

Radiological Situation in Japan after the Fukushima Accident

NURIS 2015

1st INRAG Conference on Nuclear Risk

Vienna, 16-17 April, 2015

Christian Küppers

Öko-Institut e.V., Darmstadt, Germany

- **Releases and exposure of the public**
- **Evacuation**
- **Philosophy during emergency situations**
- **View in the future**

Releases – in relation to the inventory of blocks 1-3

	I-131	Cs-137
release to the atmosphere	1.7 % - 8.3 %	0.9 % - 2.9 %
direct release to the ocean	0.2 % - 0.3 %	0.4 % - 0.9 %
to the ocean by atmosphere	1.0 % - 1.7 %	0.7 % - 1.1 %

Source: UNSCEAR

Exposure of the public, in mSv

	adults		1 year old	
	1 st year	whole life	1 st year	whole life
evacuated area	1.1 - 9.3	-	1.6 - 13	-
districts in Fukushima prefecture	1.0 - 4.3	1.1 - 11	2.0 - 7.5	2.1 - 18
districts in other prefectures in the east of Japan	0.2 - 1.4	0.2 - 4.0	0.3 - 2.5	0.4 - 6.4
other prefectures in Japan	0.1 - 0.3	0.1 - 0.6	0.2 - 0.5	0.2 - 0.9

Source: P. Jacob, 2015

Releases and exposure of the public (3)

Collective dose (public), Japan

- 18 000 man Sv (first year)
- 36 000 man Sv (next 10 years)
- 48 000 man Sv (next 80 years)

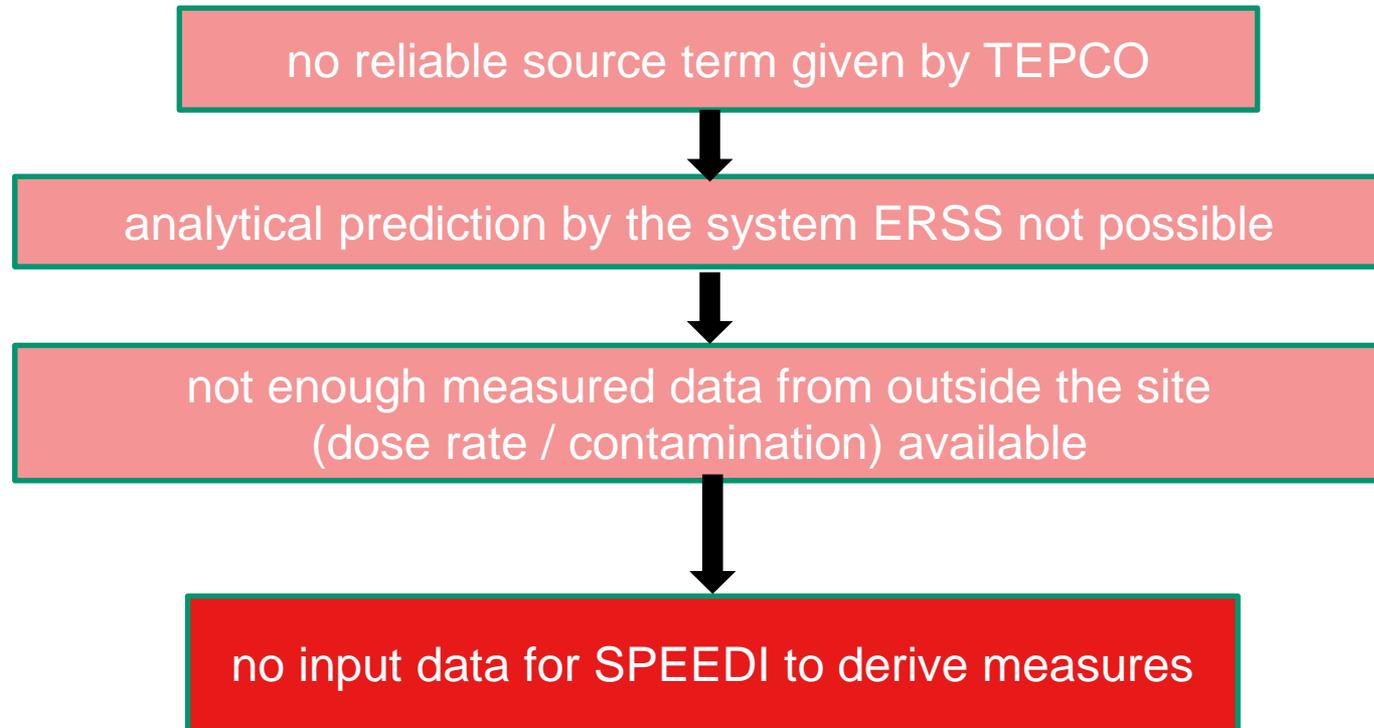
For comparison: Tschernobyl

- 360 000 man Sv über 20 Jahre
- 400 000 man Sv über 80 Jahre

Source: UNSCEAR

(collective Dose in Japan combined with ICRP detriment means 2400 cases)

- System to derive measures for the radiological protection of the public failed



- decisions, in particular evacuation zones, by feel (2 km, 3 km, 20 km)

- Evacuation poorly planned, additional problems by destroyed infrastructure

~~reconsider justification
of evacuations~~

**reasonable planning and
infrastructure**
- consider INES 7 accidents -

Evacuation (3)

- relatively “low” doses to members of the public
 - what are the reasons?

~~previous
overestimation of the
consequences of core
melt accidents~~

**“low” source term
wind direction
March (not June or July)**

**consequence of
countermeasures:
evacuation
harvesting / marketing bans**

“radiophobia”

extremely great economic and social damage to avoid high doses

much higher dose and contamination limits in emergency situations than during normal operation

reason: avoid food shortage, social-economical problems ...

optimization in radiation protection means: limits can be reduced, when less problems result from them

reduction of limits for Cs-134 and Cs-137 in food on
1st April, 2012

	2011	1 st April, 2012
drinking water	200 (100, used for baby food)	10
milk / dairy products	200	50
other food	500	100
baby food	-	50

- internationally perceived with surprise and incomprehension
- but: consistent with optimization concepts

View in the future (1)

- storage of highly contaminated water at the site
 - regularly leaks
 - regularly contamination of ground water
 - storage capacity as bottleneck
- long term contamination of
 - mushrooms (except from breeding)
 - bamboo shoots
 - special fruits
 - wild animals from forests
 - fresh water fish
- 3 kinds of evacuation areas
 - area 3: „Areas where it is expected that the residents have difficulties in returning for a long time“
 - 31 % of the residents of evacuation areas

View in the future (2)

- conditions for returning to evacuated areas
 - general restoration of infrastructure
 - general restoration of public services for daily life
 - decontamination of the areas
 - involvement of the public, local authorities in the decision making process
 - risk communication (also: information about hot spots, contaminated food ...)
some “radiophobia” is necessary to keep doses low

Thank you for your attention!

Do you have any questions?

