Federal Office for
Radiation Protection

PREDICT - ImPRovements in atmospheric dispErsion moDellIng and proteCTive action strategies in case of nuclear detonations

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Emergency Preparedness & Response Division – Situation Report

Introduction

- PREDICT aims to enable the major internationally used decision support systems JRODOS and ARGOS and other nationally used atmospheric dispersion and transport codes and follow-on foodchain models to simulate and predict consequences due to the fallout of a nuclear detonation in Europe or worldwide.
- Duration: 36 months
- 12 partners from seven countries
- Total project costs: 1,446,351 EUR
- Requested Funding: 534,645 EUR

National Institute for Public Health and the Environment
Ministry of Health, Welfare and Sport

PDC-ARGOS
CBRN Crisis Management

UK Health Security Agency

epa
Environmental Protection Agency

Technical University of Denmark
DTU

Met Office

DSA

KIT
Karlsruher Institut für Technologie

DANISH EMERGENCY MANAGEMENT AGENCY

Federal Office for Radiation Protection

NMBU
Norwegian University of Life Sciences

Strål säkerhets myndigheten
Swedish Radiation Safety Authority

Background

- Repeated threat by Russia to use tactical nuclear weapons in the war against Ukraine stresses necessity of European countries to be prepared and to be able to respond to a nuclear detonation scenario
- Considerable contamination may occur far beyond a battlefront zone due to nuclear fallout
- Radiation protection of the public could significantly help reduce stochastic and deterministic health effects in the affected population
- Decision support systems (DSS) that are currently used in Europe were primarily developed for responding to nuclear power plant (NPP) accidents
- The same applies to protective action strategies and communication to the public
- Response to a nuclear detonation is in many ways different and poses specific challenges for DSS and communication strategies that must be met

https://clips-mp4-aka.warnermediacdn.com/cnn/clips/2023-06/1213655-f9ca853dbb4649d18ecd82abf566344e/mp4/cms3-CNN-exp-putin-nuclear-weapons-nada-bashir-live-061703aseg2-cnni-world-primary-281894-1213655-1920x1080_8000k.mp4

Project structure I

Mission statement: Improve operational capabilities of the models used in Europe, so that European Member States can make sound decisions on the protection of the population from nuclear detonations

WP 1 – Characterization of airborne radiocontaminants (source term description):

- Research into datasets, relevant for atmospheric dispersion modelling for airburst and ground detonation
- What are the main dose-delivering radionuclides, activity-height and particle size distributions?
- Reduce computing time and develop relevant scenarios to be used in other WPs

WP2 – Modelling Improvement:

- Develop scientifically based recommendations for future improvements of atmospheric dispersion and radiological dose assessment models applied to nuclear detonation scenarios

Image: Glasstone and Dolan, 1977

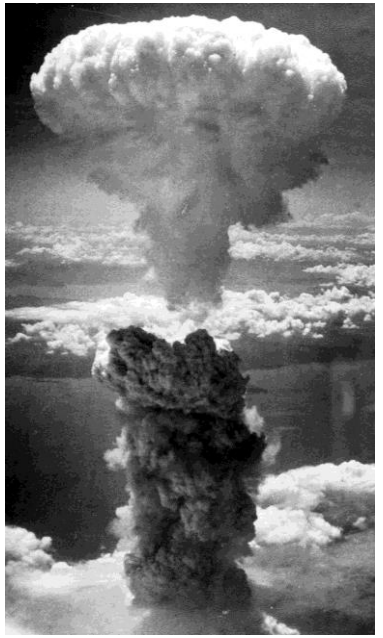


Image: Wikipedia

Project structure II

WP3 – Model Comparison:

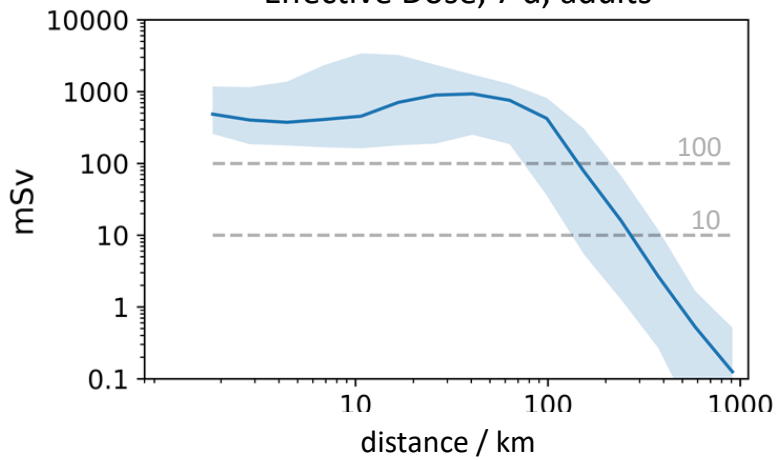
- Use historical contamination data from 1950s weapon tests for model validation as far as possible (accuracy of the prediction)
- Assess uncertainty in dispersion modelling for the same input data set but different codes from the different project partners: a) yearly averaged meteorological conditions b): specific, most relevant meteorological conditions (precision of the prediction)

WP4 – Protective actions strategies:

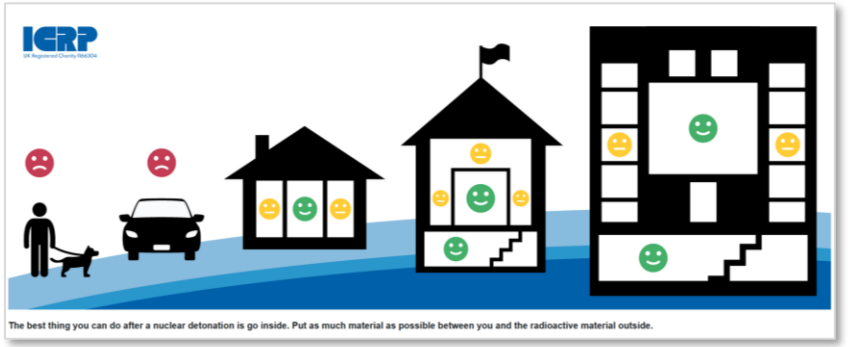
- Develop harmonized protective action strategies, based on the unified source terms of WP1 and specific endpoints of the uncertainty analysis in WP3
- Develop effective ways of communicating protective measures to the public, taking into account psychological, social and ethical consideration and utilizing results of a workshop with key players in emergency response

Averaged meteorological conditions – 10 kT yield

Effective Dose, 7 d, adults



Advice for the Public on Protection in Case of a Nuclear Detonation



Project structure III

WP 5 – Education, training and dissemination :

- Disseminate project results to the European operational emergency preparedness and response community and worldwide using:
- European Radiation Protection Platforms organised in MEENAS
- International bodies such as IAEA, OECD NEA, HERCA-WENRA
- Regular international exercises of the RODOS and ARGOS user groups
- International conferences
- Training courses targeted at the next generation of radiation protection specialists, PhD students and early career scientists

WP 6 – Project management

Project Results & Impact

- Updated simulation models, which will be state-of-the-art at the end of the project
- Development of recommendations for protective actions together with strategies to disseminate them to the population, based on the updated models
- Important to note here is the fact that all results will be implemented in national and supra-national DSS (e.g. ARGOS, JRODOS, JAM-IntND (UK), SNAP (Norway))
- Recommendations for future research for further improvement in modelling and dose assessment

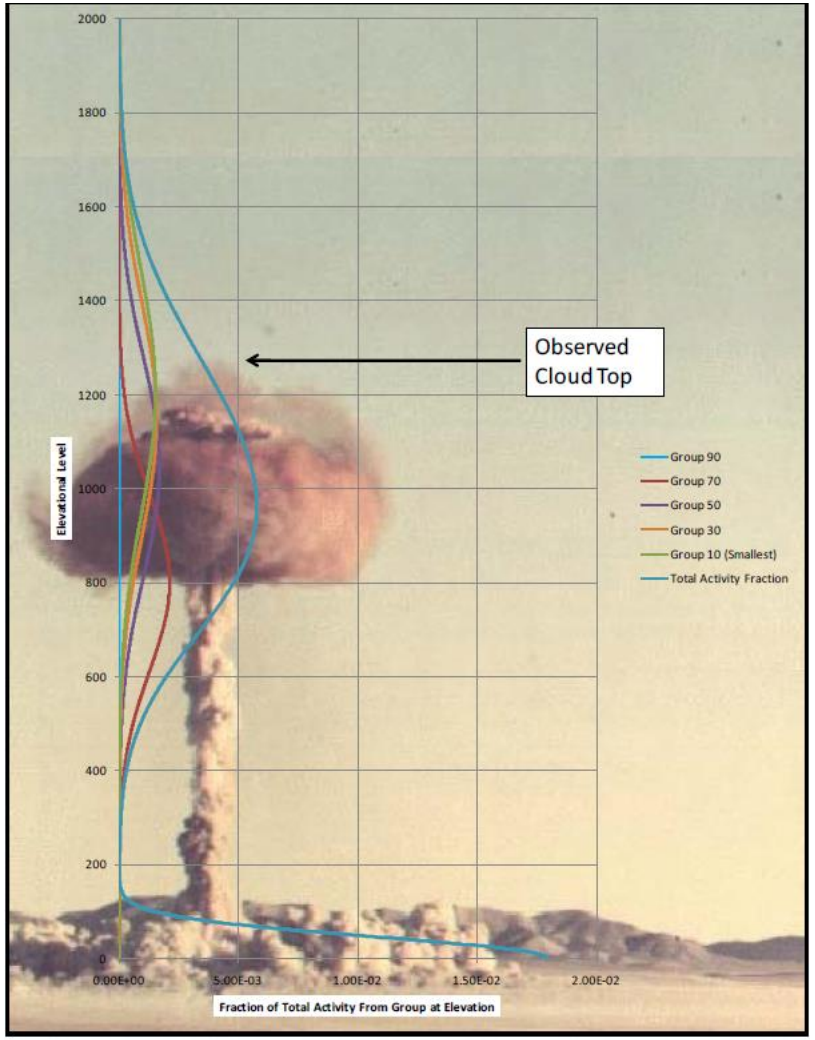


Image: O'Day, Buckley E. III , 2009

https://scholar.afit.edu/etd/2454

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Thank you for your attention!

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