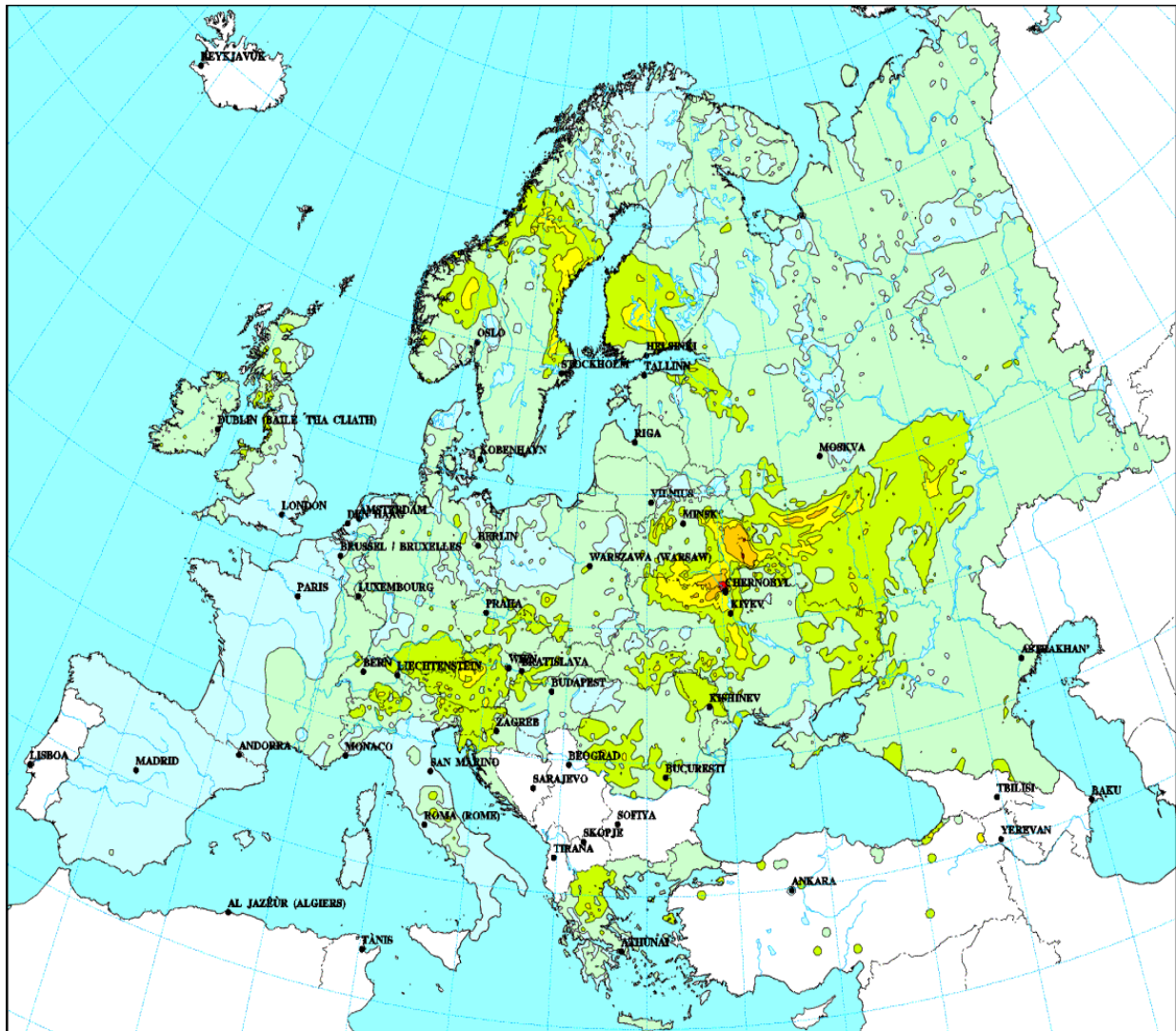


RISKMAP - Risks Due to Severe Accidents of Nuclear Power Plants in Europe

A project funded by the Ministry of Environment, Youth and Family Affairs



Cs-137 ground contamination of Europe after the Chernobyl accident 1986, taken from "Atlas of Caesium deposition on Europe after the Chernobyl accident", EUR report 16733, EC Office of Publication, Luxembourg, 1996.

Aim of the Project

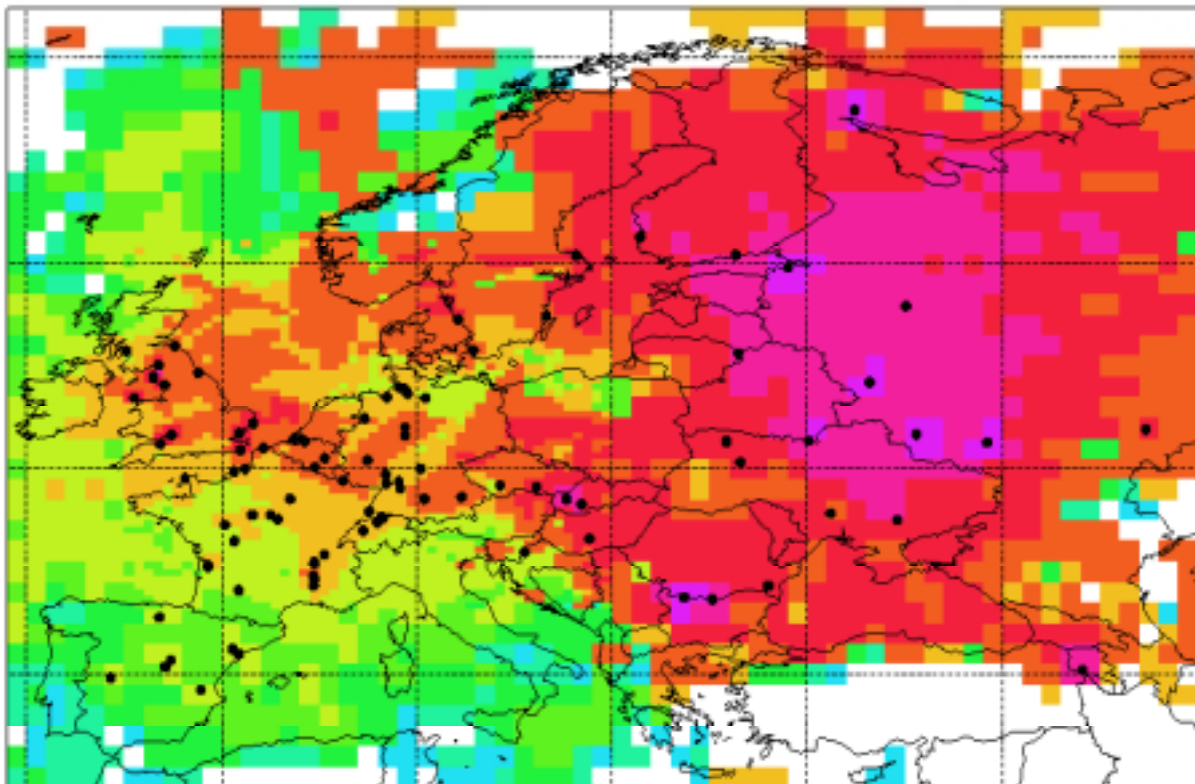
The aim of RISKMAP is to map the risk due to severe accidents of nuclear power plants (NPPs) in Europe in order to:

- make transboundary risk due to NPPs visible;
- provide a tool to determine which NPPs pose the greatest risk to a given region;
- help in defining risk “exporters” and risk “importers”, an important aspect for international liability agreements like the Vienna and Paris Convention.

The Concept

The **risk** posed by accidents in nuclear power plants is determined by the **damage** caused and the **likelihood** of occurrence. RISKMAP defines the frequency of exceedance of a chosen contamination threshold as **indicator of risk**.

Both, damage and likelihood of occurrence are influenced by two basic complexes: accidental radioactive release and atmospheric transmission.



Distribution of Risk on European Scale for an accident scenario which attributes high accident frequencies to WWER 440/230 (Bohunice V-1) and RBMK (Chernobyl) reactors and a contamination threshold of 185 kBq m^{-2} Cs-137 ground contamination.

The accidents of interest are **severe accidents** leading to large off-site releases (e.g. with release fractions in the range of 40% of the Cs-137 inventory). Their **frequencies** as evaluated in different risk and safety studies are associated with high uncertainties. As these frequencies strongly influence results, different frequency scenarios must be considered.

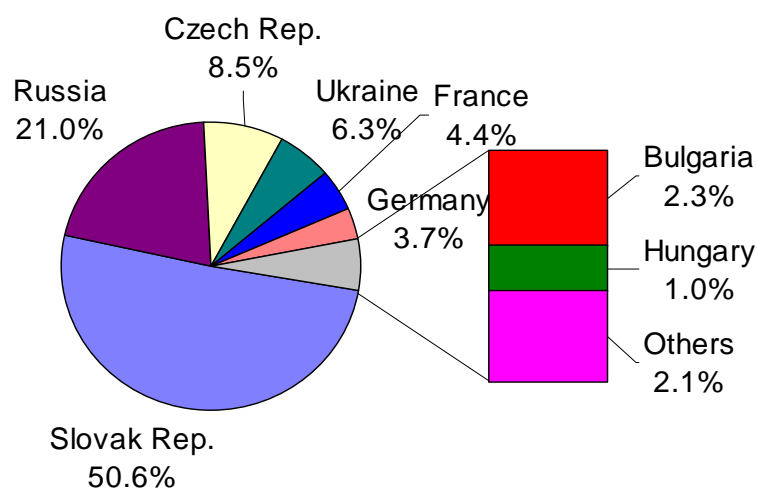
Atmospheric transport, diffusion and deposition are calculated with a Lagrangian particle model, permitting attribution of deposited nuclides to specific NPPs and accident times. Thus the percentage of the meteorological situations leading to a sufficiently high deposition can be calculated for different accident scenarios.

The **risk indicator**, calculated for a grid spread over Europe, can be plotted in maps or be evaluated on a country by country basis to show the overall relative risk or the relative importance of individual countries or NPPs for the overall risk.

The Model

Basis for the RISKMAP model are simulations assuming repeated severe accidents with large radiological releases in every NPP in Europe which are dispersed and deposited over Europe according to historical weather conditions. The meteorological simulations are based on the year 1995, which can be shown to be representative for the 20 year period 1977-1996. Release intervals cover the whole year 1995 and assure sampling of all seasons and times of day. The smaller the release intervals, the more representative are the results in screening all possible weather conditions during one year.

The releases are weighted by the inventory of the NPP and by the likelihood of releases in severe accidents. Finally the frequency of depositions above a certain level are considered being **indicators of risk**. A modular structure with precalculated deposition fields allows for rapid accident scenario calculations.

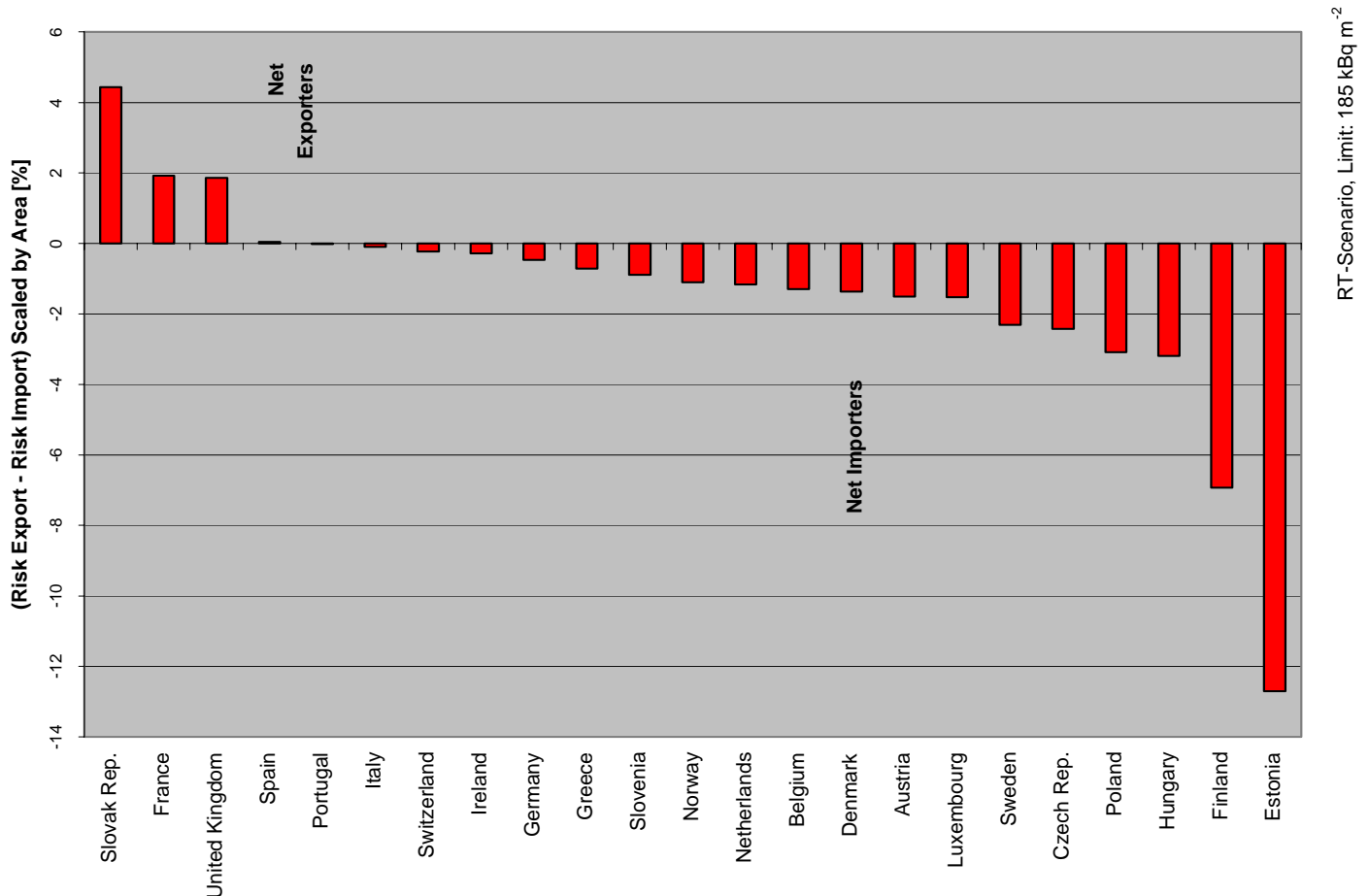


Relative contribution of European countries to the risk for Austria (RT scenario).

RISKMAP is an ongoing effort

It is intended to:

- make RISKMAP available on the internet
- invite international cooperation in further development
- evaluate more scenarios (e.g. release frequencies) for specific applications
- include more comprehensive damage and risk indicators
- use RISKMAP as a Risk Management Tool.



Export-Import matrix for selected European countries scaled by area (RT scenario)

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