Geophysical Research Abstracts,
Vol. 11, EGU2009-2013-1, 2009
EGU General Assembly 2009

Numerical simulation of the atmospheric circulation over Tahiti

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Atmospheric transport of 2 natural radionuclides (^{7}Be and ^{210}Pb) is simulated over the globe by a General Circulation Model (GCM). Results are analyzed at Tahiti station to define its capacity to detect a pollutant circulating through Pacific Ocean. Numerical results over the years 2004 and 2006 show that the recorded time series of ^{7}Be and ^{210}Pb air concentrations are poorly reproduced by this global model, where Tahiti is not described due to the insufficient resolution (1.875°x1.25° horizontally and 19 levels vertically). In order to account for the observed discrepancies, circulation over Tahiti is analyzed in details for selected periods. Simulated wind fields are calculated by the mesoscale meteorological model WRF using 4 nested grids with resolutions ranging from 27 km to 1 km. The calculated wind fields are validated by those available at the Tahiti station and at airport. Results of WRF show that this tall island acts a mechanical obstacle on the flow and that the station is strongly affected by local sea-breezes. Despite these site-specific effects, simulations of atmospheric transport for different regimes demonstrate the coupling of the station at a daily scale with the general circulation. Sensitivity tests on ^{210}Pb transport demonstrate the dominant role of deep convection in the GCM.