The operational CTBTO-WMO Atmospheric Backtracking Response system for Nuclear Test-Ban Treaty Monitoring

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After the detection of treaty-relevant radionuclides in air samples collected by the International Monitoring System (IMS) of the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO), atmospheric backtracking techniques are employed by the Provisional Technical Secretariat (PTS) to trace back the measured substances to their potential areas of origin. In the case of an underground nuclear test, potential sources are co-located with the epicenters of seismic events that may have been triggered by the explosions. Previous studies have shown that predictions or analyses of atmospheric transport, forward as well as backward, can be significantly improved and enhanced by employing ensemble techniques. Such techniques can also account for modeling uncertainties. Therefore, the PTS has put into its provisional operations a joint response system with the World Meteorological Organization and its Regional Specialized Meteorological Centers for Atmospheric Transport Modelling in September 2008. From this moment on, the system was triggered every time treaty-relevant radionuclides were measured at IMS particulate samplers, which happened in five instances between October 2008 and January 2009. A CTBTO-WMO exercise has been conducted in October/November 2008, under the test assumption that a seismic event selected by an automated routine of a National Data Centre was nuclear and has subsequently caused a series of (virtual) detections at IMS sites. The first experiences with the operational response system and the set-up and results of the exercise shall be described here. Furthermore, an outlook for future developments and activities is provided.