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A new Bayesian method to estimate upper limits of radioactive release source terms by scrutinizing measurement data from CTBTO experimental radioxenon monitoring systems in late May and early June 2009

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A global experimental monitoring network for traces of radioactive xenon is currently installed by the Provisional Technical Secretariat (PTS) of the Preparatory Commission for the Comprehensive Nuclear Test-Ban-Treaty Organization (CTBTO) within the framework of the "International Noble Gas Experiment" (INGE). After the announced test in the DPRK on 25 May 2009 collected seismic signals detected at various sites were reported by the PTS. However, no significant detections of radioactive effluents were reported publicly. This lack of radioactive signature begs the question on an upper limit of a source term that would be consistent with the non-detection in the INGE network.
In this approach we use Bayesian estimators for confidence limits from measurements of 133Xe at different sites and atmospheric transport and dilution simulations in order to infer maximum possible daily releases on 25 May and following days. The method combines all available data and extracts maximum information from all data, regardless of whether 133Xe has been detected or not.
The results indicate that releases at the explosion site, if any, must have been less than 10E13 Bq 133Xe on 25 May and even two orders of magnitude lower at some days in the week after.