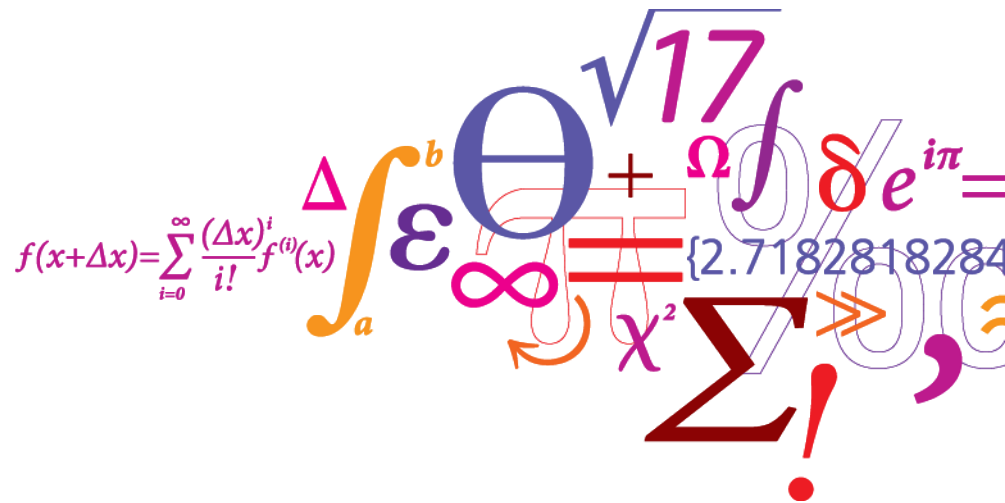


NKS FAUNA

Workshop DMI 10.09.2015

Bent Lauritzen
Radiation Physics
Head of Division



NKS FAUNA workshop

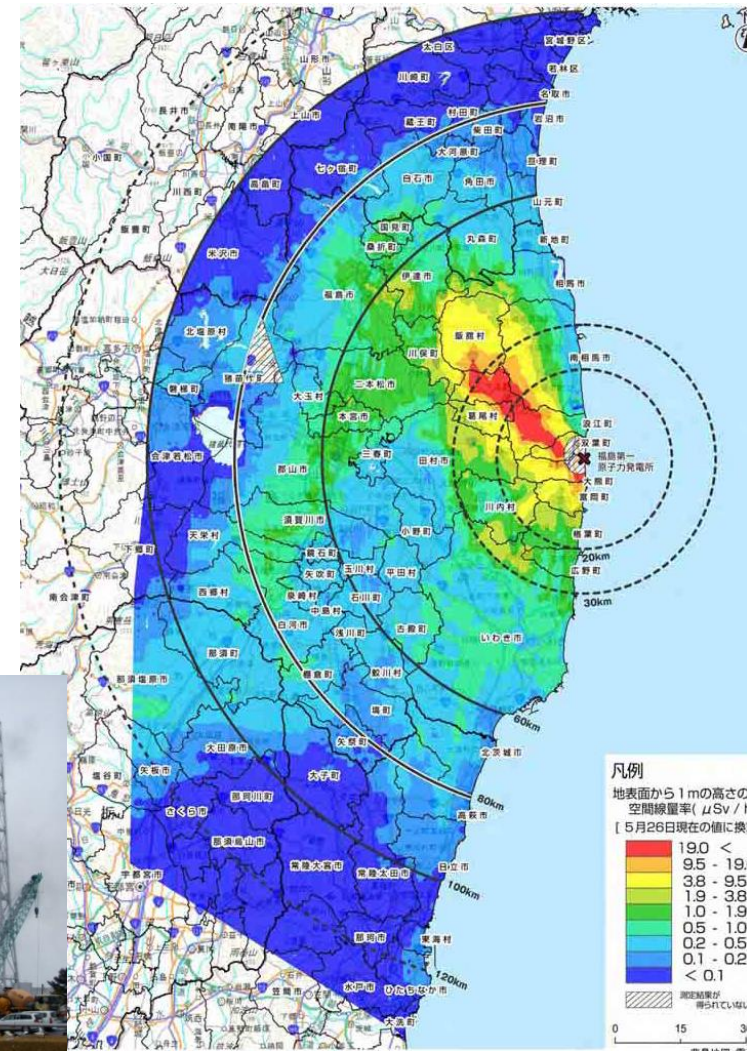
– meeting objectives

- 1) Possibilities for addressing uncertainties in real-time atmospheric dispersion modelling
- 2) Operational issues of uncertainty estimates
 - is it useful?
 - how to present it?
 - how to apply it?
- 3) Feedback to FAUNA project
- 4) Your active participation!!!

Risk communication during nuclear accidents

NKS FAUNA workshop:

- How do we communicate uncertainties during a nuclear accident?



Risk communication during nuclear accidents

Issue 1:

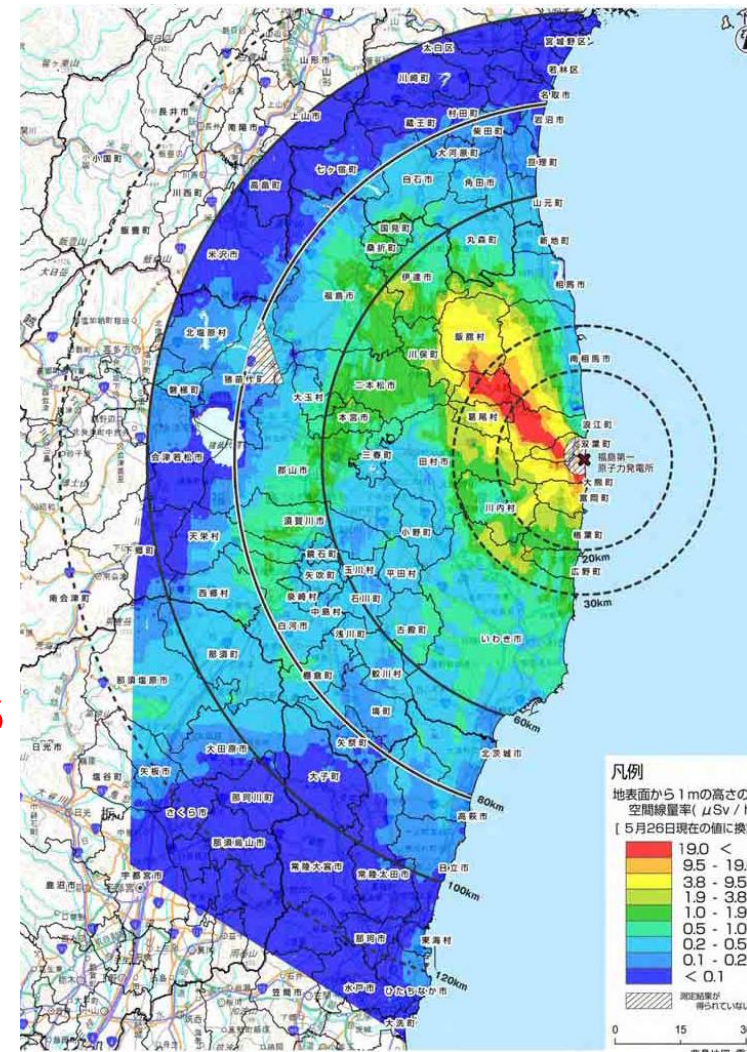
Model developers and decision makers

Issue 2:

Modeling limitations

Issue 3:

Communication failures



Model Developers ~ Decision Makers

(Steven Hanna, Fukushima 2015)

Model developers

- Universities
- Research organizations
- Private industry
- “Subject Matter Experts” – with advanced degrees in sciences, engineering, math, statistics, etc.
- Little training in risk communication

Model Developers ~ Decision Makers

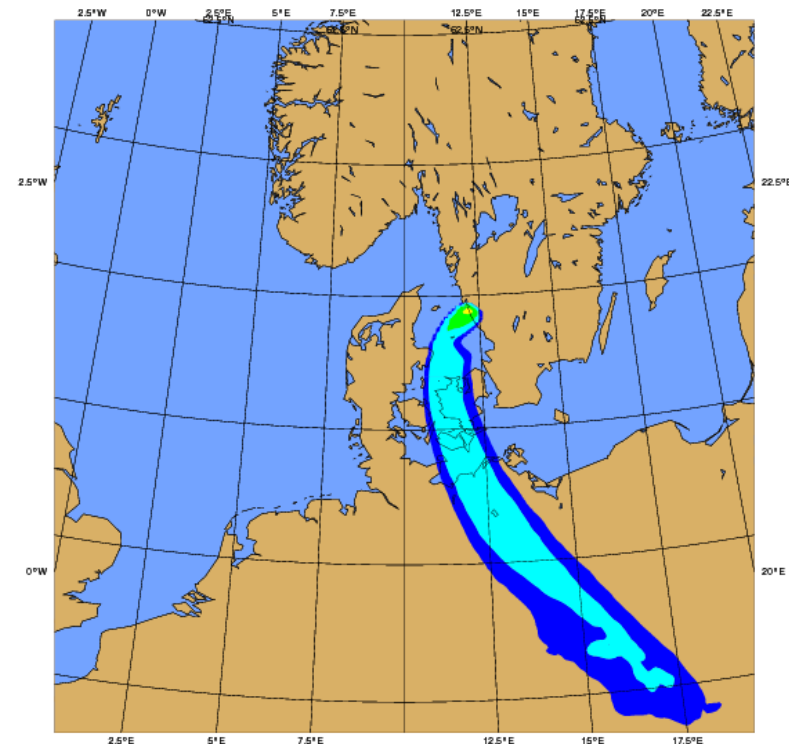
(Steven Hanna, Fukushima 2015)

Decision-Makers

- Emergency responders
- Planners
- Mayor, governor, or other head of a government agency
- Stakeholders such as railroads, chemical plant owners
- Unlikely to have scientific training

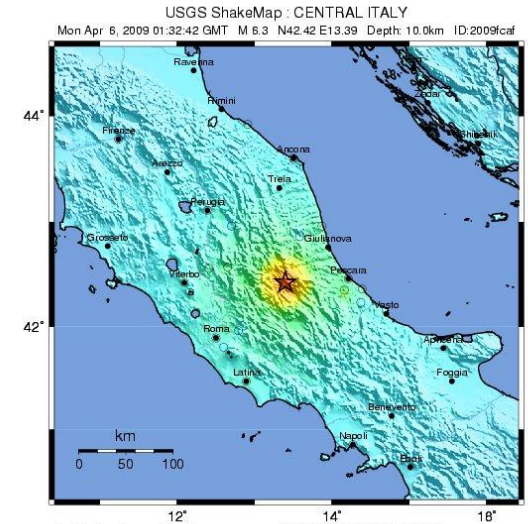
Modeling limitations

- Do models meet expectations by decision makers?
- Are model limitations communicated?
 - accuracy, adequacy
- Can DSSs cope with added information, i.e., uncertainties ?



Communication failures

– 2009 L'Aquila Earthquake –



PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%)	<.17	.17-1.4	1.4-3.9	3.9-9.2	9.2-18	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	8.1-16	16-31	31-60	60-116	>116
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X



Communication failures

– 2009 L'Aquila Earthquake –

6 April 2009: 5.8 Richter scale in Abruzzo Region

- 20,000 buildings damaged
- 65,000 people rendered homeless
- 308 casualties

Cause of disaster:

- Poor building standards
- Inadequate prior warning
- Communication failure



Communication failures

– 2009 L'Aquila Earthquake –

- At a March 31 meeting in L'Aquila, earth scientist Enzo Boschi, now a defendant in the case, **acknowledged the uncertainty, calling a large earthquake "unlikely," but saying that the possibility could not be excluded.** In a post-meeting press conference, **however, Department of Civil Protection official Bernardo De Bernardinis, also a defendant, told citizens there was "no danger."**
- <http://www.livescience.com/23497-italian-seismologist-earthquake-trial.html>
- ... prosecutors insist that the **trial is not about predicting the unpredictable**, according to [Nature News](#). During closing arguments on Monday and Tuesday (Sept. 24-25), the prosecution assistant told the courtroom that instead, the **scientists and officials had inadequately assessed the risk of a quake and given deceptive information to the public.**
- <http://www.livescience.com/23497-italian-seismologist-earthquake-trial.html>

Communication failures

– 2009 L'Aquila Earthquake –

- **October 2012:** 7 scientists convicted of multiple manslaughter, sentenced to six years imprisonment
 - ... scientists had spread “inaccurate, incomplete and contradictory” information
 - ... falsely reassuring the public
 - ... assessment of risks that was incomplete, inept, unsuitable and criminally mistaken
-
- **November 2014:** verdict overturned for six scientists; reduced sentence for ex-governmental official.



Communication failures

– 2009 L'Aquila Earthquake –

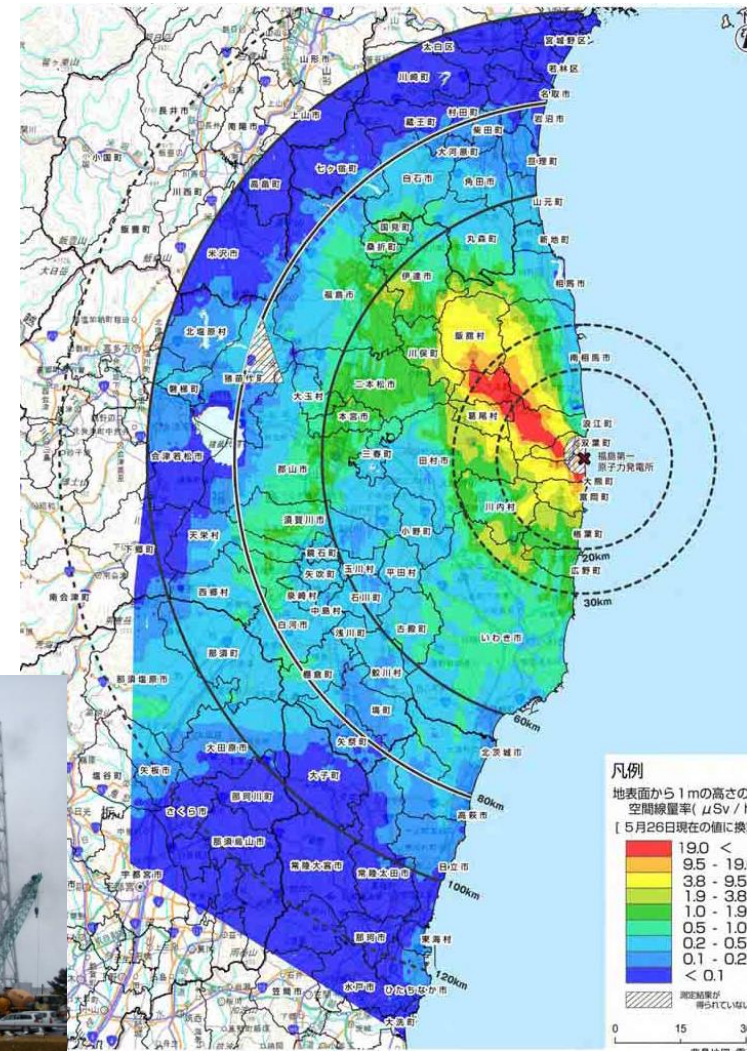
Lessons learned from L'Aquila accident and sentence

- **Reliable (short-term) predictions are not possible...**
Claims to the contrary induce false expectations
- **State of knowledge should be presented in a comprehensive and unbiased fashion**
- **Communication should include uncertainties**

(IASPEI - International Association of Seismology and Physics of the Earth's Interior)



Does this also apply to nuclear accidents?



NKS FAUNA Workshop Agenda

- **Welcome (Jens Havskov Sørensen, DMI) 10:00**
- **Workshop objectives (Bent Lauritzen, DTU Nutech) 10:05**
- **Uncertainty of numerical weather prediction and atmospheric dispersion –results of NKS-B projects MUD and FAUNA (Jens Havskov Sørensen, DMI) 10:15**
- **FOI project on uncertainties for decision support (Oscar Björnham, FOI) 10:40**
- **Norwegian perspective on uncertainties (Heiko Klein, MET Norway) 11:20**
- **Possibilities for implementation in ARGOS (Steen Hoe, DEMA) 11:45**
- **DMI operational use of meteorological uncertainties (Knud-Jacob Simonsen, DMI) 12:10**
- **Lunch 12:35**
- **Group discussions 13:35**
- **Coffee 15:05**
- **Summary and conclusion 15:20**
- **End of workshop 16:05**