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Climate response to a volcanic eruption in an offline climate-chemistry modeling system

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Mt. Baekdu is one of the most highly active volcanoes since its eruption about 1000 years ago. We estimated the climate response to the probable eruption and thus large enhancements in volcanic aerosols in the atmosphere with an offline coupled climate (CCSM3)-chemistry (GEOS-Chem) model. We first conducted a GEOS-Chem aerosol simulation with an assumed volcanic activity at Mt. Baekdu. Simulated volcanic aerosols were passed in the climate model using a linking tool developed for providing GEOS-Chem data as the CCSM3 input conditions. A simulated volcanic cloud was transported eastward and resulted in cooling (warming) tendencies in the midlatitude (polar) region. In transient simulations, the cooling condition lasted for 2 months in East Asia after the eruption stopped. Results also showed the wave-like perturbation in both temperature and geopotential height fields propagating from East Asia to North America, indicating teleconnection effects due to volcano eruptions.