

# INTERNATIONAL TRANSPORT OF AIR POLLUTION

## TRANSPORT OF AIR POLLUTION AFFECTS THE U.S.

While domestic sources of emissions are the primary cause of air pollution in our country, the U.S. is both an importer and exporter of air pollution. Air pollution flows across boundaries—not only between the U.S. and our closest neighbors, Canada and Mexico, but also between North America, Europe, and Asia and, to some extent, between North America, Africa, and Central and South America. International flow of air pollutants into the U.S. contributes to observed concentrations of ozone and fine particles and deposition of mercury, persistent organic pollutants (POPs), and acid deposition.

The impact that international transport of air pollution has on our ability to attain air quality standards or other environmental objectives in the U.S. has yet to be fully characterized (except in areas that are immediately adjacent to cities or sources in Mexico or Canada). Estimates based on the available evidence are highly uncertain but suggest that the current contributions of international transport to observed concentrations and

deposition are small but are of the same magnitude as the air quality improvements expected from recent national emissions control programs. Figure 36 illustrates one estimate of the “footprint” of North American, European, and Asian emissions with respect to ammonium sulfate, a significant man-made component of fine particle pollution. Increased emissions of particle pollution, mercury, and ozone precursors associated with economic growth in developing countries may increase background levels of these pollutants in the U.S.

For ozone and particle pollution, increased background levels of these pollutants could potentially create difficulties for local and regional areas to achieve the National Ambient Air Quality Standards and long-term visibility improvement goals. Transported ozone and fine particles also contribute to radiative forcing and global and regional climate change.

For mercury and POPs, international flows contribute to deposition and eventual human and ecosystem chemical exposures. In some locations, especially in Alaska, international sources are the dominant source of ambient air contamination.

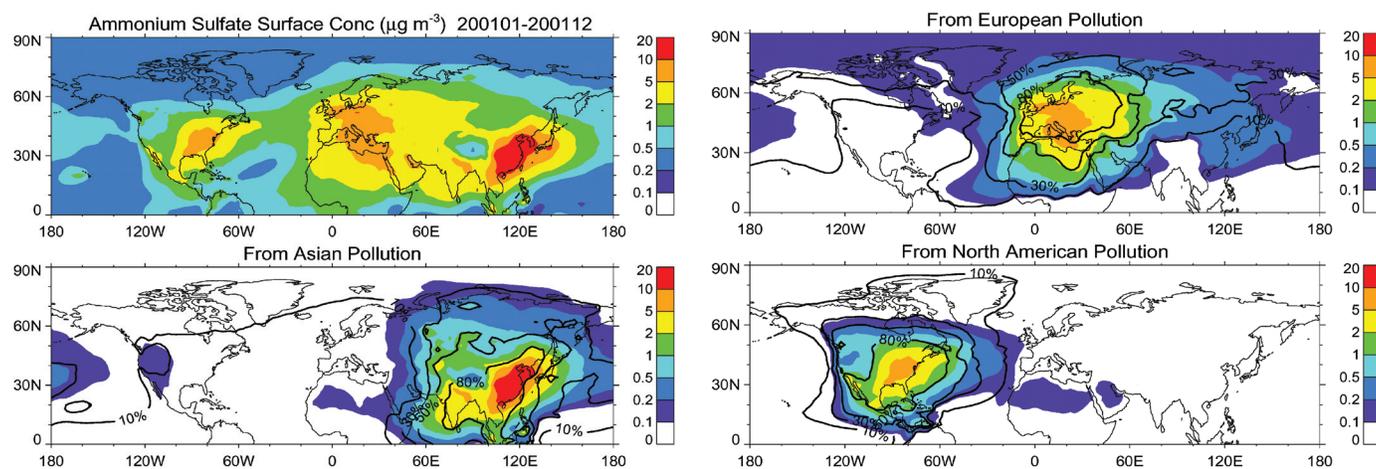


Figure 36. Annual average surface ammonium sulfate concentrations in the Northern Hemisphere in 2001 from NASA’s GOCART (Goddard Chemistry Aerosol Radiation and Transport) model (top left panel) and the amount from major source regions of Asia (second panel), Europe (third panel), and North America (last panel). Color scales are concentrations in  $\mu\text{g}/\text{m}^3$  and the contour lines show the percentage contributions to the total ammonium sulfate in 10, 30, 50, and 80 percent intervals. (Source: Chin et al., 2007, *Atmospheric Chemistry and Physics*, 7: 5501-5517)

## EFFORTS TO BETTER UNDERSTAND TRANSPORT OF AIR POLLUTION

EPA and other agencies are working via treaties and international cooperative efforts to address the international transport of air pollution. In 2008, EPA worked with the International Maritime Organization to adopt new emission standards for ocean-going vessels, a major source of air pollution in some coastal regions (see ship traffic patterns in Figure 37). In 2009, the National Academy of Sciences (NAS) completed a study funded by EPA, the National Oceanic and Atmospheric Administration (NOAA), the National Aeronautics and Space Administration (NASA), and the National Science Foundation (NSF), about the significance of international transport on air quality, deposition, and radiative forcing. This study, entitled “Global Sources of Local Pollution,” will contribute to

a 2010 assessment, co-led by EPA, of intercontinental transport in the northern hemisphere by the international Task Force on Hemispheric Transport of Air Pollution under the Convention on Long-Range Transboundary Air Pollution (LRTAP). The NAS study will also help inform U.S. participants on (1) negotiations on a global treaty to address mercury pollution that will be convened by the United Nations Environment Programme in 2010 and (2) ongoing negotiations under the global Stockholm Convention on Persistent Organic Pollutants, to which nine new toxic substances were added in 2008.

EPA continues to work bilaterally with air quality management authorities in Canada, Mexico, and other key countries, such as China and India, to help them address sources of air pollution, which ultimately helps to reduce the transport of air pollution into the U.S.

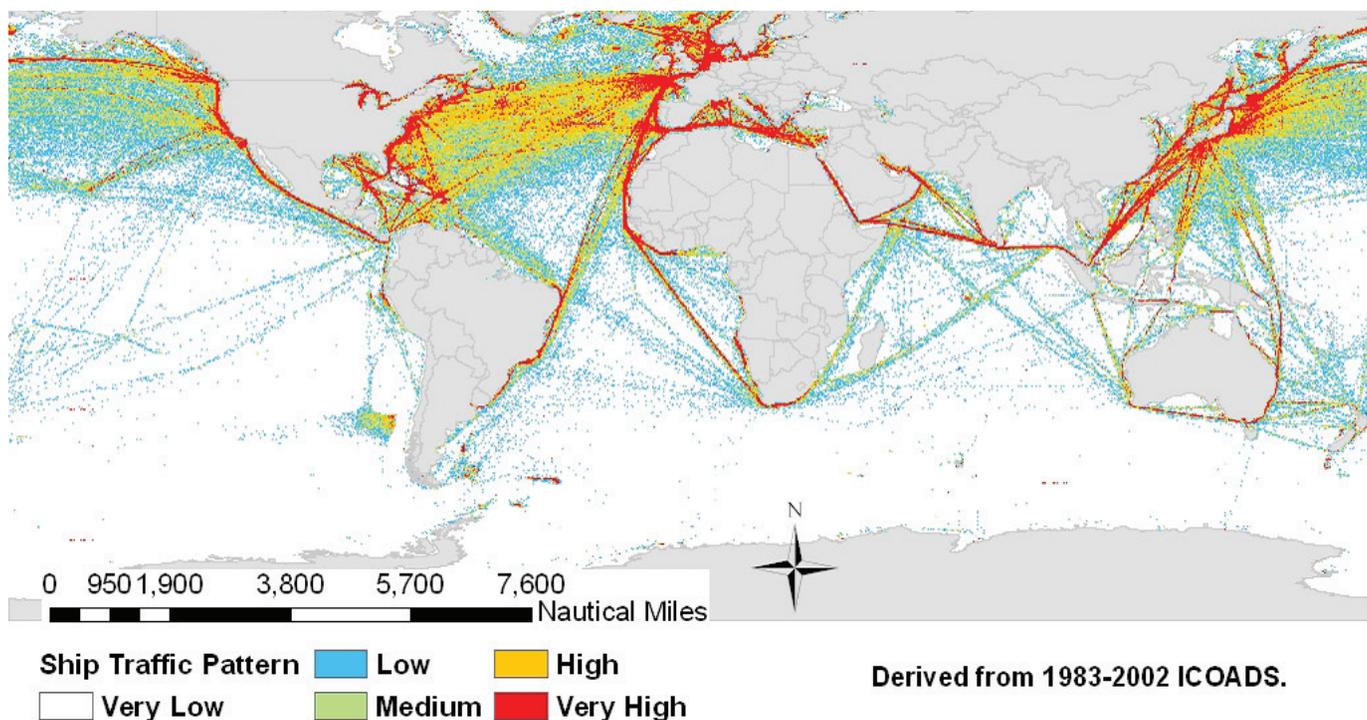


Figure 37. Marine shipping activity derived from the International Comprehensive Ocean-Atmosphere Data Set (ICOADS).