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2ND ATM-CHALLENGE 2016: INTERNATIONAL CHALLENGE TO MODEL THE LONG-RANGE TRANSPORT OF RADIOXENON RELEASED FROM MEDICAL ISOTOPE PRODUCTION TO SIX COMPREHENSIVE NUCLEAR TEST-BAN TREATY MONITORING STATIONS

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Abstract: After performing a first multi-model exercise in 2015 a more comprehensive and technically more demanding atmospheric transport modelling challenge was organized in 2016. Release data were provided by the Australian Nuclear Science and Technology Organisation radiopharmaceutical facility in Sydney (Australia) for a one month period. Measured samples for the same time frame were gathered from six International Monitoring System stations in the Southern Hemisphere with distances to the source ranging between 670 (Melbourne) and 13,500 km (Rio de Janeiro). Participants were encouraged to work with unit emissions in pre-defined emission intervals (daily, half-daily, 3-hourly and hourly emission segment lengths) and in order to perform a blind test actual emission values were not provided to the participants before submitting their results to the challenge organization team. Similar features were detected when comparing the results of the previous and the current multi-model exercise, despite the quite different settings, like the characteristics of the measured signals, the station distances to the source and the different climatological conditions at the individual monitoring stations. Especially, there is some evidence that using daily resolved emissions has no significant disadvantage compared to using higher resolved ones, even for stations located at a few hundreds of kilometres away from the source. Furthermore, an uncertainty of up to 20% in the daily stack emission data turns out to be acceptable for the purpose of a study like this. Finally, it became more evident how future exercises need to be designed in order to end up with generally accepted conclusions reaching beyond those for single test cases.

Key words: *atmospheric transport modelling, nuclear explosion monitoring, medical isotope production, radioxenon background, model comparison and validation***.**