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On the meteorological situation governing the emission and atmospheric transport conditions during the announced October 2006 event in North Korea

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At 01:35:28 UTC on 9 October 2006, the International Monitoring System being built under the auspices of the Provisional Technical Secretariat (PTS) of the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) recorded an event with the characteristics of an underground explosion in the Democratic Peoples Republic of Korea (DPRK) located at (41.43^{o}N, 129.02^{o}E). Six days earlier on 3 October the public press reported on an announcement of a nuclear test explosion issued by DPRK officials.

A comparatively low yield gave rise to many speculations on whether the explosion event was nuclear or not and demonstrated therefore the relevance of the radionuclide (RN) compartment of the IMS comprising a highly sensitive 80 stations radionuclide (RN) network. 40 of these stations are scheduled to measure also radio-xenon. The missing geo-location information for the RN measurements is provided by suitable adjoint dispersion models in charge to perform backtracking and source attribution of potential detection.

The PTS utilizes mainly backward ATM methods (source receptor sensitivity fields) to relate measurements and sources. Immediately after the incident, however, when no monitoring results were available, methods of forward plume analysis and prediction were employed. Later on, measurements and source assumptions were linked together also with backtracking methods. Assuming the underground explosion of the October 2006 was nuclear it was most likely well contained with regard to the release of radionuclide particles. Only radio-xenon could have been released but as long as there is no measurement encountered in the 40 stations network, the description of the release

scenario requires a priori assumptions. The scenario could be an immediate venting of the noble gases or a complex leakage from rock cracks triggered for example by the passage of a low pressure system.

In both cases the meteorological conditions during the release play an important role for the quality of the plume dispersion analysis and shall thus be discussed in this paper. Forward EDM methods shall be applied for this purpose, whereby the ensemble members represent variations in the applied wind field analysis, release time and dispersion model utilized. Furthermore, forward and backward results for specific sites were compared.