



A lagrangian identification of major sources of Sahel moisture

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The drying trend in the Sahelian region from the 1950s to the 1990s was a hotspot of decadal-scale changes in the climate of the 20th century. However, the sources of moisture in this region have been poorly studied. Motivated by the excellent skills of a new Lagrangian method of diagnosis for identifying the sources of moisture over a region (Stohl and James, 2004), this study examines the main sources over the Sahel. The method computes budgets of evaporation minus precipitation by calculating changes in the specific humidity along the trajectories. We tracked the air masses residing over the Sahel over a period of five years (2000-2004). Recycling was identified as the major source of moisture over the Sahel. This source is important during the first days of transport, and also on average over all 10 days of transport (Nieto et al., 2006). A band along the North Atlantic from the Sahel latitudes to the Iberian coasts and the Mediterranean area, including the Red Sea, are the other two important sources of the Sahel moisture over the year as a whole. There is strong moisture uptake over the tropical South Atlantic following the fifth day of transport, as well as on average over the 10 days of transport. However, it is not a major source during autumn, winter and spring because of the loss of moisture by precipitation during the three days before the air reaches the Sahelian region. This last fact does not occur during summer, which is why the South Atlantic Ocean is an important source of summertime moisture over the Sahel. The Indian Ocean does not seem to be an important source, although it could have a minor influence during summer.

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Stohl, A., and P. James (2004), A Lagrangian analysis of the atmospheric branch of the global water cycle. Part 1: Method description, validation, and demonstration for the August 2002 flooding in central Europe. *J. Hydrometeor.*, 5, 656-678.