

User's Guide

Welcome to the Location File for the inner **Regional Organisation for the Protection of the Marine Environment (ROPME) Sea Area**. Located in the northwest corner of the Indian Ocean, this region is known for its oil production. Bahrain, Iran, Iraq, Kuwait, Qatar, Saudi Arabia, and the United Arab Emirates (UAE) produced 27% of the world's oil in 1998. The area also holds 64% of the world's oil reserves. The Strait of Hormuz transports 15.4 million barrels of oil per day (1998 estimate) and is the world's most important "chokepoint" for oil transportation (U.S. Energy Information Administration 1999).



NOAA 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 the inner ROPME Sea Area, 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

The inner ROPME Sea Area is a semi-enclosed marginal sea with inverse estuarine circulation. This marginal sea is 990 km long with a maximum width of 338 km. The surface area is approximately 239,000 km², and with an average depth of 36 m, its volume is 8,630 km³. The entrance at the Strait of Hormuz is 56 km wide at the narrowest point. The depth of the entrance is approximately 100 m, but this area does not have a sill. Instead, the sea floor gradually deepens from the inner ROPME Sea Area through the Strait of Hormuz into the outer ROPME Sea Area, which is approximately 900 m deep. The bathymetry of the inner ROPME Sea Area has a deeper channel toward the Iranian coast, with broad shelves on the Arabian side.

Evaporation (Sugden 1965 and Hunter 1982) and wind (Wright 1974 and Hughes and Junter 1979) are major driving forces in the Gulf circulation. Evaporation occurs more in winter due to high wind speeds, even though surface temperatures are higher in summer. The overall circulation in the inner ROPME Sea Area is cyclonic, with relatively fresh water entering through the Strait of Hormuz. In winter, the cyclonic circulation is primarily found in the southern portion. This cyclonic circulation gradually expands to extend farther north during the summer. Average rainfall in the region is very small (on the order of 7 cm/year) and is not a significant influence on the circulation. River discharge is small and occurs in the north at Shatt-al-Arab. River flow can be traced equatorward along the Arabian coast, with the plume extending approximately 20 km wide along the Iraqi coastline (Mathews et al. 1979). Reservoirs and dams in Iraq, Syria, and Turkey have reduced the river flow into the inner ROPME Sea Area at Shatt-al-Arab.

Tides are mostly diurnal and semidiurnal and are not significant for the residual circulation (and hence the transport of pollutants, such as oil), except near topographic features (Hughes and Hunter 1979). The tides are complex standing waves with two amphidromic points for the semidiurnal constituents

(northwest and southeast ends) and one for the diurnal constituents (central, near Bahrain).

Current Patterns

Three current patterns are used to simulate the circulation in the inner ROPME Sea Area. These include a reverse estuarine flow, river flow, and a wind-driven circulation derived with NNW winds. Tidal flows are not simulated in the Location File because it is concerned with a large scale (>10 km) region and long (> 1 day) timescale simulations.

References

You can get more information about the inner ROPME Sea Area from the following publications and web sites.

Oceanographic

Hunter, J.R., 1982. The Physical Oceanography of the Arabian Gulf: A review and theoretical interpretation of previous observations. Paper presented at *First Gulf Conference on Environment and Pollution, Kuwait, February 7-9, 1982*, pp. 1-23.

Hughes, P. and J.R. Hunter, 1979. Physical Oceanography and Numerical Modeling of the Kuwait Action Plan Region, *Report MARINE, 278*, UNESCO Division of Marine Sciences, 106 pp.

Mathews, C. P., M. Samuel, and M.H. Al-Attar, 1979. The Oceanography of Kuwait Waters: Some effects of fish population and on the environment. *Annual Research Report 1979*. Kuwait Institute for Scientific Research, Kuwait.

Sugden, W., 1963. The Hydrography of the Persian Gulf and its Significance in Respect to Evaporative Deposition. *American Journal of Science*, **261**: 741-755.

Wright, J.L., 1974. A Hydrographic and Acoustic Survey of the Persian Gulf, Part I, M.S. thesis, Naval Postgraduate School, 87 pp.

Wind and Weather

Please contact any of the following for wind forecasts and historical data:

- Marine Emergency Mutual Aid Centre (MEMAC) at memac@batelco.com.bh
- Regional Organisation for the Protection of the Marine Environment (ROPME) at ropmek@kuwait.net
- your local meteorological office

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 navigable waters and along coastlines.

General Information

Regional Organisation for the Protection of the Marine Environment (ROPME)

<http://www.kuwait.net/~ropmek/>

History, objectives, and activities of ROPME.

U.S. Energy Information Administration: Persian Gulf Oil Export Fact Sheet

<http://www.eia.doe.gov/emeu/cabs/pgulf.html>

Brief discussion relating to the percent of world oil supplied by the Persian Gulf region, the net oil exports of Persian Gulf countries, and oil imports by the U.S., Western Europe, and Japan from the Persian Gulf region.

Marine Emergency Mutual Aid Centre (MEMAC)

<http://www.computec.com.bh/memac>