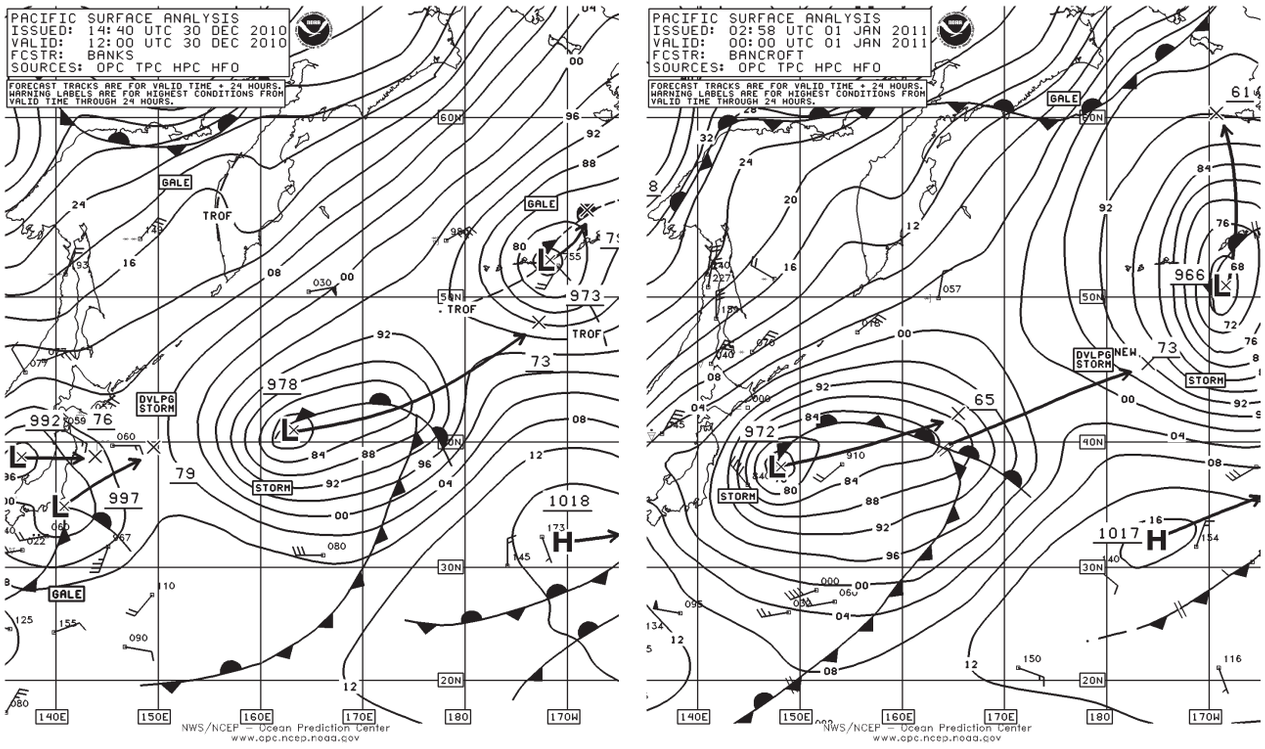


Figure 21. OPC North Pacific Surface Analysis charts valid 1200 UTC December 30, 2010 and 0000 UTC January 1, 2011.

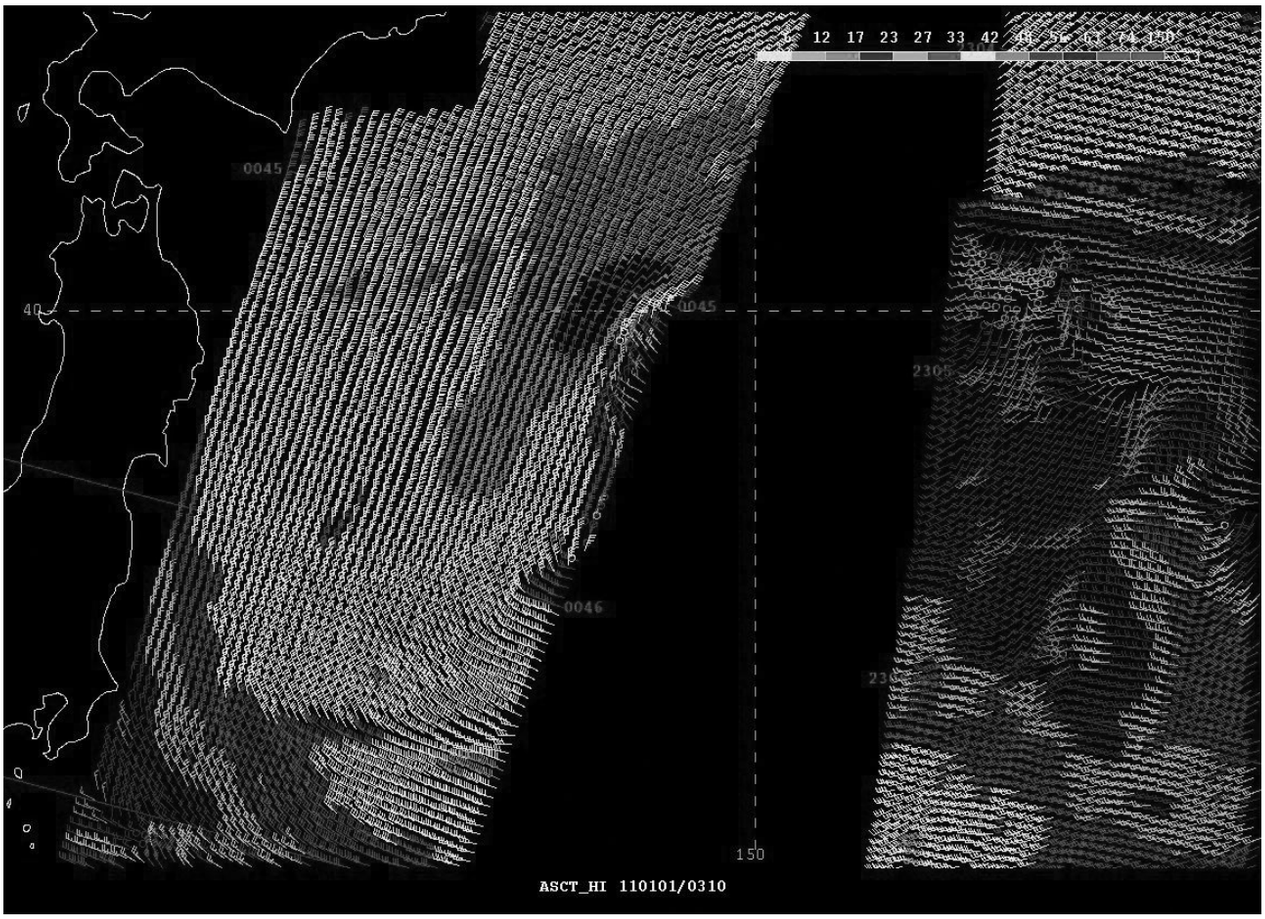


Figure 22. 25 km ASCAT image of satellite sensed winds around the cyclone shown in the second part of Figure 21. The valid time of the eastern pass is approximately 2305 UTC December 31, 2010 and of the western pass, 0045 UTC January 1, 2011, 2011, or less than one hour later than the valid time of the second part of Figure 20. The center of the cyclone is in the data-free swath between passes.

Tropical Atlantic and Tropical East Pacific Areas
January through April 2011

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NOAA National Center for Environmental Prediction

Change of Notice to Users of TAFB Portion of NWS Unified Surface Analysis

Beginning 1 June 2011, the National Hurricane Center's (NHC) Tropical Analysis and Forecast Branch (TAFB) will officially include, as part of its portion of the Unified Surface Analyses (USA), a distinction between the trade wind Intertropical Convergence Zone (hereafter ITCZ) and the monsoon trough ITCZ (hereafter monsoon trough). A second addition to the TAFB portion of the USA will be the depiction of shear lines.

Depiction of the Monsoon Trough on the TAFB portion of the Unified Surface Analysis

The decision to differentiate between the ITCZ and monsoon trough arises from the differences in wind direction and its implication for tropical cyclogenesis for each feature. TAFB's definition of each feature follows:

ITCZ — a zonally elongated axis of surface wind confluence of northeasterly (NE) and southeasterly (SE) trade winds in the tropics.

Monsoon Trough — the portion of the ITCZ which extends into or through a monsoon circulation, as depicted by a line on a weather map showing the location of minimum sea level pressure. This line coincides with the maximum cyclonic curvature vorticity, with southwesterly (SW) monsoonal flow prevailing south of the trough axis.

Implication for users of the TAFB surface analysis: users may anticipate SW winds to the south of the monsoon trough, and SE winds to the south of the ITCZ.

Implication for tropical cyclogenesis: the convergence of SW winds south of the monsoon trough and NE winds north of the monsoon trough creates a background flow that produces cyclonic vorticity, which is important for tropical cyclogenesis. The ITCZ creates a confluence zone of NE trade wind flow and SE trade wind flow, which does not readily create cyclonic vorticity. Thus, tropical cyclogenesis is more likely in a background flow associated with a monsoon trough than the ITCZ. Please see Figure below for examples of each situation.

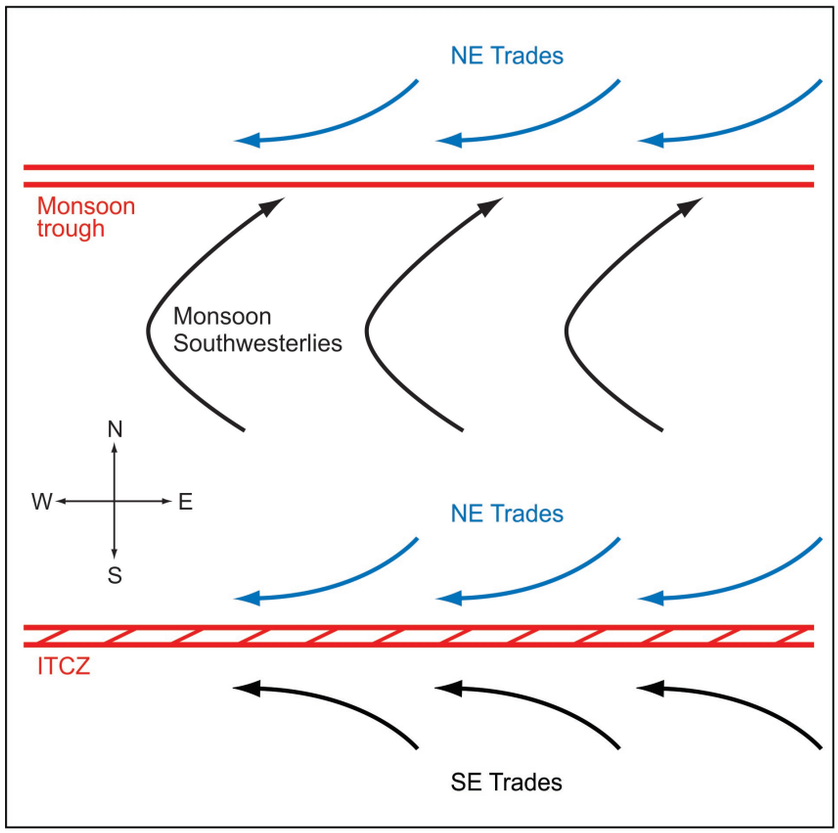


Figure 1. Top: Monsoon trough with NE trades converging with monsoon southwesterlies. This orientation creates cyclonic vorticity which is conducive for tropical cyclogenesis. Bottom: ITCZ is characterized by the confluence of NE trades with SE trades. This produces a confluent area, but does not readily create cyclonic vorticity. *(Graphic courtesy of Joan David, NHC)*

Depiction of the shear line on the TAFB portion of the Unified Surface Analysis

The shear line has previously been depicted by a trough symbol on the TAFB portion of the USA. In order to more accurately depict this final stage in the life cycle of a cold front over the subtropical and tropical waters, it was decided to depict the shear line explicitly. The TAFB definition of a shear line follows:

Shear line — A line or narrow zone across which there is an abrupt change in the horizontal wind component parallel to this line, yielding a line of maximum horizontal wind shear. Historically this term has been used to describe the final stage in the life cycle of a cold front intruding into the subtropics and tropics, and is denoted by a confluence of streamlines equatorward and west of the col region where a cold front divides the subtropical ridge. These boundaries typically lose thermal and moisture contrasts over the relatively warm oceans. Empirical guidelines suggest at least 10 kts of shear usually occurs within a 60-90 nm zone across the shear line, with the strongest winds on the poleward side. Low and middle level clouds are typically noted along this dying boundary and can produce low topped convection and stratiform precipitation. Shear lines lie in weak troughs, but due to lack of surface data over the subtropical/tropical ocean, analysis of this pressure trough is unlikely. On rare occasions, shear lines can become reinvigorated by mid tropospheric disturbances and regenerate into frontal boundaries. The symbol for the shear line is an alternating dot-dash pattern, in the color of blue.

Implication for users of the TAFB surface analysis: though nearly parallel wind flow will be found on either side of the shear line occurring over the open ocean, users will encounter

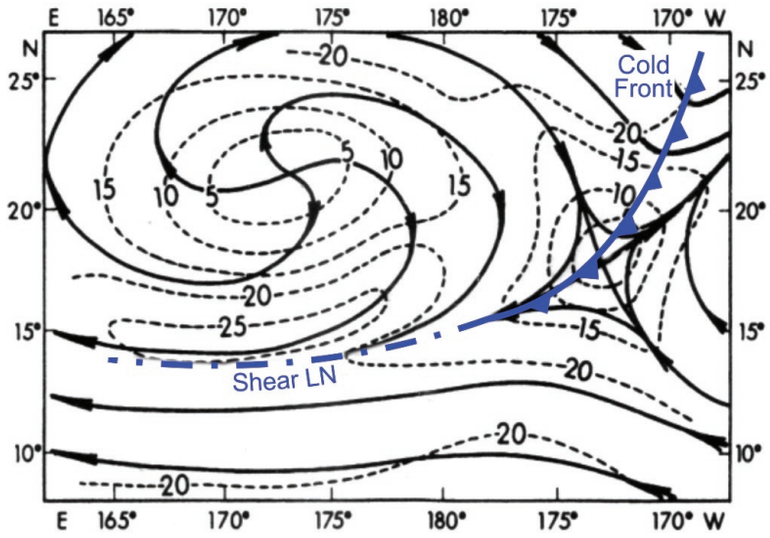


Figure 2. Schematic diagram illustrating a cold front extending into the tropics with streamlines (solid lines with arrows indicating wind direction) and isotachs (dashed lines indicating areas of equivalent wind speed), in knots. The shear line is depicted by the dash-dot symbol where winds associated with the weakened cold frontal boundary have become parallel on both sides of the boundary. *(Adapted from Palmer et al., 1955, courtesy of Joan David, NHC)*

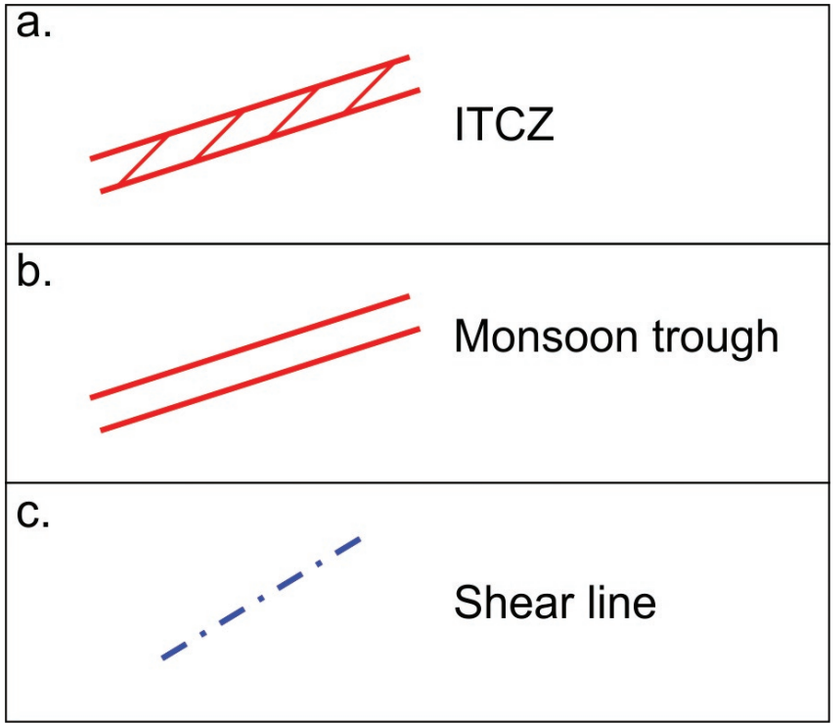


Figure 3. The ITCZ, monsoon trough, and shear line on the TAFB surface analysis will be depicted using the above symbology, respectively. *(Graphic courtesy of Joan David, NHC)*

weaker winds on its equatorward side, and an elongated band of fresh to strong winds on the poleward side of the shear line. This band of fresh to strong winds and embedded showers north of the shear line often produces seas near 8 feet or greater. Even though short-term precipitation associated with the shear line is substantially lighter than that encountered in thunderstorms, mountainous terrain can enhance precipitation associated with a shear line. When a shear line moves very slowly or remains stationary over mountainous terrain for several days, persistent rainfall can lead to significant accumulations with the potential for flash flooding and mudslides.

Tropical Atlantic and Eastern North Pacific Warnings

TAFB issued 21 non-tropical cyclone warnings in their Atlantic High Seas Area of Responsibility (AOR) and 15 warnings in their Pacific High Seas AOR during the period from 1 January to 30 April 2011. *Tables 1* and *2* summarize the warning events during this period. The TAFB Tropical Atlantic AOR extends from 7° to 31°N west of 35°W, including the Caribbean Sea and Gulf of Mexico while the Eastern North Pacific AOR extends equatorward of 30°N and east of 140°W.

Weather patterns across the Atlantic Basin during late January and early February 2011 were generally characterized by very progressive upper level flow across the eastern U.S. and Western North Atlantic, ushering in several low pressure systems and accompanying cold fronts quickly across the TAFB AOR, which yielded 11 of the 21 warnings. Several of these systems produced short-lived gale events across the Gulf of Mexico and SW North Atlantic, lasting 24 hours or less. The strongest of these frontal systems affected the SW North Atlantic waters 22 and 23 Jan when a low pressure system developed and deepened along a stalled frontal boundary off of the eastern seaboard

Tropical Atlantic, Gulf of Mexico, and Caribbean Sea Warnings

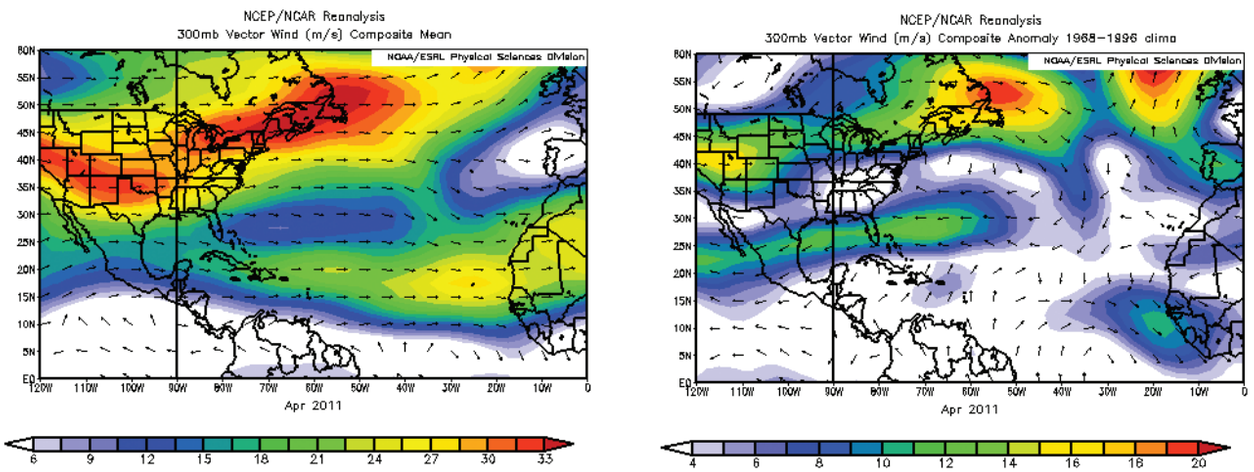
Table 1. Non-tropical cyclone Warnings issued for the Atlantic Basin between 01 Jan 2011 and 31 Apr 2011.

Onset	Region	Peak Wind Speed	Duration	Forcing
1800 UTC 06 Jan	SW N Atlc	35 kts	30 hr	Cold front
1200 UTC 08 Jan	SW N Atlc	35 kts	24 hr	Cold front
1200 UTC 09 Jan	Gulf of Mexico	35 kts	24 hr	Low and cold front
0000 UTC 21 Jan	Gulf of Mexico	35 kts	18 hr	Cold Front
1800 UTC 22 Jan	SW N ATLC	40 kts	30 hr	Cold Front
1200 UTC 25 Jan	Central Caribbean	40 kts	18 hr	Pres gradient
0600 UTC 26 Jan	SW N Atlc	35 kts	18 hr	Cold Front
0600 UTC 27 Jan	Central Atlc	35 kts	42 hr	Low N of area
1200 UTC 01 Feb	Gulf of Mexico	35 kts	12 hr	Cold Front
1200 UTC 02 Feb	Central Caribbean	35 kts	18 hr	Pres gradient
1200 UTC 04 Feb	Gulf of Mexico	35 kts	12 hr	Low along front
1200 UTC 04 Feb	Central Caribbean	35 kts	06 hr	Pres gradient
1200 UTC 07 Feb	Gulf of Mexico	35 kts	12 hr	Low and cold front
1800 UTC 09 Feb	Gulf of Mexico	35 kts	24 hr	Cold Front
1800 UTC 20 Feb	SW N Atlc and Central Atlc	40 kts	36 hr	Cold Front
0000 UTC 23 Feb	SW N Atlc and Central Atlc	35 kts	24 hr	Cold Front
0000 UTC 09 Mar	Central Atlc	35 kts	72 hr	Low N of area and trough
1200 UTC 10 Mar	Gulf of Mexico	35 kts	12 hr	Cold Front
1800 UTC 22 Mar	SW N Atlc	35 kts	06 hr	Cold Front
1800 UTC 23 Mar	SW N Atlc	35 kts	12 hr	Cold front
1200 UTC 20 Apr	SW N Atlc	35 kts	30 hr	Low pres

that then moved eastward. Southerly gales were reported east of the front on 22 Jan while north to northwesterly gales to around 40 kts were reported west of the cold front on 23 Jan. The **Noordam** (PHET) reported northwesterly winds at 40 kts across the NW Bahamas at 0200 UTC while the **Bonn Express** (DGNB) reported westerly winds at 41 kts south of Bermuda and the deep low pressure system at 1800 UTC on 23 Jan. High pressure building across the west Atlantic behind this front produced a strong pressure gradient across the Caribbean that resulted in gales to 40 kts across the east and central Caribbean on 25 and 26 Jan. Easterly gales to 41 kts were reported by the **Jens Maersk** (OYYK2) offshore of Colombia at 22 UTC on 26 Jan, while the **Grand Princess** (ZCBU5) reported gales to 38 kts across the eastern Caribbean downwind of Martinique at 0300 UTC and the **Celebrity Constellation** (9HJB9) reported gales to 37 kts near Bonaire at 1400 UTC. Well downstream from this very progressive pattern, a slow moving gale center developed just northeast of the TAFB Atlantic AOR and produced N to NE gales across far northeast portions of the AOR for 42 hours, beginning 0600 UTC 27 January, as verified by the freighter **Liberty Sun** (WCOB) at 1200 UTC 27 Jan and again at 0000 UTC 28 Jan.

An upper atmospheric pattern change occurred in the North Atlantic during February and early March. This time period yielded only 4 warning events across the AOR, with the most significant and long lived warning occurring for 72 hr beginning 0000 UTC 09 Mar. A low pressure center across the central North Atlantic and north of the AOR became occluded 07 through 08 Mar, with a broad zone of gales draped to the north of the occlusion, and extending across northeast portions of the AOR. The low and occluded front then sank slowly southward into the AOR during the next several days and gradually weakened. Several ships reported minimal gales across the AOR during this 3 day period, including the **Maersk Nimes** (VRFO7) on 09 Mar and the **CMA CGM Fortuna** (A8OF7) on 10 Mar. Three broad and slowly evolving surface low pressure systems developed across the central subtropical Atlantic between mid-March and the end of April. A series of upper level troughs and associated low pressure centers moved into the central and west central subtropical Atlantic during this period and slowly meandered about before lifting out to the northeast. This maintained a weakness in the middle levels of the atmosphere across this region and an environment primed for the development of low pressure systems at the surface. Figures 4a and b depict the mean and anomalous 300 hPa winds during the month of April, with the weakness indicated in *Figure 4a* by the elongated area of significantly lower winds extending from south Florida eastward across the central Atlantic, and in *Figure 4b*, across this same area, by winds with an anomalous eastward component. It was within this zone of weaker upper level winds that surface low pressure systems developed between mid-March and end of April.

The most complicated of these systems developed during the third week of April, when a gale center began to take on subtropical characteristics. This low center strengthened from an elongated shear axis arching cyclonically around a deepening low on 18 April, to gale force winds north of the shear axis on 20 April, to the near formation of a subtropical cyclone on 22 April (*Figure 5*). This system then quickly weakened the following day as was accurately forecast by global numerical weather prediction models.



Figures 4a and b. Mean (top) and anomalous (bottom) wind vectors at 300 hPa for the month of April 2011. Graphics provided by the NOAA Earth Systems Research Lab (ESRL) Physical Sciences Division (PSD) from the NCEP/National Center for Atmospheric Research (NCAR) Reanalysis dataset.

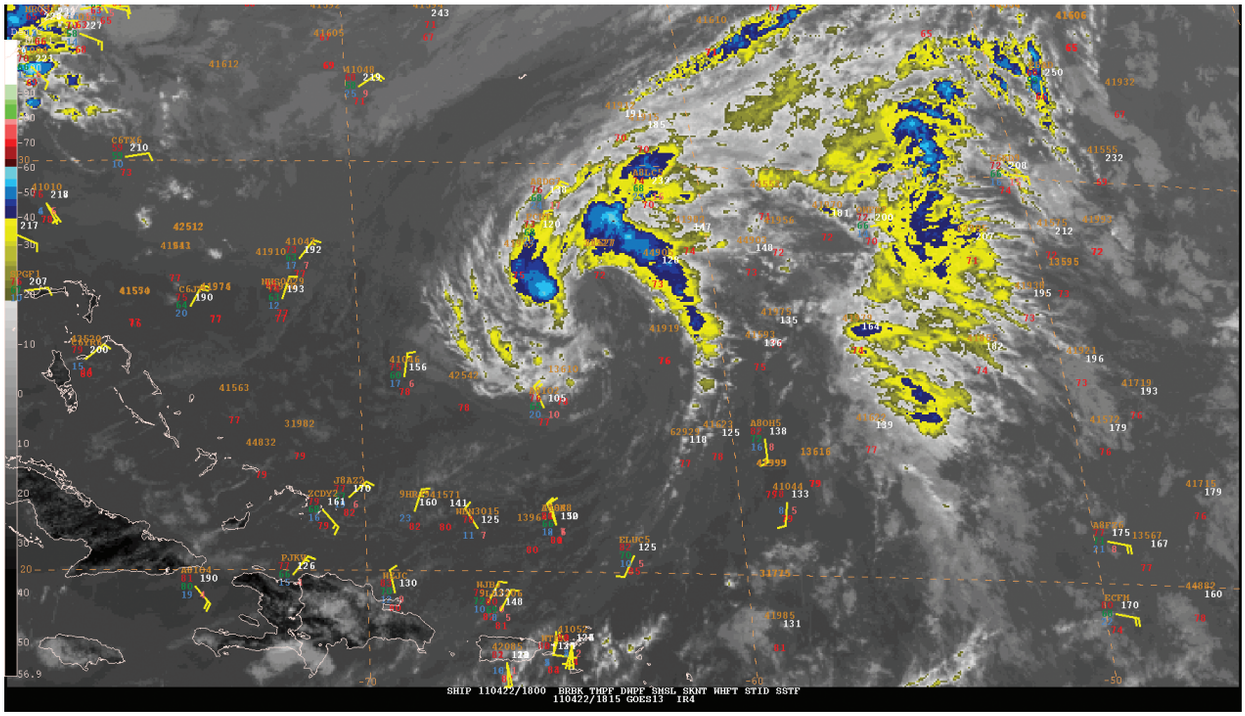


Figure 5. GOES-E IR image from 1815 UTC 22 April, with buoy and ship observations overlaid, showing the complex low pressure. The cyclone was classified by TAFB as a ST 2.5 - 35 to 40 kts - on the Hebert-Poteat Subtropical Cyclone classification technique at this time. Note ship A8LC5 located northeast of the cyclone reporting east winds at 29 kts and seas of 16 ft. However, shortly after this image was taken, the system quickly weakened and lost its opportunity to develop into a subtropical cyclone.

Eastern North Pacific Ocean to 30N and East of 140W

All but two of the eastern North Pacific non-tropical cyclone warning events observed from 01 January 2011 to 30 April 2011 found between 30N and the equator east of 140W were in the Gulf of Tehuantepec, driven by mid-latitude cold frontal passages through the narrow Isthmus of Tehuantepec. There were thirteen occurrences of gale force winds in the Gulf of Tehuantepec, with three of those events producing winds of storm force. All fifteen events are cataloged in *Table 2*.

The first significant and long-duration non-tropical cyclone warning event of the period began at 1200 UTC 11 January in the Gulf of Tehuantepec. This storm-force event was associated with a surface cold front that moved across the Gulf of Mexico and was followed by a strong high pressure ridge that built in across portions of northern Mexico and along the eastern Mexican coast southward to the Chivela Pass. *Figure 1* shows the National Weather Service Unified Surface Analysis from 1800 UTC 12 January depicting the position of the cold front across the Yucatan Channel and Peninsula as well as the strong 1041 hPa surface high centered over northeastern Mexico.

The event began with winds of gale force as captured by a 1537 UTC 12 January pass of the MetOp Advanced SCATterometer (ASCAT) shown in *Figure 7*, and the ships the **Arcadia** (ZCDN9), which reported 40 kts at 1400 UTC 11 January and maximum seas of 2.8 m (9 ft), and the **Essen Express** (DHEE), which reported 45 kts at 1800 UTC 12 January with maximum seas of 6.1 m (20 ft), highlighted in *Figure 6*. In summary, this particular gale force event lasted 102 total hours with 36 hours of storm force winds during the peak of the wind surge through the Isthmus of Tehuantepec.

A gale force wind event not related to the Gulf of Tehuantepec region was a relatively long lived Gulf of California gale that lasted 30 hours beginning 1800 UTC 02 February. A recent study, Cohen et al. 2010, showed from specific western United States observations that gales may be more frequent in the Gulf of California than previously recognized. Strong surface troughing across northwestern Mexico along with a high pressure ridge anchored by a 1033 hPa high centered over the northeast Pacific Ocean near 37N134W was responsible for a tight pressure gradient over the Gulf of California. This resulted in strong northerly flow across the entire Gulf of California. Unfortunately, the ASCAT instrument never traversed the entire Gulf of California and ship observations remained very limited in this region. However, *Figure 8* shows a 0354 UTC

Table 2. Non-tropical cyclone warnings issued for the subtropical and tropical eastern North Pacific between 01 January 2011 and 30 April 2011.

Onset	Region	Peak Wind Speed	Gale/Storm Duration
0000 UTC 03 Jan	Gulf of Tehuantepec	35 kts	18 hr
1200 UTC 11 Jan	Gulf of Tehuantepec	50 kts	102 hr / 36 hr
1800 UTC 26 Jan	Gulf of Tehuantepec	35 kts	18 hr
0600 UTC 28 Jan	Gulf of Tehuantepec	35 kts	24 hr
1800 UTC 02 Feb	Gulf of California	40 kts	30 hr
0000 UTC 03 Feb	Gulf of Tehuantepec	35 kts	24 hr
0000 UTC 05 Feb	Gulf of Tehuantepec	35 kts	18 hr
0000 UTC 08 Feb	Gulf of Tehuantepec	50 kts	24 hr / 06 hr
1800 UTC 10 Feb	Gulf of Tehuantepec	35 kts	18 hr
0000 UTC 11 Feb	Gulf of Tehuantepec	50 kts	90 hr / 18 hr
1800 UTC 01 Mar	Gulf of Tehuantepec	35 kts	24 hr
1800 UTC 06 Mar	Gulf of Tehuantepec	35 kts	18 hr
1500 UTC 10 Mar	Gulf of Tehuantepec	45 kts	33 hr
0600 UTC 20 Mar	High Seas - Cold Front	35 kts	18 hr
0000 UTC 06 Apr	Gulf of Tehuantepec	40 kts	12 hr

03 February ASCAT pass that clipped the far southern gulf waters. Data from previous events would suggest that gale force winds likely occurred over the central waters of the Gulf of California.

References

Hebert, P.J., and K.O. Poteat, 1975: A satellite classification technique for subtropical cyclones. NOAA Technical Memorandum NWS SR-83. U.S. Dept. of Commerce, National Weather Service Southern Region, Fort Worth, TX, 76102, 25 pp.

Cohen, Ariel E. and Cangialosi, John P., 2010: An Observational and High-Resolution Model Analysis of Gale Wind Events in the Gulf of California. Wea. Forecasting, 25, 613-626.

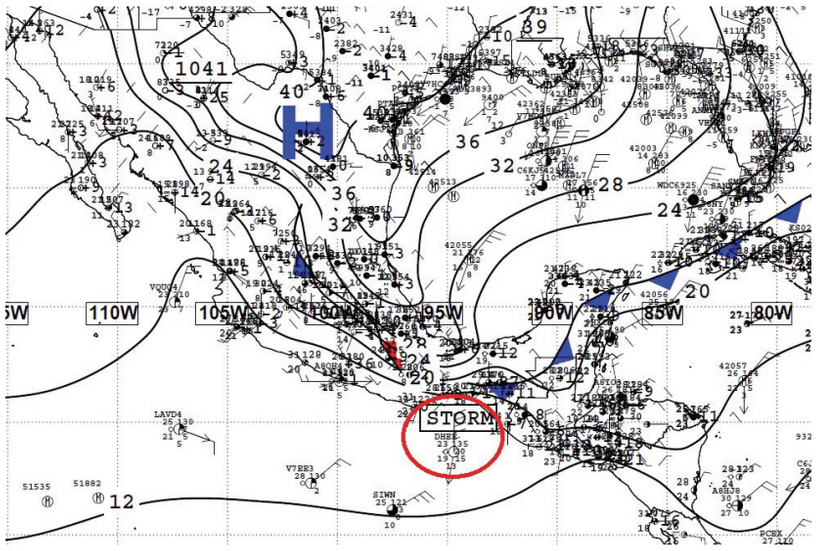


Figure 6. The National Weather Service Unified Surface Analysis at 1800 UTC 12 January 2011. Note the cold front passage ushering in a surge of storm force northerly winds into the Gulf of Tehuantepec region. A ship observation of a north wind at 45 kts is circled in red.

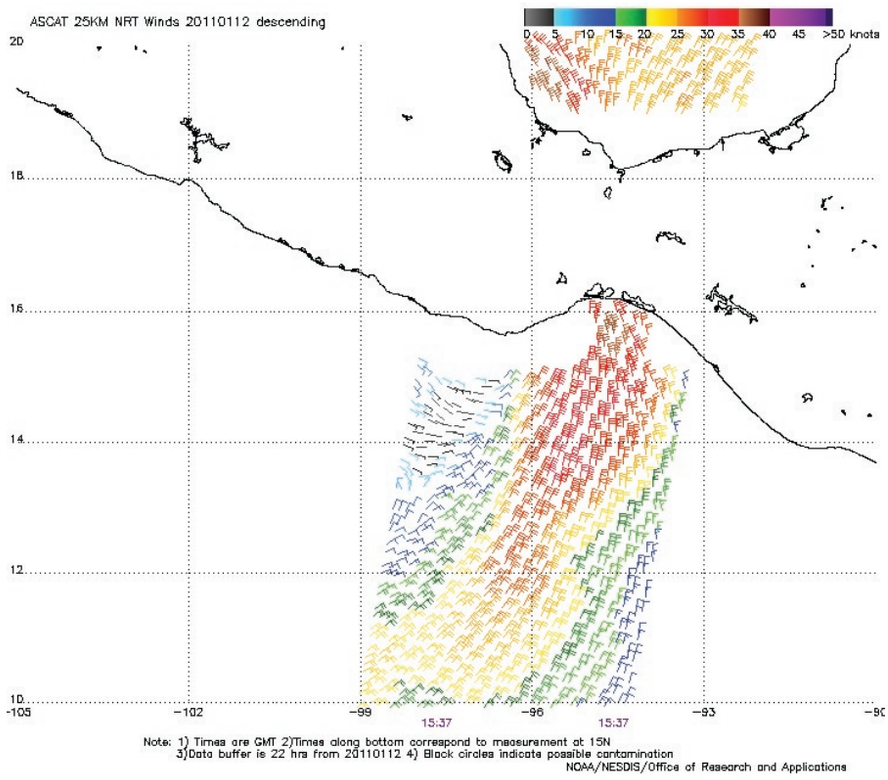


Figure 7. Ocean vector wind retrievals from an ASCAT pass on 1537 UTC 12 January 2011. Note the large swath of winds to gale force in the Gulf of Tehuantepec and area extending south-southwest.

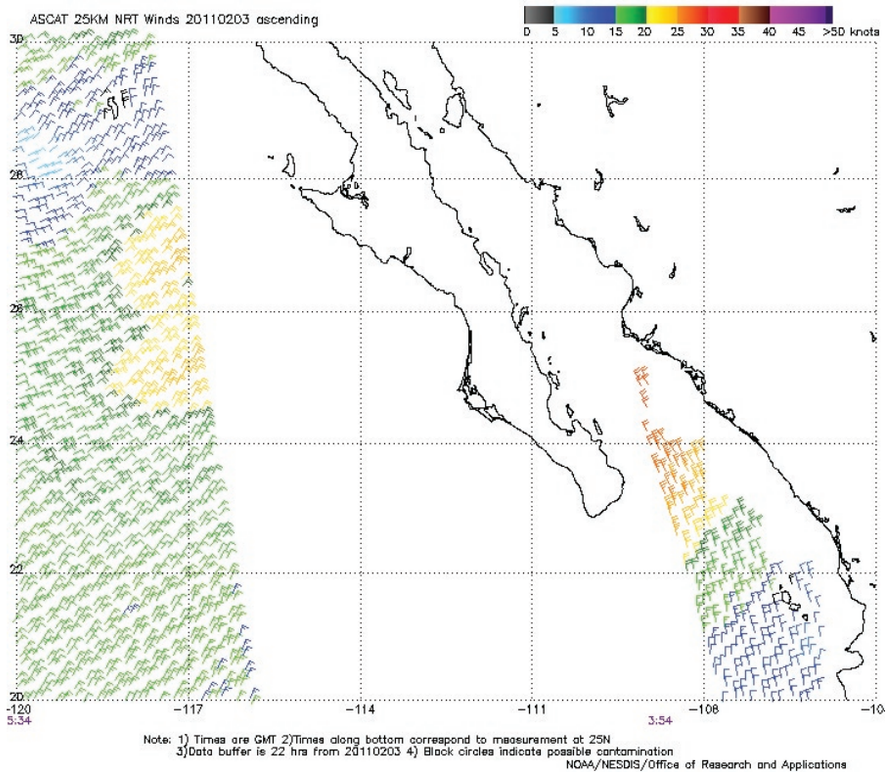


Figure 8. Ocean vector wind retrievals from the ASCAT pass on 0354 UTC 03 February 2011. Gale force winds likely occurred north of 23N across the central Gulf of California waters.

National Weather Service VOS Program New Recruits:

March 1, 2011 through June 30, 2011

SHIP NAME	CALL SIGN
Achievement	WDF2728
Algoma Discovery	CFK9796
Algoma Guardian	CFK9698
APL Coral	WDF6832
Atlantic Lily	VREF6
Baltic Bear	V7QN4
Baltic Cove	A8VG9
Baltic Wolf	V7QX8
Berra K	TCTH9
CMA CGM La Scala	2CSE5
Costa Marina	IBNC
Costa Romantica	IBCR
Deepseas Metro I	ZCED8
Disney Dream	C6YR6
Eland	DYLD
Eships Dana	ZDJT6
Fairchem Friesian	V7PU7
Federal Saguenay	8PNQ
Genco Raptor	V7NB8
Golden Eagle	V7TF7
Lowlands Brilliance	ONDC
Maersk Winnipeg	VRGI7
Mineral Ningbo	ONGA
Morning Haruka	A8GK7
Mukaddes Kalkavan	TCSU2
NYK Nebula	3ENG6

SHIP NAME	CALL SIGN
Olive L. Moore	WDF7019
Orange Star	A8WP6
Overseas Andromar	V7HP4
Overseas Tampa	WOTA
Peace Voyage	VRHO5
Safmarine Makutu	MRWF2
Saga Monal	VRZQ9
Tangguh Hiri	C6XC2
Tridonawati	ELNY2
Tyco Dependable	V7DI6
USCG Mellon	WMEL
USNS Washington Chambers T-AKE-11	NCHA

38 NEW RECRUITS! WAY TO GO!!!

VOS Cooperative Ship Report:
January through June 2011

Ship Name	Call	PMO	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
Achievement	WDF2728	Anchorage	0	0	0	0	47	29	0	0	0	0	0	0	76
Advantage	WPPO	Norfolk	4	0	9	13	8	37	0	0	0	0	0	0	71
Adventure Of The Seas	C6SA3	Miami	156	244	380	334	396	290	0	0	0	0	0	0	1800
Adventurer	WBN3015	Jacksonville	1	20	2	16	3	19	0	0	0	0	0	0	61
Al Huwaila	C6VG2	Anchorage	24	17	11	5	1	0	0	0	0	0	0	0	58
Al Khuwair	C6VM6	Anchorage	0	20	37	12	16	6	0	0	0	0	0	0	91
Al Marrouna	C6VF5	Anchorage	53	60	46	52	52	38	0	0	0	0	0	0	301
Alaska Mariner	WSM5364	Kodiak	9	33	7	34	25	85	0	0	0	0	0	0	193
Alaska Titan	WDE4789	Kodiak	12	0	0	0	0	0	0	0	0	0	0	0	12
Alaskan Explorer	WDB9918	Valdez	87	77	32	26	88	124	0	0	0	0	0	0	434
Alaskan Frontier	WDB7815	Valdez	40	17	34	45	0	68	0	0	0	0	0	0	204
Alaskan Legend	WDD2074	Valdez	23	60	116	101	0	36	0	0	0	0	0	0	336
Alaskan Navigator	WDC6644	Valdez	13	40	55	49	7	0	0	0	0	0	0	0	164
Albemarle Island	C6LU3	Miami	50	32	34	33	50	35	0	0	0	0	0	0	234
Alert	WCZ7335	Valdez	2	24	20	42	21	4	0	0	0	0	0	0	113
Algolake	VCPX	Chicago	0	0	0	0	3	0	0	0	0	0	0	0	3
Algoma Discovery	CFK9796	Chicago	0	0	0	0	0	13	0	0	0	0	0	0	13
Algoma Guardian	CFK9698	Chicago	0	0	0	7	11	9	0	0	0	0	0	0	27
Algoma Spirit	CFN4309	Chicago	0	8	50	8	5	15	0	0	0	0	0	0	86
Algorail	VYNG	Chicago	0	0	0	0	1	108	0	0	0	0	0	0	109
Algoway	VDFP	Chicago	0	0	0	1	38	38	0	0	0	0	0	0	77
Algowood	VCTD	Chicago	0	0	0	3	3	1	0	0	0	0	0	0	7
Alliance Beaumont	WKDY	Houston	30	25	0	0	27	59	0	0	0	0	0	0	141
Alliance Charleston	WRAH	Charleston	29	24	29	55	62	33	0	0	0	0	0	0	232
Alliance St Louis	WGAE	Charleston	12	21	5	27	19	39	0	0	0	0	0	0	123
Allure Of The Seas	C6XS8	Miami	7	15	1	2	0	0	0	0	0	0	0	0	25
Alpena	WAV4647	Chicago	0	0	3	11	2	10	0	0	0	0	0	0	26

Ship Name	Call	PMO	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
Altair Voyager	C6OK	Baltimore	3	0	2	18	41	5	0	0	0	0	0	0	69
American Century	WDD2876	Chicago	55	0	78	299	306	309	0	0	0	0	0	0	1047
American Courage	WDD2879	Chicago	0	0	0	0	5	7	0	0	0	0	0	0	12
American Integrity	WDD2875	Chicago	42	0	13	79	57	25	0	0	0	0	0	0	216
American Mariner	WQZ7791	Chicago	0	0	6	38	25	22	0	0	0	0	0	0	91
American Spirit	WCX2417	Chicago	16	0	7	39	56	76	0	0	0	0	0	0	194
American Tern	WAHF	Jacksonville	4	18	13	27	45	16	0	0	0	0	0	0	123
Amsterdam	PBAD	Anchorage	55	34	42	31	81	165	0	0	0	0	0	0	408
Andromeda Voyager	C6FZ6	Anchorage	9	45	20	59	25	10	0	0	0	0	0	0	168
Antonis I. Angelicoussis	C6FP5	Anchorage	72	74	26	23	65	72	0	0	0	0	0	0	332
Antwerpen	VRBK6	Anchorage	64	53	111	67	69	74	0	0	0	0	0	0	438
APL Agate	WDE8265	New York City	55	41	41	43	28	48	0	0	0	0	0	0	256
APL Belgium	9VKQ3	Los Angeles	73	23	8	53	25	14	0	0	0	0	0	0	196
APL Cairo	S6HU3	Anchorage	0	0	0	0	0	9	0	0	0	0	0	0	9
APL China	WDB3161	Los Angeles	70	90	65	61	48	31	0	0	0	0	0	0	365
APL Coral	WDF6832	Charleston	6	5	0	3	16	7	0	0	0	0	0	0	37
APL Cyprine	WDE8293	Charleston	1	14	3	13	9	16	0	0	0	0	0	0	56
APL England	9VDD2	Anchorage	76	8	23	28	57	51	0	0	0	0	0	0	243
APL Garnet	9VVN	Seattle	6	11	15	11	23	0	0	0	0	0	0	0	66
APL Ireland	9V8988	Seattle	22	58	0	0	0	0	0	0	0	0	0	0	80
APL Japan	WDE8288	New York City	45	41	24	30	34	50	0	0	0	0	0	0	224
APL Kennedy	9VAY4	Charleston	40	20	29	3	0	0	0	0	0	0	0	0	92
APL Korea	WCX8883	Los Angeles	30	145	217	279	37	28	0	0	0	0	0	0	736
APL Pearl	WDE8264	New York City	200	58	67	90	117	79	0	0	0	0	0	0	611
APL Philippines	WCX8884	Los Angeles	34	19	44	39	18	22	0	0	0	0	0	0	176
APL Scotland	9VDD3	Los Angeles	30	41	2	25	31	50	0	0	0	0	0	0	179
APL Singapore	WCX8812	Los Angeles	38	44	35	21	25	16	0	0	0	0	0	0	179
APL Spinel	9VVK	New York City	4	32	46	2	5	3	0	0	0	0	0	0	92

Ship Name	Call	PMO	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
APL Tennessee	9HA2064	Los Angeles	40	30	27	27	0	0	0	0	0	0	0	0	124
APL Texas	VRFH2	Los Angeles	0	11	54	14	42	5	0	0	0	0	0	0	126
APL Thailand	WCX8882	Los Angeles	49	48	34	39	12	42	0	0	0	0	0	0	224
APL Tourmoline	9VVP	Charleston	0	0	0	0	0	21	0	0	0	0	0	0	21
APL Turquoise	9VVY	New York City	29	0	0	0	0	0	0	0	0	0	0	0	29
APL Washington	VRFD6	Los Angeles	0	0	0	0	0	13	0	0	0	0	0	0	13
Aquarius Voyager	C6UC3	Jacksonville	4	18	8	47	8	10	0	0	0	0	0	0	95
Arctic Bear	WBP3396	Kodiak	0	0	0	10	2	1	0	0	0	0	0	0	13
Arctic Ocean	C6T2062	New York City	3	41	23	51	42	32	0	0	0	0	0	0	192
Arcturus Voyager	C6YA7	Anchorage	1	0	26	11	93	64	0	0	0	0	0	0	195
Aries Voyager	C6UK7	Anchorage	57	76	69	51	33	12	0	0	0	0	0	0	298
Arthur M. Anderson	WE4805	Chicago	156	0	32	200	147	84	0	0	0	0	0	0	619
Atlantic Breeze	VRDC6	Anchorage	20	32	16	24	15	14	0	0	0	0	0	0	121
Atlantic Cartier	SCKB	Norfolk	38	22	28	18	15	24	0	0	0	0	0	0	145
Atlantic Explorer	WDC9417	Anchorage	0	0	0	0	1	0	0	0	0	0	0	0	1
Atlantic Explorer (AWS)	NWS0021	Anchorage	0	116	388	194	181	410	0	0	0	0	0	0	1289
Atlantic Frontier	VRDJ7	Anchorage	0	0	0	6	1	0	0	0	0	0	0	0	7
Atlantic Gemini	VRDO9	Anchorage	0	219	36	0	0	0	0	0	0	0	0	0	255
Atlantic Grace	VRDT7	Anchorage	17	47	463	363	136	44	0	0	0	0	0	0	1070
Atlantic Lily	VREF6	Anchorage	0	0	10	22	37	38	0	0	0	0	0	0	107
Atlantic Ocean	C6T2064	New York City	20	0	31	31	20	21	0	0	0	0	0	0	123
Atlantis (AWS)	NWS0020	Kodiak	0	0	262	153	733	710	0	0	0	0	0	0	1858
Attentive	WCZ7337	Valdez	0	9	18	74	0	0	0	0	0	0	0	0	101
Aurora	WYM9567	Valdez	160	286	273	314	340	635	0	0	0	0	0	0	2008
Aware	WCZ7336	Valdez	0	0	33	0	0	0	0	0	0	0	0	0	33
Axel Spirit	C6FY5	Anchorage	57	80	86	80	86	76	0	0	0	0	0	0	465
Azamara Journey	9HOB8	Miami	39	142	83	44	4	3	0	0	0	0	0	0	315
Azamara Quest	9HOM8	Anchorage	36	37	51	24	51	31	0	0	0	0	0	0	230
Badger	WBD4889	Chicago	0	0	0	0	0	13	0	0	0	0	0	0	13

Ship Name	Call	PMO	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
Baltic Bear	V7QN4	Anchorage	0	0	0	0	52	45	0	0	0	0	0	0	97
Baltic Cove	A8VG9	Anchorage	0	0	1	11	6	1	0	0	0	0	0	0	19
Baltic Wolf	V7QX8	Anchorage	0	0	64	11	0	20	0	0	0	0	0	0	95
Barbara Andrie	WTC9407	Chicago	1	0	2	10	5	21	0	0	0	0	0	0	39
Barbara Foss	WYL4318	Kodiak	7	0	14	8	2	0	0	0	0	0	0	0	31
Barrington Island	C6QK	Miami	38	52	51	35	50	59	0	0	0	0	0	0	285
Bell M. Shimada (AWS)	NWS0025	Seattle	0	0	227	331	185	240	0	0	0	0	0	0	983
Berge Nantong	VRBU6	Anchorage	182	493	156	105	60	47	0	0	0	0	0	0	1043
Berge Ningbo	VRBQ2	Anchorage	2	0	1	0	41	79	0	0	0	0	0	0	123
Berlian Ekuator	HPYK	Anchorage	30	5	23	17	0	0	0	0	0	0	0	0	75
Bernardo Quintana A.	C6KJ5	New Orleans	67	61	68	72	54	62	0	0	0	0	0	0	384
Bismarck Sea	WDE5016	Kodiak	1	0	0	0	0	1	0	0	0	0	0	0	2
Bluefin	WDC7379	Seattle	0	0	0	0	2	58	0	0	0	0	0	0	60
Brilliance Of The Seas	C6SJ5	Miami	0	0	0	1	0	0	0	0	0	0	0	0	1
Buccaneer	WYW5588	Valdez	0	0	1	5	11	0	0	0	0	0	0	0	17
Buffalo	WXS6134	Chicago	12	0	0	0	0	0	0	0	0	0	0	0	12
Bulwark	WBN4113	Valdez	16	4	20	18	60	59	0	0	0	0	0	0	177
Burns Harbor	WDC6027	Chicago	28	0	0	36	49	47	0	0	0	0	0	0	160
California Voyager	WDE5381	San Francisco	42	2	6	31	55	13	0	0	0	0	0	0	149
Calumet	WDE3568	Chicago	0	0	0	0	2	8	0	0	0	0	0	0	10
Camai	KF003	Kodiak	0	0	0	0	6	0	0	0	0	0	0	0	6
Canadian Progress	VDRV	Chicago	17	0	1	34	28	10	0	0	0	0	0	0	90
Capelin	KF006	Anchorage	0	0	0	0	0	1	0	0	0	0	0	0	1
Capricorn Voyager	C6UZ5	Anchorage	29	9	15	11	1	15	0	0	0	0	0	0	80
Capt. Henry Jackman	VCTV	Chicago	0	0	0	5	4	2	0	0	0	0	0	0	11
Carnival Conquest	3FPQ9	Houston	23	14	13	11	9	59	0	0	0	0	0	0	129
Carnival Destiny	C6FN4	Miami	38	29	23	53	57	125	0	0	0	0	0	0	325
Carnival Dream	3ETA7	Jacksonville	30	49	35	8	7	30	0	0	0	0	0	0	159

Ship Name	Call	PMO	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
Carnival Ecstasy	H3GR	Miami	15	5	0	12	24	18	0	0	0	0	0	0	74
Carnival Elation	3FOC5	New Orleans	0	9	13	15	9	1	0	0	0	0	0	0	47
Carnival Fantasy	H3GS	Charleston	11	6	12	12	3	30	0	0	0	0	0	0	74
Carnival Fascination	C6FM9	Jacksonville	2	0	3	6	83	39	0	0	0	0	0	0	133
Carnival Freedom	3EBL5	Miami	23	5	7	16	67	46	0	0	0	0	0	0	164
Carnival Glory	3FPS9	Miami	49	40	39	48	8	8	0	0	0	0	0	0	192
Carnival Imagination	C6FN2	Miami	33	43	40	49	3	34	0	0	0	0	0	0	202
Carnival Inspiration	C6FM5	Miami	74	46	15	3	26	16	0	0	0	0	0	0	180
Carnival Legend	H3VT	Miami	0	0	0	0	5	3	0	0	0	0	0	0	8
Carnival Liberty	HPYE	Miami	26	21	46	51	35	53	0	0	0	0	0	0	232
Carnival Miracle	H3VS	Miami	4	57	49	52	48	42	0	0	0	0	0	0	252
Carnival Paradise	3FOB5	Los Angeles	11	6	26	28	31	36	0	0	0	0	0	0	138
Carnival Pride	H3VU	Jacksonville	0	0	0	4	23	22	0	0	0	0	0	0	49
Carnival Sensation	C6FM8	Jacksonville	25	43	10	1	0	0	0	0	0	0	0	0	79
Carnival Spirit	3FPR9	Anchorage	51	41	23	5	11	9	0	0	0	0	0	0	140
Carnival Splendor	3EUS	Anchorage	0	9	35	41	35	42	0	0	0	0	0	0	162
Carnival Triumph	C6FN5	New Orleans	0	19	31	17	19	18	0	0	0	0	0	0	104
Carnival Valor	H3VR	Miami	41	4	43	13	6	4	0	0	0	0	0	0	111
Carnival Victory	3FFL8	Miami	22	24	18	8	19	59	0	0	0	0	0	0	150
Caroline Maersk	OZWA2	Seattle	0	0	37	42	39	41	0	0	0	0	0	0	159
Cason J. Callaway	WE4879	Chicago	3	0	32	56	21	22	0	0	0	0	0	0	134
Castor Voyager	C6UZ6	Anchorage	0	66	20	62	64	23	0	0	0	0	0	0	235
Celebrity Century	9HJI9	Miami	142	93	54	115	30	152	0	0	0	0	0	0	586
Celebrity Constellation	9HJB9	Miami	417	530	351	319	312	305	0	0	0	0	0	0	2234
Celebrity Eclipse	9HXC9	Miami	649	636	692	629	659	628	0	0	0	0	0	0	3893
Celebrity Equinox	9HXD9	Miami	319	267	573	580	536	466	0	0	0	0	0	0	2741
Celebrity Infinity	9HJD9	Miami	27	45	147	75	85	84	0	0	0	0	0	0	463
Celebrity Mercury	9HJG9	Miami	0	388	0	0	0	0	0	0	0	0	0	0	388
Celebrity Millennium	9HJF9	Anchorage	194	296	287	186	227	246	0	0	0	0	0	0	1436

Ship Name	Call	PMO	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
Celebrity Solstice	9HRJ9	Miami	546	526	353	427	388	296	0	0	0	0	0	0	2536
Celebrity Summit	9HJC9	Miami	85	90	235	192	264	242	0	0	0	0	0	0	1108
Centurion	WBN3022	Jacksonville	9	11	6	0	3	0	0	0	0	0	0	0	29
Chaconia	ONCA	Houston	23	25	30	33	2	0	0	0	0	0	0	0	113
Charles Island	C6JT	Miami	48	16	14	21	19	4	0	0	0	0	0	0	122
Charleston Express	WDD6126	Houston	91	96	119	131	101	96	0	0	0	0	0	0	634
Chemical Pioneer	KAFO	New York City	0	44	25	22	11	13	0	0	0	0	0	0	115
Chukchi Sea	WED2281	Kodiak	0	0	0	3	0	0	0	0	0	0	0	0	3
CMA Cgm Racine	9HA2362	New York City	21	0	0	0	0	0	0	0	0	0	0	0	21
CMB Biwa	ONED	Anchorage	6	3	0	0	0	0	0	0	0	0	0	0	9
Commitment	WDE3894	Kodiak	8	14	0	5	46	26	0	0	0	0	0	0	99
Corwith Cramer	WTF3319	Kodiak	0	7	25	0	17	21	0	0	0	0	0	0	70
Costa Allegra	ICRA	Anchorage	17	8	4	0	0	0	0	0	0	0	0	0	29
Costa Atlantica	IBLQ	Miami	1	3	14	0	0	0	0	0	0	0	0	0	18
Costa Concordia	IBHD	Anchorage	0	120	197	213	425	363	0	0	0	0	0	0	1318
Costa Fortuna	IBNY	Miami	111	172	134	21	0	0	0	0	0	0	0	0	438
Costa Luminosa	ICGU	Anchorage	0	3	1	0	0	0	0	0	0	0	0	0	4
Costa Magica	IBQQ	Anchorage	0	3	1	0	0	0	0	0	0	0	0	0	4
Costa Marina	IBNC	Anchorage	0	15	90	40	53	157	0	0	0	0	0	0	355
Costa Mediterranea	IBCF	Anchorage	0	3	22	53	1	0	0	0	0	0	0	0	79
Costa Romantica	IBCR	Anchorage	0	39	61	55	30	3	0	0	0	0	0	0	188
Costa Serena	ICAZ	Anchorage	0	3	1	0	0	0	0	0	0	0	0	0	4
Courage	WDC6907	Baltimore	4	1	22	16	4	0	0	0	0	0	0	0	47
Courage	WDE3893	Kodiak	11	2	5	7	15	1	0	0	0	0	0	0	41
Cross Point	WCW8728	Anchorage	0	0	0	0	1	0	0	0	0	0	0	0	1
Cross Point	WDA3423	Kodiak	0	0	0	0	1	0	0	0	0	0	0	0	1
Crowned Eagle	V7QP4	Anchorage	1	1	1	9	0	2	0	0	0	0	0	0	14
Crystal Marine	9VIC4	Anchorage	11	6	0	4	15	20	0	0	0	0	0	0	56

Ship Name	Call	PMO	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
CSL Assiniboine	VCKQ	Chicago	0	0	0	0	11	0	0	0	0	0	0	0	11
CSL Niagara	VCGJ	Chicago	0	0	0	11	1	0	0	0	0	0	0	0	12
Darya Shanthi	VRXB2	Anchorage	2	57	66	114	19	18	0	0	0	0	0	0	276
Darya Tara	VRWS5	Anchorage	16	0	0	0	0	0	0	0	0	0	0	0	16
Deepwater Millennium	V7HD2	New Orleans	29	23	33	39	27	28	0	0	0	0	0	0	179
Defender	WBN3016	Jacksonville	1	0	0	40	11	29	0	0	0	0	0	0	81
Delaware II	KNBD	New York City	156	370	0	0	204	389	0	0	0	0	0	0	1119
Delaware II (AWS)	NWS0012	New York City	195	408	0	0	465	0	0	0	0	0	0	0	1068
Deliverance	WDE2632	Valdez	1	0	0	7	37	26	0	0	0	0	0	0	71
Diane H	WUR7250	Kodiak	0	0	0	4	7	8	0	0	0	0	0	0	19
Discoverer Clear Leader	V7MO2	New Orleans	103	93	76	67	86	67	0	0	0	0	0	0	492
Discoverer Deep Seas	V7HC6	New Orleans	200	150	148	179	179	200	0	0	0	0	0	0	1056
Discoverer Spirit	V7HC8	New Orleans	78	48	28	17	13	0	0	0	0	0	0	0	184
Disney Dream	C6YR6	Jacksonville	0	0	0	32	48	2	0	0	0	0	0	0	82
Disney Magic	C6PT7	Jacksonville	19	31	58	52	1	46	0	0	0	0	0	0	207
Disney Wonder	C6QM8	Jacksonville	54	58	92	31	165	133	0	0	0	0	0	0	533
Dominator	WBZ4106	Valdez	0	18	31	4	0	15	0	0	0	0	0	0	68
Drew Foss	WYL5718	Kodiak	12	7	8	15	4	0	0	0	0	0	0	0	46
Duncan Island	C6JS	Miami	50	44	50	32	53	43	0	0	0	0	0	0	272
Dynamic Energy	C6FT3	Anchorage	25	14	21	11	12	0	0	0	0	0	0	0	83
Eagle Albany	S6TD	Houston	0	0	145	216	127	155	0	0	0	0	0	0	643
Eagle Anaheim	S6TF	New Orleans	55	19	4	0	0	0	0	0	0	0	0	0	78
Eagle Phoenix	9VKH2	Houston	0	2	0	0	0	0	0	0	0	0	0	0	2
Eagle Stavanger	3FNZ5	Houston	0	7	4	0	0	0	0	0	0	0	0	0	11
Eagle Toledo	S6NK3	New Orleans	24	21	17	9	26	34	0	0	0	0	0	0	131
Eagle Torrance	9VMG5	Houston	17	19	19	5	4	0	0	0	0	0	0	0	64
Edgar B. Speer	WQZ9670	Chicago	0	0	12	103	75	44	0	0	0	0	0	0	234
Edwin H. Gott	WXQ4511	Chicago	0	0	0	4	38	46	0	0	0	0	0	0	88
El Faro	WFJK	Jacksonville	0	16	19	8	3	32	0	0	0	0	0	0	78

Ship Name	Call	PMO	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
El Morro	KCGH	Jacksonville	6	9	18	36	31	33	0	0	0	0	0	0	133
El Yunque	WGJT	Jacksonville	51	47	39	9	63	72	0	0	0	0	0	0	281
Eland	DYLD	Miami	0	0	0	8	27	46	0	0	0	0	0	0	81
Elversele	ONCT	Jacksonville	0	0	0	0	57	77	0	0	0	0	0	0	134
Empire State	KKFW	New York City	0	0	0	0	105	136	0	0	0	0	0	0	241
Enchantment Of The Seas	C6FZ7	Miami	0	33	27	17	5	1	0	0	0	0	0	0	83
Endeavor (AWS)	NWS0022	New York City	617	671	715	692	598	720	0	0	0	0	0	0	4013
Endurance	WDA3359	Valdez	42	14	14	9	44	40	0	0	0	0	0	0	163
Endurance	WDE9586	Houston	62	31	125	51	61	10	0	0	0	0	0	0	340
Ensign	WBN3012	Jacksonville	4	0	0	9	17	20	0	0	0	0	0	0	50
EOT Spar	WDE9193	Miami	41	34	44	34	45	45	0	0	0	0	0	0	243
Erkan K	V7ND9	Norfolk	0	0	6	34	20	5	0	0	0	0	0	0	65
Ernest N	A8PQ6	Anchorage	14	0	0	46	23	14	0	0	0	0	0	0	97
Eships Dana	ZDJT6	Anchorage	0	0	10	24	47	61	0	0	0	0	0	0	142
Eships Nahyan	ZDIY2	Anchorage	1	0	0	0	0	0	0	0	0	0	0	0	1
Eurodam	PHOS	Miami	11	10	23	51	29	15	0	0	0	0	0	0	139
Eurus Lima	A8MH9	New Orleans	0	0	0	18	27	13	0	0	0	0	0	0	58
Eurus Lisbon	A8MI2	New Orleans	4	7	15	12	7	11	0	0	0	0	0	0	56
Ever Dainty	9V7951	Norfolk	23	8	18	12	17	11	0	0	0	0	0	0	89
Ever Delight	3FCB8	New York City	91	85	88	55	0	10	0	0	0	0	0	0	329
Ever Deluxe	9V7953	New York City	20	5	3	6	1	0	0	0	0	0	0	0	35
Ever Develop	3FLF8	New York City	0	26	22	17	0	12	0	0	0	0	0	0	77
Ever Diadem	9V7955	New York City	13	1	12	0	4	25	0	0	0	0	0	0	55
Ever Diamond	3FQS8	New York City	0	0	0	0	0	33	0	0	0	0	0	0	33
Ever Ethic	VQFS4	Seattle	25	24	4	12	2	0	0	0	0	0	0	0	67
Ever Excel	VSXV3	Los Angeles	15	53	38	61	56	58	0	0	0	0	0	0	281
Ever Radiant	3FFR4	Los Angeles	11	12	9	7	1	0	0	0	0	0	0	0	40
Ever Reach	3FQO4	New York City	5	1	22	5	5	0	0	0	0	0	0	0	38

Ship Name	Call	PMO	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
Ever Refine	3FSB4	New York City	62	69	31	66	12	9	0	0	0	0	0	0	249
Ever Result	3FSA4	New York City	2	1	0	0	2	6	0	0	0	0	0	0	11
Ever Reward	3FYB3	New York City	3	0	2	24	5	0	0	0	0	0	0	0	34
Ever Salute	3ENU5	Anchorage	33	10	8	7	0	0	0	0	0	0	0	0	58
Ever Steady	3EHT6	Anchorage	157	37	0	0	5	22	0	0	0	0	0	0	221
Ever Summit	3EKU3	Anchorage	0	0	0	0	0	7	0	0	0	0	0	0	7
Ever Uberty	9V7960	Seattle	0	0	0	0	0	57	0	0	0	0	0	0	57
Ever Ulysses	9V7962	Anchorage	0	0	0	3	0	1	0	0	0	0	0	0	4
Ever Unific	9V7961	Anchorage	0	0	0	0	69	11	0	0	0	0	0	0	80
Ever Union	3FFG7	Seattle	0	17	0	0	8	1	0	0	0	0	0	0	26
Ever Unique	9V7959	Seattle	2	0	0	0	0	4	0	0	0	0	0	0	6
Ever United	9V7957	Seattle	0	16	11	3	7	28	0	0	0	0	0	0	65
Ever Urban	3FXN9	Seattle	22	0	0	22	12	2	0	0	0	0	0	0	58
Ever Useful	3FCC9	Anchorage	0	0	0	0	0	28	0	0	0	0	0	0	28
Everest Spirit	C6FY8	Anchorage	40	97	102	45	43	38	0	0	0	0	0	0	365
Evergreen State	WDE4430	San Francisco	29	22	15	12	6	7	0	0	0	0	0	0	91
Excalibur	ONCE	Houston	52	82	108	90	67	63	0	0	0	0	0	0	462
Excel	ONAI	Houston	0	0	0	90	86	90	0	0	0	0	0	0	266
Excelerate	ONDY	Houston	0	0	0	52	31	61	0	0	0	0	0	0	144
Explorer	ONFE	Houston	92	73	86	74	76	67	0	0	0	0	0	0	468
Explorer	WBN7618	Jacksonville	1	0	0	0	0	0	0	0	0	0	0	0	1
Explorer Of The Seas	C6SE4	New York City	30	32	56	28	27	23	0	0	0	0	0	0	196
Fairchem Friesian	V7PU7	Anchorage	0	14	9	14	33	0	0	0	0	0	0	0	70
Fairchem Mustang	HPOW	Anchorage	9	18	5	7	10	0	0	0	0	0	0	0	49
Fairchem Steed	3EBR5	Anchorage	0	9	9	3	0	0	0	0	0	0	0	0	21
Fairweather	WDB5604	Kodiak	1	0	0	0	2	14	0	0	0	0	0	0	17
Fairweather	WTEB	Anchorage	0	0	0	0	0	578	0	0	0	0	0	0	578
Fairweather (AWS)	NWS0004	Anchorage	0	0	0	0	169	121	0	0	0	0	0	0	290
Federal Asahi	VRWG3	Anchorage	10	18	0	0	0	0	0	0	0	0	0	0	28

Ship Name	Call	PMO	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
Federal Maas	8POB	New Orleans	0	0	0	0	0	15	0	0	0	0	0	0	15
Federal Mackinac	V7RI8	Anchorage	32	1	2	6	3	1	0	0	0	0	0	0	45
Federal Saguenay	8PNQ	Anchorage	0	0	0	30	236	23	0	0	0	0	0	0	289
Federal Venture	VRXL7	Anchorage	17	7	10	33	17	38	0	0	0	0	0	0	122
Flanders Loyalty	ONEV	Houston	26	20	13	1	44	43	0	0	0	0	0	0	147
Florida Voyager	WDF4764	San Francisco	0	1	5	20	28	43	0	0	0	0	0	0	97
FMG Cloudbreak	ONFW	Anchorage	36	45	54	39	15	22	0	0	0	0	0	0	211
FMG Matilda	ONFN	Anchorage	0	0	0	0	21	28	0	0	0	0	0	0	49
Freedom	WDB5483	Jacksonville	12	3	2	1	17	0	0	0	0	0	0	0	35
Freedom Of The Seas	C6UZ7	Jacksonville	0	0	15	0	0	0	0	0	0	0	0	0	15
Freja Dania	A8LC2	Anchorage	0	0	2	22	28	29	0	0	0	0	0	0	81
Fritzi N	A8PQ4	Anchorage	0	13	65	6	0	13	0	0	0	0	0	0	97
Front Kathrine	V7QX2	Anchorage	17	61	55	42	36	5	0	0	0	0	0	0	216
Front Tina	A8HH5	Anchorage	12	0	0	0	0	0	0	0	0	0	0	0	12
Furth	V7MP5	Norfolk	1	14	31	40	18	12	0	0	0	0	0	0	116
G. L. Ostrander	WCV7620	Chicago	0	0	0	19	27	20	0	0	0	0	0	0	66
Gauntlet	WBN6511	Jacksonville	43	21	26	8	11	28	0	0	0	0	0	0	137
Gemini Voyager	C6FE5	Los Angeles	25	0	0	0	0	0	0	0	0	0	0	0	25
Genco Augustus	VRDD2	Anchorage	61	69	87	82	114	64	0	0	0	0	0	0	477
Genco Claudius	V7SY6	Anchorage	25	21	17	14	1	14	0	0	0	0	0	0	92
Genco Constantine	VRDR8	Anchorage	90	27	67	64	63	25	0	0	0	0	0	0	336
Genco Raptor	V7NB8	Anchorage	0	0	0	0	0	20	0	0	0	0	0	0	20
Genco Thunder	V7LZ4	Anchorage	30	14	4	0	0	0	0	0	0	0	0	0	48
Genco Tiberius	VRDD3	Anchorage	0	0	0	4	21	23	0	0	0	0	0	0	48
Genco Titus	VRDI7	Anchorage	45	64	68	2	0	10	0	0	0	0	0	0	189
George N	A8PQ5	Anchorage	0	144	184	401	0	27	0	0	0	0	0	0	756
Geysir	WCZ5528	Norfolk	6	31	75	70	26	0	0	0	0	0	0	0	208
Golden Bear	NMRY	San Francisco	0	0	0	0	16	64	0	0	0	0	0	0	80

Ship Name	Call	PMO	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
Golden Eagle	V7TF7	Anchorage	0	0	0	7	0	0	0	0	0	0	0	0	7
Golden State	WHDV	San Francisco	7	5	6	1	0	0	0	0	0	0	0	0	19
Gordon Gunter	WTEO	New Orleans	0	0	0	0	278	319	0	0	0	0	0	0	597
Gordon Gunter (AWS)	NWS0014	New Orleans	0	0	217	569	212	0	0	0	0	0	0	0	998
Grandeur Of The Seas	C6SE3	Miami	87	98	111	52	53	57	0	0	0	0	0	0	458
Great Republic	WDF7994	Chicago	0	0	0	0	0	60	0	0	0	0	0	0	60
Green Bay	WDD9433	Charleston	29	10	0	0	94	40	0	0	0	0	0	0	173
Green Dale	WCZ5238	Jacksonville	59	46	40	47	66	55	0	0	0	0	0	0	313
Green Ridge	WZZF	Jacksonville	83	59	11	34	37	26	0	0	0	0	0	0	250
Gretchen H	WDC9138	Kodiak	0	0	27	19	25	21	0	0	0	0	0	0	92
GSF C.R. Luigs	YJUF5	New Orleans	9	7	0	0	0	0	0	0	0	0	0	0	16
GSF Development Driller I	YJSW5	New Orleans	62	70	66	63	45	31	0	0	0	0	0	0	337
GSF Grand Banks	YJUF7	Houston	131	124	128	111	118	109	0	0	0	0	0	0	721
Guardian	WBO2511	Valdez	14	9	36	16	14	30	0	0	0	0	0	0	119
Gulf Reliance	WDD2703	Kodiak	10	34	5	14	0	0	0	0	0	0	0	0	63
Gulf Titan	WDA5598	Kodiak	8	17	9	1	8	4	0	0	0	0	0	0	47
H A Sklenar	C6CL6	New Orleans	99	63	84	64	71	61	0	0	0	0	0	0	442
H. Lee White	WZD2465	Chicago	3	0	0	3	40	40	0	0	0	0	0	0	86
Harmonious	VRCL9	Anchorage	21	0	44	56	76	0	0	0	0	0	0	0	197
Harriette	WRFJ	Houston	1	0	33	21	0	0	0	0	0	0	0	0	55
Hatsu Eagle	ZNZH6	Seattle	9	11	22	15	7	0	0	0	0	0	0	0	64
Healy	NEPP	Seattle	0	0	0	0	0	87	0	0	0	0	0	0	87
Healy (AWS)	NWS0003	Seattle	0	0	0	0	11	708	0	0	0	0	0	0	719
Helenka B	WAH5520	Anchorage	0	4	0	0	6	1	0	0	0	0	0	0	11
Henry B. Bigelow	WTDF	New York City	0	6	262	299	196	444	0	0	0	0	0	0	1207
Henry B. Bigelow (AWS)	NWS0017	New York City	0	57	0	0	0	0	0	0	0	0	0	0	57
Henry Goodrich	YJQN7	Houston	125	127	127	110	114	111	0	0	0	0	0	0	714
Herbert C. Jackson	WL3972	Chicago	11	0	1	25	51	58	0	0	0	0	0	0	146
Hi'ialakai	WTEY	Honolulu	0	0	68	66	14	0	0	0	0	0	0	0	148

Ship Name	Call	PMO	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
Hi'ialakai (AWS)	NWS0010	Honolulu	0	0	402	489	543	0	0	0	0	0	0	0	1434
High Glory	3EFV2	Anchorage	19	9	8	2	0	0	0	0	0	0	0	0	38
Hoegh Oslo	LAEK7	Jacksonville	7	0	11	32	14	0	0	0	0	0	0	0	64
Hon. James L. Oberstar	WL3108	Chicago	0	0	1	25	12	5	0	0	0	0	0	0	43
Honor	WDC6923	Baltimore	69	37	15	33	13	1	0	0	0	0	0	0	168
Hood Island	C6LU4	Miami	64	60	76	71	60	30	0	0	0	0	0	0	361
Horizon Anchorage	KGTX	Anchorage	146	185	189	169	136	179	0	0	0	0	0	0	1004
Horizon Challenger	WZJC	Houston	83	56	67	84	81	48	0	0	0	0	0	0	419
Horizon Consumer	WCHF	Los Angeles	38	39	40	46	14	81	0	0	0	0	0	0	258
Horizon Eagle	WDD6039	San Francisco	7	95	121	72	78	76	0	0	0	0	0	0	449
Horizon Enterprise	KRGB	San Francisco	69	64	71	75	66	53	0	0	0	0	0	0	398
Horizon Falcon	WDD6040	San Francisco	80	74	77	77	69	61	0	0	0	0	0	0	438
Horizon Hawk	WDD6033	San Francisco	32	31	42	90	57	54	0	0	0	0	0	0	306
Horizon Hunter	WDD6038	San Francisco	44	54	67	49	57	53	0	0	0	0	0	0	324
Horizon Kodiak	KGTZ	Anchorage	58	52	47	46	44	41	0	0	0	0	0	0	288
Horizon Navigator	WPGK	Jacksonville	71	121	150	156	171	171	0	0	0	0	0	0	840
Horizon Pacific	WSRL	San Francisco	72	62	39	17	47	35	0	0	0	0	0	0	272
Horizon Producer	WJBJ	Jacksonville	107	87	132	147	172	234	0	0	0	0	0	0	879
Horizon Reliance	WFLH	Los Angeles	48	32	69	63	76	68	0	0	0	0	0	0	356
Horizon Spirit	WFLG	Los Angeles	88	80	83	83	82	72	0	0	0	0	0	0	488
Horizon Tacoma	KGTY	Anchorage	32	3	49	48	46	52	0	0	0	0	0	0	230
Horizon Tiger	WDD6042	San Francisco	93	62	45	76	41	2	0	0	0	0	0	0	319
Horizon Trader	KIRH	New York City	62	62	85	85	88	89	0	0	0	0	0	0	471
Houston	KCDK	Miami	25	21	8	2	30	20	0	0	0	0	0	0	106
Hyundai No. 203	3FRY8	New York City	21	21	2	0	0	0	0	0	0	0	0	0	44
Independence II	WGAX	Baltimore	120	124	71	121	108	135	0	0	0	0	0	0	679
Independence Of The Seas	C6WW4	Miami	0	32	34	39	33	33	0	0	0	0	0	0	171
Indian Ocean	C6T2063	New York City	30	31	32	27	30	31	0	0	0	0	0	0	181

Ship Name	Call	PMO	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
Indiana Harbor	WXN3191	Chicago	28	0	0	75	75	71	0	0	0	0	0	0	249
Inland Seas	WCJ6214	Chicago	0	0	0	1	0	1	0	0	0	0	0	0	2
Integrity	WDD7905	Kodiak	0	0	0	0	3	6	0	0	0	0	0	0	9
Invader	WBO3337	Valdez	2	25	5	6	17	50	0	0	0	0	0	0	105
Island Scout	WDC6588	Kodiak	0	1	0	0	0	0	0	0	0	0	0	0	1
Iver Foss	WYE6442	Kodiak	0	0	0	0	0	4	0	0	0	0	0	0	4
James R. Barker	WYP8657	Chicago	9	0	37	124	76	114	0	0	0	0	0	0	360
Jean Anne	WDC3786	Los Angeles	122	63	35	59	91	81	0	0	0	0	0	0	451
Jeppesen Maersk	OWTW2	New York City	25	17	37	2	9	0	0	0	0	0	0	0	90
Jewel Of The Seas	C6FW9	Miami	0	36	44	14	6	4	0	0	0	0	0	0	104
John B. Aird	VCYP	Chicago	0	0	0	1	24	17	0	0	0	0	0	0	42
John G. Munson	WE3806	Chicago	20	0	0	70	80	16	0	0	0	0	0	0	186
Joides Resolution	D5BC	Norfolk	6	1	0	0	0	0	0	0	0	0	0	0	7
Joseph L. Block	WDA2768	Chicago	64	0	485	715	580	42	0	0	0	0	0	0	1886
Ka'imimoana	WTEU	Honolulu	35	67	73	58	27	0	0	0	0	0	0	0	260
Ka'imimoana (AWS)	NWS0009	Honolulu	317	533	593	479	254	0	0	0	0	0	0	0	2176
Kaministiqua	CFN4612	Chicago	1	0	0	0	0	0	0	0	0	0	0	0	1
Karen Andrie	WBS5272	Chicago	193	15	15	241	231	183	0	0	0	0	0	0	878
Karoline N	A8PQ8	Anchorage	1	160	50	60	54	0	0	0	0	0	0	0	325
Kasif Kalkavan	V7IX7	Norfolk	33	63	92	47	52	0	0	0	0	0	0	0	287
Kauai	WSRH	San Francisco	14	3	0	0	0	0	0	0	0	0	0	0	17
Kaye E. Barker	WCF3012	Chicago	7	0	9	38	43	59	0	0	0	0	0	0	156
Kennicott	WCY2920	Kodiak	8	0	0	4	0	2	0	0	0	0	0	0	14
Keswick	C6XE5	Anchorage	10	1	0	6	11	9	0	0	0	0	0	0	37
Kilo Moana	WDA7827	Honolulu	14	27	37	20	58	49	0	0	0	0	0	0	205
Kings Pointer	WTDL	New York City	0	0	0	0	399	459	0	0	0	0	0	0	858
Kiyi	KAO107	Chicago	0	0	0	0	26	20	0	0	0	0	0	0	46
Knorr (AWS)	NWS0029	New York City	117	173	744	720	734	720	0	0	0	0	0	0	3208
Kodiak	KQXZ	Valdez	0	0	1	28	54	0	0	0	0	0	0	0	83

Ship Name	Call	PMO	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
Kodiak King	WCE8949	Kodiak	0	0	0	1	0	0	0	0	0	0	0	0	1
Kota Halus	9V8258	Anchorage	32	26	0	0	0	0	0	0	0	0	0	0	58
Kota Harum	9VFF8	Anchorage	0	0	0	0	40	55	0	0	0	0	0	0	95
Kota Jati	VRWJ7	Anchorage	41	44	22	26	33	5	0	0	0	0	0	0	171
Kota Jaya	VRWM2	Anchorage	19	33	27	33	24	14	0	0	0	0	0	0	150
Laurence M. Gould (AWS)	WCX7445	New Orleans	593	536	700	669	497	710	0	0	0	0	0	0	3705
Lavender Passage	3FJY6	Anchorage	0	7	22	10	0	0	0	0	0	0	0	0	39
Lee A. Tregurtha	WUR8857	Chicago	0	0	1	2	14	33	0	0	0	0	0	0	50
Leslie Lee	WYC7933	Valdez	1	0	0	0	0	0	0	0	0	0	0	0	1
Liberty Eagle	WHIA	Houston	32	32	3	46	30	74	0	0	0	0	0	0	217
Liberty Glory	WADP	Houston	26	17	22	20	41	3	0	0	0	0	0	0	129
Liberty Grace	WADN	Houston	62	50	11	43	0	46	0	0	0	0	0	0	212
Liberty Of The Seas	C6VQ8	Miami	2	37	15	4	0	9	0	0	0	0	0	0	67
Liberty Spirit	WCPU	Houston	26	22	16	54	61	85	0	0	0	0	0	0	264
Liberty Sun	WCOB	Houston	57	18	20	110	16	4	0	0	0	0	0	0	225
Limerick Spirit	C6VF3	Anchorage	7	10	5	0	0	1	0	0	0	0	0	0	23
LNG Aries	V7BW7	New York City	114	122	35	117	53	0	0	0	0	0	0	0	441
LNG Capricorn	V7BW8	New York City	46	62	41	0	0	0	0	0	0	0	0	0	149
LNG Edo	C6W2033	Anchorage	7	19	25	31	3	2	0	0	0	0	0	0	87
LNG Gemini	V7BW9	Anchorage	21	0	11	35	53	70	0	0	0	0	0	0	190
LNG Leo	V7BX2	New York City	32	0	0	0	0	0	0	0	0	0	0	0	32
LNG Libra	V7BX3	Anchorage	76	82	88	22	0	0	0	0	0	0	0	0	268
LNG Taurus	V7BX4	New York City	61	72	92	9	0	0	0	0	0	0	0	0	234
Lois H	WTD4576	Kodiak	0	0	0	4	0	0	0	0	0	0	0	0	4
Lowlands Brilliance	ONDC	Anchorage	0	0	0	0	0	21	0	0	0	0	0	0	21
Lowlands Orchid	ONFP	Anchorage	55	46	21	12	66	45	0	0	0	0	0	0	245
M/V Integrity	WDC6925	Baltimore	59	40	30	50	61	51	0	0	0	0	0	0	291
Maasdam	PFRO	Miami	184	110	44	32	129	204	0	0	0	0	0	0	703

Ship Name	Call	PMO	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
Mackinaw	NBGB	Chicago	3	2	3	0	0	0	0	0	0	0	0	0	8
Madrid Spirit	ECFM	Anchorage	2	14	54	18	0	0	0	0	0	0	0	0	88
Maersk Carolina	WBDS	Charleston	39	32	39	36	35	41	0	0	0	0	0	0	222
Maersk Constellation	WRYJ	Houston	16	11	2	0	0	0	0	0	0	0	0	0	29
Maersk Danang	A8PS5	New York City	0	0	47	45	31	47	0	0	0	0	0	0	170
Maersk Drummond	A8JF3	New York City	3	0	36	7	26	28	0	0	0	0	0	0	100
Maersk Georgia	WAHP	New York City	94	60	34	24	74	68	0	0	0	0	0	0	354
Maersk Idaho	WKPM	New York City	22	30	15	50	66	24	0	0	0	0	0	0	207
Maersk Iowa	KABL	Norfolk	49	16	65	65	54	41	0	0	0	0	0	0	290
Maersk Karlskrona	A8PW8	New York City	3	7	6	7	2	0	0	0	0	0	0	0	25
Maersk Kentucky	WKPY	Houston	33	18	31	9	23	29	0	0	0	0	0	0	143
Maersk Merritt	VRCH6	Los Angeles	11	7	1	0	0	0	0	0	0	0	0	0	19
Maersk Missouri	WAHV	Norfolk	66	18	42	68	54	30	0	0	0	0	0	0	278
Maersk Montana	WCDP	New York City	40	52	57	55	17	52	0	0	0	0	0	0	273
Maersk Ohio	KABP	New York City	98	92	30	83	87	81	0	0	0	0	0	0	471
Maersk Tangier	A8NH3	Miami	9	4	0	0	0	0	0	0	0	0	0	0	13
Maersk Utah	WKAB	Norfolk	73	66	86	26	69	78	0	0	0	0	0	0	398
Maersk Virginia	WAHK	Norfolk	0	38	48	31	14	43	0	0	0	0	0	0	174
Maersk Westport	VRFO4	New York City	0	0	0	1	1	0	0	0	0	0	0	0	2
Maersk Winnipeg	VRGI7	New York City	0	0	0	4	0	4	0	0	0	0	0	0	8
Maersk Wisconsin	WKPN	New York City	39	31	20	21	36	39	0	0	0	0	0	0	186
Maersk Wyoming	WKPF	New York City	50	90	64	72	75	51	0	0	0	0	0	0	402
Mahimahi	WHRN	Los Angeles	32	19	12	22	18	19	0	0	0	0	0	0	122
Maia H	WYX2079	Kodiak	0	0	18	5	0	0	0	0	0	0	0	0	23
Majesty Of The Seas	C6FZ8	Miami	0	5	6	14	0	0	0	0	0	0	0	0	25
Malolo	WYH6327	Kodiak	3	3	0	0	30	67	0	0	0	0	0	0	103
Manistee	WDB6831	Chicago	5	0	0	5	3	44	0	0	0	0	0	0	57
Manitowoc	WDE3569	Chicago	113	0	21	145	123	129	0	0	0	0	0	0	531
Manoa	KDBG	San Francisco	61	42	47	46	32	33	0	0	0	0	0	0	261

Ship Name	Call	PMO	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
Manukai	WRGD	Los Angeles	12	25	13	14	20	30	0	0	0	0	0	0	114
Manulani	WECH	Los Angeles	56	62	20	38	59	33	0	0	0	0	0	0	268
Marchen Maersk	OUIY2	Seattle	22	66	0	0	70	1	0	0	0	0	0	0	159
Marcus G. Langseth	WDC6698	Anchorage	0	0	13	37	40	33	0	0	0	0	0	0	123
Maren Maersk	OUJI2	Seattle	0	1	0	0	0	0	0	0	0	0	0	0	1
Marie Maersk	OULL2	New York City	28	0	0	0	0	0	0	0	0	0	0	0	28
Marilyn	WFQB	Houston	13	33	46	0	0	0	0	0	0	0	0	0	92
Marine Express	3FHX2	Anchorage	3	11	5	4	1	7	0	0	0	0	0	0	31
Mariner Of The Seas	C6FV9	Jacksonville	26	34	23	0	3	24	0	0	0	0	0	0	110
Marit Maersk	OUJN2	Los Angeles	60	0	0	64	1	0	0	0	0	0	0	0	125
Mary Ann Hudson	KSDF	Houston	35	54	28	1	0	0	0	0	0	0	0	0	118
Matanuska	WN4201	Kodiak	6	1	0	0	0	0	0	0	0	0	0	0	7
Maui	WSLH	San Francisco	0	39	42	35	37	42	0	0	0	0	0	0	195
Maunalei	KFMV	Baltimore	22	36	0	20	21	14	0	0	0	0	0	0	113
Maunawili	WGEB	Los Angeles	59	52	51	65	61	40	0	0	0	0	0	0	328
Mcarthur II	WTEJ	Seattle	0	0	78	49	89	102	0	0	0	0	0	0	318
Mcarthur II (AWS)	NWS0006	Seattle	0	0	289	280	163	0	0	0	0	0	0	0	732
Medeia	WDE6486	Anchorage	0	1	0	0	0	0	0	0	0	0	0	0	1
Mein Schiff	9HJH9	Miami	34	29	50	30	12	4	0	0	0	0	0	0	159
Melville	WECB	Los Angeles	66	61	87	74	81	332	0	0	0	0	0	0	701
Mermaid Express	H9PV	Anchorage	9	0	0	0	0	0	0	0	0	0	0	0	9
Mesabi Miner	WYQ4356	Chicago	3	0	13	42	37	54	0	0	0	0	0	0	149
Midnight Sun	WAHG	Seattle	44	24	58	122	48	70	0	0	0	0	0	0	366
Mike O'leary	WDC3665	Kodiak	0	0	0	0	0	41	0	0	0	0	0	0	41
Miletus	V7UI6	Anchorage	13	8	0	0	0	0	0	0	0	0	0	0	21
Mill House	9VAK9	Anchorage	0	0	0	5	26	45	0	0	0	0	0	0	76
Mill Reef	9VAK8	Anchorage	21	0	1	0	21	27	0	0	0	0	0	0	70
Mindanao	S6SR	Anchorage	0	47	73	72	53	28	0	0	0	0	0	0	273

Ship Name	Call	PMO	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
Mineral Beijing	ONAR	Anchorage	56	22	37	14	10	11	0	0	0	0	0	0	150
Mineral Belgium	ONCF	Anchorage	18	0	51	34	15	29	0	0	0	0	0	0	147
Mineral Ningbo	ONGA	Anchorage	0	0	0	3	19	39	0	0	0	0	0	0	61
Mineral Noble	ONAN	Anchorage	19	41	34	7	5	18	0	0	0	0	0	0	124
Mineral Tianjin	ONBF	Anchorage	22	12	0	0	0	3	0	0	0	0	0	0	37
Miss Roxanne	WCX4992	Valdez	0	0	0	0	1	6	0	0	0	0	0	0	7
Mississippi Voyager	WDD7294	San Francisco	28	40	3	21	8	4	0	0	0	0	0	0	104
Mokihana	WNRD	San Francisco	30	49	60	37	43	40	0	0	0	0	0	0	259
Moku Pahu	WBWK	San Francisco	0	0	9	0	0	0	0	0	0	0	0	0	9
Monarch Of The Seas	C6FZ9	Jacksonville	33	22	8	8	23	43	0	0	0	0	0	0	137
Monitor	WCX9104	Jacksonville	4	0	18	16	21	8	0	0	0	0	0	0	67
Montrealais	VDWC	Chicago	0	0	0	0	0	2	0	0	0	0	0	0	2
Morning Haruka	A8GK7	Anchorage	0	0	0	0	68	122	0	0	0	0	0	0	190
Nachik	WDE7904	Kodiak	0	0	0	0	2	8	0	0	0	0	0	0	10
Nancy Foster	WTER	Charleston	0	0	205	603	474	257	0	0	0	0	0	0	1539
Nanuq	WCY8498	Valdez	2	1	0	0	0	0	0	0	0	0	0	0	3
Nathaniel B. Palmer (AWS)	WBP3210	Seattle	404	522	699	663	616	720	0	0	0	0	0	0	3624
National Glory	WDD4207	Houston	12	0	0	0	0	0	0	0	0	0	0	0	12
Navigator Of The Seas	C6FU4	Miami	36	9	7	12	20	2	0	0	0	0	0	0	86
Neptune Voyager	C6FU7	New Orleans	23	6	19	3	4	21	0	0	0	0	0	0	76
New Horizon	WKWB	Los Angeles	21	10	0	0	17	53	0	0	0	0	0	0	101
Nieuw Amsterdam	PBWQ	Miami	61	148	84	29	2	144	0	0	0	0	0	0	468
Noble Star	KRPP	Houston	31	74	49	42	5	0	0	0	0	0	0	0	201
Noordam	PHET	Miami	116	173	156	102	45	64	0	0	0	0	0	0	656
North Star	KIYI	Seattle	27	21	36	55	28	28	0	0	0	0	0	0	195
Northwest Swan	ZCDJ9	Anchorage	63	42	63	57	54	0	0	0	0	0	0	0	279
Norwegian Dawn	C6FT7	Miami	81	32	99	23	33	198	0	0	0	0	0	0	466
Norwegian Epic	C6XP7	Miami	33	29	22	43	66	16	0	0	0	0	0	0	209
Norwegian Gem	C6VG8	Jacksonville	45	44	1	167	138	162	0	0	0	0	0	0	557

Ship Name	Call	PMO	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
Norwegian Jade	C6WK7	Anchorage	50	37	146	162	155	97	0	0	0	0	0	0	647
Norwegian Jewel	C6TX6	Jacksonville	62	36	45	57	34	56	0	0	0	0	0	0	290
Norwegian Pearl	C6VG7	Anchorage	34	49	68	87	7	50	0	0	0	0	0	0	295
Norwegian Sky	C6PZ8	Miami	16	9	5	52	21	10	0	0	0	0	0	0	113
Norwegian Spirit	C6TQ6	New Orleans	68	37	117	175	204	155	0	0	0	0	0	0	756
Norwegian Star	C6FR3	Anchorage	184	157	174	100	61	98	0	0	0	0	0	0	774
Norwegian Sun	C6RN3	Jacksonville	90	120	212	116	44	31	0	0	0	0	0	0	613
Nunaniq	WRC2049	Kodiak	0	0	0	0	4	0	0	0	0	0	0	0	4
Nyk Delphinus	3ENU7	Norfolk	0	25	45	0	0	0	0	0	0	0	0	0	70
Nyk Demeter	3ENV5	New York City	11	6	22	18	27	9	0	0	0	0	0	0	93
Oasis Of The Seas	C6XS7	Miami	20	17	26	19	29	8	0	0	0	0	0	0	119
Ocean Charger	WDE9698	Houston	52	9	0	0	6	5	0	0	0	0	0	0	72
Ocean Crescent	WDF4929	Houston	1	0	19	49	56	41	0	0	0	0	0	0	166
Ocean Harvester	WBO5471	Kodiak	11	5	6	12	2	0	0	0	0	0	0	0	36
Ocean Mariner	WCF3990	Kodiak	0	0	0	29	19	1	0	0	0	0	0	0	49
Ocean President	VRAD4	Anchorage	3	11	21	0	0	0	0	0	0	0	0	0	35
Ocean Reliance	WADY	Kodiak	0	0	0	0	0	2	0	0	0	0	0	0	2
Ocean Titan	WDB9647	Kodiak	0	0	3	3	0	2	0	0	0	0	0	0	8
Oceanus (AWS)	NWS0028	New York City	744	670	740	670	632	720	0	0	0	0	0	0	4176
Okeanos Explorer	WTDH	Honolulu	0	0	54	30	0	455	0	0	0	0	0	0	539
Okeanos Explorer (AWS)	NWS0016	Honolulu	0	0	362	217	0	0	0	0	0	0	0	0	579
Oleander	V7SX3	New York City	19	0	0	17	19	15	0	0	0	0	0	0	70
Olive L. Moore	WDF7019	Chicago	0	0	0	58	56	57	0	0	0	0	0	0	171
OOCL America	VRWE8	Seattle	2	3	5	1	6	0	0	0	0	0	0	0	17
OOCL Busan	VRDN3	Charleston	25	7	26	13	22	16	0	0	0	0	0	0	109
OOCL Nagoya	VRFX8	New York City	24	11	9	23	41	39	0	0	0	0	0	0	147
OOCL Norfolk	VREX4	Norfolk	1	1	13	23	41	44	0	0	0	0	0	0	123
Oosterdam	PBKH	Anchorage	73	55	96	87	73	64	0	0	0	0	0	0	448

Ship Name	Call	PMO	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
Optimana	9VAR2	Anchorage	73	51	146	175	152	43	0	0	0	0	0	0	640
Orange Blossom	ELEI6	New York City	90	66	38	0	0	0	0	0	0	0	0	0	194
Orange Sky	ELZU2	New York City	0	0	0	0	0	19	0	0	0	0	0	0	19
Orange Star	A8WP6	New York City	0	0	0	0	10	6	0	0	0	0	0	0	16
Orange Sun	A8HY8	New York City	9	7	22	7	16	38	0	0	0	0	0	0	99
Orange Wave	ELPX7	New York City	11	0	4	0	0	16	0	0	0	0	0	0	31
Oregon II	WTDO	New Orleans	0	0	0	0	0	224	0	0	0	0	0	0	224
Oregon II (AWS)	NWS0013	New Orleans	0	242	300	381	0	0	0	0	0	0	0	0	923
Oregon Voyager	WDF2960	San Francisco	35	12	12	23	17	0	0	0	0	0	0	0	99
Oriental Queen	VRAC9	Anchorage	191	42	26	29	40	73	0	0	0	0	0	0	401
Orion Voyager	C6MC5	Baltimore	24	21	35	51	0	46	0	0	0	0	0	0	177
Oscar Dyson	WTEP	Kodiak	0	0	0	0	150	170	0	0	0	0	0	0	320
Oscar Dyson (AWS)	NWS0001	Kodiak	0	0	0	0	516	612	0	0	0	0	0	0	1128
Oscar Elton Sette	WTEE	Honolulu	0	15	139	125	0	2	0	0	0	0	0	0	281
Oscar Elton Sette (AWS)	NWS0015	Honolulu	0	102	592	455	0	0	0	0	0	0	0	0	1149
Ouro Do Brasil	ELPP9	Baltimore	20	37	16	30	38	28	0	0	0	0	0	0	169
Overseas Alcesmar	V7HP2	Anchorage	35	3	53	67	114	47	0	0	0	0	0	0	319
Overseas Alcmar	V7HP3	Anchorage	9	3	0	0	0	0	0	0	0	0	0	0	12
Overseas Anacortes	KCHV	Miami	26	13	11	20	14	8	0	0	0	0	0	0	92
Overseas Andromar	V7HP4	New Orleans	7	2	4	4	0	14	0	0	0	0	0	0	31
Overseas Ariadmar	V7HP6	Anchorage	6	6	14	20	20	19	0	0	0	0	0	0	85
Overseas Boston	WJBU	Valdez	82	107	141	132	70	85	0	0	0	0	0	0	617
Overseas Cascade	WOAG	Charleston	0	6	8	0	0	0	0	0	0	0	0	0	14
Overseas Houston	WWAA	Miami	4	1	3	0	13	8	0	0	0	0	0	0	29
Overseas Joyce	V7NV4	Jacksonville	40	25	65	35	94	46	0	0	0	0	0	0	305
Overseas Long Beach	WAAT	Anchorage	72	183	257	59	27	59	0	0	0	0	0	0	657
Overseas Los Angeles	WABS	Los Angeles	227	191	58	148	125	237	0	0	0	0	0	0	986
Overseas Luxmar	WDC7070	Miami	14	0	32	18	11	10	0	0	0	0	0	0	85
Overseas Maremar	WDC6975	Houston	0	21	11	5	19	16	0	0	0	0	0	0	72

Ship Name	Call	PMO	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
Overseas Martinez	WPAJ	Valdez	0	23	2	18	6	21	0	0	0	0	0	0	70
Overseas Nikiski	WDBH	Valdez	13	16	20	29	35	22	0	0	0	0	0	0	135
Overseas Rimar	V7HQ3	Anchorage	21	16	15	13	20	22	0	0	0	0	0	0	107
Overseas Tampa	WOTA	Baltimore	0	0	0	0	5	6	0	0	0	0	0	0	11
Overseas Texas City	WHED	Miami	0	6	2	5	0	12	0	0	0	0	0	0	25
Pacific Celebes	VRZN9	Los Angeles	1	9	25	13	40	37	0	0	0	0	0	0	125
Pacific Flores	VRZN8	Los Angeles	0	18	18	25	0	0	0	0	0	0	0	0	61
Pacific Freedom	WDD9283	Kodiak	0	0	0	0	14	0	0	0	0	0	0	0	14
Pacific Java	VRZN7	Los Angeles	42	31	16	49	31	53	0	0	0	0	0	0	222
Pacific Makassar	VRZO2	Los Angeles	37	57	73	31	83	47	0	0	0	0	0	0	328
Pacific Reliance	WDC9368	Kodiak	1	0	0	0	0	0	0	0	0	0	0	0	1
Pacific Star	WCW7740	Valdez	0	0	0	0	1	0	0	0	0	0	0	0	1
Pacific Wolf	WDD9286	Kodiak	2	0	0	1	0	4	0	0	0	0	0	0	7
Pandalus	WAV7611	Anchorage	0	0	0	0	0	12	0	0	0	0	0	0	12
Patriarch	WBN3014	Jacksonville	16	4	43	26	0	0	0	0	0	0	0	0	89
Patriot	WQVY	Baltimore	41	37	39	27	35	57	0	0	0	0	0	0	236
Paul Gauguin	C6TH9	Anchorage	93	63	41	59	80	126	0	0	0	0	0	0	462
Paul R. Tregurtha	WYR4481	Chicago	26	0	17	76	89	87	0	0	0	0	0	0	295
Peace Voyage	VRHO5	Anchorage	0	0	2	21	25	20	0	0	0	0	0	0	68
Pelican State	WDE4433	Miami	10	18	10	11	9	7	0	0	0	0	0	0	65
Philadelphia Express	WDC6736	Houston	71	142	120	131	93	122	0	0	0	0	0	0	679
Philip R. Clarke	WE3592	Chicago	42	0	18	36	5	20	0	0	0	0	0	0	121
Phoenix Alpha	VRZT8	Anchorage	11	1	0	0	12	1	0	0	0	0	0	0	25
Phoenix Beta	VRZT9	Anchorage	0	27	49	8	2	7	0	0	0	0	0	0	93
Phoenix Light	HPHV	Anchorage	0	0	1	0	20	36	0	0	0	0	0	0	57
Phoenix Voyager	C6QE3	San Francisco	3	21	33	32	2	13	0	0	0	0	0	0	104
Pilot	WBN3011	Jacksonville	0	0	0	5	2	0	0	0	0	0	0	0	7
Pisces (AWS)	NWS0024	New Orleans	0	0	41	35	0	0	0	0	0	0	0	0	76

Ship Name	Call	PMO	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
Polar Adventure	WAZV	Valdez	72	35	20	51	41	39	0	0	0	0	0	0	258
Polar Cloud	WDF5296	Kodiak	20	0	44	0	0	0	0	0	0	0	0	0	64
Polar Discovery	WACW	Valdez	116	82	0	0	0	0	0	0	0	0	0	0	198
Polar Endeavour	WCAJ	Valdez	21	20	70	78	84	29	0	0	0	0	0	0	302
Polar Enterprise	WRTF	Valdez	24	22	21	17	76	72	0	0	0	0	0	0	232
Polar Ranger	WDC8652	Kodiak	0	0	0	0	2	0	0	0	0	0	0	0	2
Polar Resolution	WDJK	Valdez	139	100	210	209	88	180	0	0	0	0	0	0	926
Polar Spirit	C6WL6	Anchorage	27	46	23	4	2	28	0	0	0	0	0	0	130
Polar Storm	WDE8347	Kodiak	0	0	0	0	7	0	0	0	0	0	0	0	7
Polar Viking	WDD6494	Kodiak	0	7	16	0	2	1	0	0	0	0	0	0	26
Posidana	9VBM6	Anchorage	30	109	183	370	254	69	0	0	0	0	0	0	1015
Poul Spirit	C6FJ8	Anchorage	11	1	0	0	0	0	0	0	0	0	0	0	12
Premium Do Brasil	A8BL4	Baltimore	28	32	34	15	33	16	0	0	0	0	0	0	158
President Adams	WRYW	Norfolk	36	35	21	12	41	43	0	0	0	0	0	0	188
President Jackson	WRYC	Charleston	63	25	39	33	0	0	0	0	0	0	0	0	160
President Polk	WRYD	New York City	13	19	17	13	31	0	0	0	0	0	0	0	93
President Truman	WNDP	Charleston	45	24	30	45	28	25	0	0	0	0	0	0	197
Presque Isle	WZE4928	Chicago	0	0	10	110	84	20	0	0	0	0	0	0	224
Prestige New York	KDUE	Jacksonville	37	32	36	30	48	9	0	0	0	0	0	0	192
Pride Of America	WNBE	Anchorage	42	19	19	5	14	12	0	0	0	0	0	0	111
Pride Of Baltimore II	WUW2120	Baltimore	0	0	0	5	22	41	0	0	0	0	0	0	68
Prinsendam	PBGH	Miami	0	33	39	37	91	5	0	0	0	0	0	0	205
Quebecois	CYGR	Chicago	0	0	0	5	30	23	0	0	0	0	0	0	58
R. J. Pfeiffer	WRJP	Los Angeles	0	3	2	0	0	0	0	0	0	0	0	0	5
R. M. Thorstenson	KGCJ	Kodiak	1	0	3	3	0	0	0	0	0	0	0	0	7
Radiance Of The Seas	C6SE7	Anchorage	20	99	93	95	62	20	0	0	0	0	0	0	389
Rebecca Lynn	WCW7977	Chicago	0	0	3	22	18	12	0	0	0	0	0	0	55
Redoubt	WDD2451	Kodiak	0	0	0	10	28	0	0	0	0	0	0	0	38
Regulus Voyager	C6FE6	San Francisco	23	8	31	21	0	0	0	0	0	0	0	0	83

Ship Name	Call	PMO	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
Resolve	WCZ5535	Baltimore	25	29	12	17	24	34	0	0	0	0	0	0	141
Rhapsody Of The Seas	C6UA2	Anchorage	11	31	33	7	0	32	0	0	0	0	0	0	114
Robert C. Seamans	WDA4486	Kodiak	0	0	9	23	26	28	0	0	0	0	0	0	86
Robert S. Pierson	CFN4934	Chicago	0	0	0	0	7	15	0	0	0	0	0	0	22
Roger Blough	WZP8164	Chicago	1	0	36	177	313	173	0	0	0	0	0	0	700
Roger Revelle	KAOU	Los Angeles	0	2	11	33	67	595	0	0	0	0	0	0	708
Ronald H. Brown	WTEC	Charleston	0	0	0	0	0	22	0	0	0	0	0	0	22
Ronald N	A8PQ3	Anchorage	10	3	8	23	8	234	0	0	0	0	0	0	286
Ryndam	PHFV	Miami	14	45	31	95	56	33	0	0	0	0	0	0	274
S/R American Progress	KAWM	Valdez	80	80	54	51	51	72	0	0	0	0	0	0	388
S/R Wilmington	WBVZ	Miami	2	0	0	0	0	0	0	0	0	0	0	0	2
Safmarine Makutu	MRWF2	Anchorage	0	0	0	37	45	27	0	0	0	0	0	0	109
Saga Adventure	VRBL4	Anchorage	0	0	0	0	0	29	0	0	0	0	0	0	29
Saga Andorinha	MYNJ6	Anchorage	4	0	0	0	0	0	0	0	0	0	0	0	4
Saga Frontier	VRCP2	Anchorage	5	0	0	0	0	0	0	0	0	0	0	0	5
Saga Monal	VRZQ9	Anchorage	0	0	53	63	39	86	0	0	0	0	0	0	241
Saga Navigator	VRDA4	Anchorage	3	9	20	86	142	124	0	0	0	0	0	0	384
Saga Viking	VRXO6	Anchorage	4	12	0	0	0	4	0	0	0	0	0	0	20
Saipem 7000	C6NO5	Anchorage	0	0	0	0	19	82	0	0	0	0	0	0	101
Salvia Ace	ZCXR	Jacksonville	33	4	0	0	0	0	0	0	0	0	0	0	37
Samson Mariner	WCN3586	Kodiak	0	1	0	1	0	0	0	0	0	0	0	0	2
Samuel De Champlain	WDC8307	Chicago	44	0	12	37	29	6	0	0	0	0	0	0	128
Sandra Foss	WYL4908	Kodiak	0	0	3	0	0	16	0	0	0	0	0	0	19
Saudi Abha	HZRX	Baltimore	0	3	17	0	3	0	0	0	0	0	0	0	23
Saudi Diriyah	HZZB	Houston	20	0	45	17	11	0	0	0	0	0	0	0	93
Saudi Hofuf	HZZC	Houston	1	8	7	0	0	5	0	0	0	0	0	0	21
Saudi Tabuk	HZZD	Houston	57	64	0	35	30	5	0	0	0	0	0	0	191
Sea Breeze	WBN3019	Jacksonville	58	0	0	0	7	0	0	0	0	0	0	0	65

Ship Name	Call	PMO	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
Sea Hawk	WDD9287	Kodiak	0	0	0	0	0	1	0	0	0	0	0	0	1
Sea Horse	WBN4382	Jacksonville	10	10	2	6	0	0	0	0	0	0	0	0	28
Sea Prince	WYT8569	Kodiak	3	48	38	26	5	0	0	0	0	0	0	0	120
Sea Voyager	WCX9106	Valdez	399	94	0	43	93	120	0	0	0	0	0	0	749
Sea-Land Champion	WKAU	Houston	11	31	44	47	37	62	0	0	0	0	0	0	232
Sea-Land Charger	WDB9948	Los Angeles	33	38	52	30	25	40	0	0	0	0	0	0	218
Sea-Land Comet	WDB9950	Los Angeles	112	59	24	39	36	54	0	0	0	0	0	0	324
Sea-Land Eagle	WKAE	Houston	152	193	166	103	86	143	0	0	0	0	0	0	843
Sea-Land Intrepid	WDB9949	Los Angeles	55	9	17	23	30	21	0	0	0	0	0	0	155
Sea-Land Lightning	WDB9986	Los Angeles	73	65	36	23	35	6	0	0	0	0	0	0	238
Sea-Land Mercury	WKAW	Houston	75	18	57	70	117	94	0	0	0	0	0	0	431
Sea-Land Meteor	WDB9951	Norfolk	29	3	47	24	6	29	0	0	0	0	0	0	138
Sea-Land Racer	WKAP	Houston	175	107	112	128	96	118	0	0	0	0	0	0	736
Seabulk Arctic	WCY7054	Houston	34	24	16	19	38	21	0	0	0	0	0	0	152
Seabulk Trader	KNJK	Miami	37	48	38	15	25	20	0	0	0	0	0	0	183
Sedef Kalkavan	V7LU5	Norfolk	0	0	5	15	0	0	0	0	0	0	0	0	20
Senang Spirit	C6ME8	Anchorage	9	3	9	113	8	0	0	0	0	0	0	0	142
Seneca	WBN8469	Kodiak	0	0	0	0	36	13	0	0	0	0	0	0	49
Sentinel	WBN6510	Jacksonville	0	0	15	25	8	0	0	0	0	0	0	0	48
Sentry	WBN3013	Jacksonville	0	26	0	0	6	47	0	0	0	0	0	0	79
Serenade Of The Seas	C6FV8	Miami	26	13	23	25	3	17	0	0	0	0	0	0	107
Serenata	3EEE2	Anchorage	26	5	18	23	28	7	0	0	0	0	0	0	107
Seven Seas Mariner	C6VV8	Anchorage	37	24	1	9	24	16	0	0	0	0	0	0	111
Seven Seas Navigator	ZCDT7	Anchorage	19	24	19	11	9	6	0	0	0	0	0	0	88
Seven Seas Voyager	C6SW3	Anchorage	24	22	0	18	72	8	0	0	0	0	0	0	144
Sheila Mcdevitt	WDE2542	New Orleans	29	72	14	57	53	1	0	0	0	0	0	0	226
Sidney Foss	WYL5445	Kodiak	0	22	11	0	0	9	0	0	0	0	0	0	42
Sierra	WSNB	Valdez	11	26	23	13	4	23	0	0	0	0	0	0	100
Siku	WCQ6174	Kodiak	0	0	0	1	2	20	0	0	0	0	0	0	23
Sinuk	WCQ8110	Kodiak	0	0	0	45	135	114	0	0	0	0	0	0	294

Ship Name	Call	PMO	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
Siranger	9VAH	Anchorage	0	0	0	0	0	18	0	0	0	0	0	0	18
Snopac Innovator	WUU9229	Kodiak	0	0	0	3	1	2	0	0	0	0	0	0	6
Soga	3FDR8	New York City	18	16	21	19	17	15	0	0	0	0	0	0	106
Sol Do Brasil	ELQQ4	Baltimore	16	37	27	58	57	21	0	0	0	0	0	0	216
Splendour Of The Seas	C6TZ9	Anchorage	99	108	205	202	129	141	0	0	0	0	0	0	884
St Louis Express	WDD3825	Houston	405	340	371	447	235	444	0	0	0	0	0	0	2242
St. Clair	WZA4027	Chicago	46	0	0	0	0	0	0	0	0	0	0	0	46
Stacey Foss	WYL4909	Kodiak	9	0	0	0	0	0	0	0	0	0	0	0	9
Stadt Berlin	V2OH8	New York City	12	10	16	13	8	7	0	0	0	0	0	0	66
Stalwart	WBN6512	Valdez	36	50	55	42	27	64	0	0	0	0	0	0	274
Star Alabama	LAVU4	Baltimore	31	23	45	11	0	19	0	0	0	0	0	0	129
Star America	LAVV4	Jacksonville	6	6	31	17	30	10	0	0	0	0	0	0	100
Star Atlantic	LAYG5	Anchorage	43	23	13	0	9	9	0	0	0	0	0	0	97
Star Derby	LAXS2	Anchorage	48	13	50	42	32	36	0	0	0	0	0	0	221
Star Dieppe	LEQZ3	Anchorage	9	27	16	19	18	24	0	0	0	0	0	0	113
Star Eagle	LAWO2	New Orleans	20	25	36	39	42	62	0	0	0	0	0	0	224
Star Evviva	LAHE2	Jacksonville	2	14	0	10	0	6	0	0	0	0	0	0	32
Star Florida	LAVW4	Jacksonville	18	31	29	44	22	28	0	0	0	0	0	0	172
Star Fraser	LAVY4	Anchorage	325	139	367	244	261	69	0	0	0	0	0	0	1405
Star Fuji	LAVX4	Charleston	13	18	20	8	9	8	0	0	0	0	0	0	76
Star Gran	LADR4	Los Angeles	30	22	4	22	0	0	0	0	0	0	0	0	78
Star Grip	LADQ4	Charleston	36	15	53	4	63	51	0	0	0	0	0	0	222
Star Hansa	LAXP4	Jacksonville	0	1	0	25	5	1	0	0	0	0	0	0	32
Star Harmonia	LAGB5	Baltimore	11	2	0	0	0	0	0	0	0	0	0	0	13
Star Herdla	LAVD4	New Orleans	77	8	69	7	17	29	0	0	0	0	0	0	207
Star Hidra	LAVN4	Baltimore	22	27	5	35	33	0	0	0	0	0	0	0	122
Star Isfjord	LAOX5	New Orleans	1	36	17	8	41	46	0	0	0	0	0	0	149
Star Ismene	LANT5	Baltimore	8	2	2	37	8	68	0	0	0	0	0	0	125

Ship Name	Call	PMO	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
Star Japan	LAZV5	New Orleans	19	15	14	18	0	29	0	0	0	0	0	0	95
Star Java	LAJS6	Baltimore	54	48	38	42	15	20	0	0	0	0	0	0	217
Star Juventas	LAZU5	Baltimore	0	18	15	2	1	0	0	0	0	0	0	0	36
Star Kilimanjaro	LAIG7	Anchorage	38	33	62	10	23	31	0	0	0	0	0	0	197
Star Kinn	LAJF7	Anchorage	1	0	0	18	0	3	0	0	0	0	0	0	22
Star Kvarven	LAJK7	Anchorage	6	9	16	28	46	10	0	0	0	0	0	0	115
State Of Maine	WCAH	New York City	0	0	0	0	53	40	0	0	0	0	0	0	93
Statendam	PHSG	Miami	31	18	12	65	69	92	0	0	0	0	0	0	287
Stellar Eagle	V7RJ6	Anchorage	0	0	0	14	0	0	0	0	0	0	0	0	14
Stellar Voyager	C6FV4	Seattle	3	0	0	30	54	76	0	0	0	0	0	0	163
Stewart J. Cort	WDC6055	Chicago	6	0	7	43	46	38	0	0	0	0	0	0	140
Stimson	KF002	Kodiak	15	1	6	0	3	2	0	0	0	0	0	0	27
Sumida	3FMX7	New York City	64	32	0	0	0	0	0	0	0	0	0	0	96
Sunshine State	WDE4432	Miami	10	0	1	1	15	12	0	0	0	0	0	0	39
Superstar Aquarius	C6LG6	Miami	29	19	0	0	0	0	0	0	0	0	0	0	48
Superstar Libra	C6DM2	Anchorage	106	97	118	119	116	116	0	0	0	0	0	0	672
Talisman	LAOW5	Jacksonville	0	17	23	0	0	32	0	0	0	0	0	0	72
Tamesis	LAOL5	Norfolk	0	27	0	14	10	23	0	0	0	0	0	0	74
Tan'erliq	WCY8497	Valdez	0	0	0	0	3	0	0	0	0	0	0	0	3
Tangguh Hiri	C6XC2	Anchorage	0	0	0	9	31	16	0	0	0	0	0	0	56
Taurus	WYH6499	Kodiak	0	0	0	1	4	1	0	0	0	0	0	0	6
Thailand Express	3EIZ7	Seattle	0	0	0	1	16	10	0	0	0	0	0	0	27
Thomas G. Thompson	KTDQ	Seattle	0	0	0	1	22	0	0	0	0	0	0	0	23
Thomas Jefferson	WTEA	Norfolk	0	0	0	331	439	305	0	0	0	0	0	0	1075
Thrasher	V7TE3	Anchorage	2	4	0	0	0	0	0	0	0	0	0	0	6
Tiglax	WZ3423	Anchorage	0	0	0	0	2	0	0	0	0	0	0	0	2
Tim S. Dool	VGPY	Chicago	0	0	0	5	6	8	0	0	0	0	0	0	19
Tina Litrico	KCKB	New Orleans	22	5	0	15	0	20	0	0	0	0	0	0	62
Torm Esbjerg	VREQ5	Anchorage	11	6	4	0	0	0	0	0	0	0	0	0	21
Tower Bridge	C6TF8	Anchorage	19	11	19	1	0	6	0	0	0	0	0	0	56

Ship Name	Call	PMO	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
Tridonawati	ELNY2	Anchorage	0	0	0	0	0	70	0	0	0	0	0	0	70
Tropic Carib	J8PE3	Miami	10	10	22	24	11	0	0	0	0	0	0	0	77
Tropic Dawn	J8PR3	Miami	9	4	13	11	7	1	0	0	0	0	0	0	45
Tropic Jade	J8NY	Miami	33	32	36	40	36	29	0	0	0	0	0	0	206
Tropic Lure	J8PD	Miami	24	21	23	19	22	19	0	0	0	0	0	0	128
Tropic Night	J8NX	Miami	1	4	0	0	0	46	0	0	0	0	0	0	51
Tropic Opal	J8NW	Miami	36	33	23	61	43	43	0	0	0	0	0	0	239
Tropic Palm	J8PB	Miami	8	9	13	11	11	13	0	0	0	0	0	0	65
Tropic Sun	J8AZ2	Miami	0	24	25	22	8	10	0	0	0	0	0	0	89
Tropic Tide	J8AZ3	Miami	28	0	31	39	38	63	0	0	0	0	0	0	199
Tropic Unity	J8PE4	Miami	0	0	0	11	61	64	0	0	0	0	0	0	136
TS Kennedy	KVMU	New York City	102	66	0	0	0	0	0	0	0	0	0	0	168
Tug Dorothy Ann	WDE8761	Chicago	1	0	0	0	0	95	0	0	0	0	0	0	96
Tug Spartan	WDF5483	Chicago	0	0	0	0	1	20	0	0	0	0	0	0	21
Tustumena	WNGW	Kodiak	94	128	247	160	158	198	0	0	0	0	0	0	985
Tyco Decisive	V7DI7	Baltimore	19	51	44	55	0	0	0	0	0	0	0	0	169
Tyco Dependable	V7DI6	Baltimore	0	0	0	0	4	60	0	0	0	0	0	0	64
Tyco Durable	V7DI8	Baltimore	2	1	43	61	56	75	0	0	0	0	0	0	238
Tyco Responder	V7CY9	Baltimore	67	2	0	0	0	0	0	0	0	0	0	0	69
Tycom Reliance	V7CZ2	Baltimore	8	5	42	0	1	0	0	0	0	0	0	0	56
UBC Saiki	P3GY9	Seattle	66	45	10	59	34	29	0	0	0	0	0	0	243
UBC Santa Marta	5BDK2	New Orleans	107	46	76	75	123	103	0	0	0	0	0	0	530
Umang	A8PF6	Anchorage	34	18	1	2	0	1	0	0	0	0	0	0	56
Unique Brilliance	VRXK4	Anchorage	0	0	0	0	59	26	0	0	0	0	0	0	85
Unique Carrier	VRCV5	Anchorage	12	77	2	3	2	0	0	0	0	0	0	0	96
Unique Sunshine	VRWV4	Anchorage	0	0	0	0	0	14	0	0	0	0	0	0	14
United Spirit	ELYB2	Seattle	121	88	116	78	137	41	0	0	0	0	0	0	581
US Epa Bold	WAA2245	Jacksonville	0	0	4	0	4	1	0	0	0	0	0	0	9

Ship Name	Call	PMO	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
USCG Alder	NGML	Chicago	0	0	1	3	0	0	0	0	0	0	0	0	4
Valdez Star	WCO7674	Valdez	74	80	30	0	0	20	0	0	0	0	0	0	204
Veendam	PHEO	Miami	42	53	66	37	81	16	0	0	0	0	0	0	295
Vega Voyager	C6FV3	Anchorage	51	33	16	14	38	40	0	0	0	0	0	0	192
Vigilant	WDE2719	Kodiak	40	62	47	49	34	28	0	0	0	0	0	0	260
Viking Star	WDE6434	Kodiak	4	0	0	0	3	0	0	0	0	0	0	0	7
Virginian	KSPH	Houston	58	63	76	90	80	60	0	0	0	0	0	0	427
Vision Of The Seas	C6SE8	Miami	27	11	9	17	2	7	0	0	0	0	0	0	73
Volendam	PCHM	Anchorage	480	502	385	248	405	518	0	0	0	0	0	0	2538
Voyager Of The Seas	C6SE5	Miami	83	56	27	16	7	55	0	0	0	0	0	0	244
Walter J. Mccarthy Jr.	WXU3434	Chicago	0	0	0	0	0	12	0	0	0	0	0	0	12
Washington Express	WDD3826	Houston	79	108	56	66	73	128	0	0	0	0	0	0	510
Westerdam	PINX	Miami	93	39	42	74	29	0	0	0	0	0	0	0	277
Westwood Columbia	C6SI4	Seattle	46	35	32	34	40	45	0	0	0	0	0	0	232
Westwood Olympia	C6UB2	Seattle	56	19	38	22	35	28	0	0	0	0	0	0	198
Westwood Rainier	C6SI3	Seattle	44	37	34	45	42	30	0	0	0	0	0	0	232
Wilfred Sykes	WC5932	Chicago	578	0	102	718	738	718	0	0	0	0	0	0	2854
Woldstad	KF001	Kodiak	5	0	14	16	17	25	0	0	0	0	0	0	77
World Spirit	ELWG7	Seattle	0	28	17	47	23	37	0	0	0	0	0	0	152
Xpedition	HC2083	Anchorage	19	0	27	40	0	6	0	0	0	0	0	0	92
Ym Antwerp	VRET5	Anchorage	31	27	16	17	39	38	0	0	0	0	0	0	168
Ym Busan	VREX8	Charleston	42	77	48	57	48	24	0	0	0	0	0	0	296
Yorktown Express	WDD6127	Houston	17	42	30	45	34	20	0	0	0	0	0	0	188
Yuhsan	H9TE	Anchorage	4	9	7	16	12	0	0	0	0	0	0	0	48
Zaandam	PDAN	Anchorage	106	120	56	41	7	119	0	0	0	0	0	0	449
Zenith	WBV3237	Kodiak	0	1	0	0	0	0	0	0	0	0	0	0	1
Zim Djibouti	A8SI4	Seattle	18	0	0	0	2	47	0	0	0	0	0	0	67
Zim Los Angeles	A8SI3	Seattle	31	27	29	46	24	32	0	0	0	0	0	0	189
Zim Ningbo	A8SI5	Seattle	17	24	37	12	28	1	0	0	0	0	0	0	119
Zim San Diego	A8SI7	Seattle	0	1	0	1	0	0	0	0	0	0	0	0	2

Ship Name	Call	PMO	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
Zim Shanghai	VRGA6	New York City	14	8	4	0	6	5	0	0	0	0	0	0	37
Zim Shenzhen	VQUQ4	New York City	79	71	44	40	48	47	0	0	0	0	0	0	329
Zuiderdam	PBIG	Anchorage	53	70	35	222	165	176	0	0	0	0	0	0	721
Total Ships Reporting:	774	Totals:	26695	26905	32793	36082	35689	38163	0	0	0	0	0	0	196327

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