## What It Is

The Air Resources Laboratory's HYbrid Single-Particle Lagrangian Integrated Trajectory (HYSPLIT) model is a complete system for computing both simple air parcel trajectories and complex dispersion and deposition simulations. The model calculation method is a hybrid between the *Lagrangian* approach, which uses a moving frame of reference as the air parcels move from their initial location, and the *Eulerian* approach, which uses a fixed three-dimensional grid as a frame of reference. In the model, advection and diffusion calculations are made in a Lagrangian framework following the transport of the air parcel, while pollutant concentrations are calculated on a fixed grid.
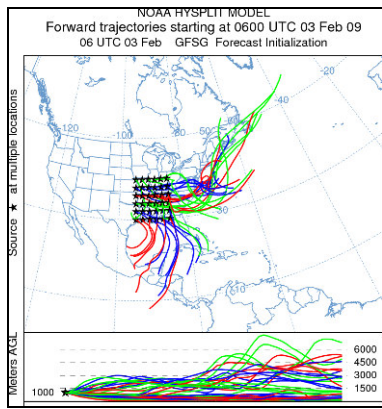

**Trajectory matrix of source locations.**

Through a joint effort between NOAA and Australia's Bureau of Meteorology, the model uses advection algorithms, updated stability and dispersion equations, a graphical user interface, and the option to include modules for chemical transformations. HYSPLIT can be run interactively on ARL's READY (Real-time Environmental Applications and Display sYstem) web site, or it can be installed on a PC and run using a graphical user interface.

## What It Is Used For

The model is designed to support a wide range of simulations related to the atmospheric transport and dispersion of pollutants and hazardous materials, as well as the deposition of these materials (such as mercury) to the Earth's surface. Some of the applications include tracking and forecasting the release of radioactive material, volcanic ash, wildfire smoke, and pollutants from various stationary and mobile emission sources. Operationally, the model is used by NOAA's National Weather Service through the National Centers for Environmental Prediction and at local Weather Forecast Offices.

At the local/regional level, field forecasters regularly respond to requests for dispersion forecasts from state and local emergency managers. At the national level, the model is often applied to needs from the aviation industry and air quality regulators. Internationally, NOAA responds through its participation with the World Meteorological Organization and the International Atomic Energy Agency by providing dispersion model forecasts in the event of a large scale nuclear incident.
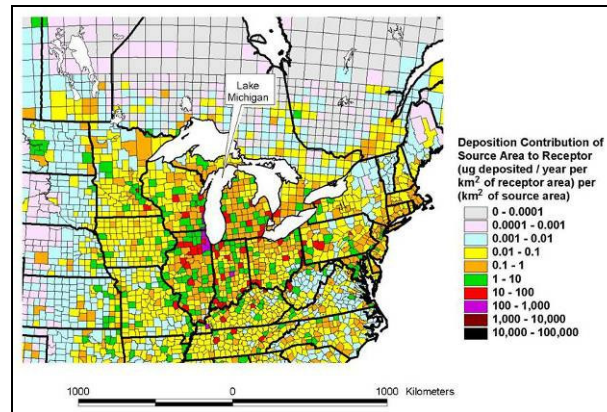

**HYSPLIT mercury modeling.**
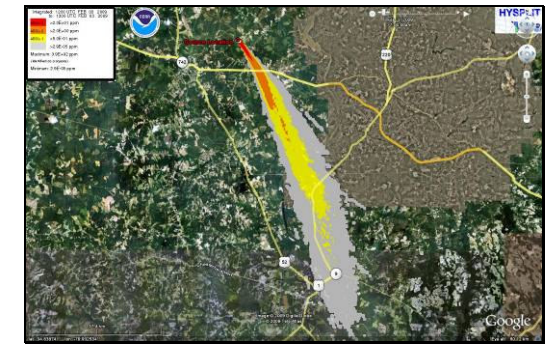

**Concentrations displayed in Google Earth.**

## Why It Is Important

The accidental or intentional release of chemical, biological or nuclear agents can have significant health, safety, homeland and national security, economic, and ecological implications. ARL's HYSPLIT model is a tool that helps explain how, where, and when chemicals and materials are atmospherically transported, dispersed, and deposited. Having this understanding is essential for responding appropriately and preventing disaster. For instance, accurate predictions of the path of a chemical release help emergency managers evacuate the right people. Predictions of volcanic ash plume locations allow aircraft to avoid dangerous areas. Understanding the sources of hazardous air pollutants allows air quality managers to develop targeted policies and plans to mitigate the problem.
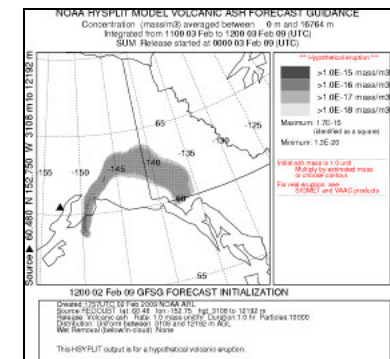

**Volcanic ash forecast.**

## Quick Links

NOAA Air Resources Laboratory
http://www.arl.noaa.gov

HYSPLIT Documentation
http://www.arl.noaa.gov/HYSPLIT_info.php

Atmospheric Transport & Dispersion
http://www.arl.noaa.gov/atmosDisp.php

Air Quality
http://www.arl.noaa.gov/AirQual.php

Volcanic Ash Documentation
http://www.arl.noaa.gov/VolcAsh.php

Forecast Trajectories for U.S.
http://www.arl.noaa.gov/READY_traj_pick.php

READY
http://www.arl.noaa.gov/ready.php

RSMC for Transport & Dispersion
Model Products
http://www.arl.noaa.gov/rsmc.php

**FOR MORE INFORMATION, CALL OR WRITE:**

**NOAA Air Resources Laboratory
SSMC3, R/ARL
1315 East-West Highway
Silver Spring, MD 20910**
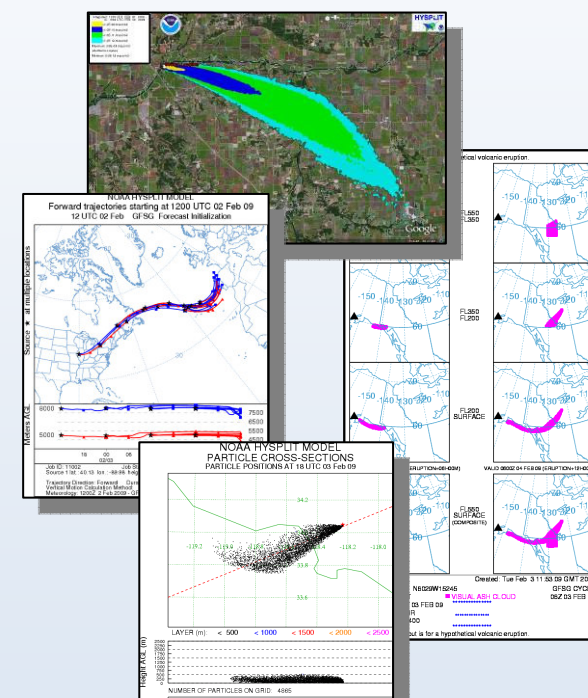

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# *HYSPLIT*

## Atmospheric Transport and Dispersion Model



**www.arl.noaa.gov/HYSPLIT_info.php**

National Oceanic and Atmospheric Administration
Office of Oceanic and Atmospheric Research
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