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On the usability of frequency distributions and source attribution of Cs-137 detections encountered in the IMS radio-nuclide network for radionuclide event screening and climate change monitoring

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Under the provisions of the Comprehensive Nuclear-Test-Ban Treaty (CTBT), airborne radioactivity is measured by means of high purity Germanium gamma ray detectors deployed in a global monitoring network. Almost 60 of the scheduled 80 stations have been put in provisional operations by the end of 2008. Each station daily sends the 24 hour samples' spectroscopic data to the Vienna based Provisional Technical Secretariat (PTS) of the CTBT Organization (CTBTO) for review for treaty-relevant nuclides. Cs-137 is one of these relevant isotopes. Its typical minimum detectable concentration is in the order of a few μBq/m^3. However, this isotope is also known to occur in atmospheric trace concentrations, due to known non CTBT relevant processes and sources related to, for example, the re-suspension of cesium from historic nuclear tests and/or the Chernobyl reactor disaster, temporarily enhanced by bio-mass burning (Wotawa et al. 2006). Properly attributed cesium detections can be used as a proxy to detect Aeolian dust events (Igarashi et al, 2001) that potentially carry cesium from all aforementioned sources but are also known to play an important role for the radiative forcing in the atmosphere (shadow effect), at the surface (albedo) and the carbon dioxide cycle when interacting with oceanic phytoplankton (Mikami and Shi, 2005). In this context this paper provides a systematic attribution of recent Cs-137 detections in the PTS monitoring network in order to

- Characterize those stations which are regularly affected by Cs-137
- Provide input for procedures that distinguish CTBT relevant detection from other sources (event screening)
- Explore on the capability of certain stations to use their Cs-137 detections as a proxy to detect aeolian dust events and to flag the belonging filters to be relevant for further investigations in this field (-> EGU-2009 Session CL16/AS4.6/GM10.1: *Aeolian dust: initiator, player, and recorder of environmental change*).

References

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