

INFLUENCE OF NORTH AMERICAN SOURCES ON SULFATE AT SAGRES AND
PUNTA DEL HIDALGO DURING ACE-2

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October 2002

For presentation at the
American Geophysical Union 2002 Annual Meeting
San Francisco, CA
Dec. 6-10, 2002

ABSTRACT

A hemispheric-scale Eulerian model has been used to ascertain sources of sulfate at Sagres, southwestern Portugal, and Punta del Hidalgo, Canary Islands, during the ACE-2 project, June-July, 1997. At both locations time series of modeled sulfate mixing ratios closely track the observations for the entire duration of the project. At Sagres sulfate was dominated by contributions from European sources, except for brief periods where contributions from biogenic sources were comparable. At Punta del Hidalgo European, North American, and biogenic sources each contributed comparably to sulfate mixing ratios, with no single source consistently dominating over the time period. Transport of sulfate from North American emissions across the North Atlantic was driven by the general synoptic features which included a persistent Azores high and an Icelandic low; animations of the transport of sulfate from the several source regions (to be shown during the presentation) facilitate the display and interpretation of the influence of the synoptic conditions on formation and transport of sulfate. These calculations provide quantitative model confirmation of earlier suggestions, based on back trajectories, of the influence of North American sources on aerosol loadings at these locations. These findings highlight the importance of long-range transport not only in influencing aerosol radiative forcing over oceans but also in affecting air quality and climate in downwind areas and point to ways to determine the influences of specific source regions.