Contribution ID: **375** Type: **oral**

Ar-37 in the Atmospheric and Sub-Soil Gases

Thursday, 23 October 2014 10:10 (20 minutes)

On-site inspection of the radioactive noble gas isotope 37Ar is a definitive and unambiguous indicator of an underground nuclear explosion. 37Ar is produced underground by neutron activation of calcium by the reaction 40Ca(n,α) 37Ar. In the atmosphere, 37Ar is produced by the spallation reaction 40Ar(n,4n)37Ar. Periodic measurements over the last six years on air collected in Bern revealed a background level in the order of 1-5 mBq/m3air in agreement with former findings and theoretical calculations. Those calculations also indicated that the intrusion of stratospheric air masses may lead to elevated tropospheric 37Ar concentrations up to 8-10 mBq/m3air. Selected samples taken up to now in the vicinity of nuclear power plants revealed no significant deviation from the natural background. In order to distinguish between natural and artificially elevated 37Ar the location-specific 37Ar activity range in soils, rocks and the atmosphere were identified. From CARIBIC flights, a passenger aircraft with a special air freight container filled with scientific equipment in the cargo compartment, tropospheric air samples were analyzed for 37Ar and 85Kr. The natural 37Ar production in soils and the rock basement underlying the alluvium is investigated by means of insitu measurements of different isotopes, theortical calculations and irradiation experiments on selected rock samples. This will help resolve the temporal evolution and/or constancy of the natural 37Ar background and allow for an interpretation in terms of the identification of clandestine nuclear explosions.

Country or International Organization

Switzerland

Primary author: PURTSCHERT, Roland (University of Bern)

Co-author: RAGHOO, Lauren Samara (Climate & Environmental Physics, Physics Departement, University of Bern, Sidlerstrasse 5, CH-3012 Bern, Switzerland)

Presenter: PURTSCHERT, Roland (University of Bern)

Session Classification: Noble Gas Measurements in Support of Nuclear Safeguards Implementation