

### **1.3-O3. Application of Atmospheric Dispersion Modeling to On-Site Inspection (OSI)**

The U.S. Department of Energy's National Atmospheric Release Advisory Center (DOE/NARAC) provides 24/7 high-fidelity tools and expert staff to predict and analyze the impacts of hazardous atmospheric releases, such as the recent Fukushima Dai-ichi nuclear power plant accident (Sugiyama et al., 2011: Health Physics 102(5), 493-508). Local-to-global scale meteorological and dispersion modeling could significantly contribute to CTBTO missions by the use of NARAC expert predictions and analyses to support On-Site Inspection (OSI) operational capabilities and exercises, such as the recent Integrated Field Exercise (IFE). Ground truth scenarios incorporating high-resolution numerical weather prediction and dispersion modeling that take into account topography, time-dependent meteorology, data assimilation, nuclear detonation source terms, gas/particulate releases, radioactive decay, precipitation, and deposition can provide realistic concentration footprints and time-dependent air concentration and deposition data for exercises. Based on operational approaches currently used in DOE/NARAC emergency response modeling, OSI protocols could be extended to include the iterative use of models to guide sample collection with source estimation and model refinement based on field until the release is characterized. On-going development of improved nuclear detonation source terms, four-dimensional data assimilation, and deposition algorithms are improving the fidelity of NARAC models for such applications.

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