Geophysical Research Abstracts
Vol. 12, EGU2010-12880, 2010
EGU General Assembly 2010

Global Chemical Transport of Radon and Carbon Monoxide using the Colorado State University Multiscale Modeling Framework

Daniele Rosa (1) and William Collins (2)

(1) UC Berkeley, Earth & Planetary Science, Berkeley, United States (drosa@berkeley.edu), (2) Lawrence Berkeley Laboratory, Earth Sciences, Berkeley, United States (wdcollins@lbl.gov)

The implications of treating cloud convective physical processes at the sub-grid scale of a conventional global circulation model are investigated by analyzing the transport and mixing of atmospheric passive tracers. The analysis contrasts the tracer distributions produced by a conventional mass-flux convective parameterization with that from a super-parameterized cloud-system-resolving treatment of convective processes. The Community Atmosphere Model from the National Center for Atmospheric Research and its Colorado State University Multiscale Modeling Framework version are used to simulate global concentrations of radon and carbon monoxide. The simulations are conducted in chemical transport mode so that the lateral large-scale wind fields are identical and dynamical differences are confined to the sub-grid vertical velocities. The concentration profiles of the short lived radon are sensitive to convective processes in both the boundary layer and the free troposphere. The upper troposphere concentration map of the long lived carbon monoxide is sensitive to deep convective processes over strong emission sources like burning biomass and polluted areas. The results from the numerical simulations are contrasted and compared in a climatological mean sense to the observations from field campaigns for radon and from satellite data for carbon monoxide.