Geophysical Research Abstracts
Vol. 14, EGU2012-7065, 2012
EGU General Assembly 2012

Global risk of radioactive fallout after nuclear reactor accidents

D. Kunkel (1), J. Lelieveld (1,2), M.G. Lawrence (1,3)

(1) Max-Planck Institute for Chemistry, Mainz, Germany (daniel.kunkel@mpic.de), (2) The Cyprus Institute, Nicosia, Cyprus, (3) Institute for Advanced Sustainability Studies, Potsdam, Germany

Reactor core meltdowns of nuclear power plants are rare, yet the consequences are catastrophic. But what is meant by ”rare”? And what can be learned from the Chernobyl and Fukushima incidents? Here we assess the risk of exposure to radioactivity due to atmospheric dispersion of gases and particles following severe nuclear accidents, using particulate ^{137}Cs and gaseous ^{131}I as proxies for the fallout. It appears that previously the occurrence of major accidents and the risks of radioactive contamination have been underestimated. Using a global model of the atmosphere we compute that on average, in the event of a core melt of any nuclear power plant worldwide, more than 90 % of emitted ^{137}Cs would be transported beyond 50 km and about 50 % beyond 1000 km distance. This corroborates that such accidents have large-scale and trans-boundary impacts. Although the emission strengths and atmospheric removal processes of ^{137}Cs and ^{131}I are quite different, the radioactive contamination patterns over land and the human deposition exposure are computed to be similar. High human exposure risks occur around reactors in densely populated regions, notably in southern Asia where a core melt can subject 55 million people to radioactive contamination. The recent decision by Germany to phase out its nuclear reactors will reduce the national risk, though a large risk will still remain from the reactors in neighbouring countries.