User's Guide

Welcome to the Location File for Apra Harbor, Guam! Located in the western North Pacific Ocean about three-quarters of the way between Hawaii and the Philippines, Guam is the largest and southernmost island in the Mariana archipelago. The island is surrounded by fringing reefs.

NOAA has created Location Files for different U.S. coastal regions to help you use the General NOAA Oil Modeling Environment, GNOME. In addition, on a case-by-case basis, NOAA develops international Location Files when working with specific partners. Each Location File contains information about local oceanographic conditions that GNOME uses to model oil spills in the area covered by that Location File. Each Location File also contains references (both print publications and Internet sites) to help you learn more about the location you are simulating.

As you work with the Location File for Apra Harbor, GNOME will prompt you to:

1. Choose the model settings (start date and time, and run duration).
2. Input the wind conditions.

GNOME will guide you through choosing the model settings and entering the wind conditions. Click the Help button anytime you need help setting up the model. Check the "Finding Wind Data" Help topic to see a list of web sites that publish wind data for this region.

More information about GNOME and Location Files is available at http://response.restoration.noaa.gov/software/gnome/gnome.html .

Technical Documentation

Background

Guam's currents are heavily influenced by the North Pacific Equatorial Current, which moves westward across the Pacific between eight degrees and fifteen degrees north. Subsurface and surface current measurements in the vicinity of Luminao Reef and outside the reef at Adelup Point (Jones and Randall 1971) showed a consistent westerly movement, at least in winter. Maas (1985) describes a convergence in the longshore currents at Orote Peninsula with weak net flow inside the harbor.

Winds are dominated by the Trade Winds, which generally come from a direction between east and northeast. Although Guam lies southeast of the heaviest tropical cyclone activity in the western Pacific (Eldredge 1983), tropical cyclones often affect Guam weather during the wet season (July through November). This Location File does not attempt to simulate currents during a tropical cyclone.

Reef systems exist along the modeled coastline. Fine-scale surface current patterns within the reefs, and between the reefs and the shore, are complex and were not modeled because of resolution considerations and lack of sufficient observational data. Also, land-sea breeze effects on nearshore circulation were not simulated.

Current Patterns

The Apra Harbor Location File contains two current patterns, one for tidal currents within the harbor, and another to represent mean flow from the North Pacific Equatorial Current. Both current patterns were created using the NOAA Current Analysis for Trajectory Simulations (CATS) model.

The simplified tidal currents used in the Location File do not represent the eddies that Maas indicates are present in the harbor. Tidal ranges within the harbor are usually less than one meter. Tidal current records were not available, so a ten-year record of simulated current time series was constructed by differentiating the tidal height file. This record was scaled to 1-1/2 knots maximal tidal current at the entrance to the harbor.

The residual currents were modeled using the NOAA hydrodynamics model Wind Analysis of Currents (WAC), which generates current patterns in part by using wind stress as a forcing function. The steady state winds were 15 knots from the east to represent the Trade Winds. The flow convergence at Orote

Peninsula was simulated by assuming a set down in water surface elevation at the northern and southern part of the island compared to mean ocean levels offshore.

References

You can get more information about Apra Harbor from these publications and web sites.

Oceanographic

Maas, E. 1985. Objective Wave Height Prediction Technique for the Outer Apra Harbor. Publication details unknown.

Jones, R.S. and R.H. Randall. 1971. An Annual Cycle Study of Biological, Chemical, and Oceanographic Phenomena Associated with the Agana Ocean Outfall. Report to the Guam Water Pollution Control Commission, 67 pp.

Eldredge, L.G. 1983. Summary of Environmental and Fishing Information on Guam and the Commonwealth of the Northern Mariana Islands: Historical Background, Description of the Islands, and Review of the Climate, Oceanography, and Submarine Topography. National Marine Fisheries report PB85-111573.

Weather and Online Information

National Weather Service (NWS) Internet Weather Source
    http://weather.noaa.gov/weather/current/PGUM.html
Current weather conditions at Guam International Airport.

National Data Buoy Center: Western Pacific Ocean Regional Map
    http://www.ndbc.noaa.gov/Maps/wstpmap.shtml
Here are two ways to view historical data for a disestablished buoy near Guam. First, click station "52009" on the map or in the Station List.
(1) Under "Historical Data", click the year of data you would like to view, then follow the instructions for downloading.
(2) In the section "Climatic summary table and plots," click "wind speed" to view a graph of average wind speed (knots) from 9/90 to 12/93, or click "wind gust" to view a graph of peak wind gust (knots) for the same time period.

The Weather Underground, Inc.
    http://www.wunderground.com/MAR/PM/151.html
Marine forecast for Guam-Rota waters.
    http://www.wunderground.com/cgi-bin/findweather/getForecast?query=Guam
Weather conditions and forecast for Agana, Guam.

Kuentos Communications, Inc. Chicken Little's Weather Page of Guam
    http://www.guam.net/weather/graphs.htm
Current weather conditions, with a link to graphs of weather conditions over the last 24 hours.

University of Guam Marine Laboratory
    http://www.uog.edu/marinelab/index.html
Offers monthly tide predictions and lunar data for Guam.

NOAA CoastWatch Central Pacific: Sea level altimetry and geostrophic currents using Topex cycle 294 data (Western Pacific)
    http://coastwatch.nmfs.hawaii.edu/topex/pictures/latest_wpac.gif
Image showing the sea surface height (colors and contours) as well as the geostrophic currents (white arrows, derived from the TOPEX altimeter on board the TOPEX/Poseidon spacecraft). Hawaii CoastWatch is funded by contract with the NOAA National Environmental Satellite Data and Information Service (NESDIS) and is hosted by the Honolulu Laboratory of the National Marine Fisheries Service Southwest Fisheries Science Center.

Oil Spill Response

NOAA Hazardous Materials Response Division (HAZMAT)
    http://response.restoration.noaa.gov
Tools and information for emergency responders and planners, and others concerned about the effects of oil and hazardous chemicals in our waters and along our coasts.