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Transport Modelling for Noble Gas Detections at Darwin, Australia, with Focus on Interhemispheric Exchange

The location of the noble gas station AUX09 in Darwin is particular in its position relative to the seasonally oscillating position of the Inter Tropical Convergence Zone (ITCZ). Darwin is located in the Southern Hemisphere but is influenced by the Australian-Indonesian Monsoon with advection of northern air masses during the Australian Summer (wet season). It is affected by south-easterly trade winds during the Australian Winter (dry season). This climatic setup is also influencing possible source regions for detections of radioactive xenon isotopes at Darwin. For comparison with the INGE time series and tagging of air masses, krypton-85 measurements taken in weekly samples from 2007 to 2010 by the Environmental Research Institute of the Supervising Scientist (eriss) in cooperation with the German Federal Radiation Protection Office (BfS, Freiburg) are used. Due to the global distribution of nuclear reprocessing facilities as main krypton-85 emitters nearly exclusively in the Northern Hemisphere, elevated krypton-85 levels at Darwin indicate recent advection of northern air masses. A sensitivity study is performed to quantify the seasonally dependent potential influence of xenon emissions of the ANSTO medical isotope production facility in Sydney, Australia and the Batan Serpong Medical Isotope Production Facility in Jakarta, Indonesia to AUX09 concentrations.

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