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THE INFLUENCE OF A CUT-OFF LOW PRESSURE SYSTEM ON SULFATE CONCENTRATIONS OVER THE NORTHEASTERN ATLANTIC OCEAN

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We have developed an Eulerian transport and transformation model for evaluating the spatial and temporal patterns of atmospheric sulfate using observation-derived meteorology (Benkovitz et al., JGR, 1994). We report here simulations for the North Atlantic and adjacent continental regions for April 1987, focusing on the evolution of a strong, occluded cyclone associated with a very well defined cut-off low pressure system in the mid- and upper troposphere (April 4-7). Because this system exhibits negligible zonal and meridional wind components, it is quasi-stationary through the 4-day period. The center of the system lies to the south of the British Isles; an extensive band of easterly winds associated with the resulting warm "conveyor belt" transports SO<sub>2</sub> and sulfate from industrialized areas in Europe over the northeastern Atlantic, resulting in a region of high sulfate burden that echoes the circulation associated with the low-pressure system. Because the system is quasi-stationary, the storm-relative flow is approximately equal to the observed wind field, and there is significant isentropic up-slope flow associated with the western edge of the storm. Thus, as the warm conveyor belt slopes upward into the middle troposphere, precipitation removes the sulfate from the column. These results prompt us to ask, do cut-off low pressure systems act as reservoirs for sulfate over periods of several days? These slow moving systems spin-down over a period of several days, influencing the transport and removal of sulfate on the synoptic scale. They contain extensive and complicated conveyor belt circulations, some of which continually recirculate sulfate-laden air about the center of low pressure. In addition, because occluded cyclones represent the dissipating stage of mid-latitude storms, they may not contain precipitation of the intensity observed during earlier stages in the storm. A movie showing model output will be shown and discussed. This movie is available for examination at [http://tassle.das.bnl.gov/sulfate\\_model.html](http://tassle.das.bnl.gov/sulfate_model.html).