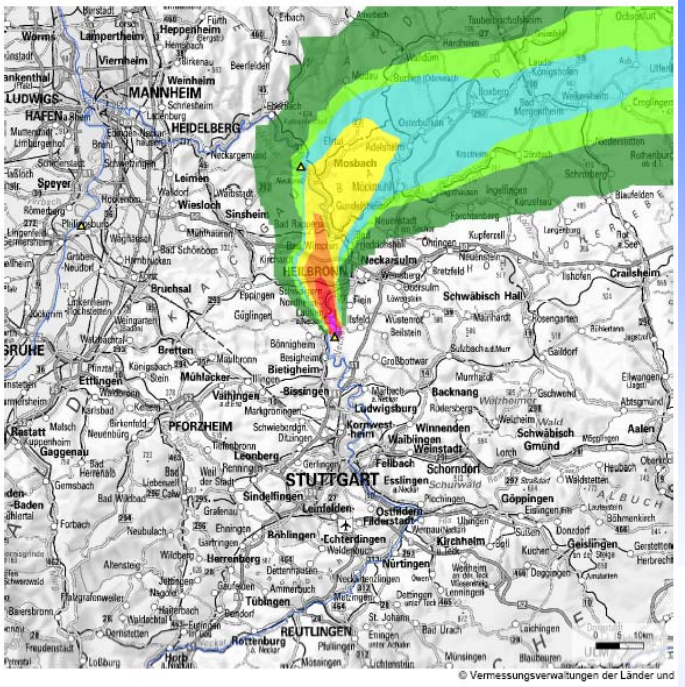


Use of DSS in Germany

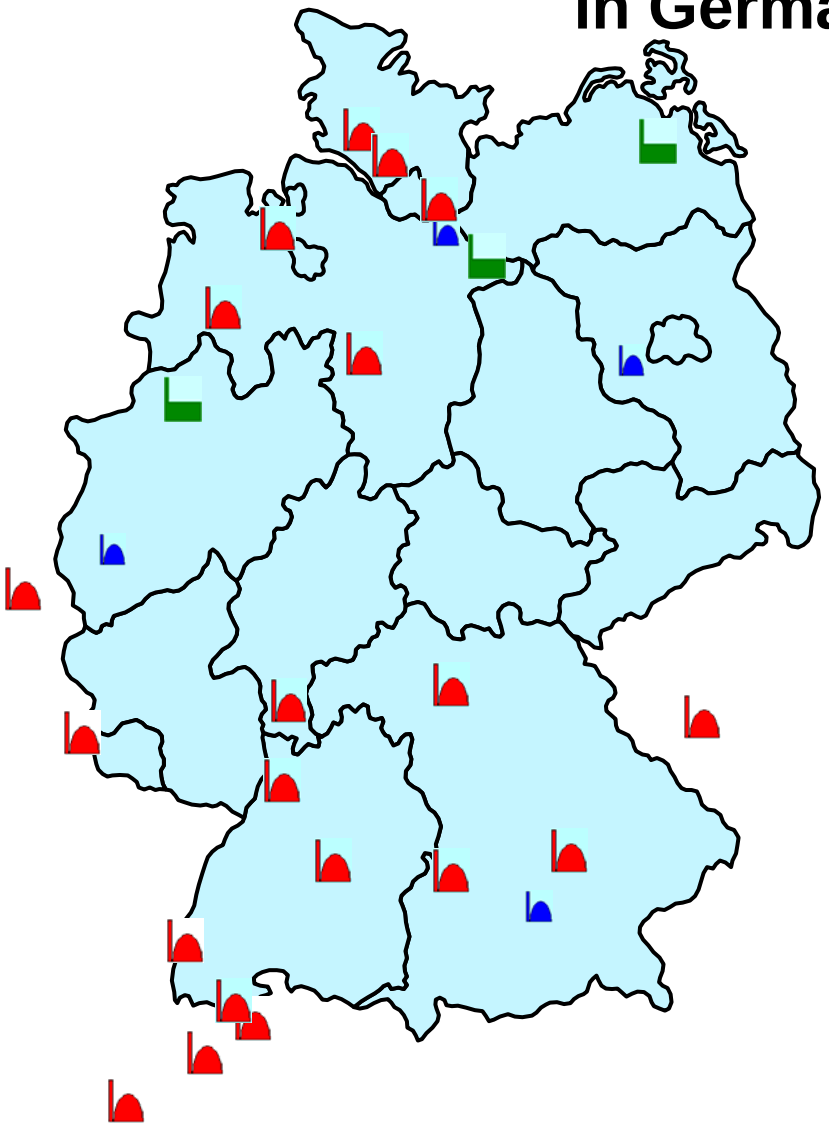
Florian Gering

Federal Office for Radiation Protection (BfS)

Emergency Management Division

Munich, Germany

Framework for nuclear emergency management in Germany



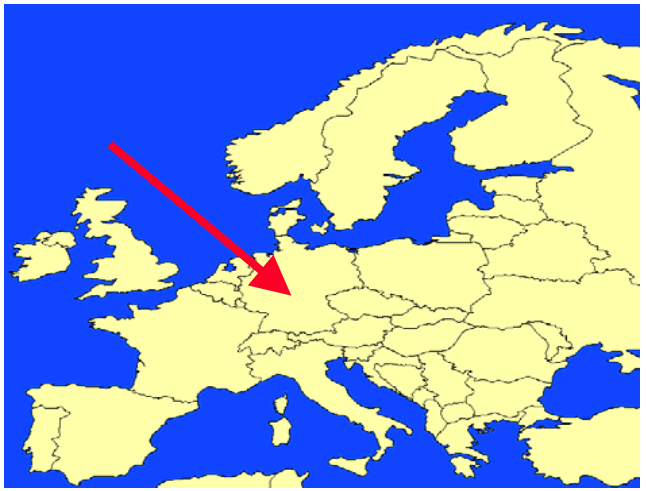
17 nuclear power plants

8 NPPs close to border

4 research reactors

Nuclear facility

- 16 states („provinces“), 5 with NPPs
- Population: about 82 million
- Located in central Europe (9 neighbouring countries)



Aim of emergency management :

- To make decisions about the need for countermeasures, which might be introduced to protect man against radiological hazards

Basis for decisions about countermeasures:

- Best available information about the contamination of the environment and the resulting exposure of humans

For the evaluation of the radiological situation and decision making three kind of information are essential:

- The size of the affected area
- The radionuclide spectrum and contamination/radiation level
- The actual and the future dose to man

(not: effect of countermeasures)

Key question: How to get this information?

For this purpose:

The „Integrated Measurement and Information System“ (IMIS) has been developed in Germany

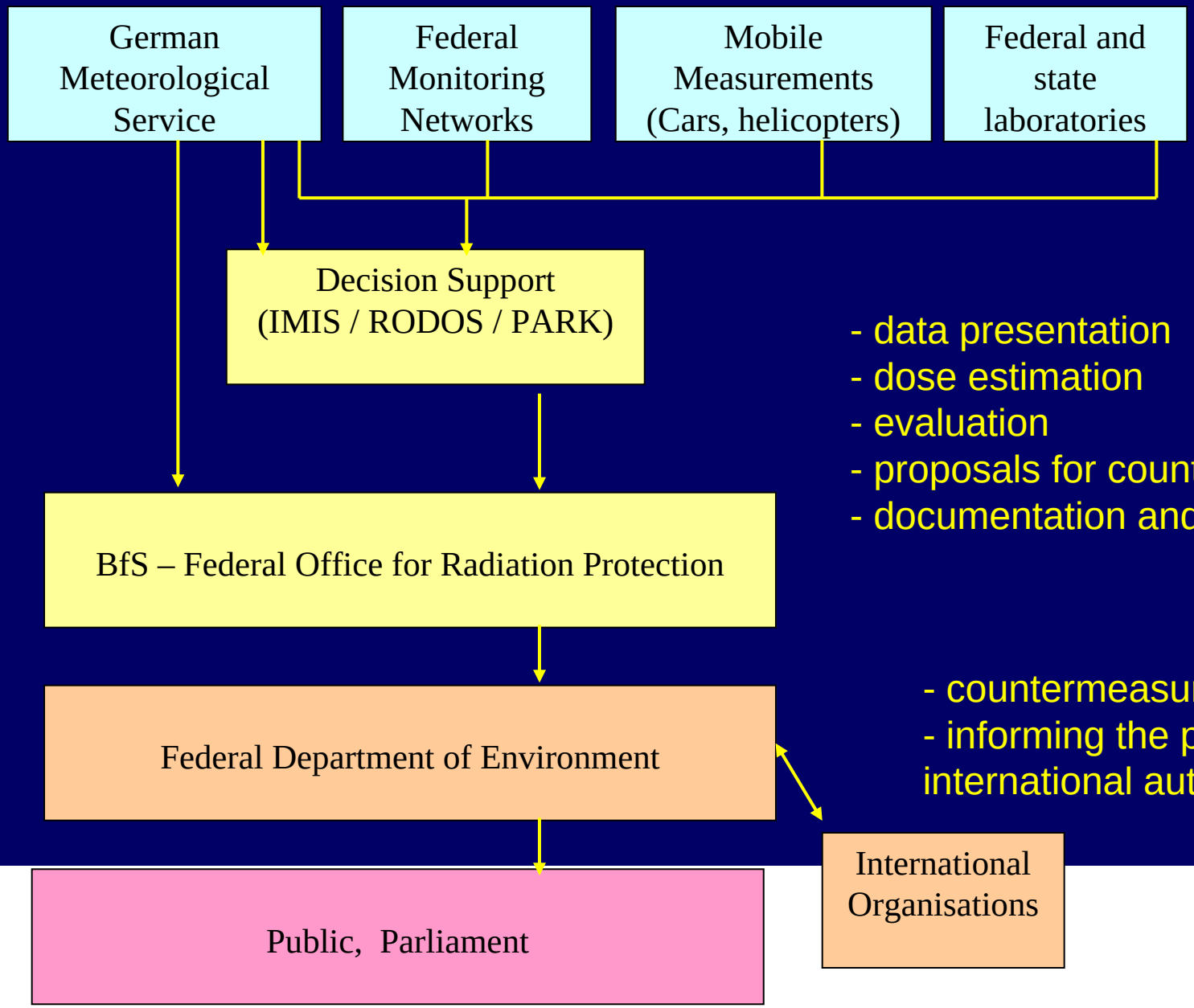
Tasks in an emergency situation:

- To quickly assess the radioactive contamination of the environment,
- To estimate the resulting exposure of humans,
- To inform all relevant „players“ quickly and simultaneously about the radiological situation (easy to use!)

Decision support tools (**N**uclear, on federal level):

- “Massnahmenkatalog” (catalogue of countermeasures)
- IMIS, which includes PARK and RODOS
- ELAN

- More tools for **R**adiological events
- More tools on state and operators level



Bundesamt für Strahlenschutz

Emercency situation
Early / pre-release phase

staying in house

evacuation

distribution of iodine-tablets

countermeasures to pretend contamination of agricultural products

- **cows in stable**
- **close greenhouses**
- **cover vegetables,etc.**

Informations in IMIS in pre-release phase

Trajectories

IMIS–Trajektorie basierend auf dem LMO – Modell

Höhe Start–/Zielpunkt
Ausgangshöhe [m]
- *678 (6)*
- *875 (6)*
- *1078 (6)*

Abstände 12 Stunden

Trajektorie (Europa)
Höhe [m]
- *[0 ; 500) (0)*
- *[500 ; 1000) (45)*
- *[1000 ; 3000) (1405)*
- *[3000 ; 5000) (9)*
- *[5000 ; 20000[(0)*

Vorwärts – Trajektorie

Start–/Ankunftsort: TEMELIN
geo. Länge/ geo. Breite:
E 14° 16' 00" / N 49° 10' 00"

Start–/Ankunftszeit:
25.04.2006 12:00 (in UTC)
Gesamtzeit: 66 h

Datenquelle: DWD

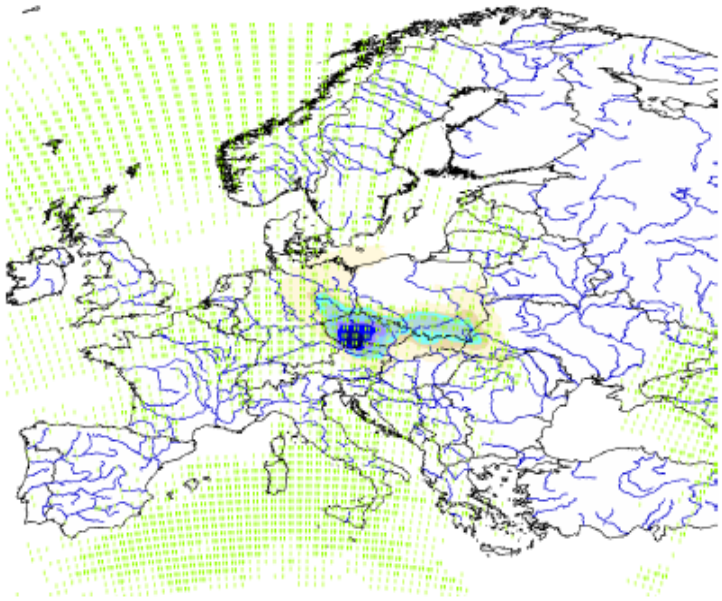
Europa
Flüsse
Europa

IMIS
Bundesminister für Umwelt, Naturschutz und Reaktorsicherheit

Referenzzeit: 25.04.2006 00:00 (in UTC)
Erstellungszeit: 25.04.2006 14:10 (in UTC)
Importdatum: 25.04.2006 14:12 (in UTC)

Alle Höhenangaben beziehen sich auf NN.

Atmospheric dispersion calculations



Prognose (Summe über 54 h): Regen, Schnee und mittlere Cs 137 – Aktivitätskonzentration für nasse Niederschläge (Deposition), trockene Niederschläge (Deposition)

Niederschlag
Summe/Skennwert) [mm]
- *[0 ; 5) (1348)*
- *>=5 (1255)*

(n): Anzahl der Werte

Deposition
Summe/Skennwert) [Bq/m²]
- *[1 ; 300)*
- *[300 ; 1000)*
- *[1000 ; 3000)*
- *[3000 ; 10000)*
- *[10000 ; 30000)*
- *[30000 ; 100000)*
- *[100000 ; 300000)*
- *[300000 ; 3000000)*

Maximalwert:
9,23E05 Bq/m²

Europa

Ausgangszeit: 25.04.2006 12:00 (in UTC)
Intervallende: Ausgangszeit + 54 [h]
Gitterkennung: Europamodell
Quellterm: 1,21E16 [Bq]
Emissionsort: N4910 , E01418
Emissionsdauer: 6 [h]
Emissionshöhe von 0 [m] bis 500 [m]

Datenquelle: DWD

Europa
Flüsse
Europa

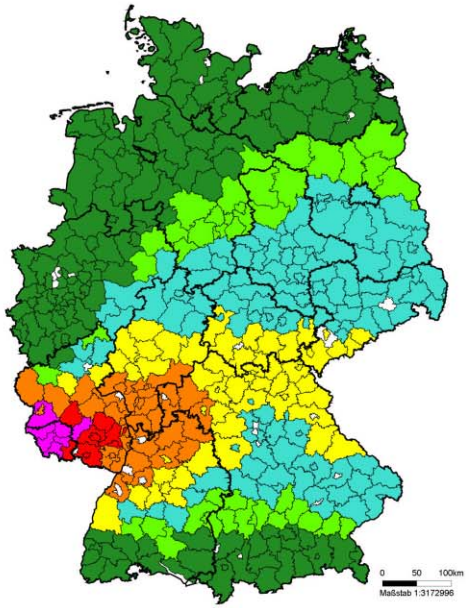
IMIS
Bundesminister für Umwelt, Naturschutz und Reaktorsicherheit

Vorgang: 349043969 / 25.04.2006 18:51 (in ges. Zeit)

Informations in IMIS in pre-release phase

PARK (covers Germany)

Testdaten / Übungsdaten



Maßnahme: Vermarktungssperre
Kontamination von Kuhmilch durch I −131 zum Zeitpunkt der höchsten Kontamination innerhalb von 14 Tagen

Kontamination
Landkreismaximalwerte
Wert der Kontamination [Bq/kg]
- *unclassified (29)*
- *[0 ; 20) (137)*
- *[20 ; 50) (44)*
- *[50 ; 200) (118)*
- *[200 ; 500) (57)*
- *[500 ; 2000) (39)*
- *[2000 ; 5000) (10)*
- *[5000 ; 20000) (7)*
- *>20000 (0)*

Maximalwert:
6,18E03 Bq/kg
10046000 Sankt Wendel
Richtwert für Vermarktungssperre:
500 Bq/kg

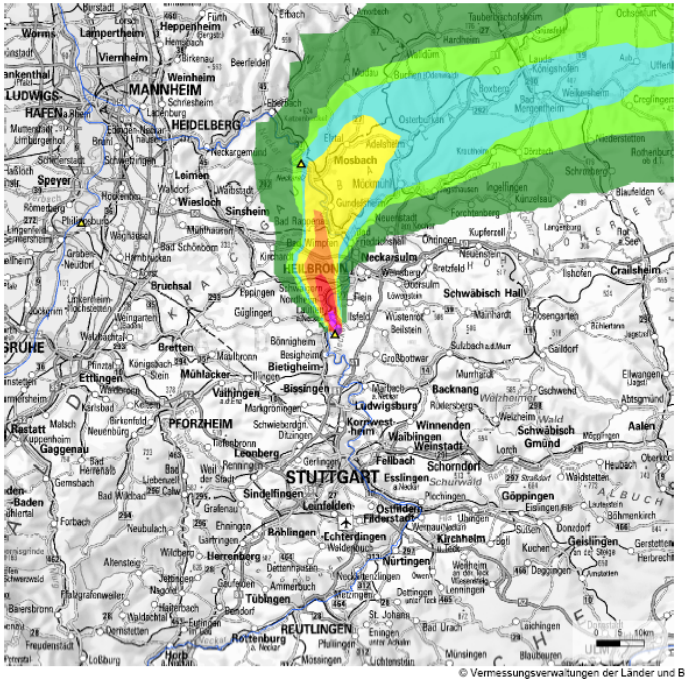
Bundesländer
Kreise

Prognosezeitpunkt: 30.09.2005 (in UTC)
Grundlage: DWD−Prognosen 28.09.2005 00:00 (in UTC)
Eingangsdaten
von 28.09.2005 06:00 (in UTC)
bis 30.09.2005 06:00 (in UTC)

IMIS
Bundesminister für Umwelt, Naturschutz und Reaktorsicherheit
RST_auto vom 28.09.2005 12:17 (in ges. Zeit)

bge−m / 28.09.2005 10:47:37 / automatisch
Seite 1 von 1

RODOS (up to 100 km)



Maßnahme: Verteilung von Iodtabletten für Erwachsene Schilddrüsendosis für Erwachsene durch im Zeitraum von 7 Tagen inhaliertes Radioiod

Schilddrüsendosis
Wert
- *[1E-03 ; 1,5E00)*
- *[1,5E00 ; 5E00)*
- *[5E00 ; 1,5E01)*
- *[1,5E01 ; 5E01)*
- *[5E01 ; 1,5E02)*
- *[1,5E02 ; 5E02)*
- *[5E02 ; 1,5E03)*
- *>=1,5E03*

Maximalwert:
1,54E04
Richtwert Verteilung von Iodtabletten für Kleinkinder:
50 mSv

Kernkraftwerke
Gewässer
Deutschland TK1000

Datenquelle: RODOS

Freisetzungsort: ; NECKARWESTHEIM (9.1740,49.0400)

Freisetzungsbeginn: , Thu Aug 07 11:05:00 MEST 2008

Quellterm: ; Edelgase: 2.93E+17 Bq, Iod: 7.18E+16 Bq, Aerosole: 2.43E+16 Bq

Datenbasis: , DWD-Prognosen von 07.08.08 00:00 (UTC)

IMIS
Bundesamt für Strahlenschutz (im Auftrag des BMU)

RODOS-Zentrale
Rechnung von: , Thu Aug 07 11:18:00 MEST 2008
Lauf-Kennung: , dwr1-708-1

Bundesamt für Strahlenschutz

Standard results of DSS (RODOS/PARK)

Results with relation to interventions:

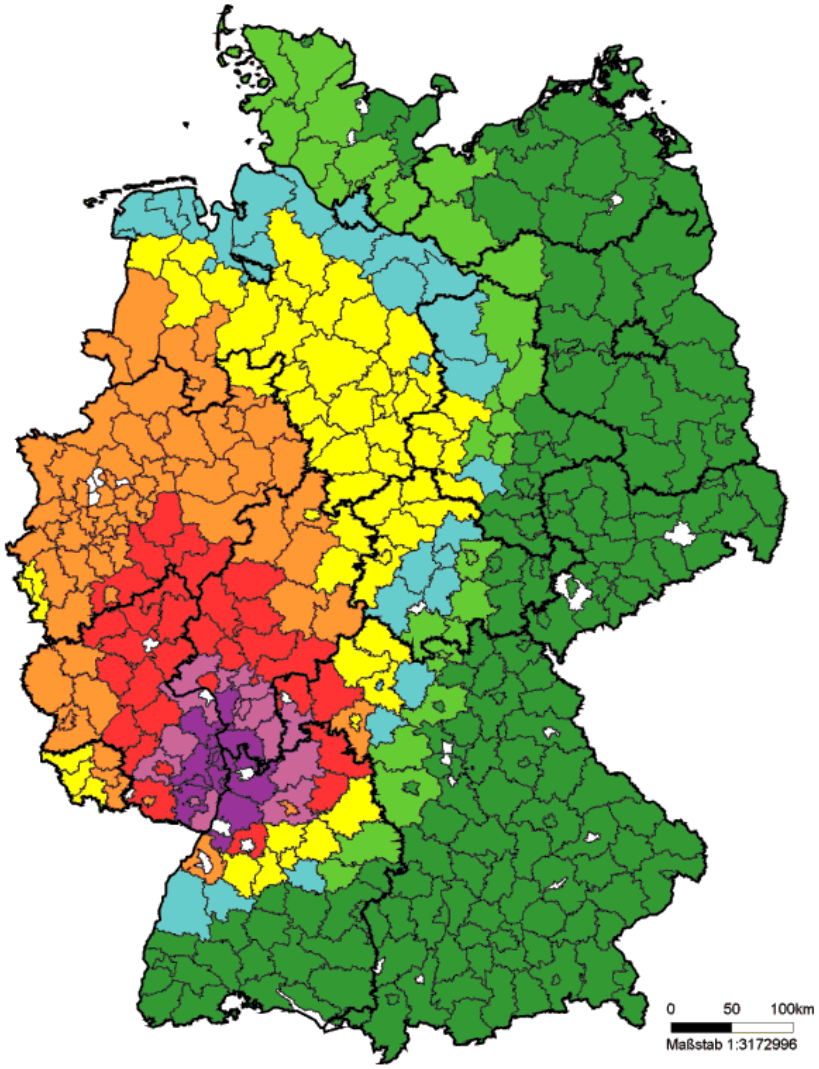
- Dose relevant for sheltering
- Dose relevant for evacuation
- Dose relevant for distribution of stable iodine
- Dose relevant for temporary relocation
- Contamination of leafy vegetables
- Contamination of cow‘s milk

Other results:

- Ground contamination
- Gamma dose rates
- Cloud arrival time

Standard visualization of results of DSS

Testdaten / Übungsdaten



Measure: Food ban

Contamination of leafy vegetables by radioiodine

DERL: 2000 Bq/kg

Wert der Kontamination [Bq/kg]

- *unclassified (29)*
- *[0 ; 60) (169)*
- *[60 ; 200) (30)*
- *[200 ; 600) (33)*
- *[600 ; 2000) (55)*
- *[2000 ; 6000) (64)*
- *[6000 ; 20000) (32)*
- *[20000 ; 60000) (15)*
- *>60000 (14)*

Maximalwert:

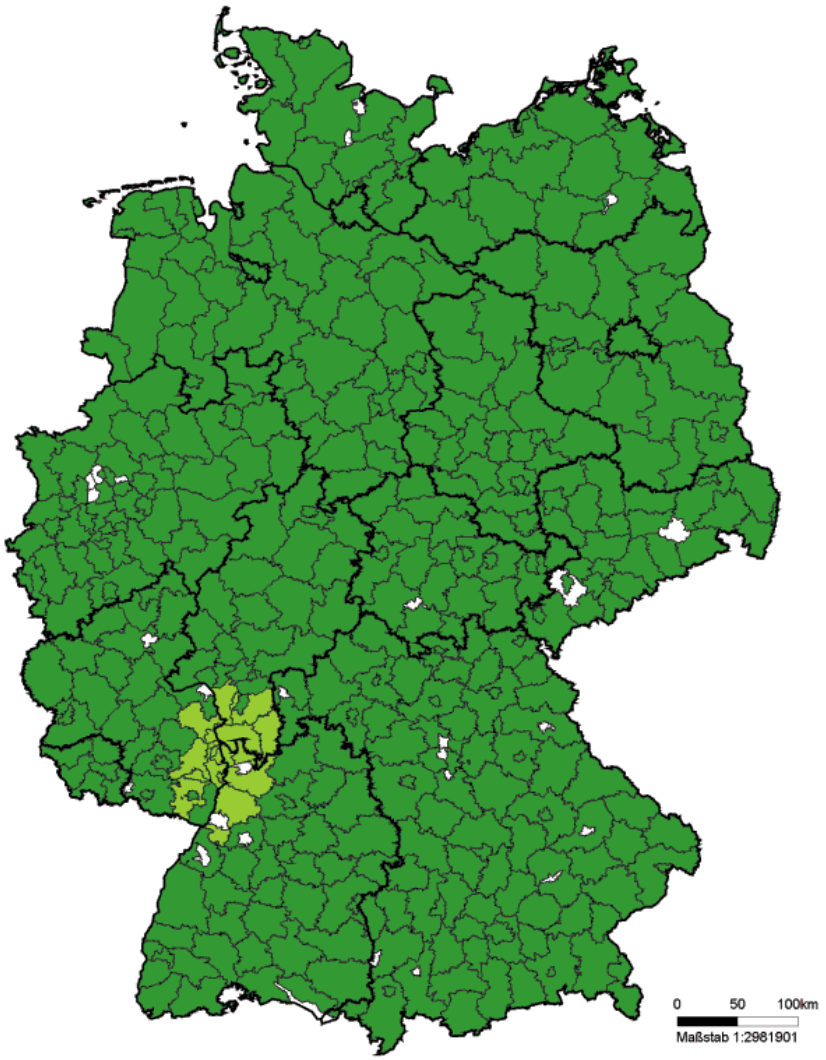
1,31E05 Bq/kg
08222000 Mannheim, Universitätsstadt

Richtwert für Vermarktungssperre:

2000 Bq/kg

Standard visualization of results of DSS

Testdaten / Übungsdaten



Measure: Sheltering

Sum of eff. Doses
For adults from inhalation, external exposure over 7 days

IL: 10 mSv

eff.Dosis
Landkreismaximalwerte

Summe(Wert der Dosis) [mSv]
- *nicht klassifiziert (29)*
- *[0 ; 0,3) (396)*
- *[0,3 ; 1) (16)*
- *[1 ; 3) (0)*
- *[3 ; 10) (0)*
- *[10 ; 30) (0)*
- *[30 ; 100) (0)*
- *[100 ; 300) (0)*
- *>300 (0)*

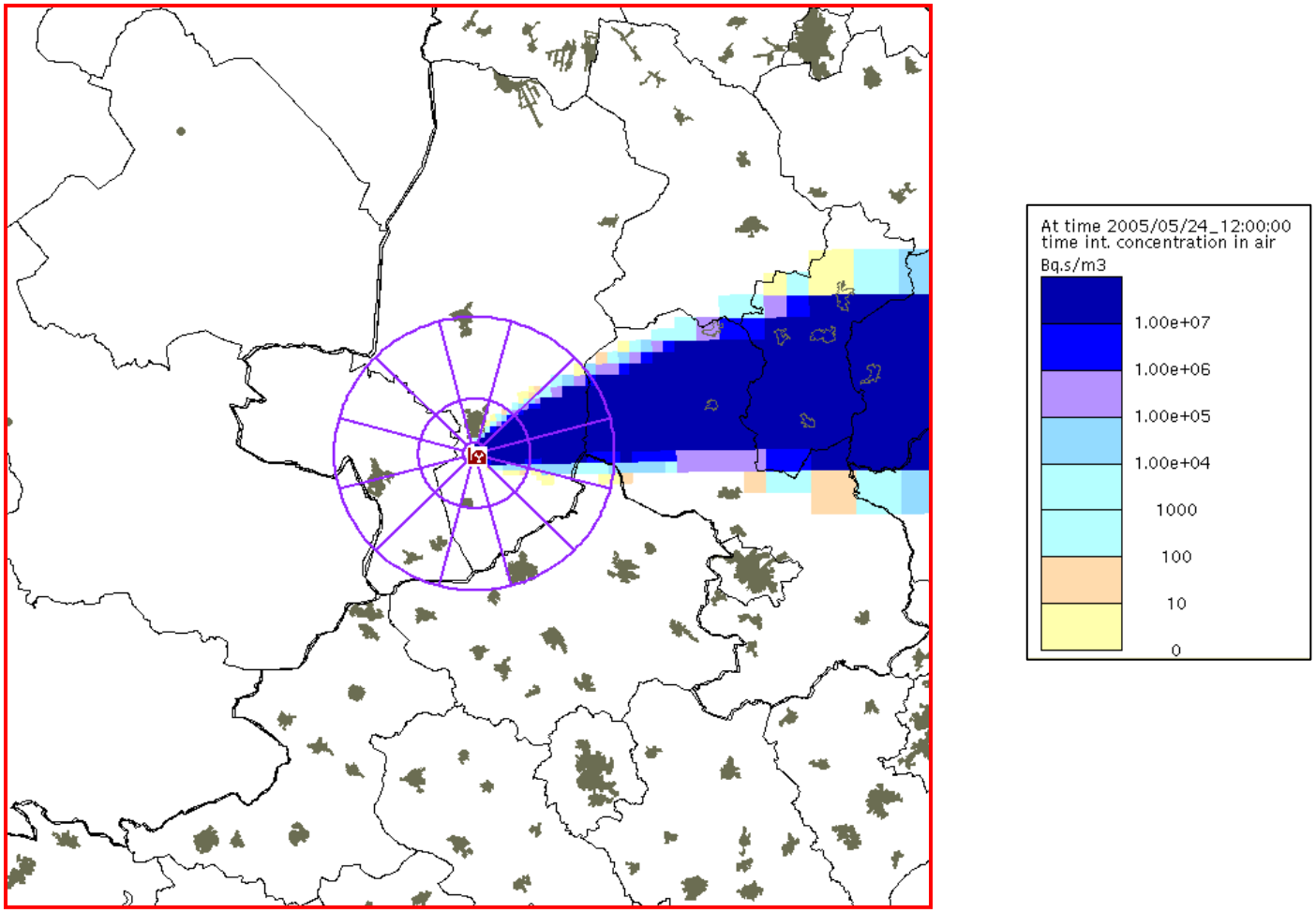
Maximalwert:

7,05E−01 mSv
08222000 Mannheim, Universitätsstadt

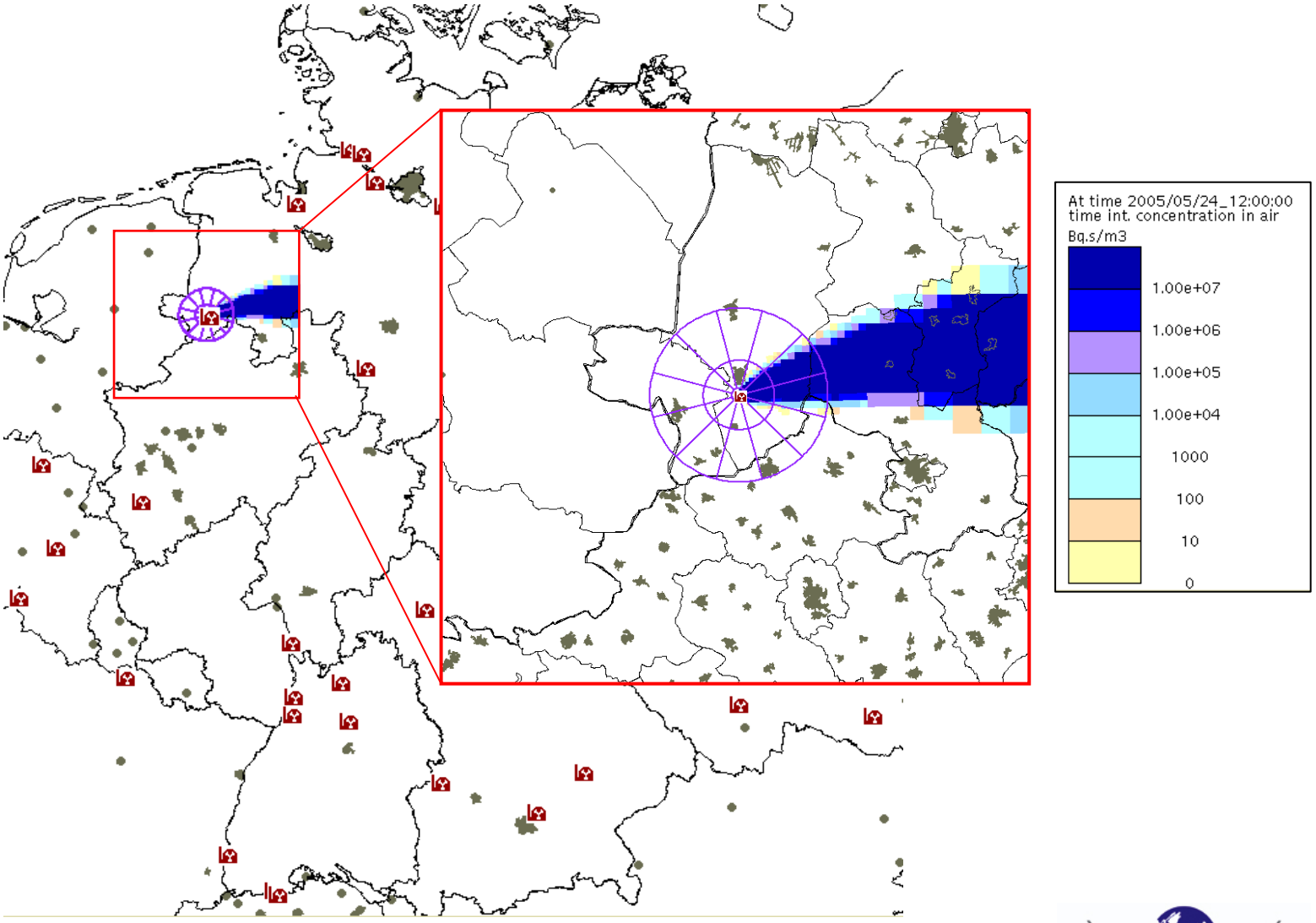
Richtwert für Aufenthalt in Häusern:

10 mSv

Example result for local dispersion

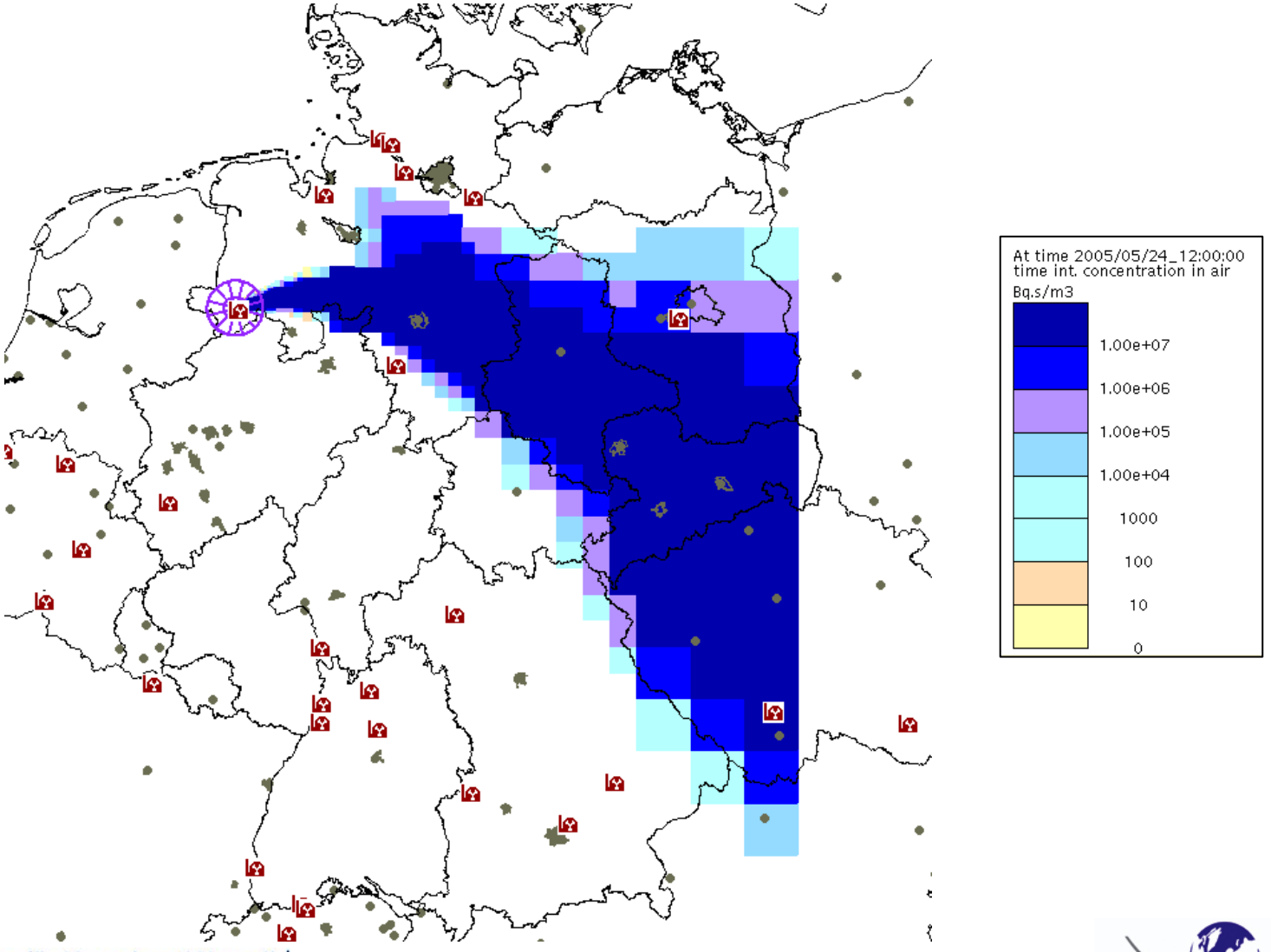


Example result for local dispersion



Bundesamt für Strahlenschutz

Example result for combined local and long-range dispersion



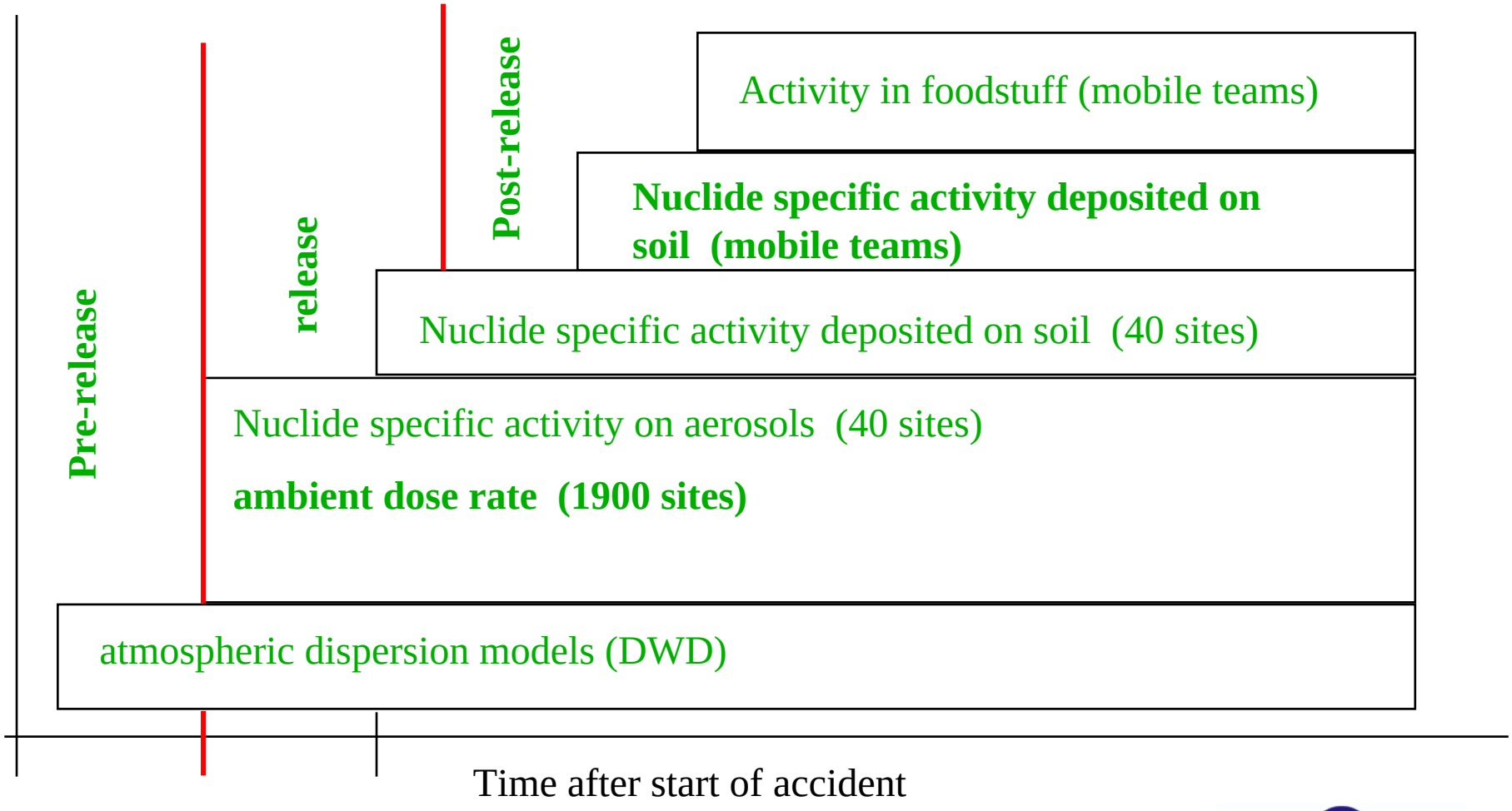
Bundesamt für Strahlenschutz

Emercency situation
- release phase / during plume passage

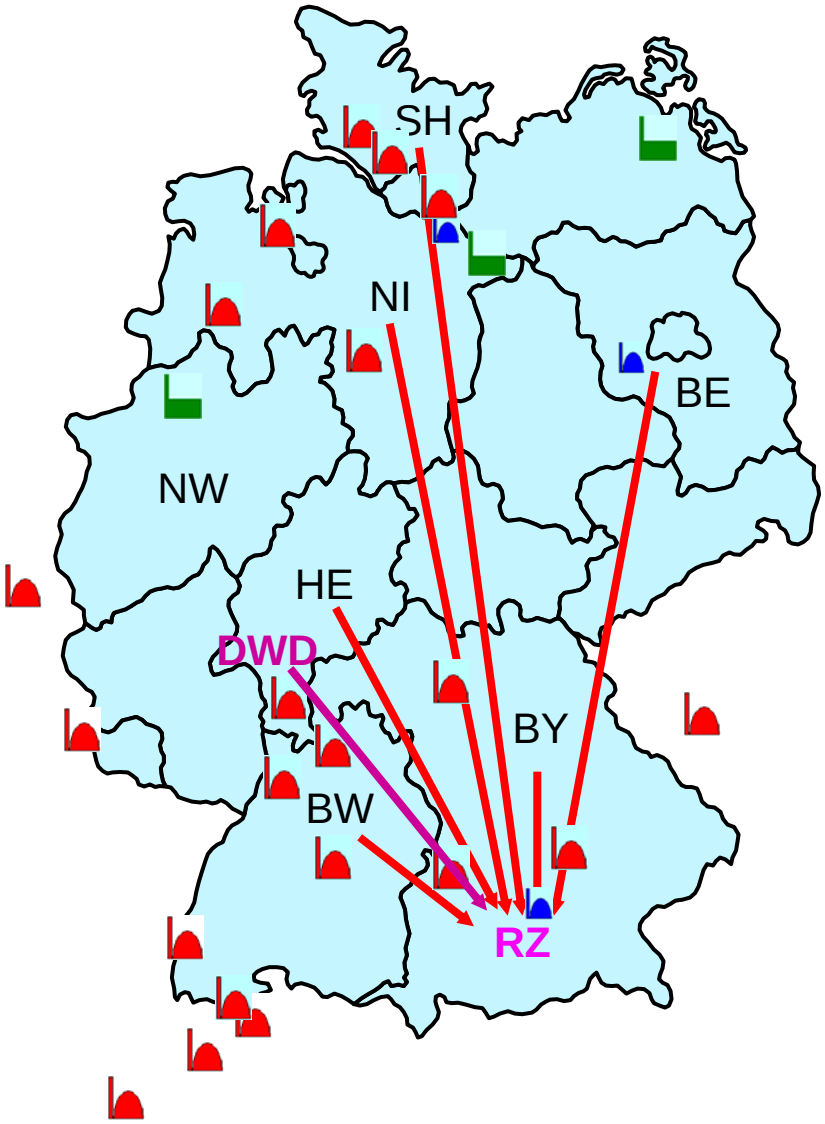
Countermeasures as in early phase (revisited)

Measurements

Availability of measurement data



On-site monitoring data (KFÜ)



Nuclear power plant

Reasearch reactor

Nuclear facility

RZ RODOS Centre

DWD German Weather Service

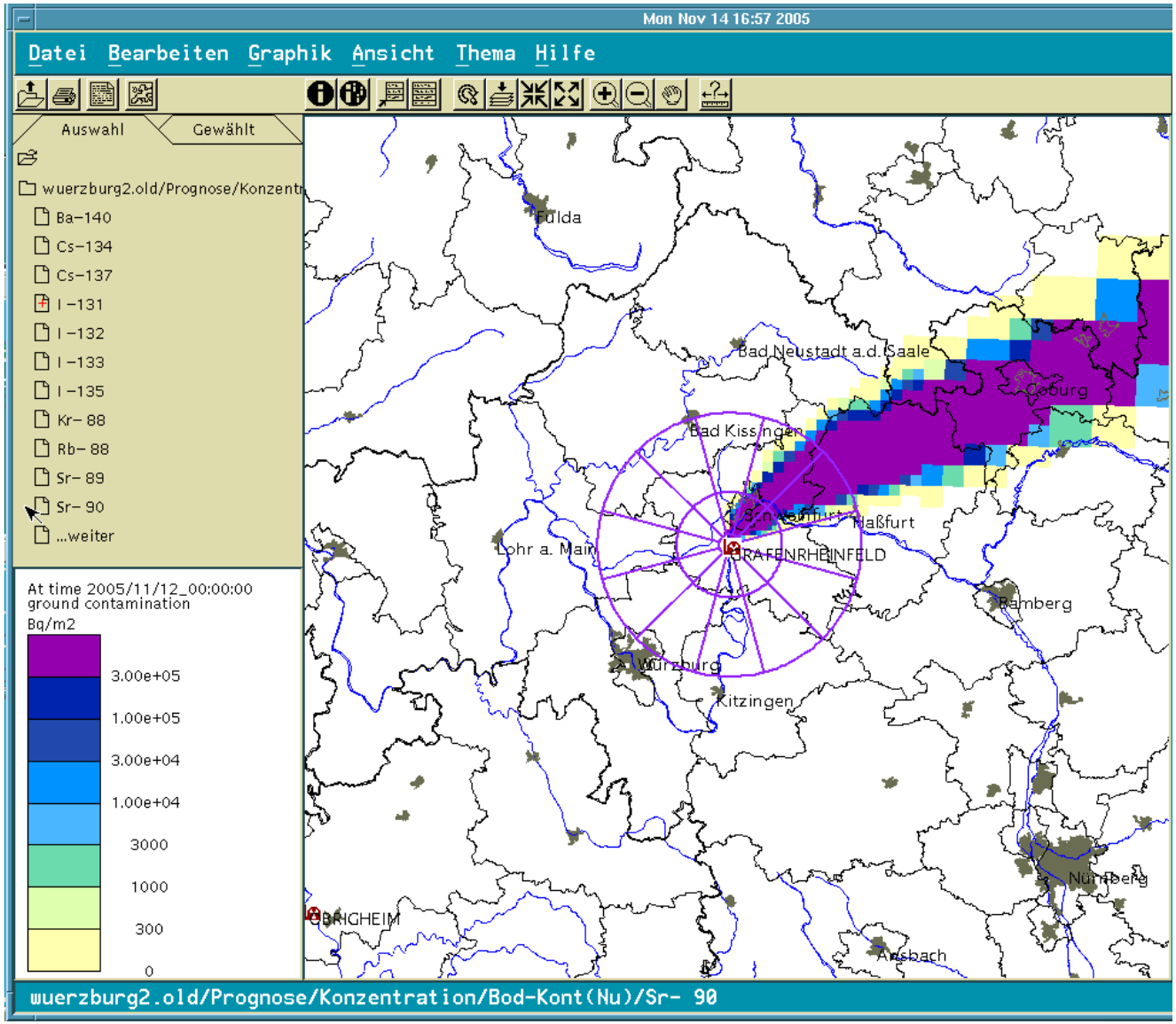
NPP monitoring data transfer:

NWP data transfer:

Bundesamt für Strahlenschutz

Transition from pre-release to release phase

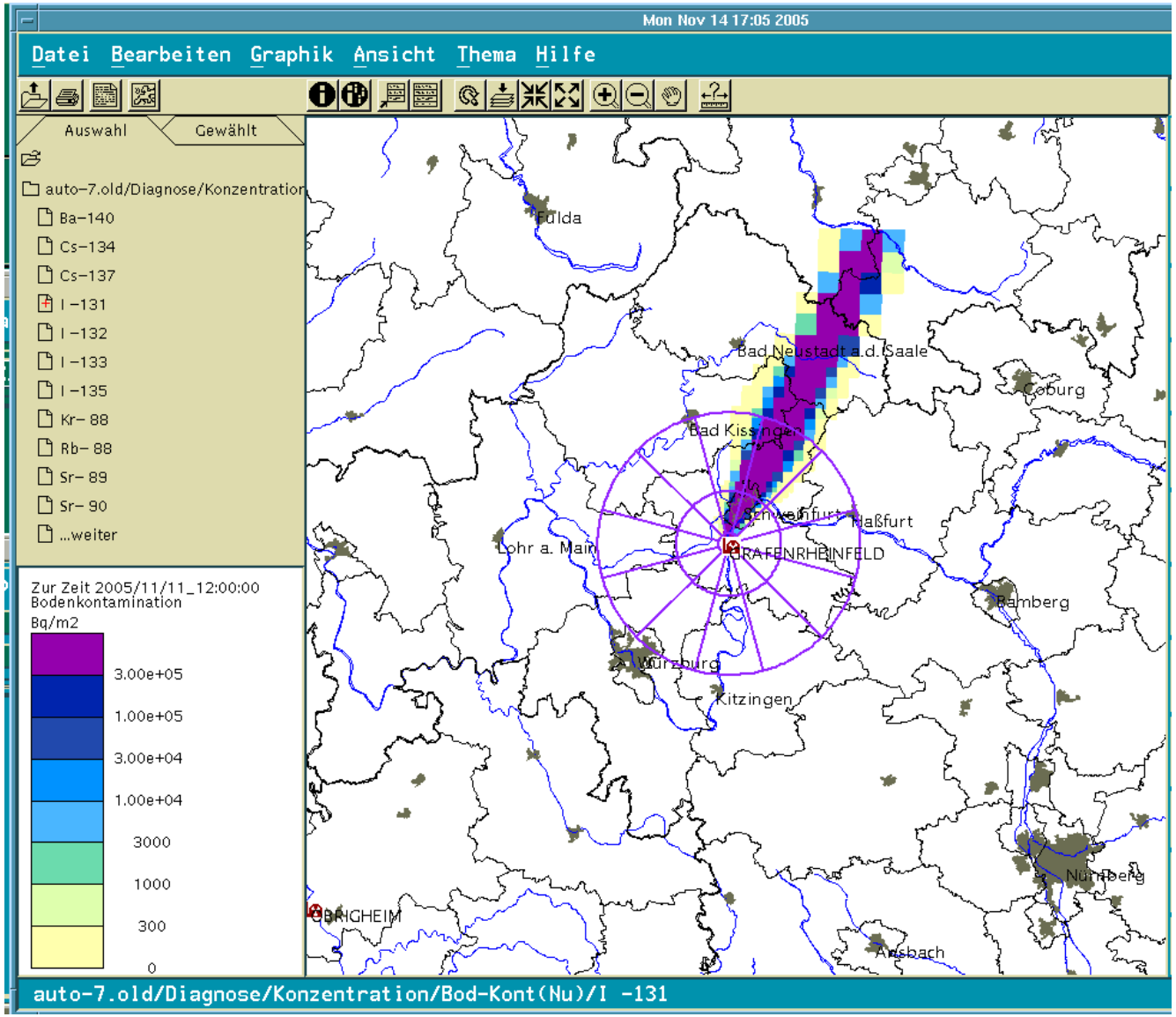
Prognosis



Bundesamt für Strahlenschutz

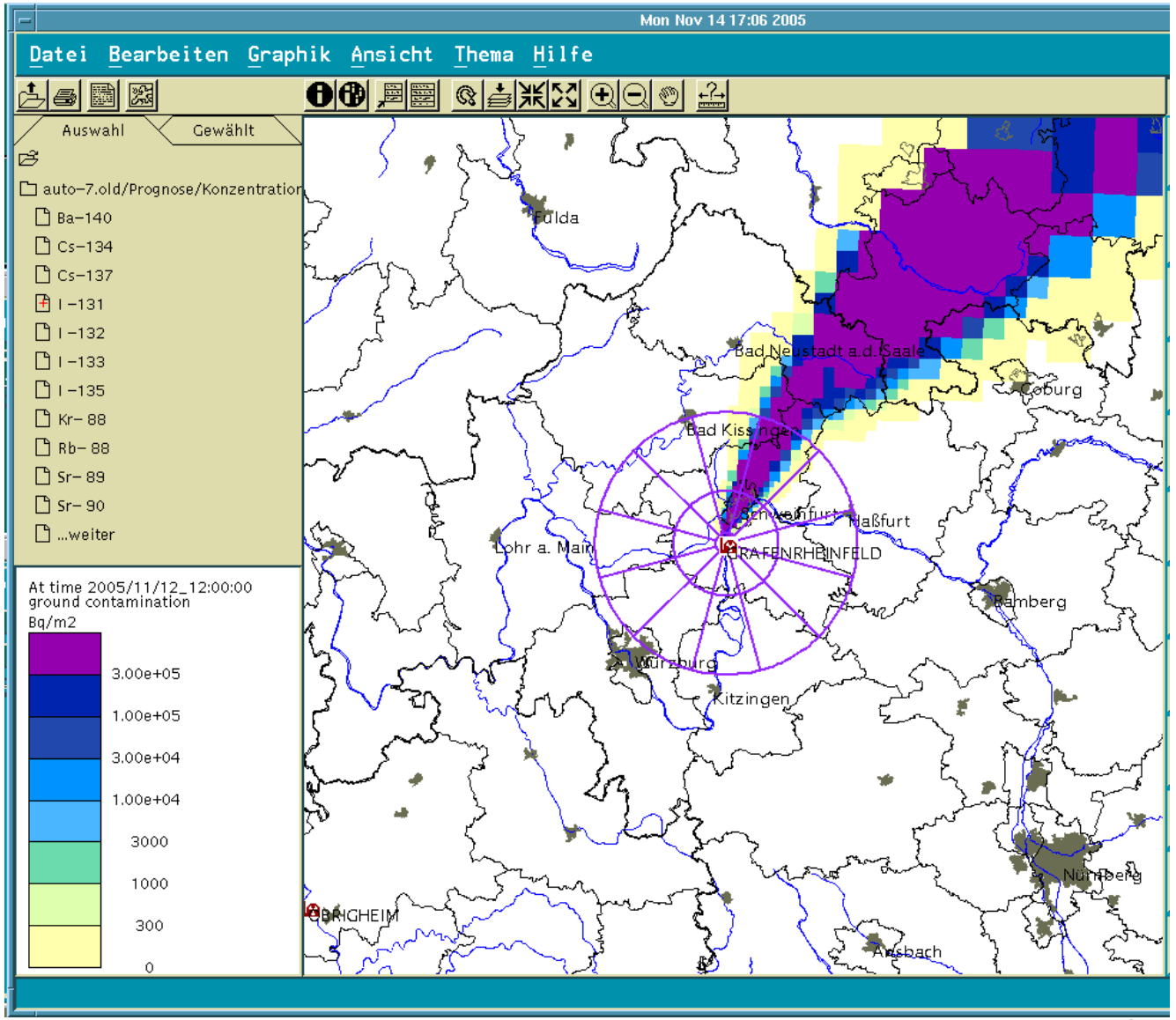
Transition from pre-release to release phase

Diagnosis



Transition from pre-release to release phase

Prognosis + Diagnosis

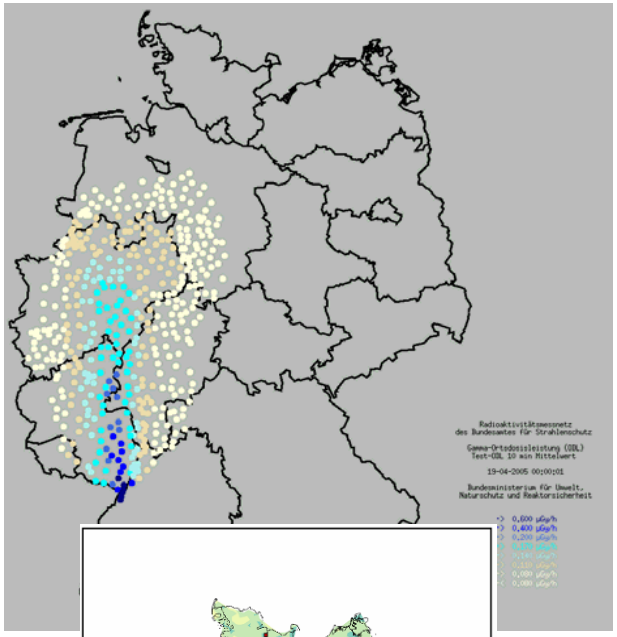


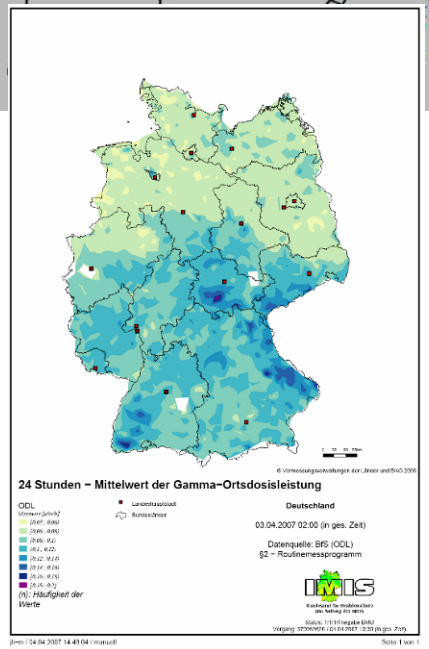
Bundesamt für Strahlenschutz

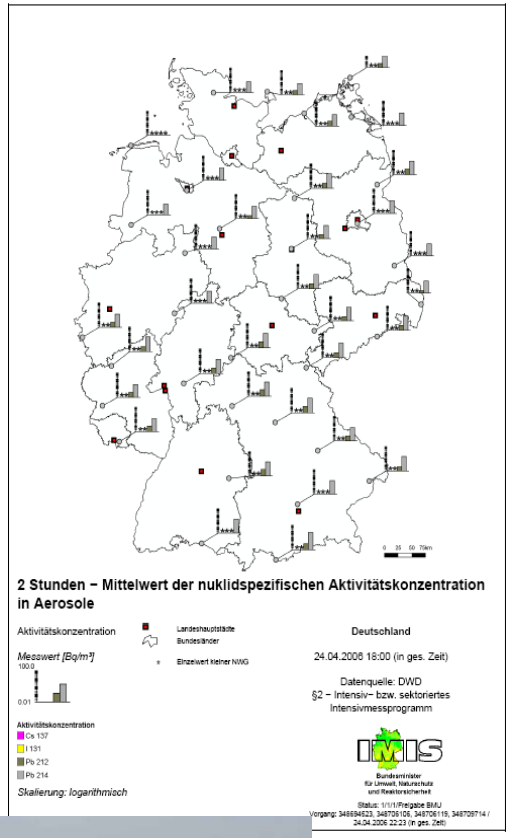
Transition from pre-release to release phase

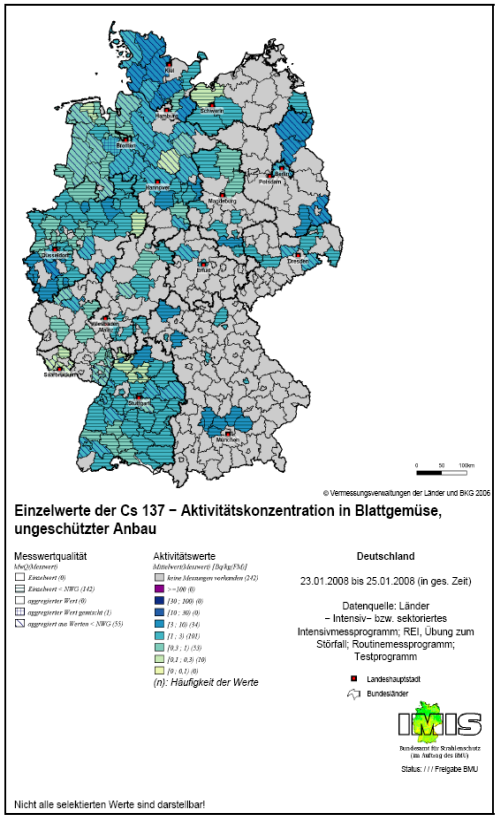
Data assimilation

?


Radioaktivitätsmessnetz
des Bundesamtes für Strahlenschutz
Gamma-Ortsdosisleistung (ODL)
Test-ODL 10 min Mittelwert
19-04-2005 00:00:01
Bundesministerium für Umwelt,
Naturschutz und Reaktorsicherheit


24 Stunden – Mittelwert der Gamma-Ortsdosisleistung
ODL
Deutschland
03.04.2007 02:00 (in ges. Zeit)
Datenquelle: BfS (ODL)
§2 – Routinemessprogramm
(n): Häufigkeit der Werte


2 Stunden – Mittelwert der nuklidspezifischen Aktivitätskonzentration in Aerosole
Aktivitätskonzentration
Messwert [Bq/m³]
Cs 137
I 131
Pb 212
Pb 214
Skalierung: logarithmisch
Deutschland
24.04.2006 18:00 (in ges. Zeit)
Datenquelle: DWD
§2 – Intensiv- bzw. sektoriertes
Intensivmessprogramm


Einzelwerte der Cs 137 – Aktivitätskonzentration in Blattgemüse, ungeschützter Anbau
Messwertqualität
Aktivitätswerte
Deutschland
23.01.2008 bis 25.01.2008 (in ges. Zeit)
Datenquelle: Länder
– Intensiv- bzw. sektoriertes
Intensivmessprogramm; REI, Übung zum
Störfall; Routinemessprogramm;
Testprogramm
(n): Häufigkeit der Werte
Nicht alle selektierten Werte sind darstellbar!

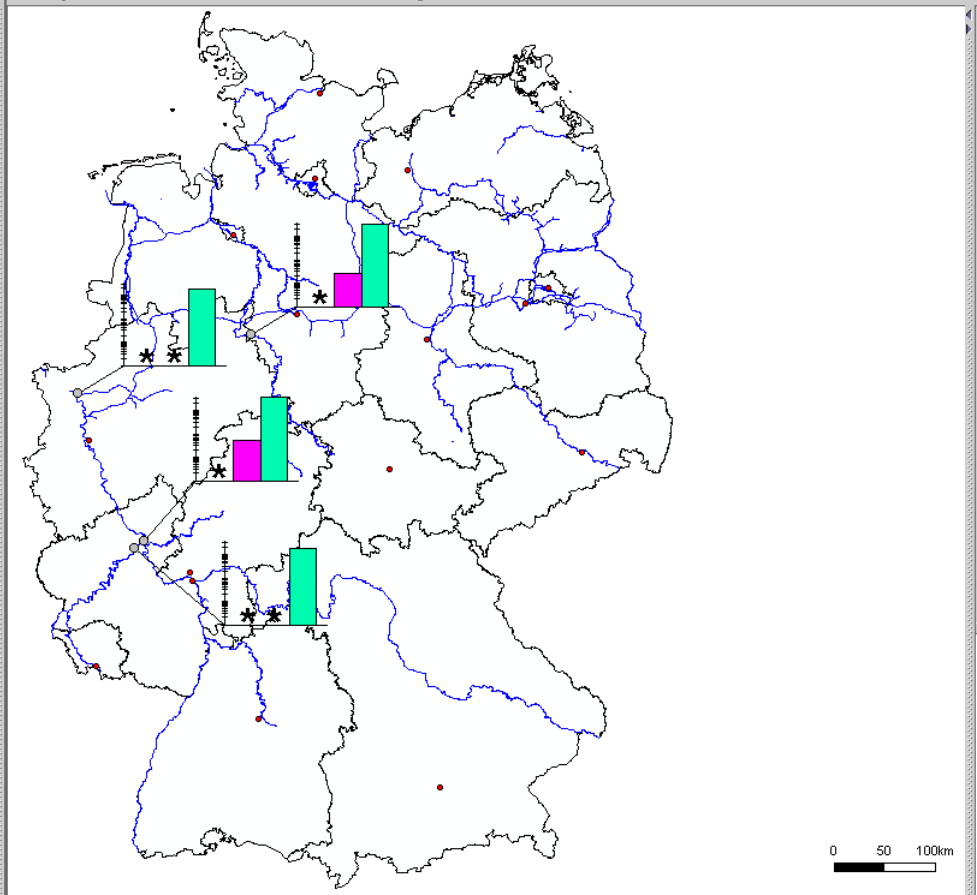
IMIS - 0 - Joachim Lieser - [Darstellungen, IMIS-World, § 2 Normalbetrieb, Bundeswasserstraßen, K-nuklidspezif. BfG, Ansicht von K-nuklidspezif. BfG]

Browser Bearbeiten Ansicht Einstellungen Darstellungsdefinition Karte Hilfe

Darstellungen | Stammdaten | manuelle Datenerfassung | PARK | Aufträge

- Darstellungen
  - IMIS-World
    - Empfang
    - Alle Nutzer
    - Beispiele
    - Darstellungen mit Länderausschnitt
    - Mülleimer-Empfang
    - PER-0001
    - Stammdatentabellen
    - § 2 Intensivbetrieb
    - § 2 Normalbetrieb
      - Bundeswasserstraßen
        - **K-Gamma-Beta BfG**
        - **K-nuklidspezif. BfG**
          - Ansicht von K-nuklidspezif. BfG
          - Aktivitätskonzentration
          - Sel Aktivität
      - In-Situ
      - Küstengewässer
      - Luft-Aerosole/gasförmig
      - Niederschlag
      - ODL
    - § 3 Darstellungen
  - ZdB
  - PARK
  - RUF
  - PARK Standardinformationsbedarf
  - Joachim Lieser

Nuklidspezifische Aktivitätskonzentration in Wasser in Fließgewässern

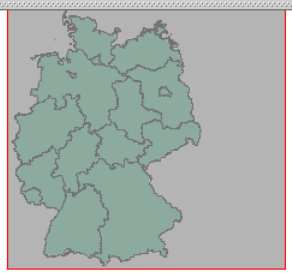


Aktivitätskonzentration
Messwert [Bq/l]
0.341
1.0E-4
Co 60
Cs 137
K 40
Skalierung: logarithmisch

Landeshauptstädte

Bundeswasserstrassen

Bundesländer



Position 32325247.44,5760948.69 Maßstab 1: 4484744

Deutschland

27.09.2004 02:00 (in ges. Zeit)

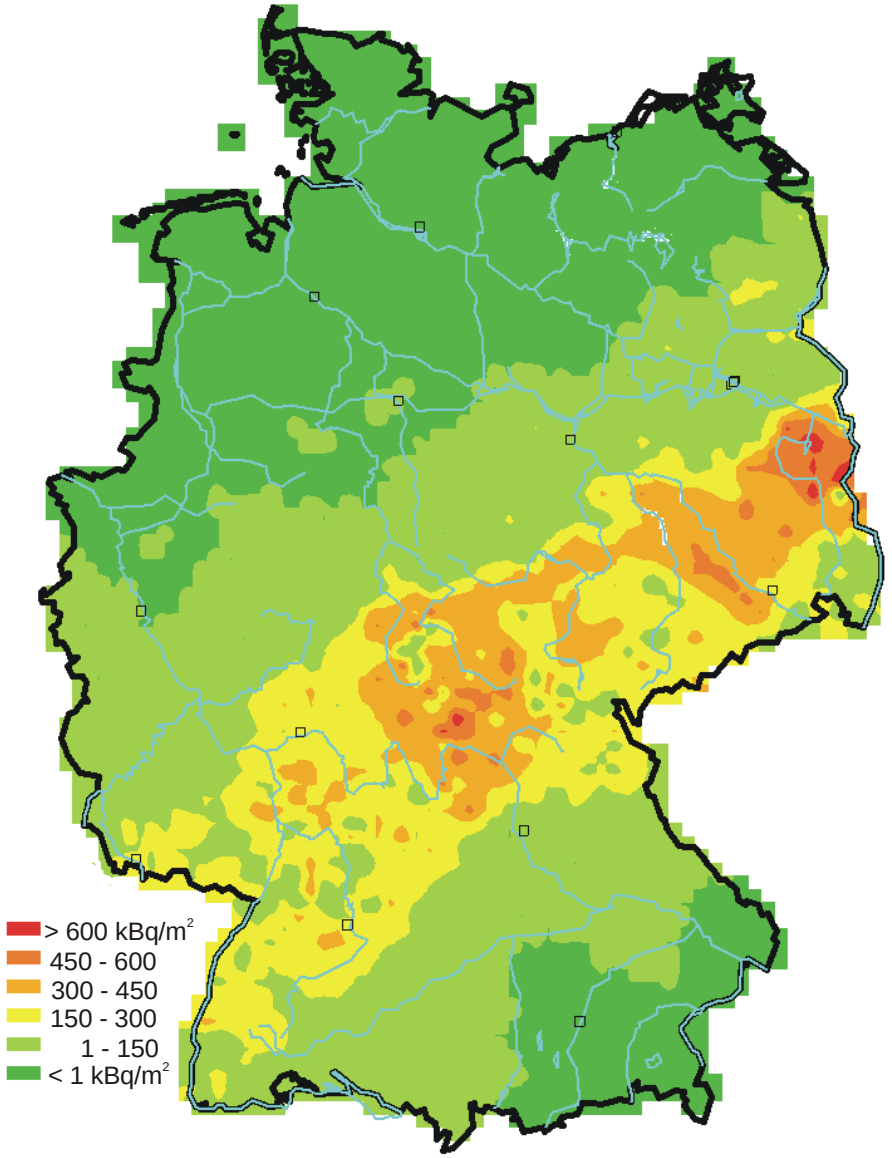
Datenquelle: BfG
§2 - Spontanproben Bund

* Einzelwert kleiner NWG

Status: 1/1/1/Freigabe BMU
Vorgangs: / 28.09.2004 11:56 bis 28.09.2004 13:33 (in ges. Zeit)

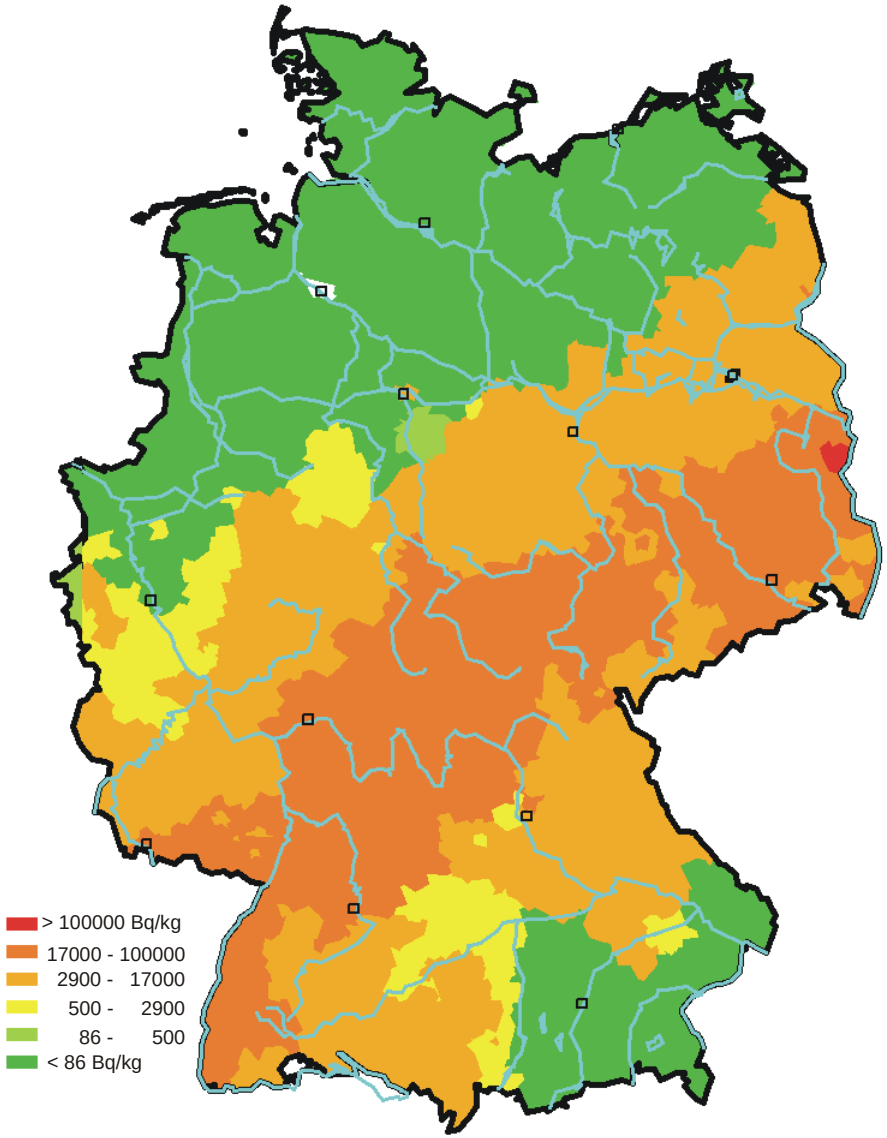
Start | IMIS - Mozilla | SquirrelMail 1.4.1 - M... | Download-Manager | Assistent für das Suc... | IMIS - 0 - Joachim Lie... | 08:28

Contamination of Soil with Iodine-131 (PARK calculation based on measurements)

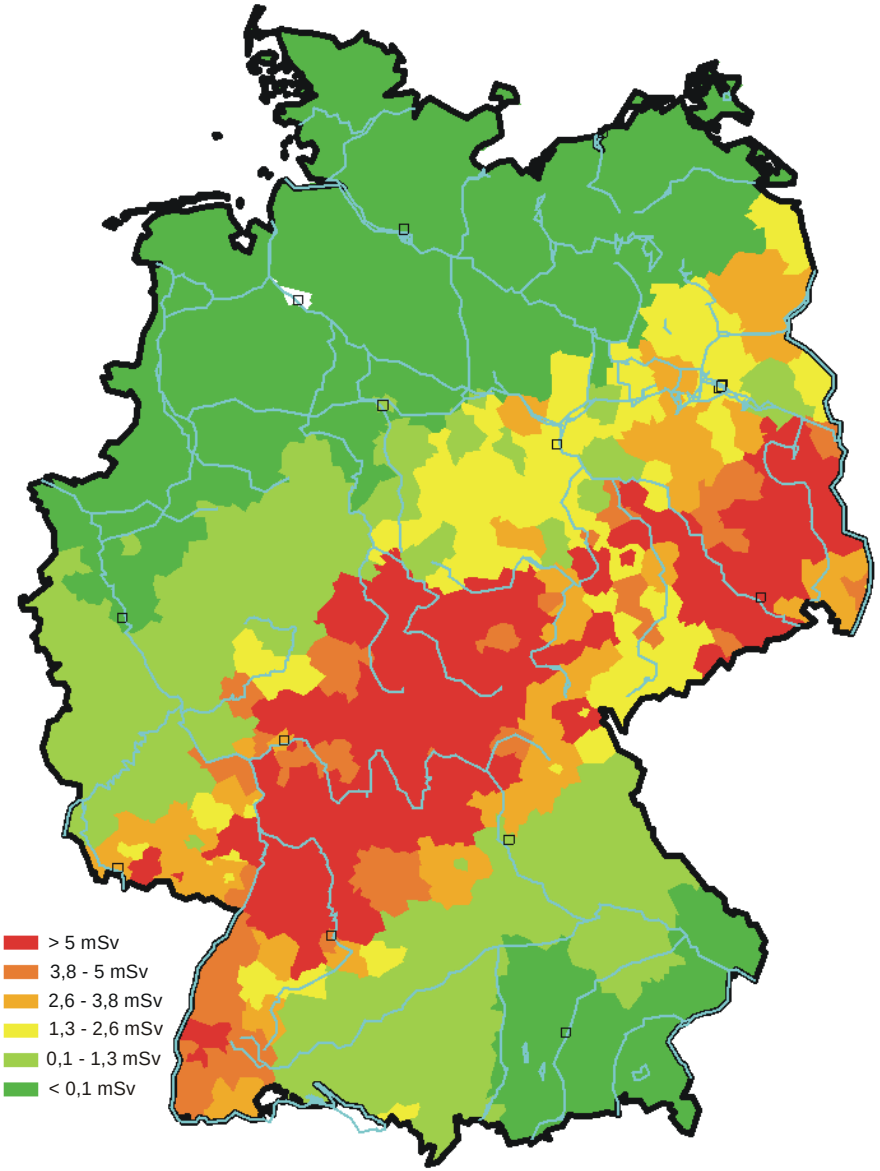


Bundesamt für Strahlenschutz

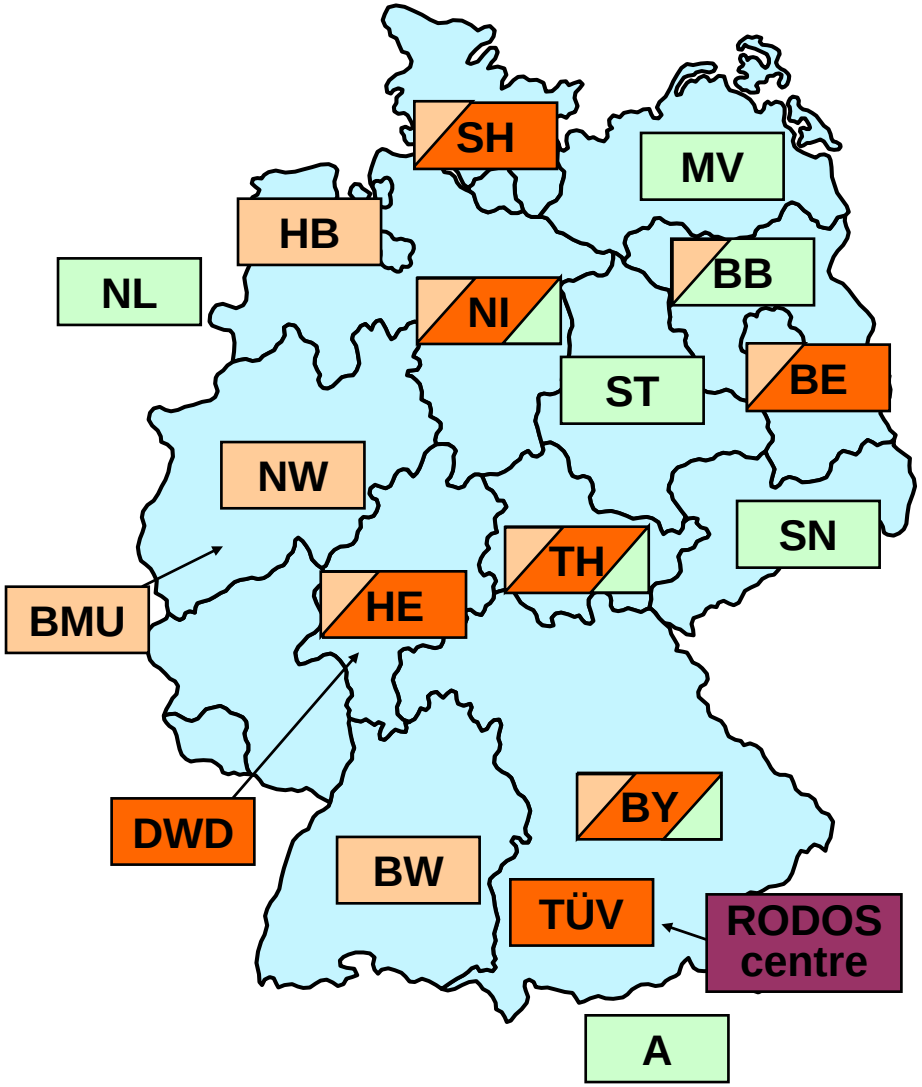
Concentrations of Iodine-131 Activity in Cow‘s Milk (PARK calculation based on measurements)



Average Local District Values for Effective Dose due to Ingestion (PARK calculation based on measurements)



RODOS users



A-User

B-User

C-User

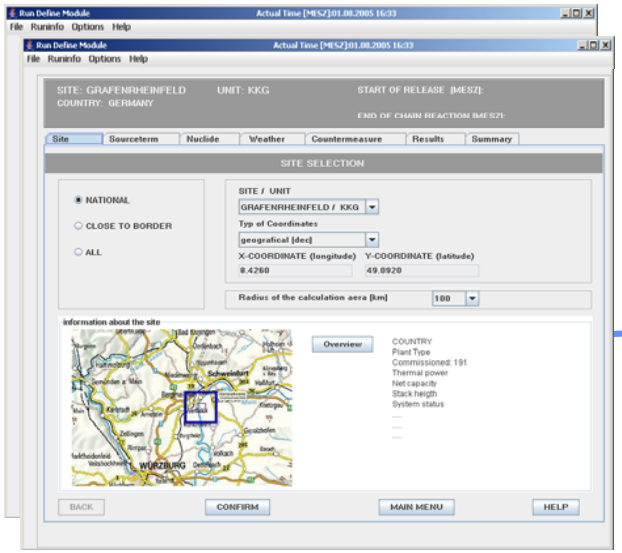
Bundesamt für Strahlenschutz

New options for the use of RODOS

User interface NPP monit. system

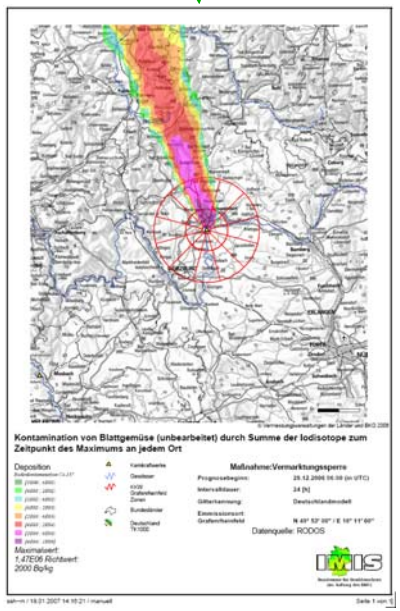
Automatic alarm (NPP monit. syst.)

User interface (RODOS user)



XML-Interface

RODOS calculation



Electron. situation report of the states

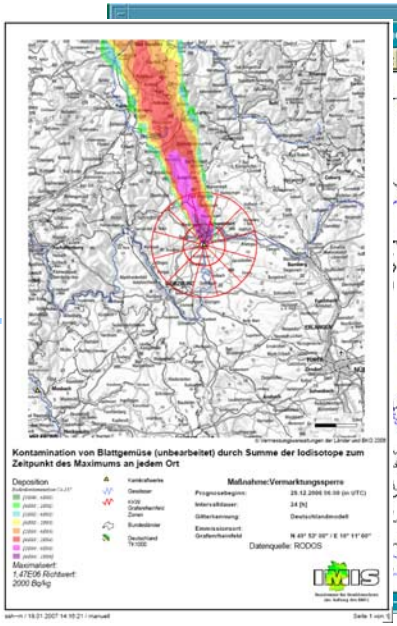
Linking RODOS with other decision support tools

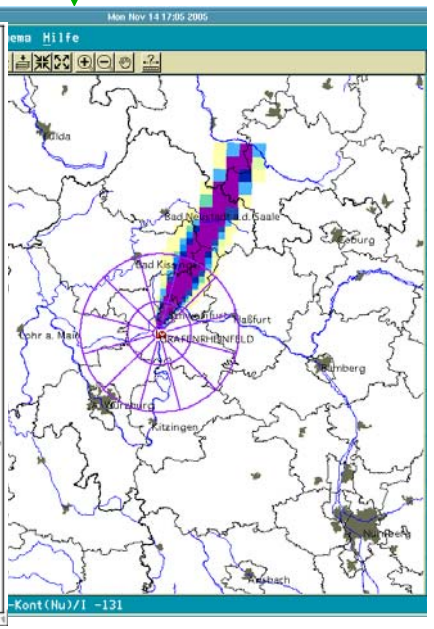
Other decision support tool (e.g. used by NPP operator for near range)

RODOS system (e.g. covering medium and far range)

XML-Interface (full run definit. or ST definit.)

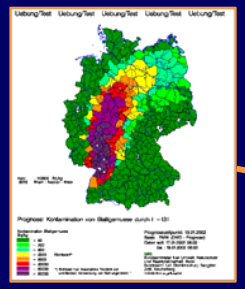
RODOS run



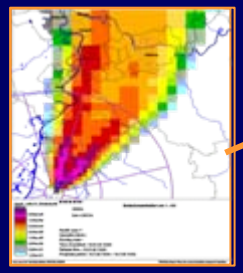


Electronic Situation Display (ELAN)

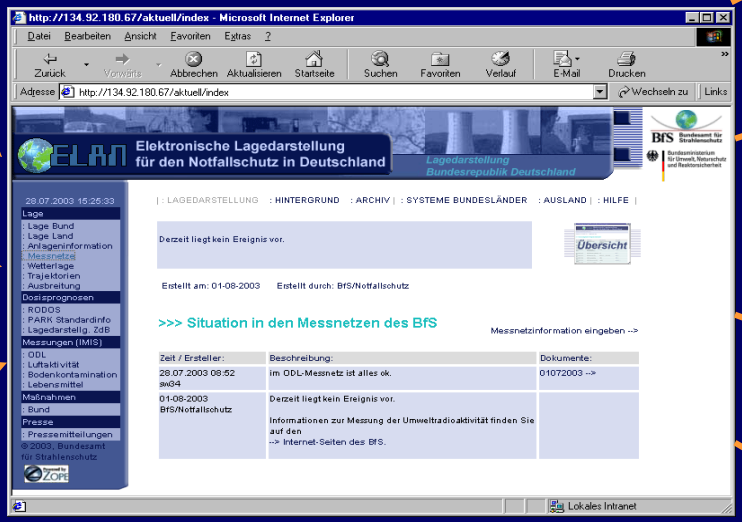
IMIS

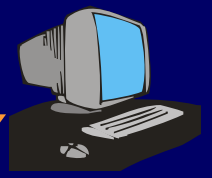


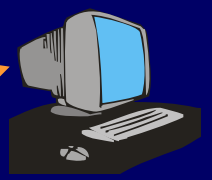
PARK

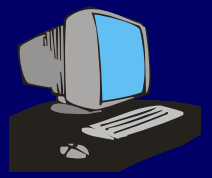


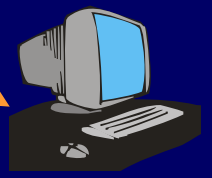
RODOS











Information providing

User

http://elan.bfs.de/aktuell/index - Microsoft Internet Explorer

Datei Bearbeiten Ansicht Favoriten Extras ?

Zurück Vorwärts Abbrechen Aktualisieren Startseite Suchen Favoriten Verlauf E-Mail Drucken Bearbeiten

Adresse http://elan.bfs.de/aktuell/index Wechseln zu

ELAN – Elektronische Lagedarstellung für den Notfallschutz in Deutschland

Lagedarstellung Bundesrepublik Deutschland

BfS Bundesamt für Strahlenschutz

Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit

22.09.2003 15:19:13

Lage
: Lage Bund
: Lage Land
: Anlageninformation
: Messnetze
: Wetterlage
: Trajektorien
: Ausbreitung
Dosisprognosen
: RODOS
: PARK Standardinfo
: Lagedarstellg. ZdB
Messungen (IMIS)
: ODL
: Luftaktivität
: Bodenkontamination
: Lebensmittel
Maßnahmen
: Bund
Presse
: Pressemitteilungen

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Powered by ZOPE

Derzeit liegt kein Ereignis vor.

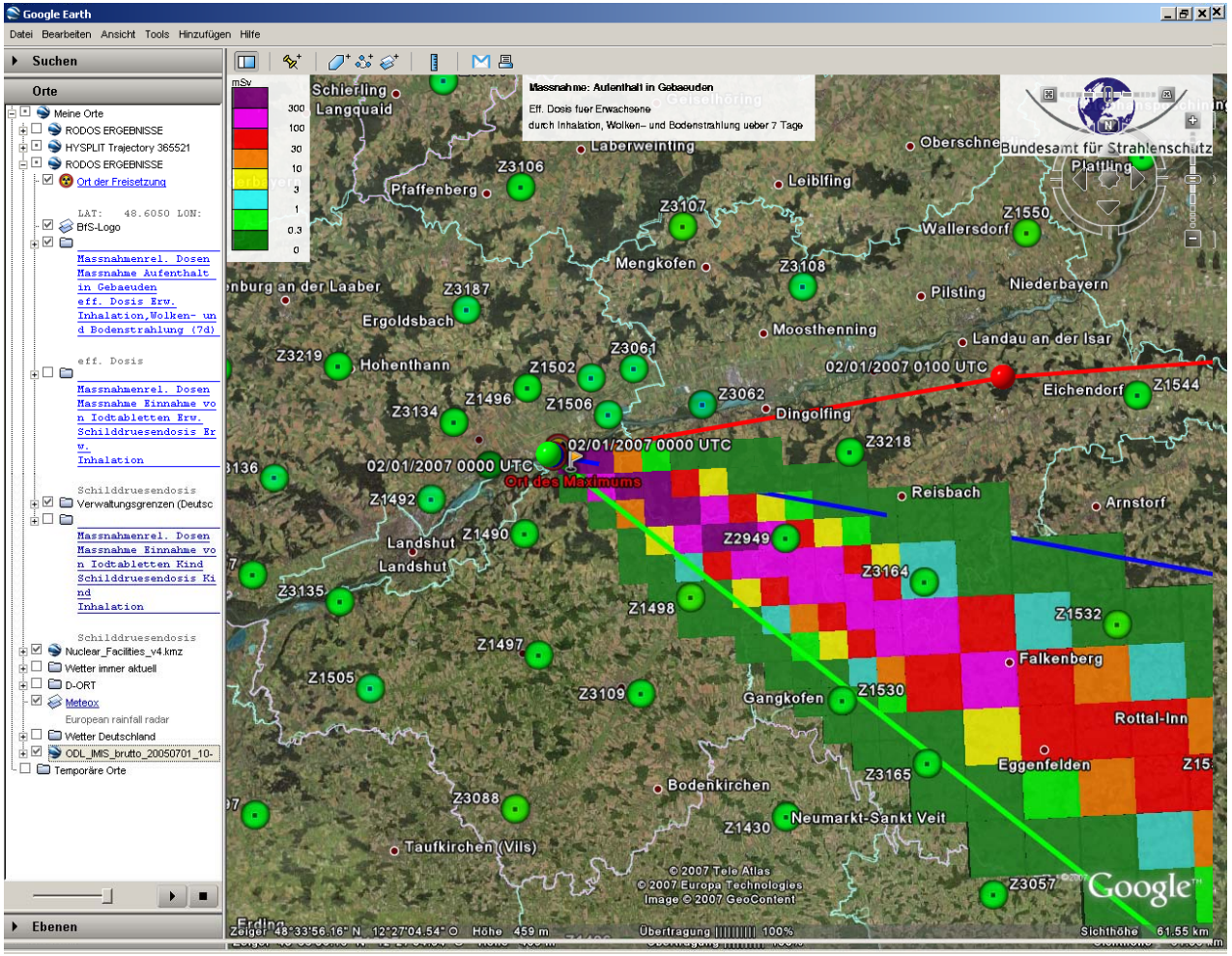
Erstellt am: 05.08.2003 14:49 Erstellt durch: unbekannt

>>> Lagebeschreibung der Länder

Lageinformation eingeben -->

Zeit / Ersteller:	Beschreibung:	Dokumente:
01-08-2003 BfS/Notfallschutz	Derzeit liegt kein Ereignis vor. Zu den länderspezifischen Informationssystemen gelangen Sie im Kapitel --> "Länderdarstellungen"	

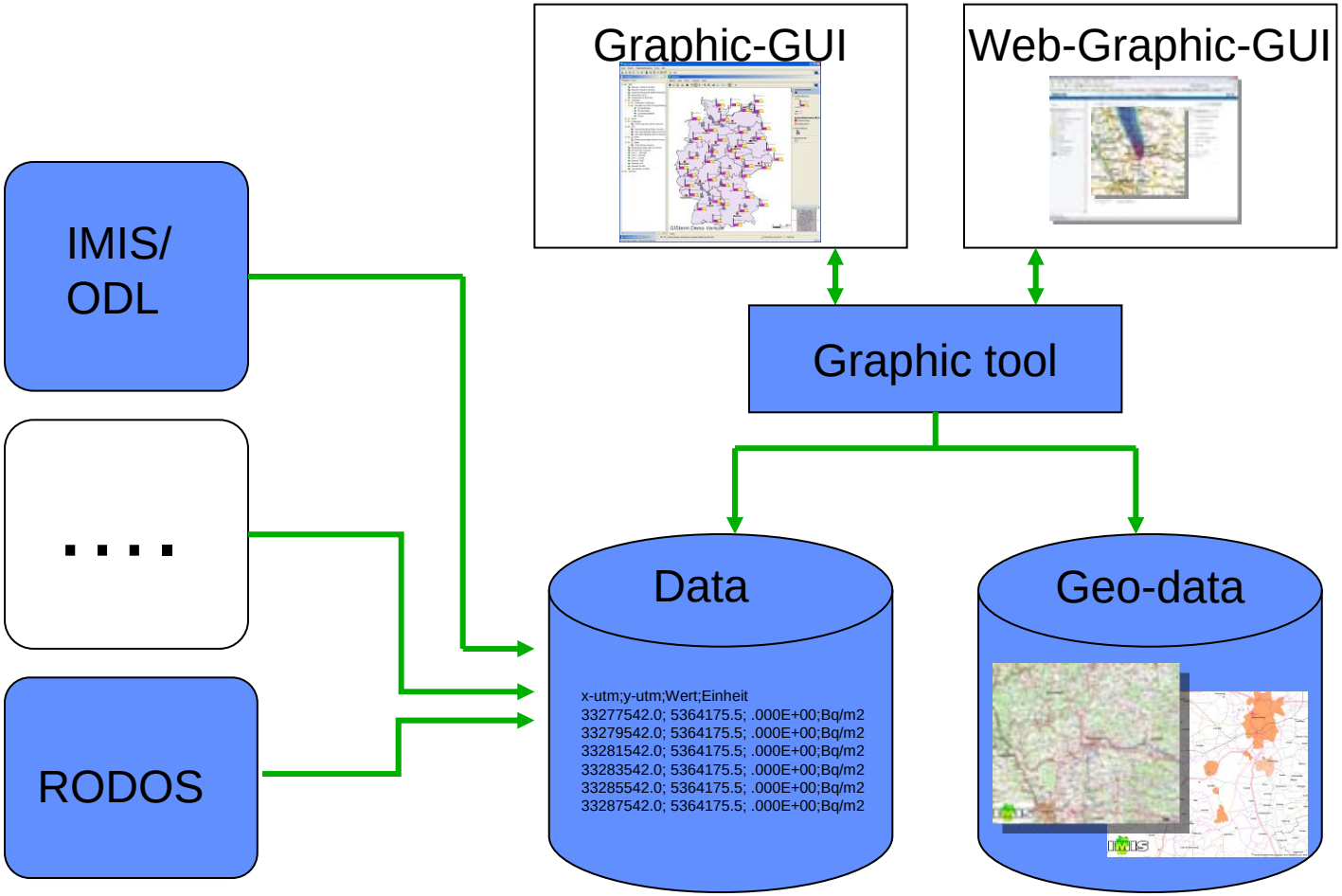
RODOS results in Google Earth



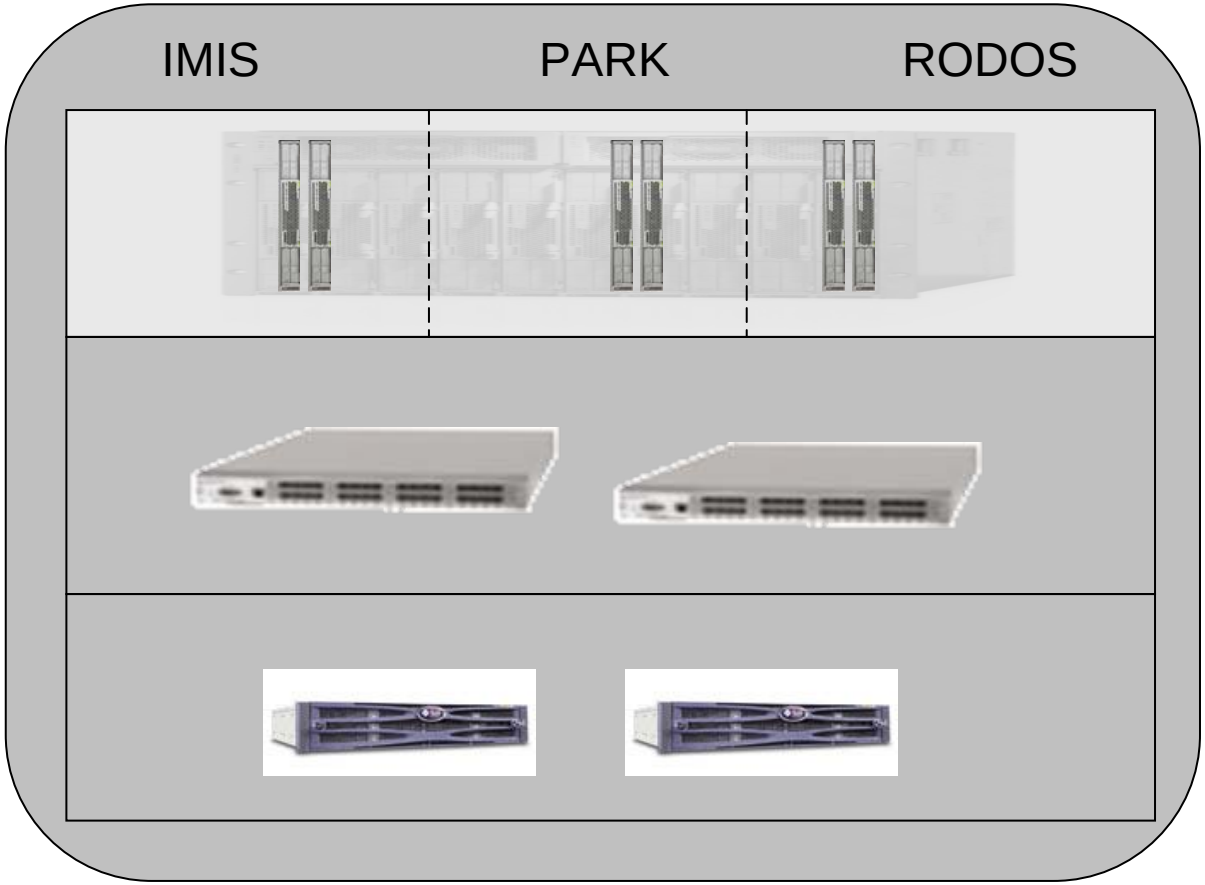
- Google Earth map
- Trajectory (DWD)
- RODOS dose calculation
- GDR measurements

Bundesamt für Strahlenschutz

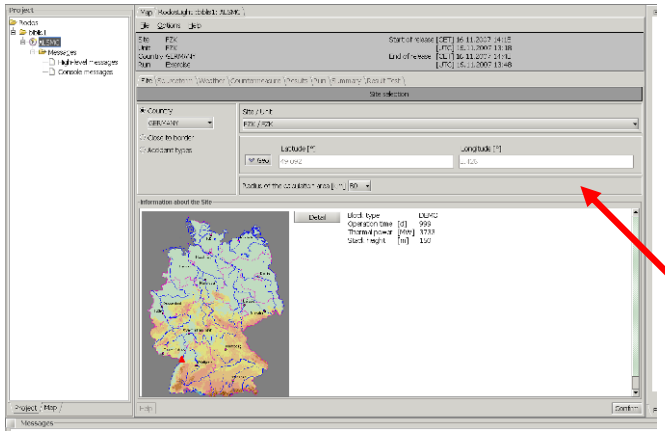
Visualization of DSS results in new concept

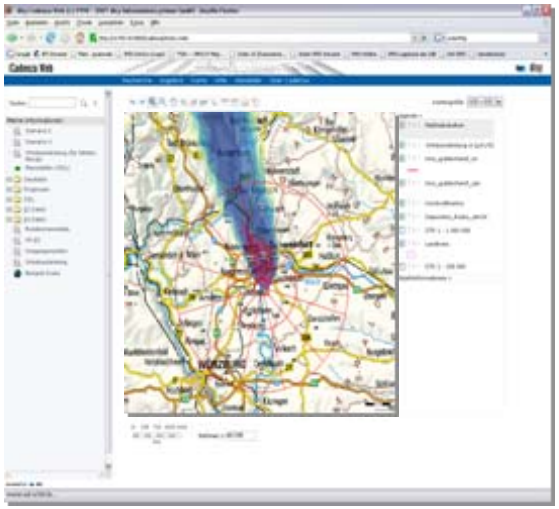


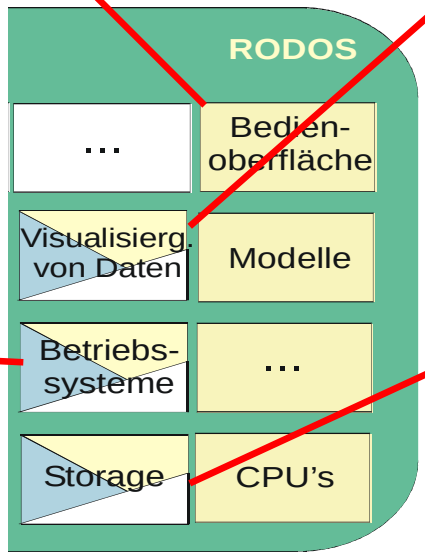
New infrastructure in new concept

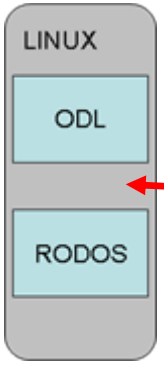


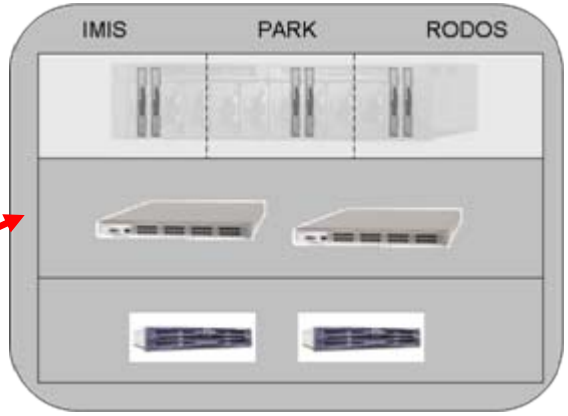
RODOS in new concept



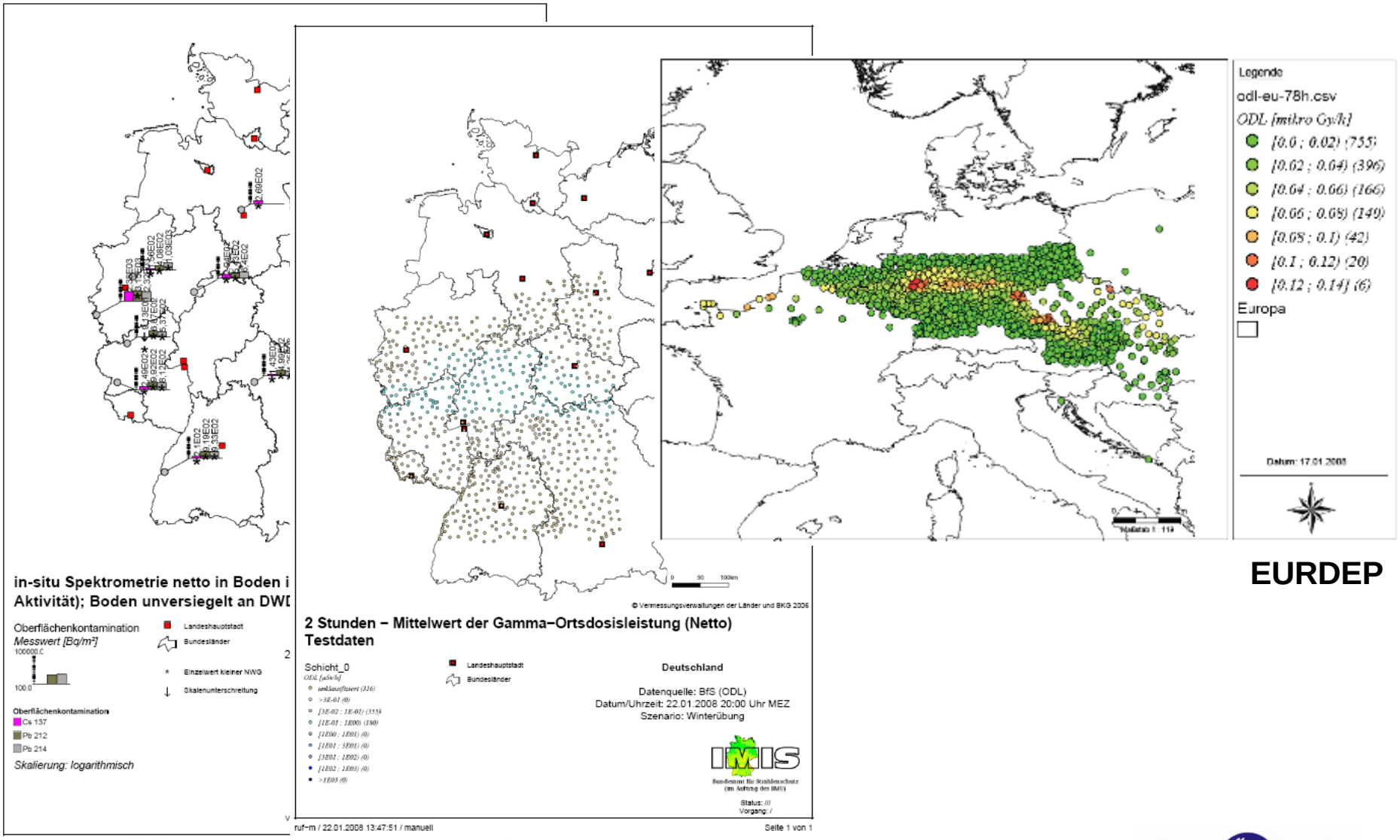








Exercise preparation



EURDEP

Bundesamt für Strahlenschutz

2007
2008

RODOS centre

- staff: 6 persons in Oberschleißheim (normal operation)
  + 3 persons in Freiburg (emergency operation),
  including 2 RODOS-administrators
- 1 person on call (around the clock)
- response time: 20-30 min during working hours,
  about 1.5 h during all other times
- permanent service contract with FZK
- excercises:
  - with staff once per week,
  - with A-users once per week,
  - national 2 per year,
  - international once per year (DSSNET, INEX)