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Applications of Atmospheric and Oceanic Diffusion Modeling at RSMC Beijing

RSMC Beijing became one of the world's eight Regional Environmental Emergency Response Centers by the end of 1996. Since 1997, it has provided nuclear incident response exercises for the IAEA under the WMO framework and has offered source reconstruction services for CTBTO's IMS monitoring stations since 2003. The center's current environmental emergency response system is based on China's CMA-GFS and CMA-MESO numerical weather prediction models, and the HYSPLIT and CMA-SDM Lagrangian atmospheric diffusion models. These models form a multi-scale atmospheric diffusion forecasting system, supporting forecasts from minutes to weeks and addressing diverse emergency response needs. Key technologies include source term assessment for nuclear plants, ensemble forecasting for medium- and large-scale diffusion, multi-trajectory source reconstruction and dose assessment, which have been applied in incidents such as the Fukushima disaster and national nuclear emergency exercises. A rapid-response platform has been developed, integrating data management, diffusion model computation and product distribution, enabling full automation from data processing to product release. Future efforts will focus on next-generation MCV-based diffusion systems and further development of source term and assimilation technologies.

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