



MUDMAP



MUDMAP is a computer model and analysis system developed and used by RPS scientists and engineers that predicts the transport, dispersion, and seabed deposition of drill cuttings and solids from drilling muds.

Model Description

MUDMAP includes detailed models that account for the three stages:

- The initial dilution, spreading, and free fall of the consolidated mass of mud and cuttings in the immediate vicinity of the release location (i.e. convective decent phase)
- The continued spreading and collapse of the consolidated mass as it either hits the seabed or becomes trapped by a strong density gradient in the water column (i.e. dynamic collapse phase)
- The subsequent transport, dispersion, and deposition of the discharged material by local currents (i.e. dispersion stage).

MUDMAP is controlled through an interactive Graphic User Interface (GUI) that integrates the model with a geographic information system (GIS), environmental data management tools, automatic grid generation tools, and associated input/output interfaces.

MUDMAP's near field model predicts the transport and dilution of discharged material through through the convective decent and dynamic collapse phases. Model input includes a definition of the drilling material's bulk and component density, as well as the physical parameters associated with it (i.e. settling velocities, size classes, and mass fraction); release location, discharge rate, and model duration; and the current and hydrographic fields.

DRILLING MUDS AND CUTTINGS TRANSPORT, DISPERSION, AND SEABED DEPOSITION MODEL AND ANALYSIS

Model output (dilution, plume center location/width, trapping depths, contaminant concentration, thickness and deposition) can be displayed. These outputs are also used as inputs for the far field model.

The far field transport and fate of the discharge material is predicted by a particle-based model using a random walk procedure. The particle model allows the user to predict the transport and fate of settling/buoyant particles from single or multiple sources.

Algorithms account for the major processes affecting the fate of discharges:

- Initial dilution and dispersion of a material stream as it is discharged into receiving waters
- Growth and further dilution of the discharge cloud as particles sink towards the seabed and entrain seawater
- Spreading of the discharge cloud as material strikes the seabed
- The transport and dispersion of the discharge plume by local hydrodynamic conditions



Geographic Information System (GIS)

The embedded GIS allows the user to input, store, manipulate, and analyze geographically referenced information. The simplified GIS has been designed to be user friendly, interactive and fast. GIS data is not required as input to MUDMAP, but is helpful in analyzing and interpreting model predictions.

The GIS allows an unlimited number of geographic databases to be created each with individual layers of data. Typical uses of the GIS include storing location names, biological resources (bird colonies, fish spawning areas), industrial facilities, environmental data.

Through the use of linking procedures additional information about geographically referenced data can be obtained. These link files might include charts, graphics, tables, tutorials, bibliographies, text, photographs, or animations. Examples of data which might be stored in the GIS for a typical problem include: Contaminant source strengths versus time for the discharge, details of outfall location and configuration, water column and sediment (core/grab sample) contaminant distributions, distribution and abundance of biota including shellfish, fish, birds, and marine mammals. Data may be shared with commercial GIS applications such as ArcView® and MapInfo, and tools such as ArcView's 3D Analyst may be used to perform complete 3D analysis.

Environmental Data Products and Services

Base Maps: MUDMAP can be set up for operation anywhere in the world. A geographic location for MUDMAP may be of any size and resolution. Please contact us for details. RPS can immediately prepare coastlines for anywhere in the world from the CIA, Digital Chart of the World (DCW), or World Vector Shoreline (WVS) databases. In addition, geo-referenced raster maps may also be used. Alternatively, base maps may be digitized from fine scale charts, or imported from existing GIS applications.

GIS Data Layers: Locations of sensitive resources such as critical biological habitats, water intakes, industrial sites, archaeological sites, etc. may be supplied in a GIS database. This data may already be available in RPS archives, or we can readily rather and provide this data on an individual basis. The user may view, edit and update this database using MUDMAP's embedded GIS.

Hydrodynamic Data: Models of water movement in oceans, estuaries, lakes, and rivers represent a fundamental component of many environmental assessment problems. Such models provide the basis for physical transport of drill cuttings and mud in the water.

RPS maintains several hydrodynamic models:

- Open channel network flow
- 2-D finite difference
- 3-D boundary fitted
- 3-D finite difference (horizontal)
- vertically layered
- continuous vertical representation

MUDMAP may also integrate current meter data, seasonal atlas based current fields, or import data from hydrodynamic models. We work with a number of institutes and universities throughout the world to be able to provide the best possible data for any area.

For more information
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