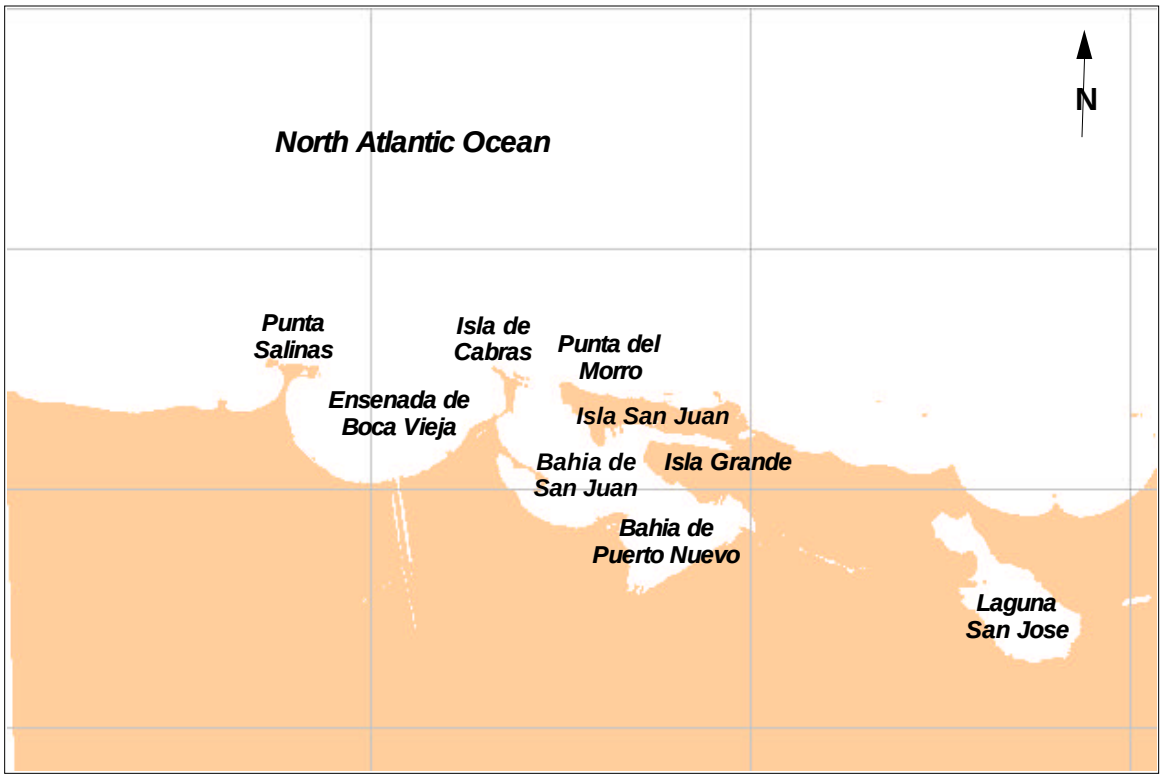
User's Guide

Welcome to the Location File for San Juan, Puerto Rico! San Juan is one of the best natural harbors in the Caribbean, and is the second oldest city in the Americas. Caribbean shipping is centered around the harbor because it is the second largest sea port in the area (New York City is the largest) (Blue Water Maritime, http://www.bluewatermaritime.com/shippingports.htm). San Juan is the only harbor on the north coast that affords protection in all weather. It is protected on the north by the relatively high land of Isla San Juan, and on the south, east, and west by the adjacent low mangrove swamps of the Puerto Rico mainland.



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 San Juan, GNOME will prompt you to:

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

GNOME guides 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

The currents along the northern shore of Puerto Rico are part of the westward drift caused by the easterly trade winds. Within this Location File, large-scale, wind-driven currents are simulated offshore, and tidally forced currents are simulated for San Juan harbor. Extensive reef systems are found within San Juan harbor and along the outer coastline, where the surface currents are highly variable, both spatially and temporally. Due to the intricate structure of the reef systems, the fine scale circulation within them was not simulated in this Location File.

Easterly trade winds with a daily land/sea breeze superimposed are the common wind circulation pattern in the San Juan area. Locally, winds are controlled by land/sea breeze; winds blow onshore during daylight hours, changing to blow offshore after sunset. Neither the land/sea breeze phenomena, nor its effects on nearshore circulation, were simulated in the San Juan Location File.

Hurricanes and tropical storms generally bring strong northerly to northeasterly winds, creating heavy sea and breakers at the entrance to San Juan harbor. Longshore currents generated by high winds are not simulated in this Location File.

Current Patterns

The circulation in the vicinity of San Juan is simulated with two current patterns: offshore and tidal currents. The offshore current pattern represents the large-scale westward wind drift currents and the net transport through the coral reef systems. The tidal current pattern represents the tidally driven currents in San Juan harbor.

Offshore Currents

In the nearshore area, the westward drift was assumed to result from a barotropic setdown. This change in sea level was simulated in the Current Analysis for Trajectory Simulations (CATS) Diagnostic Analysis for Currents (DAC) hydrodynamic model. Data were not available for the spatial variability of

the nearshore surface currents around San Juan, so the current pattern was scaled from observations made during the Berman Barge grounding in 1994. Surface currents during the grounding were approximately 1/3 knot.

Tidal Currents

The CATS Streamfunction Analysis for Currents (SAC) hydrodynamic model was used to generate the tidally driven surface currents in San Juan harbor. The U.S. Coast Pilot indicates a mean tidal range of 1.1 feet; however, the wind is known to significantly alter the water level. Observations of the spatial and temporal variations of the surface currents in the harbor were unavailable. Since tidal harmonics are not available for the area, the tidal height station of Punta del Morro was used. The tidal currents were simulated by scaling the time derivative of the sea level height by an estimate of the volume transport. The result was 0.1-knot (0.05 m/s) surface currents at the Punta del Morro station.

References

You can get more information about San Juan, PR from these publications and web sites.

Oceanographic

U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Ocean Service. **United States Coast Pilot (USCP) 5**. Atlantic Coast: Gulf of Mexico, Puerto Rico, and Virgin Islands. Washington, DC: 1997.

Weather and Online Information

San Juan National Weather Service Forecast Office
http://www.srh.noaa.gov/sju/
Click "San Juan" on the map to view current weather and forecasts.

The Weather Underground, Inc.
http://www.wunderground.com/US/PR/San_Juan.html
Weather conditions and forecasts for San Juan, PR.

Internet Weather Source (IWS) Puerto Rico Weather
http://weather.noaa.gov/weather/PR_cc_us.html
Forecasts, watches, warnings, and the most recently observed weather conditions for locations throughout Puerto Rico. To find wind speed and direction in the San Juan area, choose "San Juan" from the "Forecasts, watches, and warnings" menu, then click the link "Area Conditions for San Juan and North Sections of Puerto Rico, PR."

The Weather Channel
http://www.weather.com/weather/cities/us_pr_san_juan.html
Current conditions and forecasts for San Juan, PR.

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.