

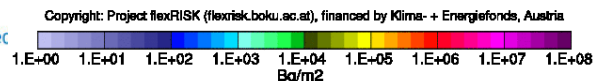
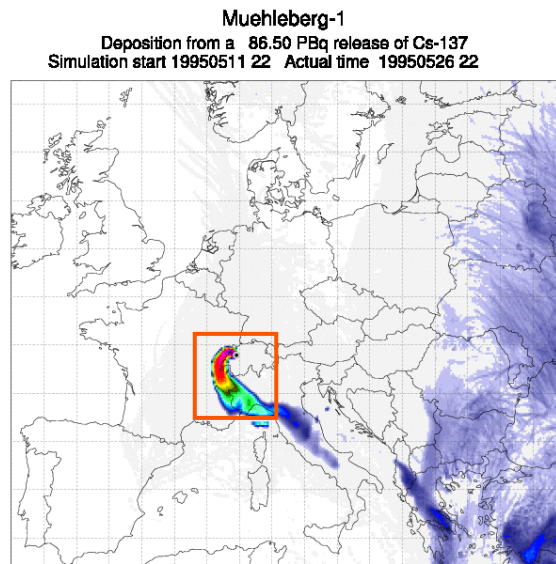
# Meteorological and atmospheric transport modeling aspects flexRISK

Delia Arnold & flexRISK team  
26 June 2012

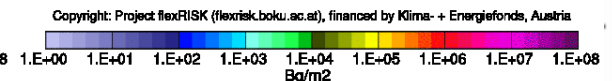
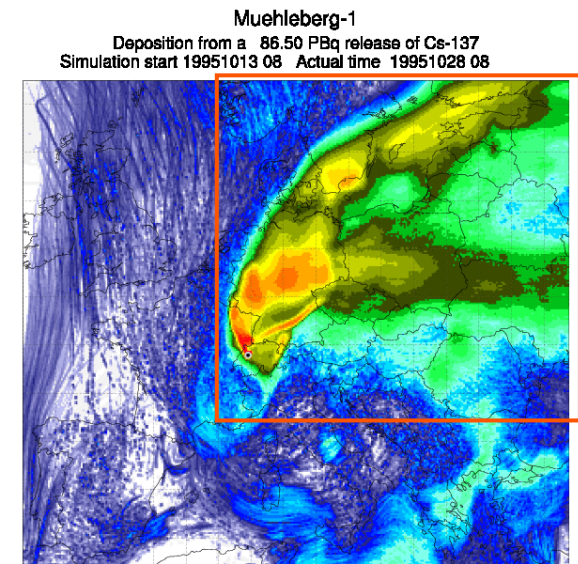
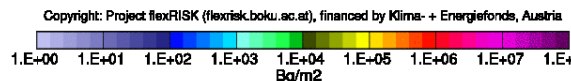
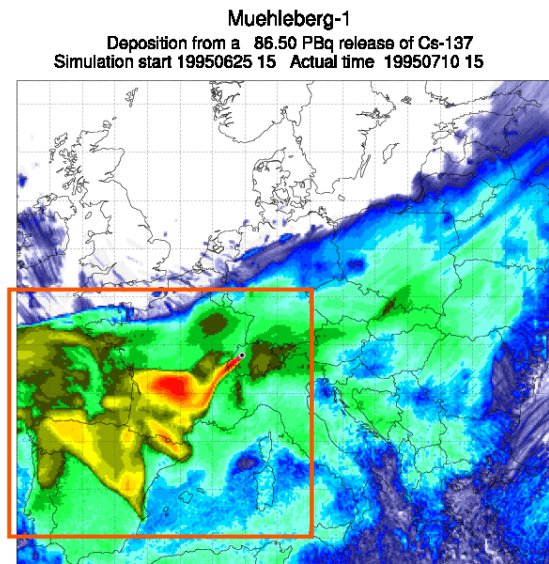
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- Once the radionuclides become airborne they undergo:
  - Transport (wind) and diffusion
  - Dry and wet (rain) deposition
 } Determine which regions will be affected
- The geographical extent & pattern of the contamination varies depending on the meteorological conditions
  - wide range of scales involved

*Nearby – short-range transport*

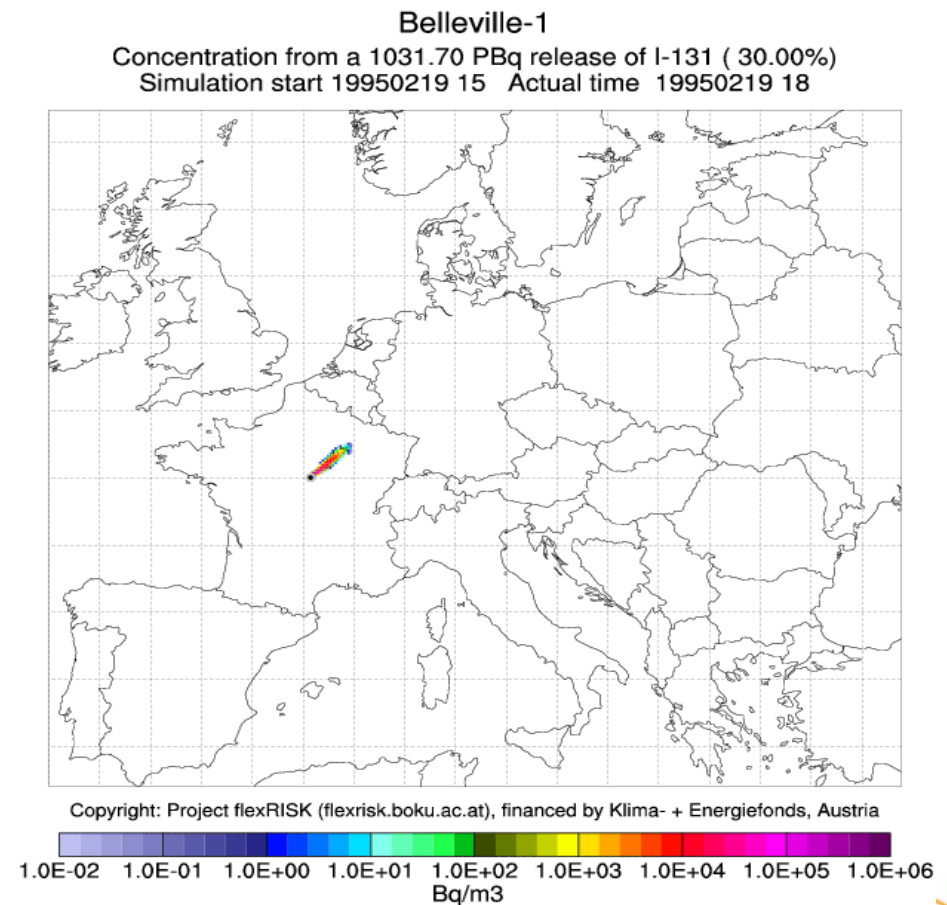
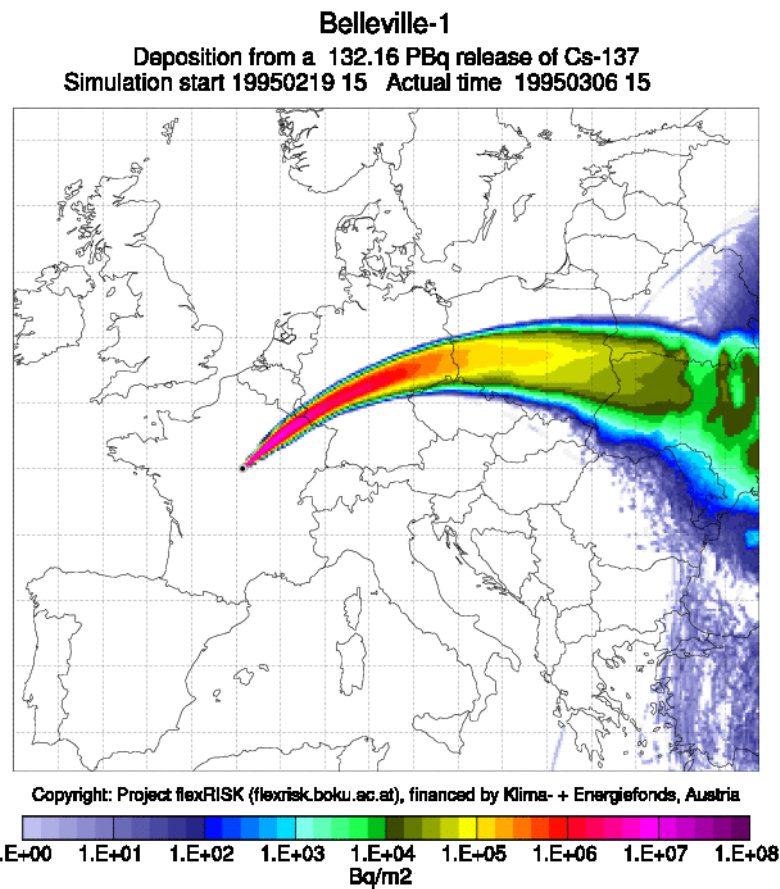


*Far– regional/global scale transport*



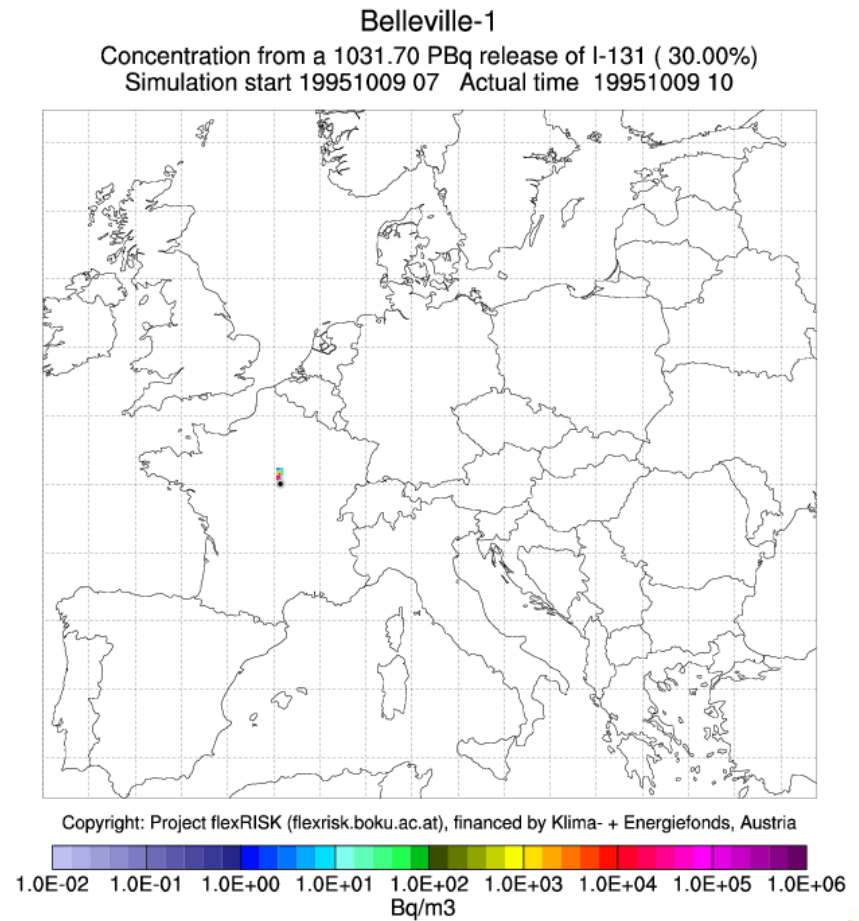
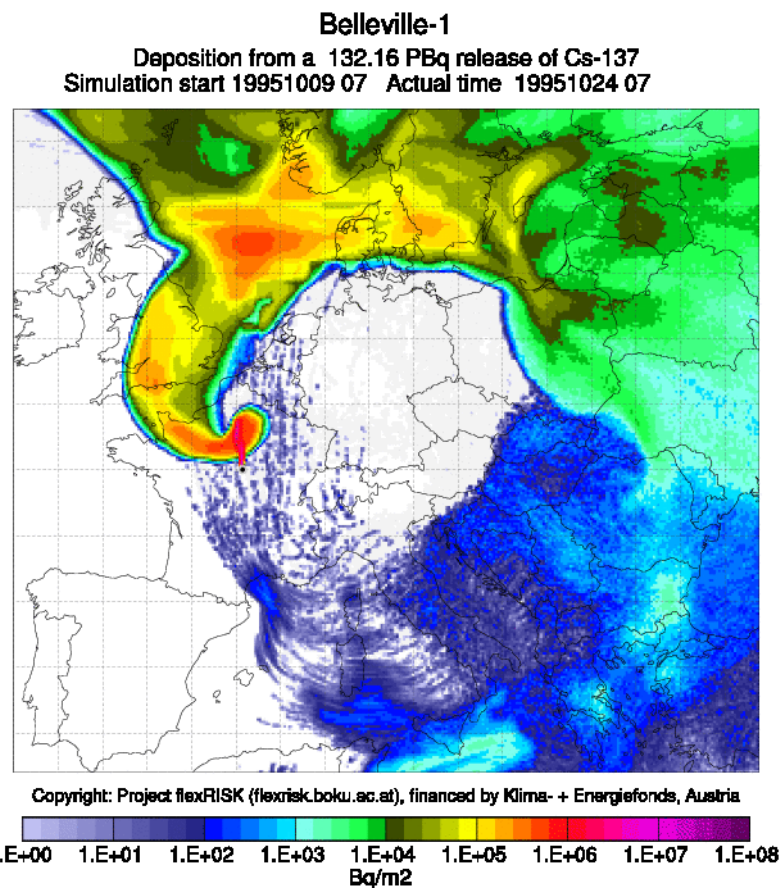
- The transport patterns (movement of the radioactive cloud) vary in complexity

*Simple meteorological conditions – westerly flow*



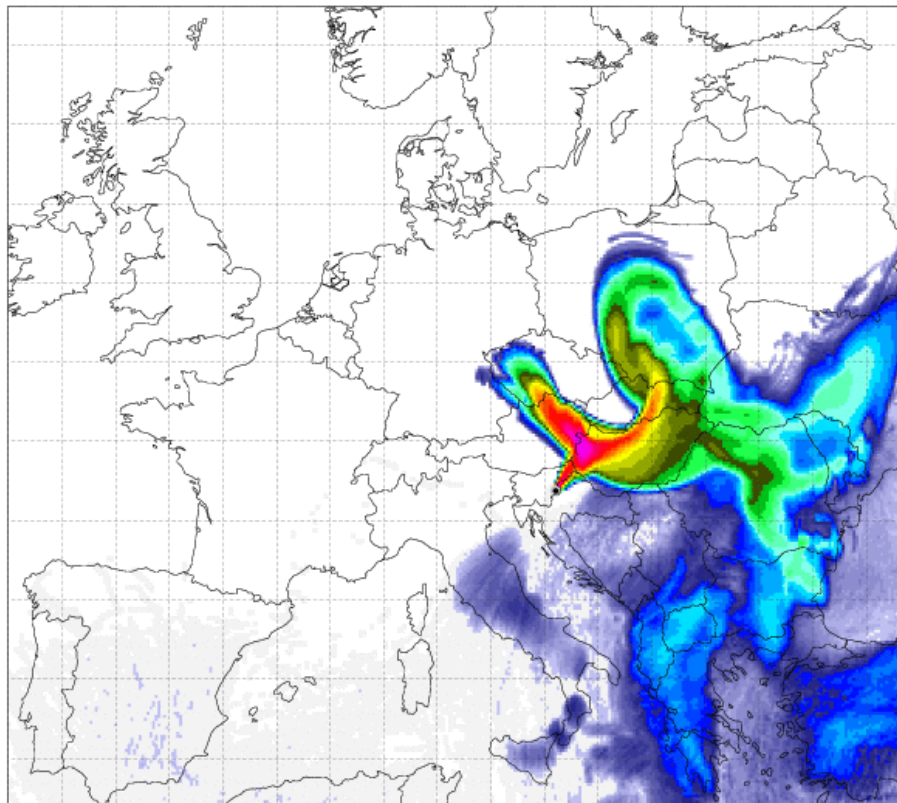
- The transport patterns (movement of the radioactive cloud) vary in complexity

### *Complex meteorological conditions*



## Krsko-1

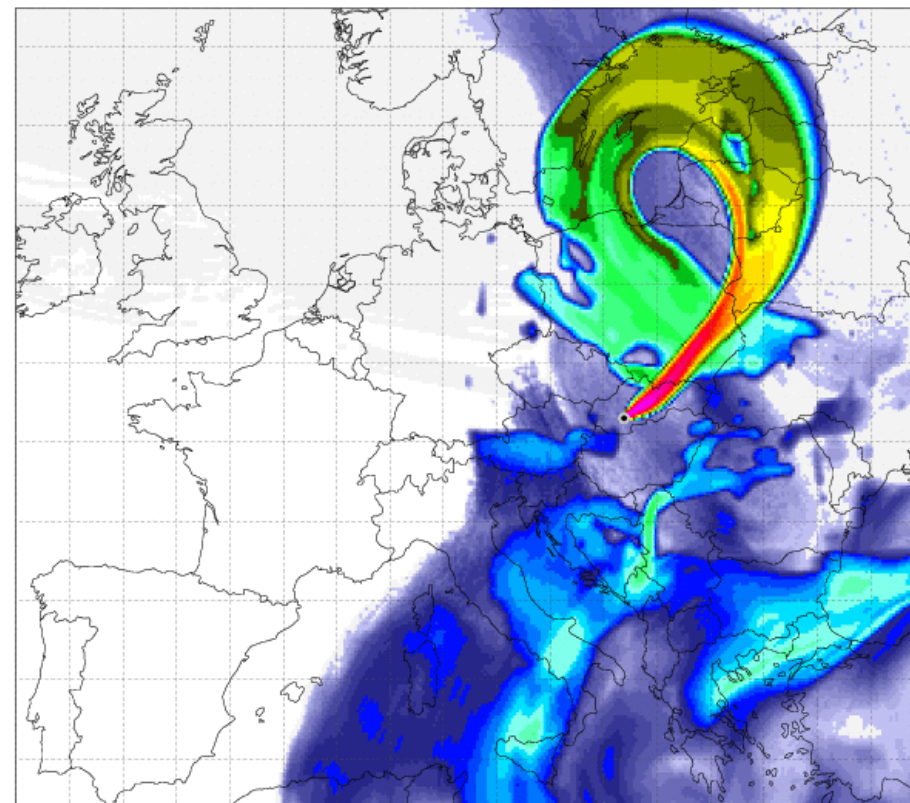
Deposition from a 69.04 PBq release of Cs-137  
 Simulation start 19950425 16 Actual time 19950510 16



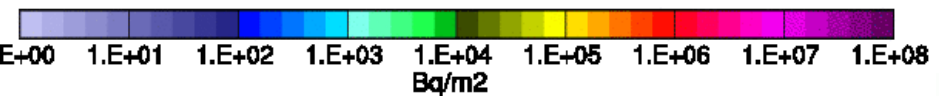
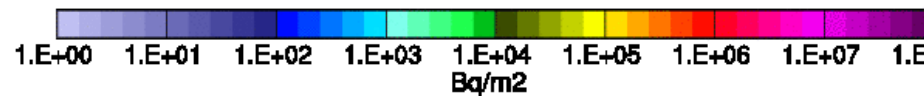
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## Mochovce-1

Deposition from a 76.05 PBq release of Cs-137  
 Simulation start 19950110 00 Actual time 19950125 00

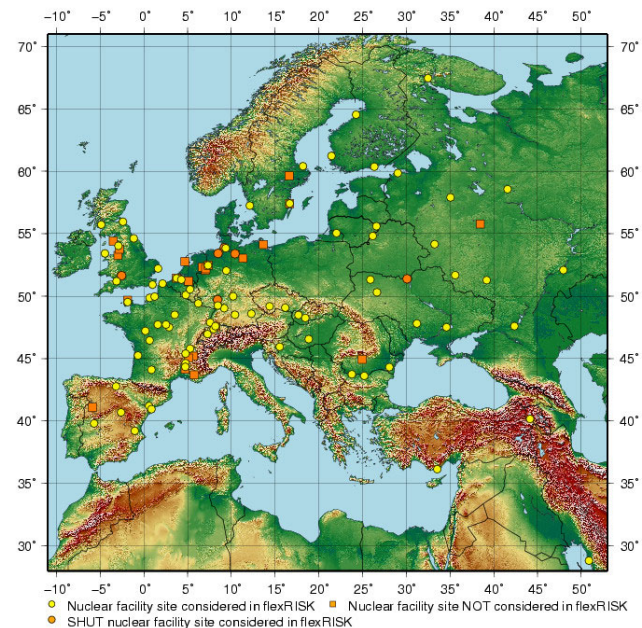
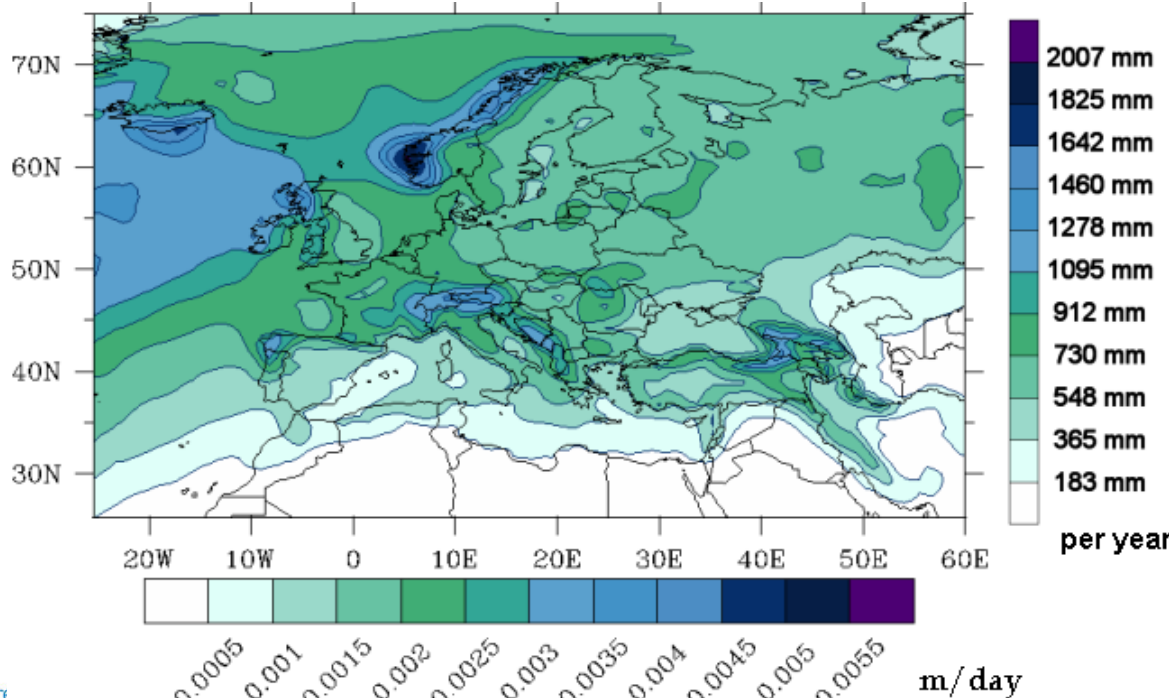


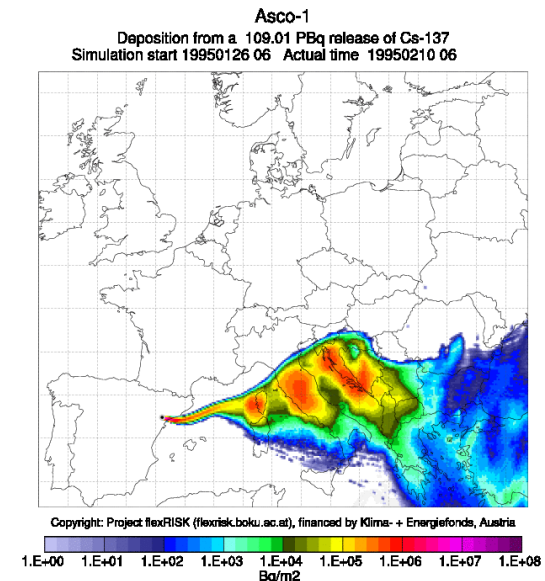
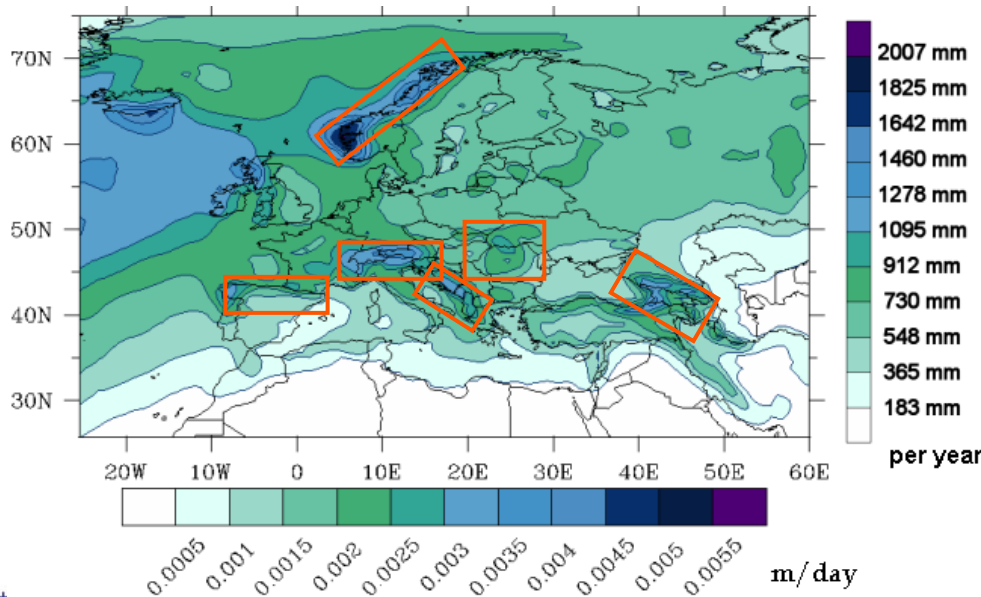
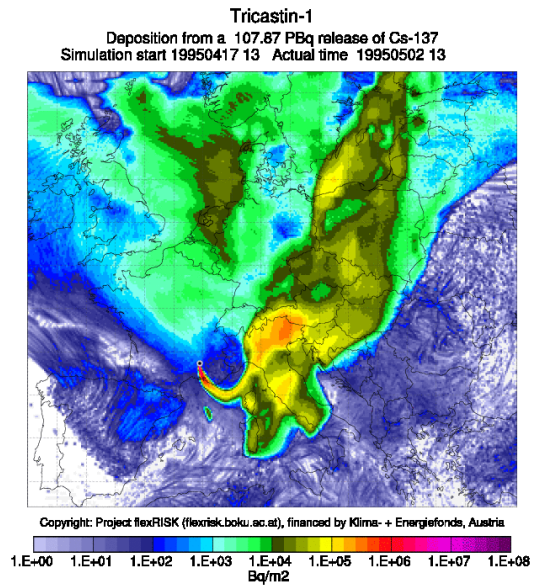
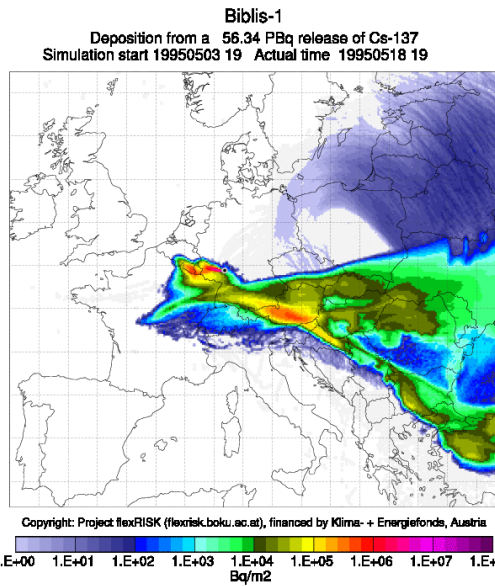
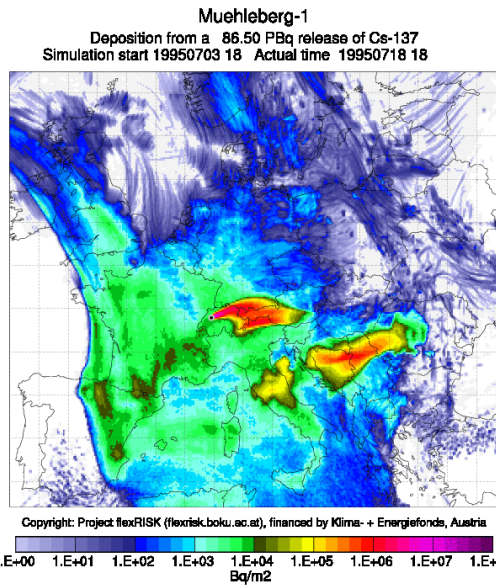
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- Precipitation and wet deposition

- Mountainous areas have more precipitation and thus a higher risk of heavy contamination of the ground
- The largest part of the Mediterranean region, especially the southern region, has little precipitation
- Western Europe, especially the northwestern coasts, receive more precipitation than eastern Europe.





- There are infinite meteorological possibilities → define a set of cases large enough to attain climatological representativeness but feasible regarding computational and human time.
- 10-year period: 2000 – 2009 (+ 88 simulations in 1995)
- Simulations with a length of 15 days and starting times evenly distributed over the seasons and hours of the day
- Ca. 270 simulations per year, new one ca. every 27 h.
- Meteorological data: ERA-Interim Data, from the European Center for Medium Range Weather Forecasting

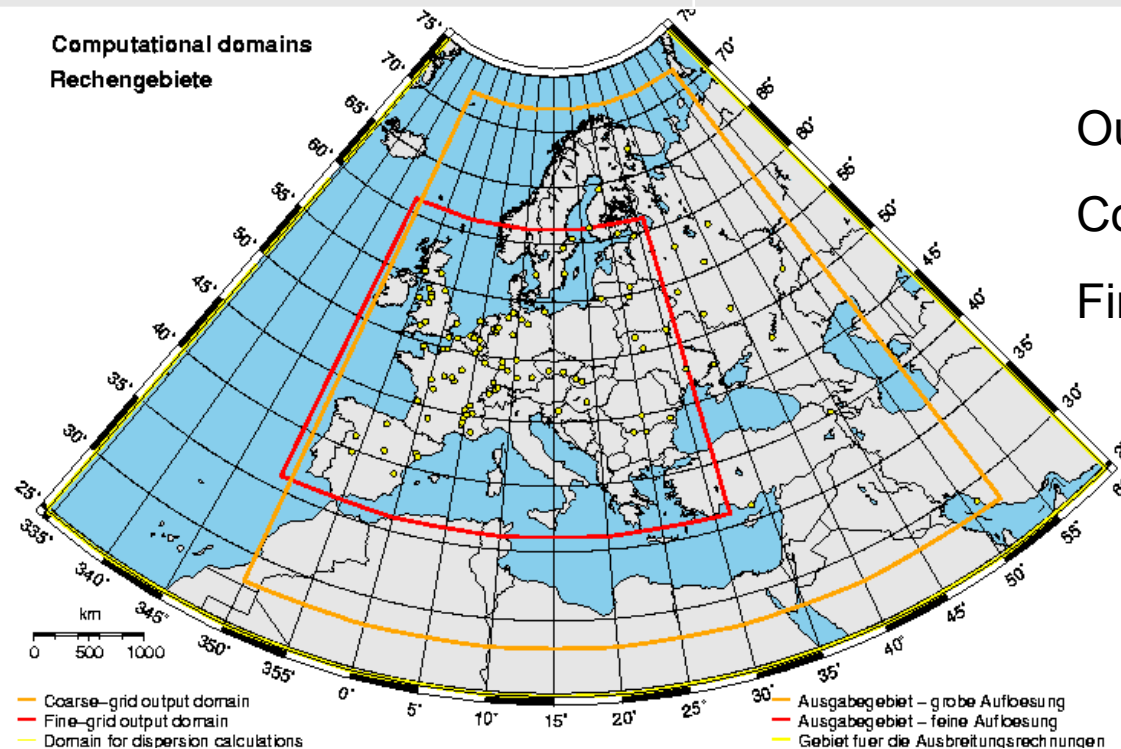
**Total number of release dates (cases) ~ 2700**



- The dispersion calculations were done with the model FLEXPART

## Model specifications

Number of particles per run	250,000
Length of simulations	15 days
Number of output vertical levels	1 (0 - 150 m a.g.l)
Species	2 (aerosol and noble gas)



- Total number of runs: **~250,000** → HPC
- VSC-1 in the beginning, in 2012 switched to VSC-2

## Resources

Number of nodes	40
Total CPU hours	170,000
Total run time (only the	3 weeks
Total output	2.5 TB
Development	Tailored scripts to produce and check runs



Many thanks for the wonderful support by the VSC staff!