



Australian Government

Australian Radiation Protection and Nuclear Safety Agency

Defining an Atmospheric Source Term During Early Stages of the Fukushima Nuclear Accident

**Dr Marcus Grzechnik, Mr Blake Orr,
Dr Rick Tinker & Dr Stephen Solomon**



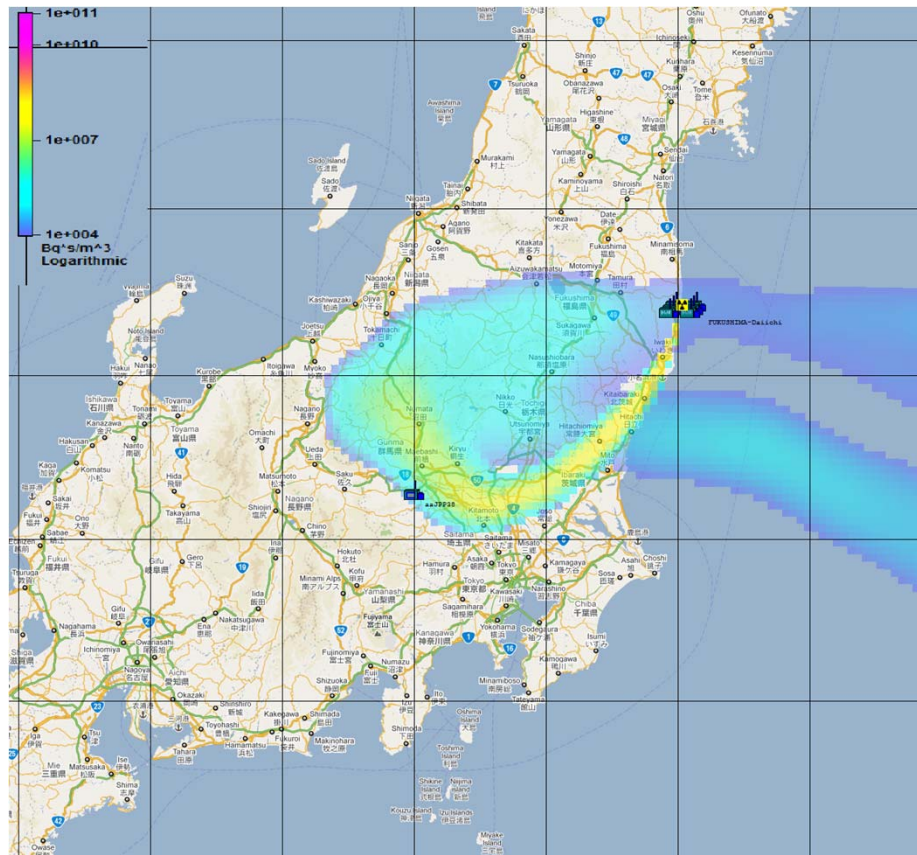


ARGOS & Source Types

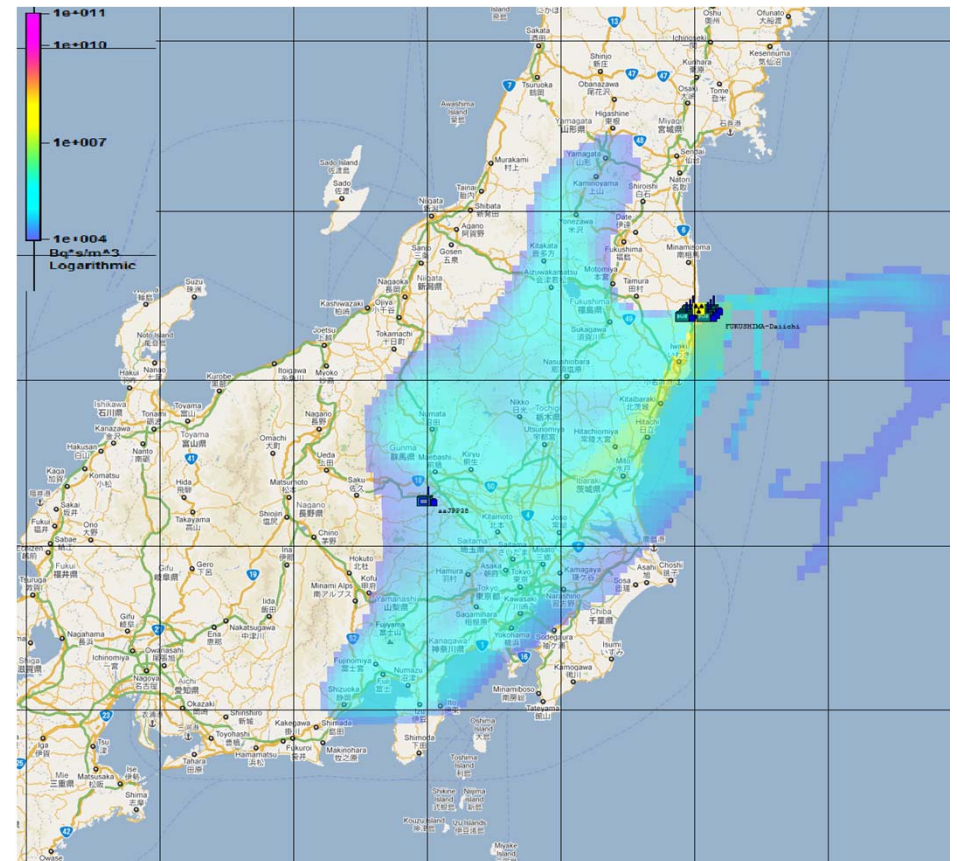
- Accident Reporting and Guidance Operational System (DEMA & PDC)
 - SQL Database
 - Gaussian Puff; Rimpuff (Risø)
 - Dose Calculation, OILs
 - Australian BOM Wind Data (0.375°x 0.375°)
- Activities based on 1% core release (single 2380MWth reactor – Reference Accident)
 - I-131 – 1.2E+16Bq (1200TBq); Cs-137 – 8.1E+14Bq (810TBq)
 - Continuous Release (24hr)
 - Hourly Pulse Releases



Running ARGOS



Pulse 1700utc 14-3-2011



24hr 0600utc 14-3-2011

How can we verify or test this source term?



Local CTBT Measurements

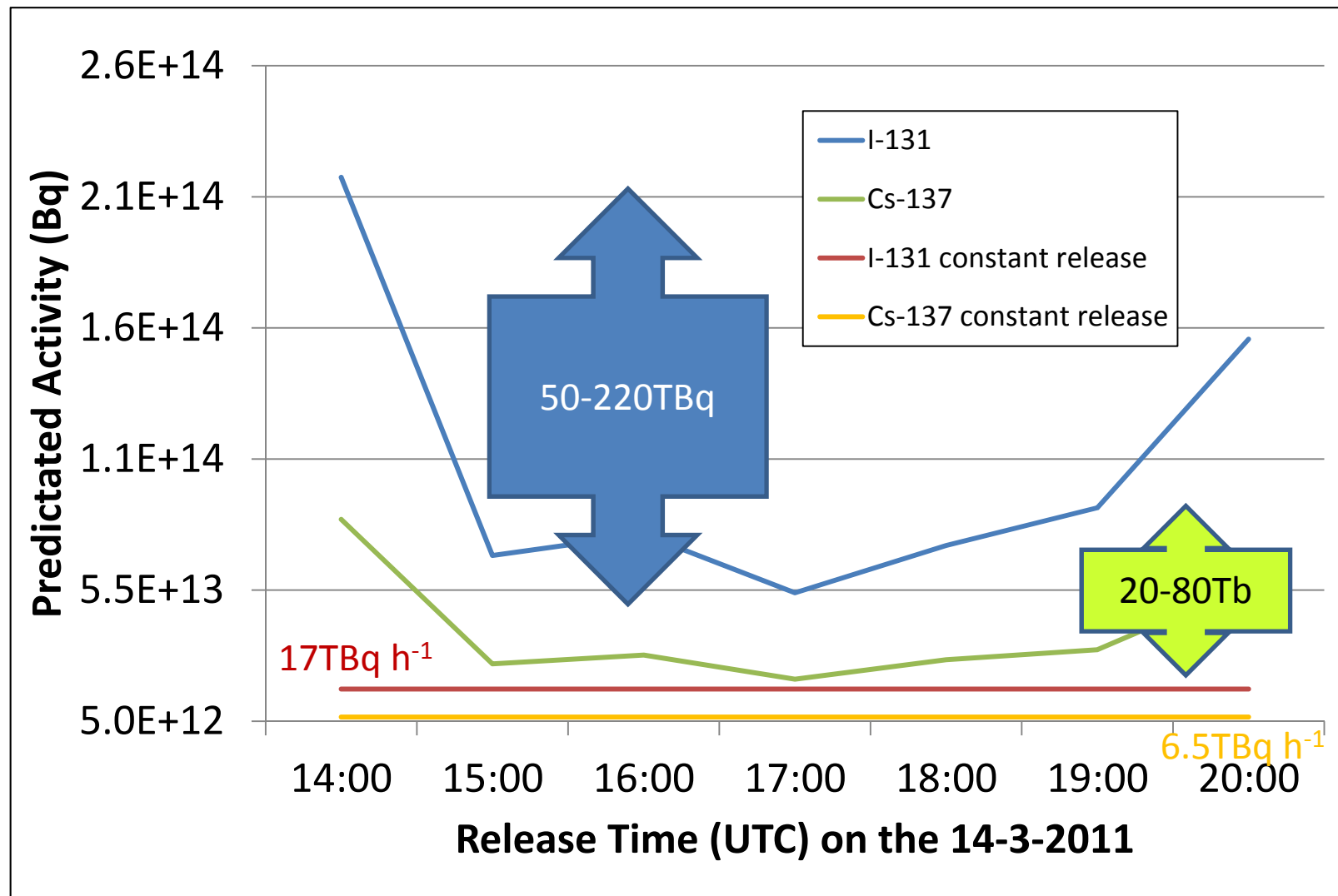


- Optimal release time was determined by trial and error
- Most likely from 1400utc to 2000utc 14-3-2011

Radionuclide Detection (Bq/m ³)	24 hour Collection Start (UTC)				
	March 12 06:55	March 13 06:55	March 14 06:55	March 15 06:55	March 16 06:55
Cs-137	1.2E-05	7.1E-04	Not Available	5.6E+00	1.6E-02
I-131	8.3E-05	2.7E-03		1.5E+01	5.6E-02

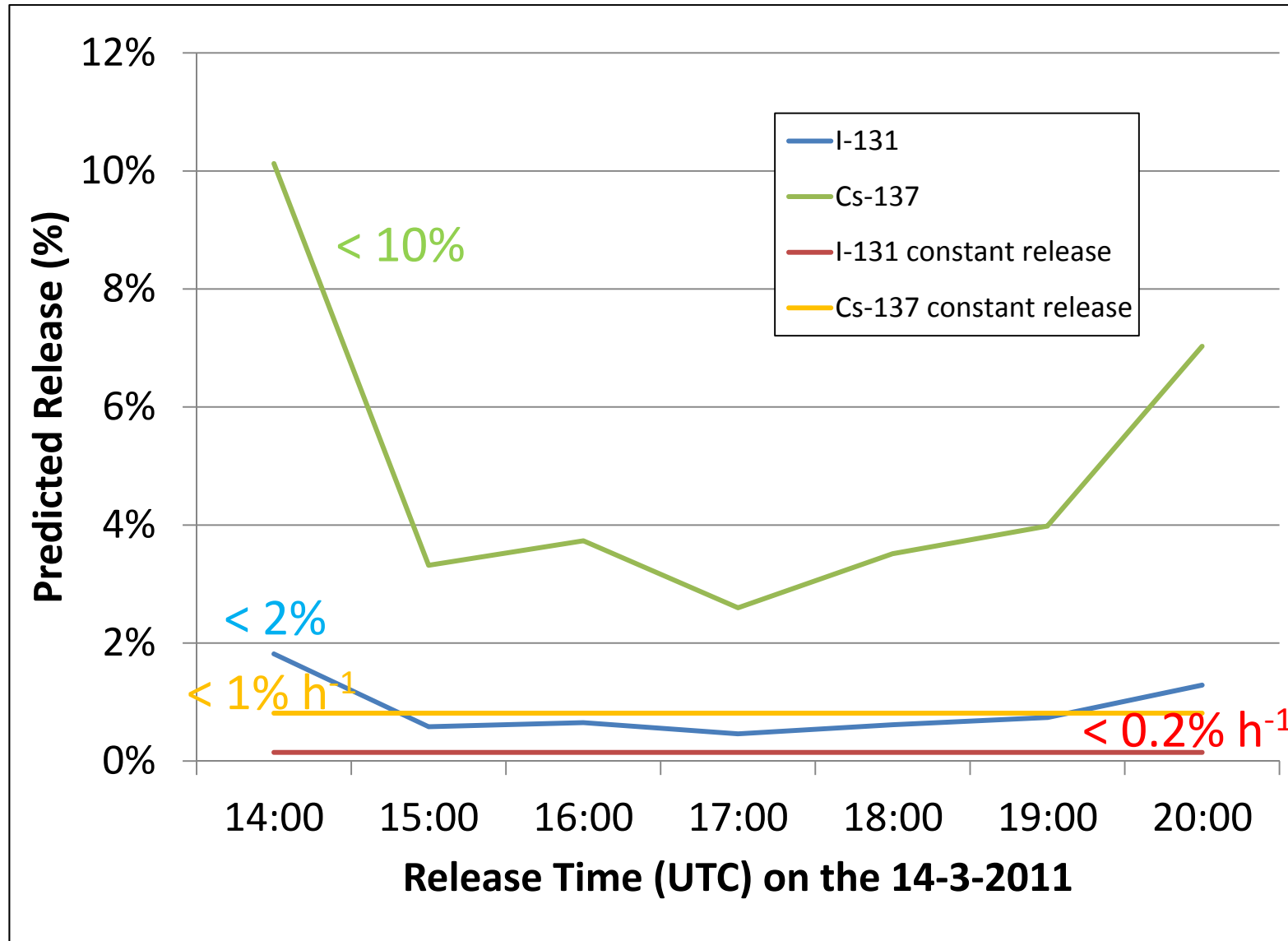


Predicted Release Activities to obtain CTBT detection





% of (1%) Source Term to Obtain Detected Activities





Conclusions

- ARGOS simulations show that detected levels at JPP38 (15-3-2011) could be obtained with a release of;

PULSE

- Less than 10% of ARPANSA Cs-137 source term
- Less than 2% of ARPANSA I-131 source term

OR

CTS 24hr

- Less than 1% h⁻¹ of ARPANSA Cs-137 source term
- Less than 0.2% h⁻¹ of ARPANSA I-131 source term

- ARPANSA 'Reference Accident' source term was sufficiently conservative