Operational demonstration tool for forecasting nuclear explosions fallout, atmospheric dispersion and corresponding doses for the aviation sector

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Within the European Natural Airborne Disaster Information and Coordination System for Aviation (EUNADICS-AV) project, the effects on the aviation key infrastructure of both nuclear accidents from civil nuclear facilities and nuclear explosions are under study. Whereas extensive work has already been done for other environmental hazards such as volcanic explosions and even operational advice is provided to the aviation community, for the nuclear emergencies little to no information is provided to make decisions upon (for example whether to land or not in an airport, divert from a pre-established route or close an airport). At the Austrian Weather and Geodynamical Service (ZAMG), a nuclear explosion source module has been developed for FLEXPART that, for a range of yields (from a low -terrorist-like device to a high military-like - nuclear weapon) and a pre-defined type of fuel, set of particle bins, number of wafers and associated proportions of radionuclides per wafer and particle bin, provides a set of products tailored for aviation in a computationally efficient environment to ensure potential operational implementation. The current products include radionuclide activity concentrations at ground level and flight levels up to FL650 and doses due to ground shine, cloud shine and inhalation at ground level. Approximated doses at higher levels will be as well be given through look-up tables based on detailed calculations of doses within aircrafts. The modules have been tested with fictitious and realistic scenarios.