Geophysical Research Abstracts
Vol. 14, EGU2012-6373, 2012
EGU General Assembly 2012

Regional Climate Response to Volcanic Radiative Forcing in Middle East and North Africa

G. Stenchikov and M. Dogar
King Abdullah University of Science and Technology (gera@envsci.rutgers.edu)

We have tested the regional climate sensitivity in the Middle East and North Africa (MENA) to radiation perturbations caused by the large explosive equatorial volcanic eruptions of the second part of 20th century, El Chichon and Pinatubo occurred, respectively, in 1982 and 1991. The observations and reanalysis data show that the surface volcanic cooling in the MENA region is two-three times larger than the global mean response to volcanic forcing. The Red Sea surface temperature appears to be also very sensitive to the external radiative impact. E.g., the sea surface cooling, associated with the 1991 Pinatubo eruption, caused deep water mixing and coral bleaching for a few years. To better quantify these effects we use the Geophysical Fluid Dynamics Laboratory global High Resolution Atmospheric Model (HIRAM) to conduct simulations of both the El Chichon and Pinatubo impacts with the effectively 25-km grid spacing. We find that the circulation changes associated with the positive phase of the arctic oscillation amplified the winter temperature anomalies in 1982-1984 and 1991-1993. The dynamic response to volcanic cooling also is characterized by the southward shift of the inter-tropical convergence zone in summer and associated impact on the precipitation patterns. Thus, these results suggest that the climate regime in the MENA region is highly sensitive to external forcing. This is important for better understanding of the climate variability and change in this region.