

ASEAN NPSR

2017 Benchmark Problem Assessment

Progress Report: Thailand

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JRODOS



Conditions

NPP2 (Jan 18)

- Release characteristics
 - Location: $21^{\circ}40'15''\text{N}$, $108^{\circ}33'30''\text{E}$
 - Release amount
 - I-131: 1×10^{16} Bq (short-term consequences)
 - Cs-137: 6×10^{13} Bq (long-term consequences)
 - Release starting time: **January 18, 2018 at 07:00 (UTC)**
 - Release period: 26 hours
 - Release height: **10** meters
 - Heat content: 500 kW
- Weather data specification
 - Coverage: $6.5\text{-}32.0^{\circ}\text{N}$, $95.5\text{-}122.5^{\circ}\text{E}$
 - Resolution: $0.5^{\circ} \times 0.5^{\circ}$
 - Nesting scheme: Not specified

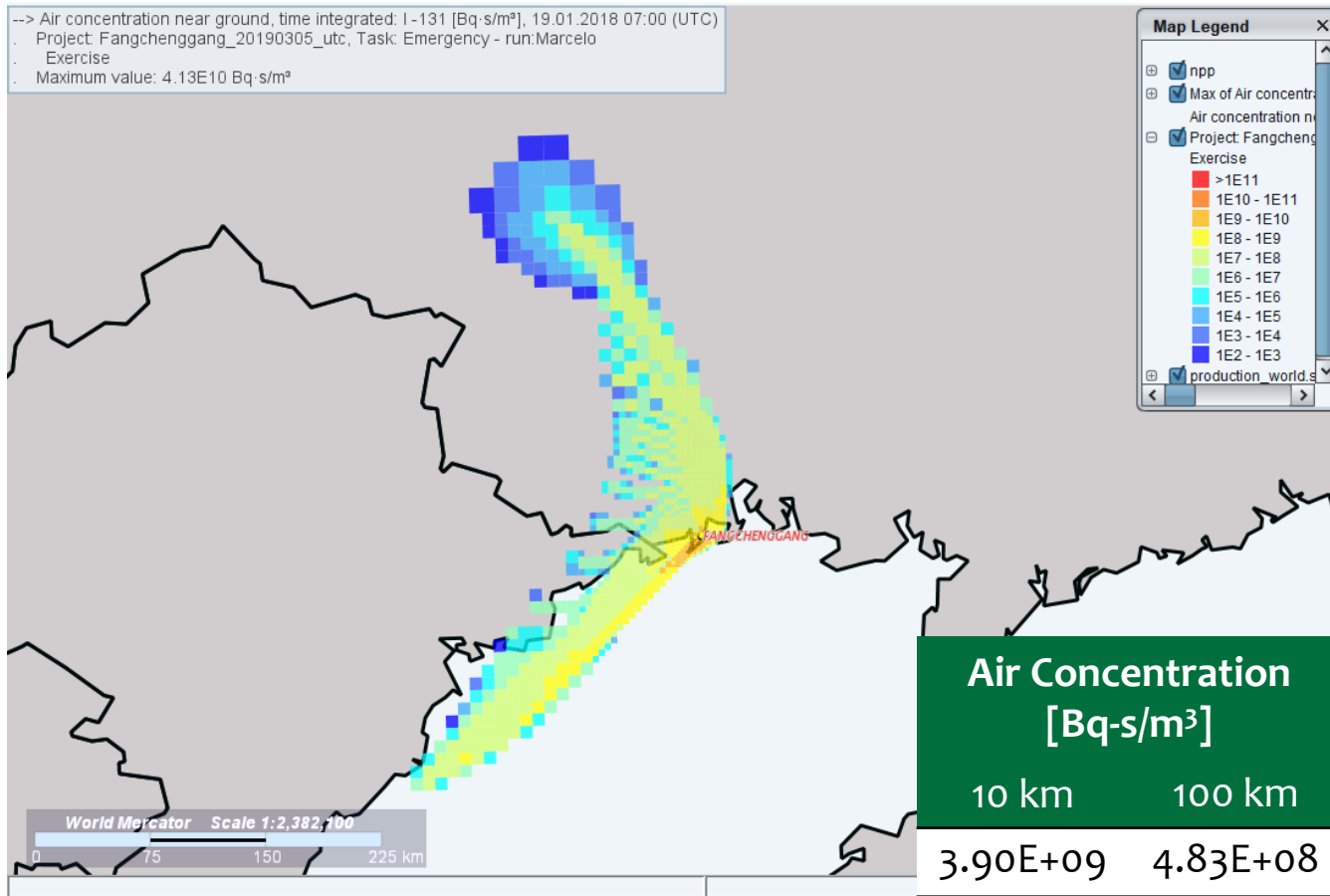
Conditions

NPP2 (Jan 18)

- Results to be compared
 - Distribution maps of the following values at **1 day** from the release starting time
 - **(Time-integrated)** air concentration (Bq/m^3)
 - **(Time-integrated)** ground concentration (Bq/m^2)
 - Time-integrated exposure dose in terms of TEDE (μSv)
 - **1-day** TEDE exposure extent (*defined as the furthest distance to which the specified TEDE is extended to*) for $1 \mu\text{Sv}$
 - **Maximum** air concentration (Bq/m^3), ground concentration (Bq/m^2), exposure dose in terms of TEDE (μSv) at **1 day** from the release starting time at **10 / 100 km**

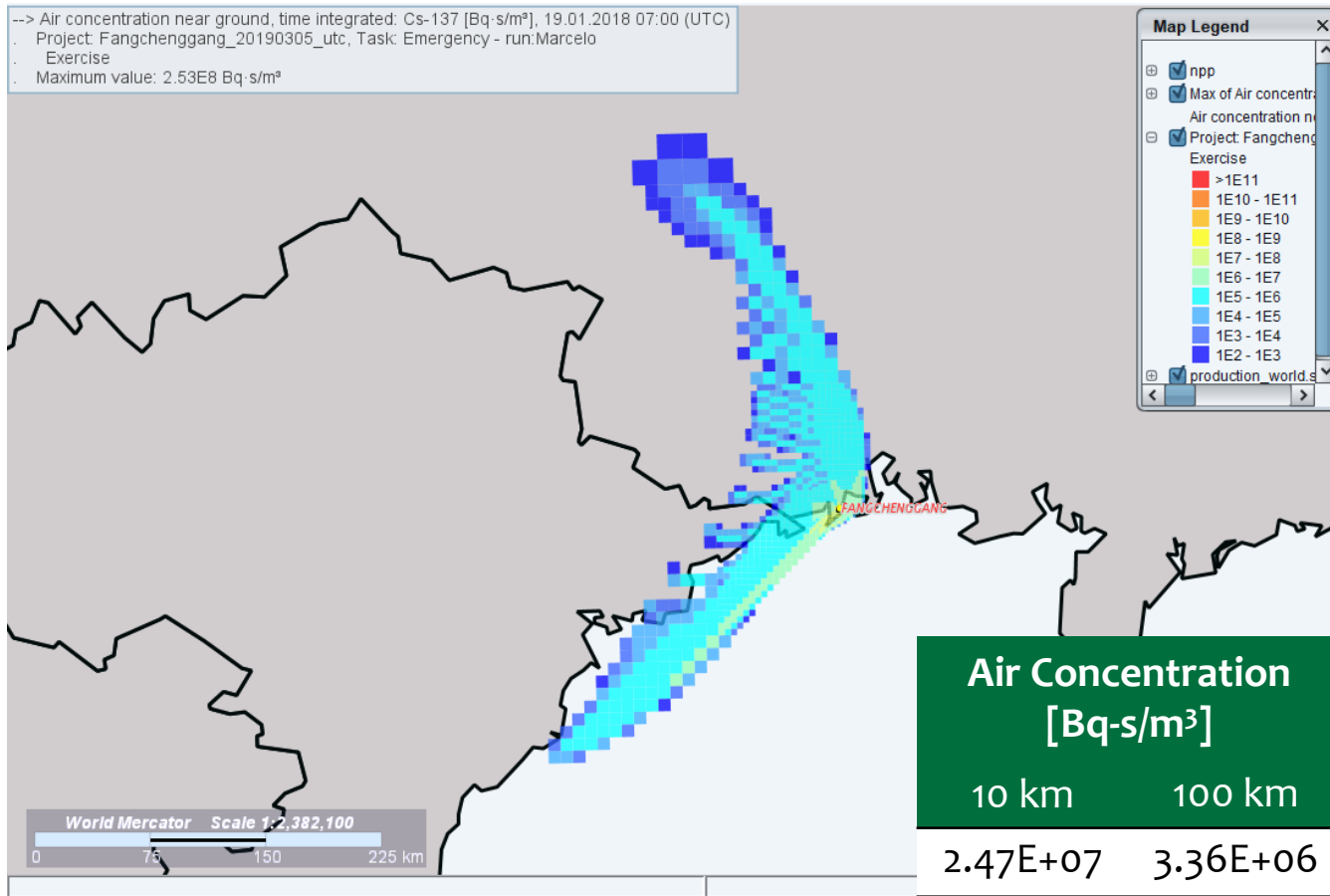
Results –Air Concentration (I-131; 1 day)

NPP2 (Jan 18)



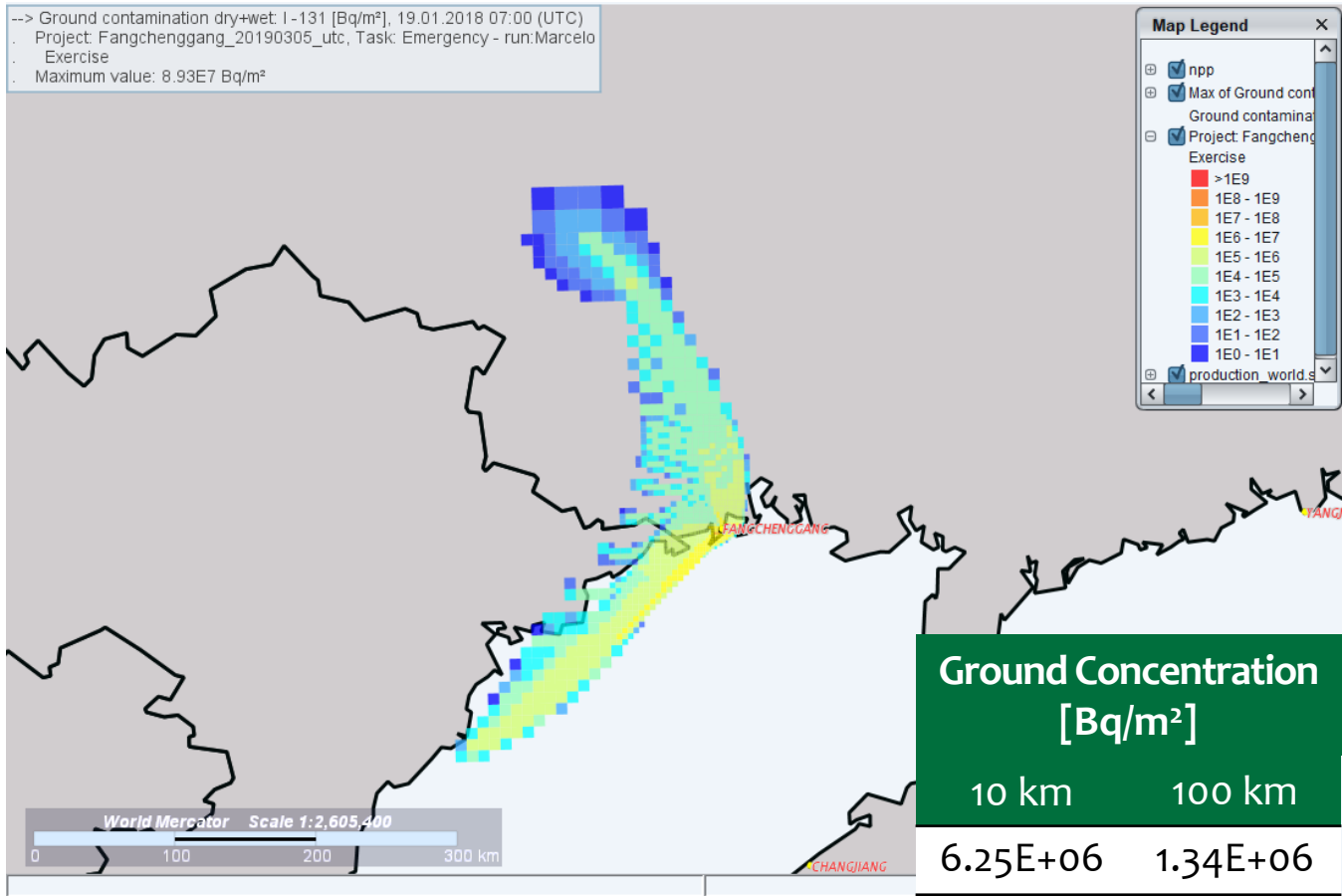
Results –Air Concentration (Cs-137; 1 day)

NPP2 (Jan 18)



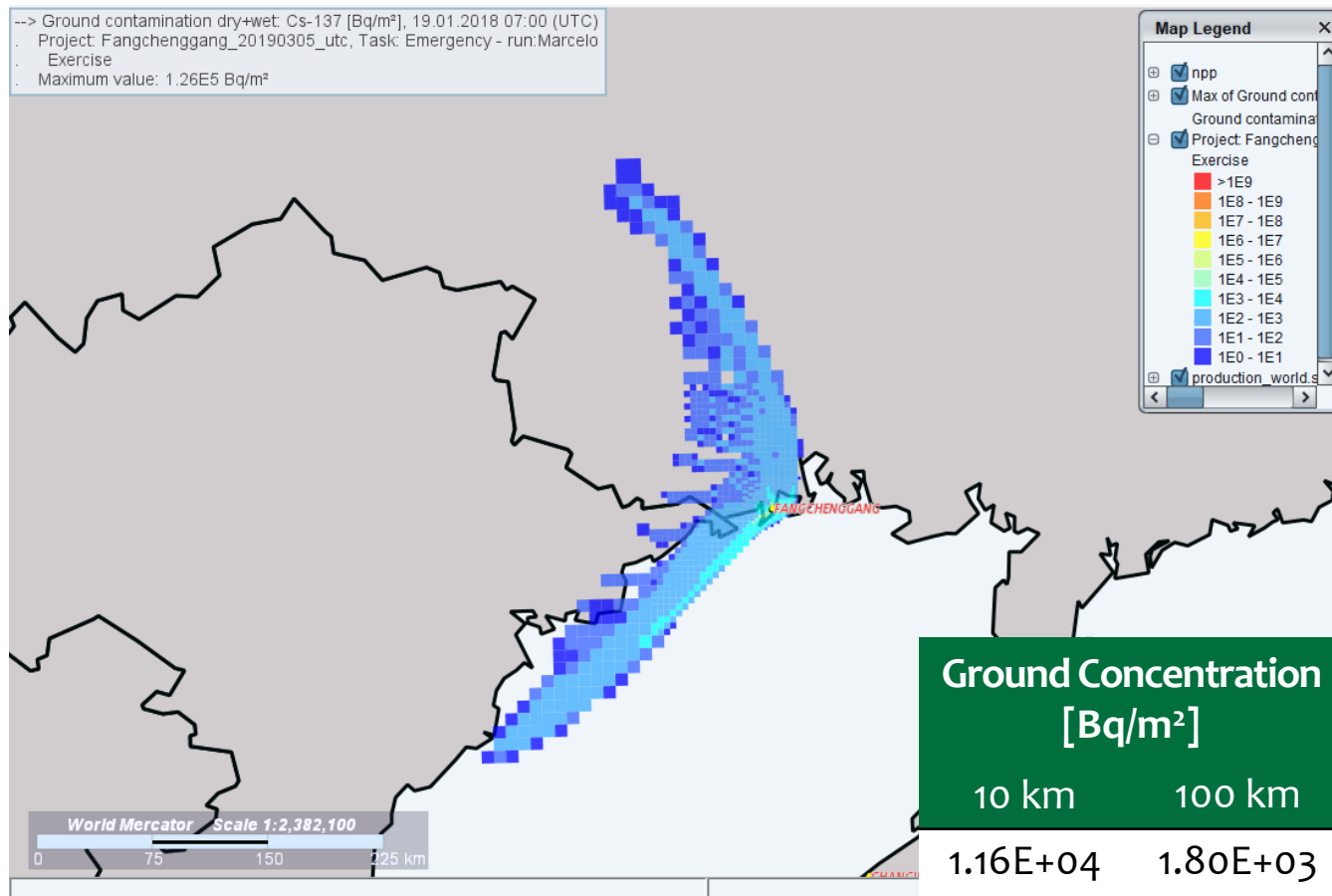
Results – Ground Concentration (I-131; 1 day)

NPP2 (Jan 18)



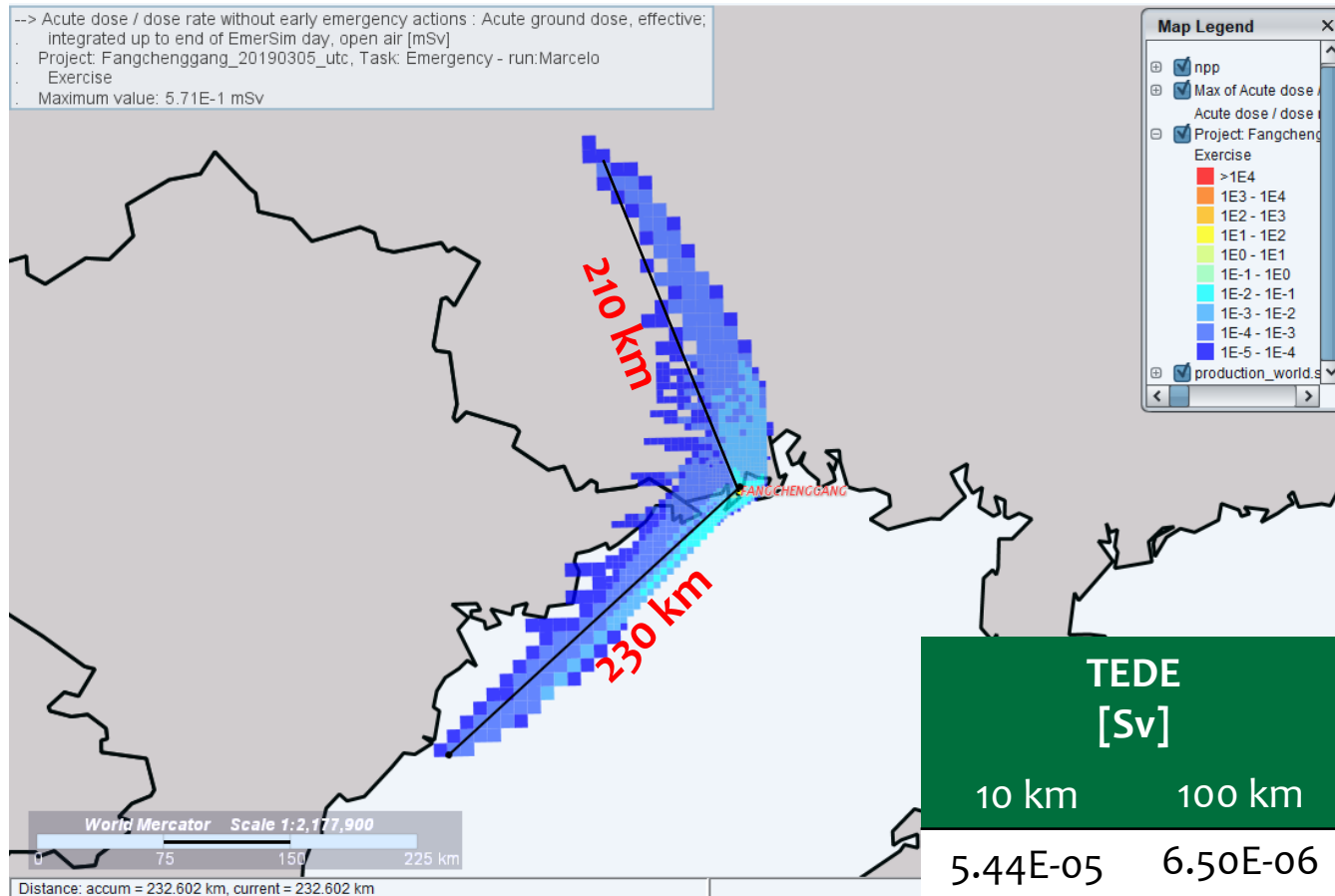
Results – Ground Concentration (Cs-137; 1 day)

NPP2 (Jan 18)



Results – TEDE (1 day)

NPP2 (Jan 18)



Conditions

NPP2 (Nov 24)

- Release characteristics
 - Location: 21°40'15"N, 108°33'30"E
 - Release amount
 - I-131: 1×10^{16} Bq (short-term consequences)
 - Cs-137: 6×10^{13} Bq (long-term consequences)
 - Release starting time: November 24, 2018 at 16:00 (UTC)
 - Release period: 26 hours
 - Release height: 10 meters
 - Heat content: 500 kW
- Weather data specification
 - Coverage: 6.5-32.0°N, 95.5-122.5°E
 - Resolution: 0.5° x 0.5°
 - Nesting scheme: Not specified

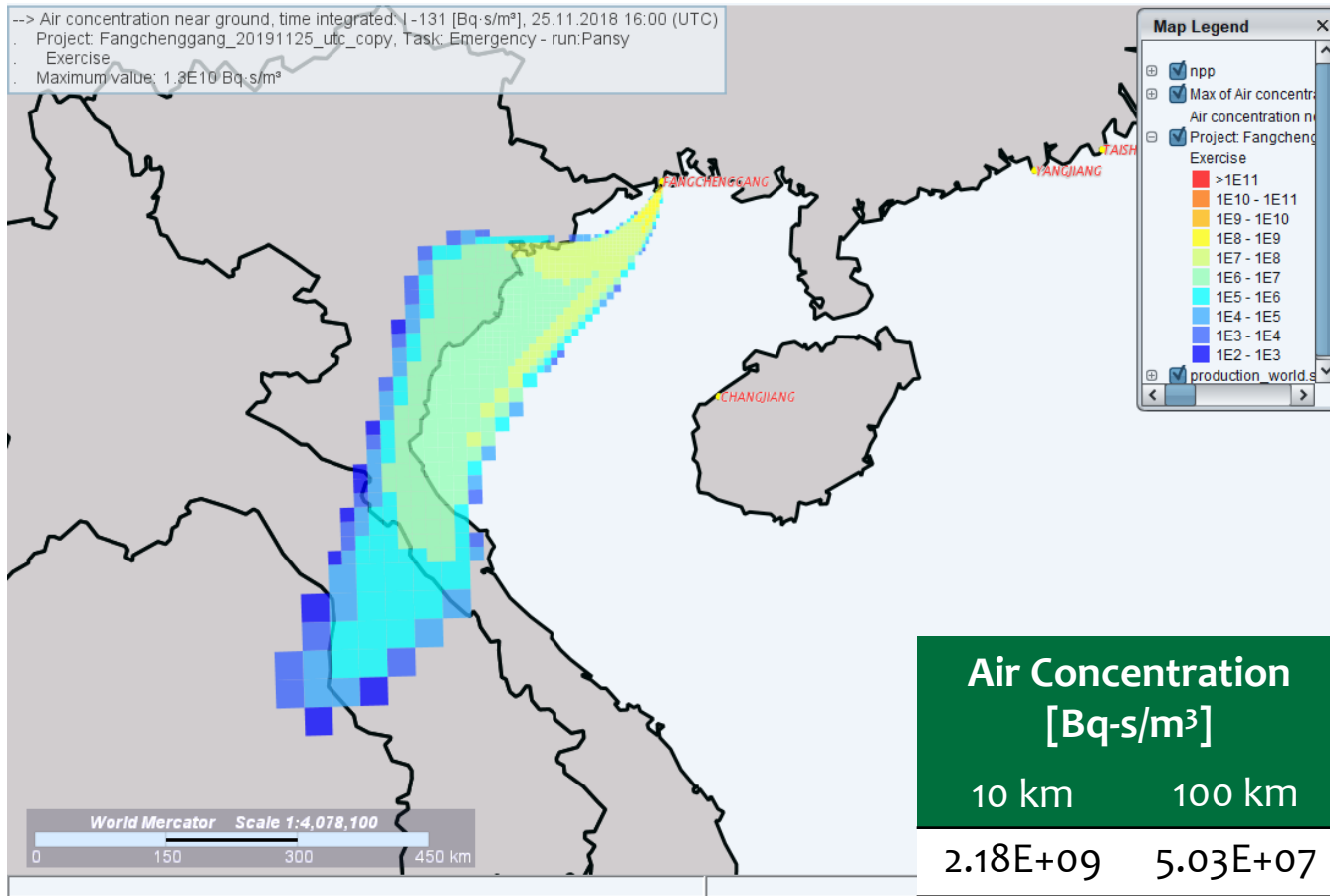
Conditions

NPP2 (Nov 24)

- Results to be compared
 - Distribution maps of the following values at **1 day** from the release starting time
 - **(Time-integrated)** air concentration (Bq/m^3)
 - **(Time-integrated)** ground concentration (Bq/m^2)
 - Time-integrated exposure dose in terms of TEDE (μSv)
 - **1-day** TEDE exposure extent (*defined as the furthest distance to which the specified TEDE is extended to*) for $1 \mu\text{Sv}$
 - **Maximum** air concentration (Bq/m^3), ground concentration (Bq/m^2), exposure dose in terms of TEDE (μSv) at **1 day** from the release starting time at **10 / 100 km**

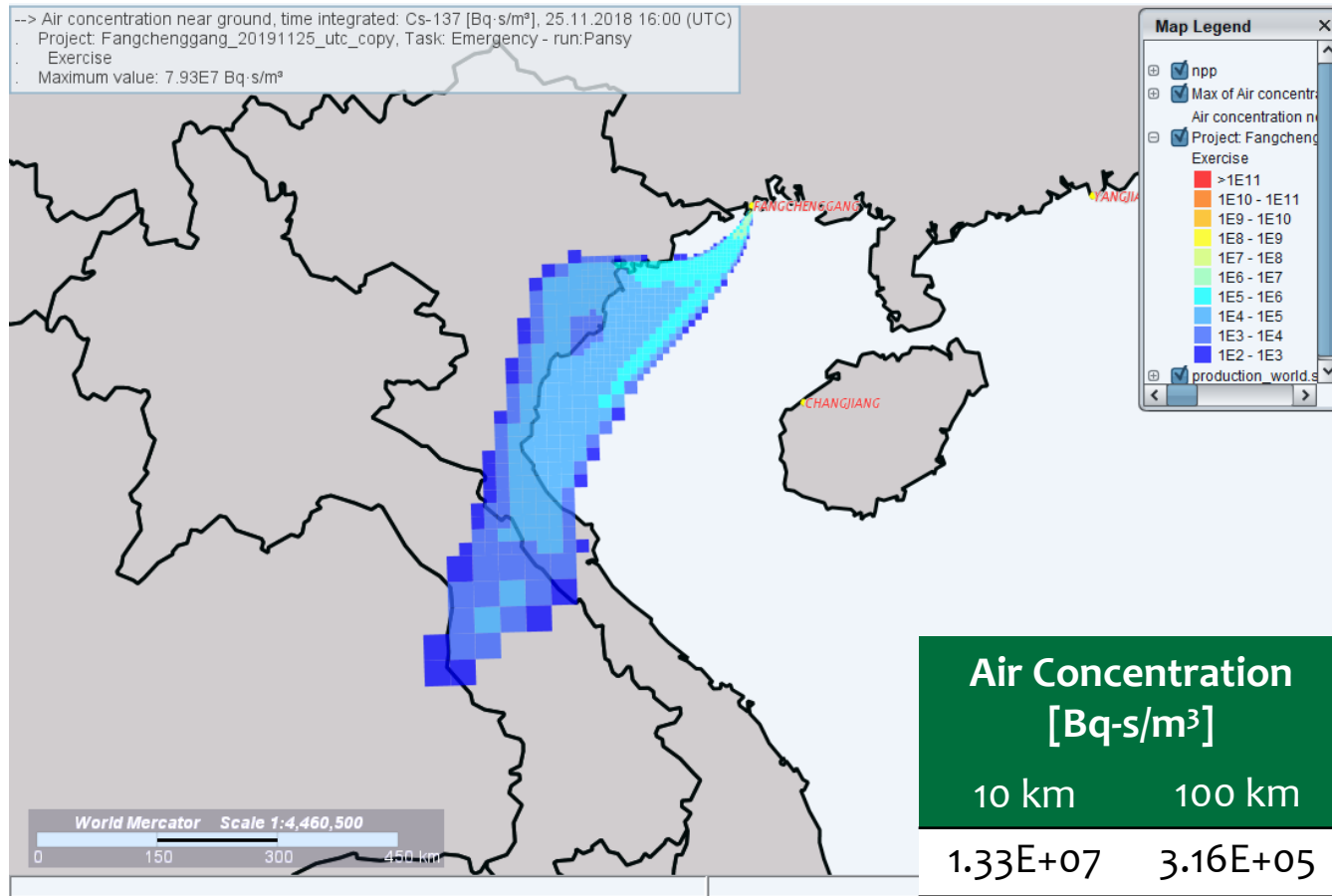
Results – Air Concentration (I-131; 1 day)

NPP2 (Nov 24)



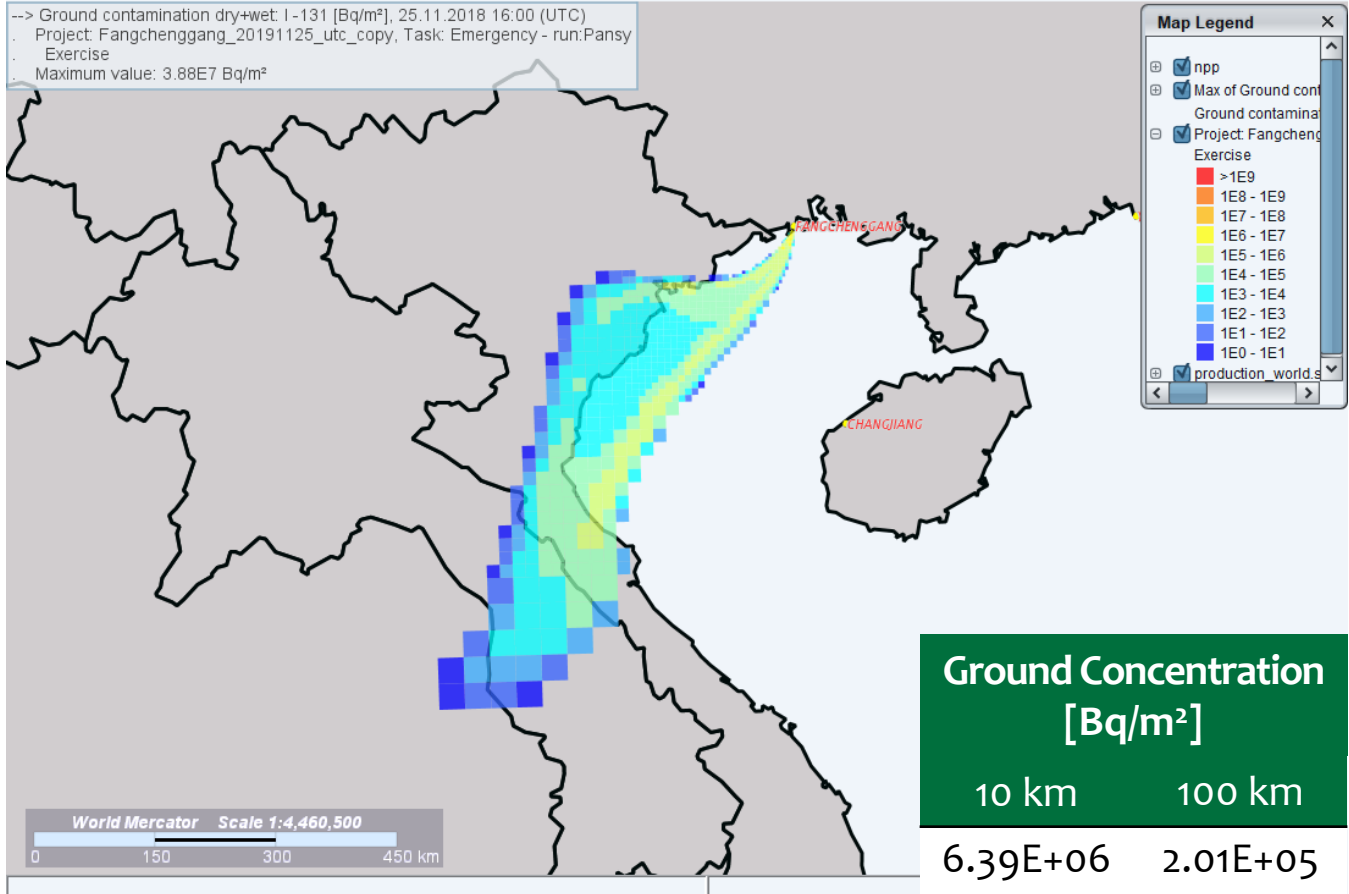
Results – Air Concentration (Cs-137; 1 day)

NPP2 (Nov 24)



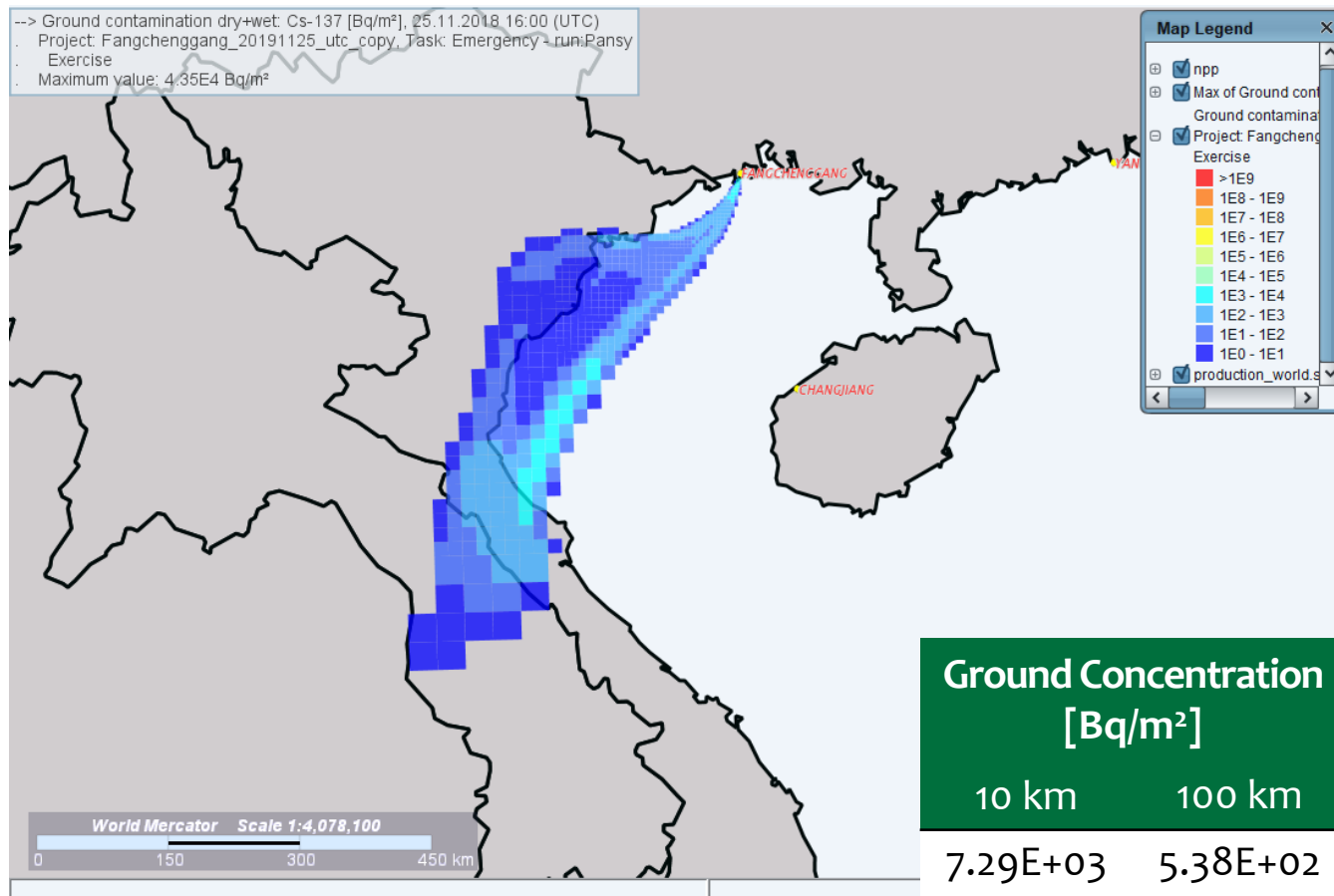
Results – Ground Concentration (I-131; 1 day)

NPP2 (Nov 24)



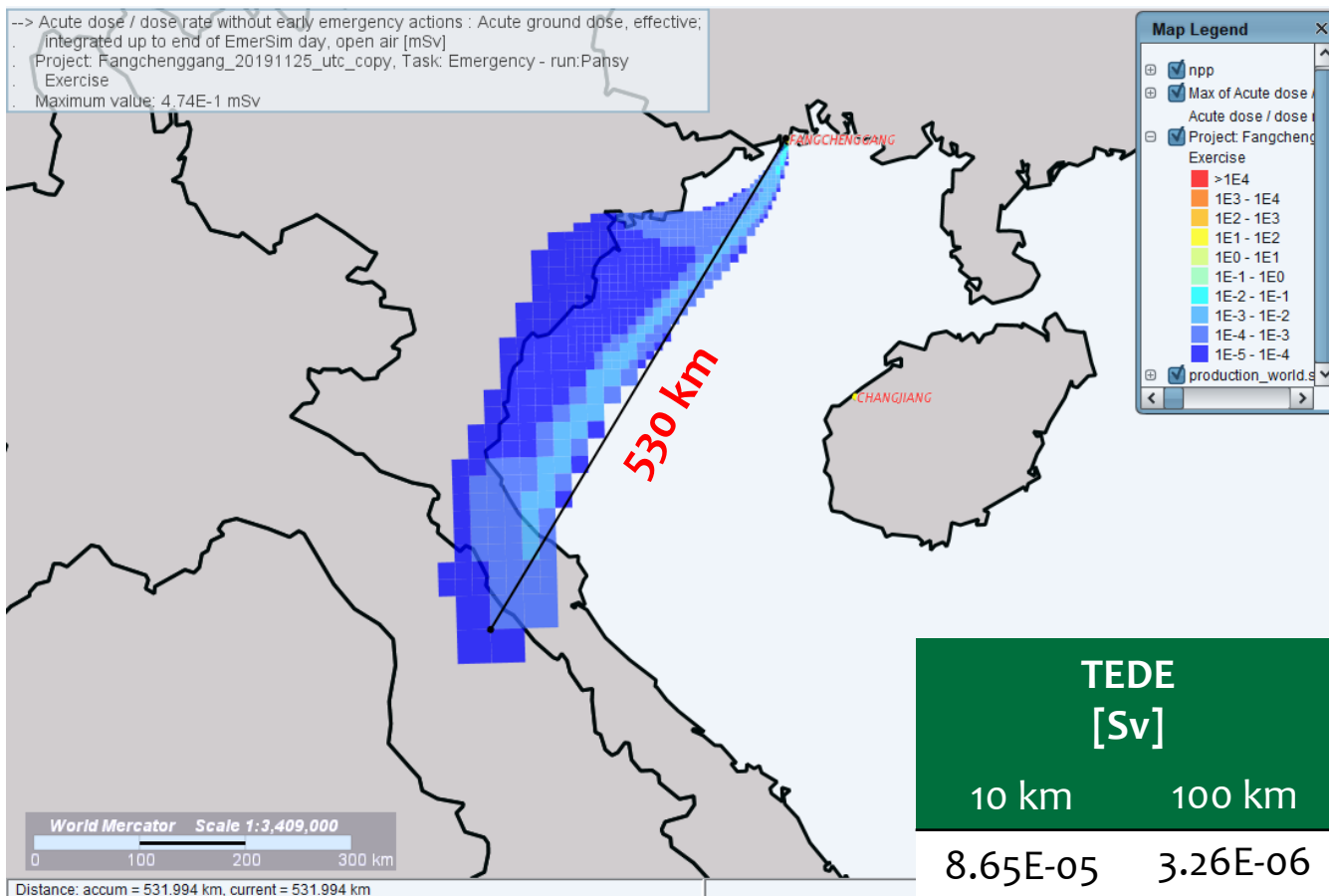
Results – Ground Concentration (Cs-137; 1 day)

NPP2 (Nov 24)



Results – TEDE (1 day)

NPP2 (Nov 24)



Conditions

NPP1(Jan 30)

- Release characteristics
 - Location: 11°24'48"N, 108°58'29"E
 - Release amount
 - I-131: 1×10^{16} Bq (short-term consequences)
 - Cs-137: 6×10^{13} Bq (long-term consequences)
 - Release starting time: January 30, 2018 at 16:00 (UTC)
 - Release period: 26 hours
 - Release height: 10 meters
 - Heat content: 500 kW
- Weather data specification
 - Coverage: 6.5-32.0°N, 95.5-122.5°E
 - Resolution: 0.5° x 0.5°
 - Nesting scheme: Not specified

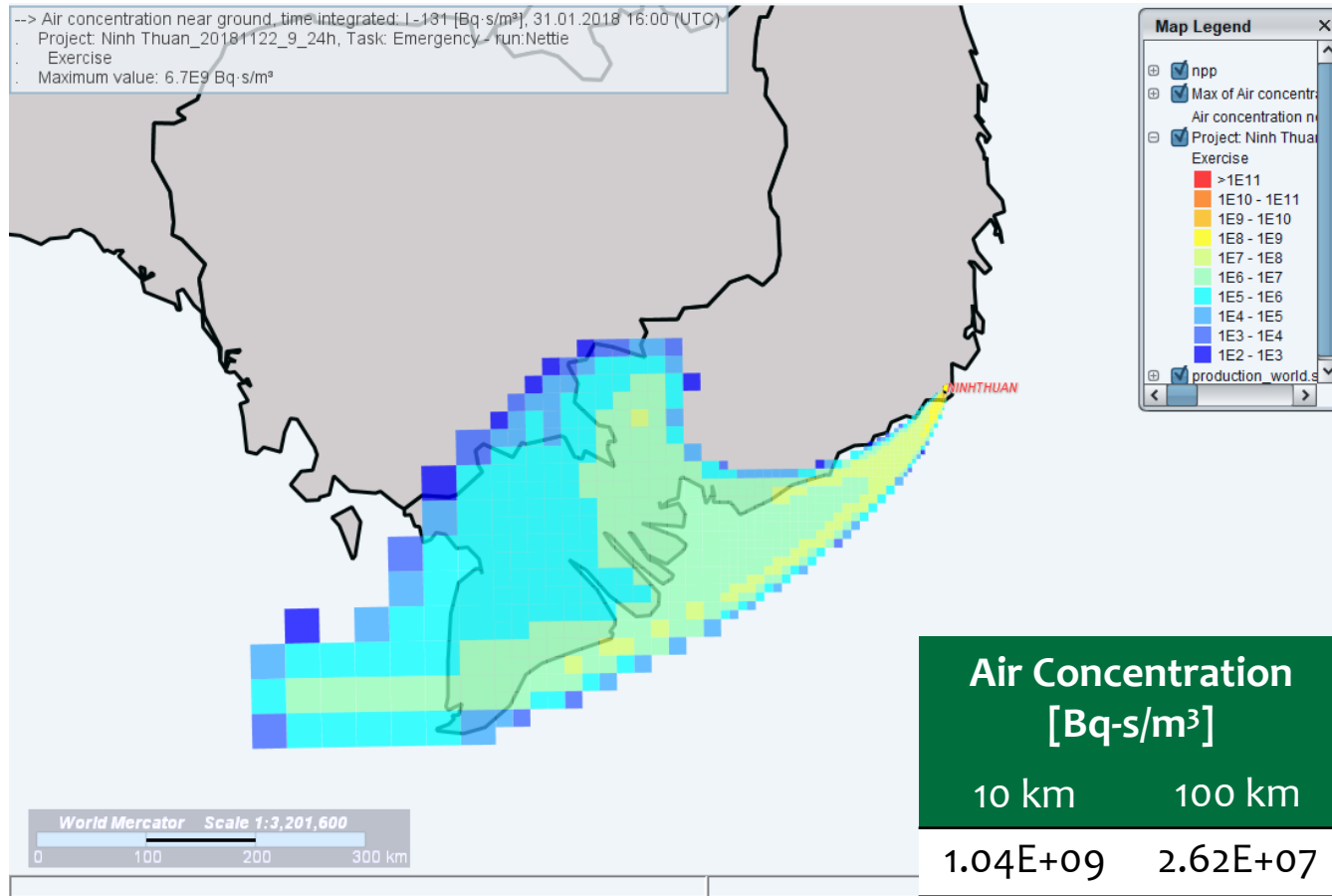
Conditions

NPP1(Jan 30)

- Results to be compared
 - Distribution maps of the following values at **1 day** from the release starting time
 - **(Time-integrated)** air concentration (Bq/m^3)
 - **(Time-integrated)** ground concentration (Bq/m^2)
 - Time-integrated exposure dose in terms of TEDE (μSv)
 - **1-day** TEDE exposure extent (*defined as the furthest distance to which the specified TEDE is extended to*) for $1 \mu\text{Sv}$
 - **Maximum** air concentration (Bq/m^3), ground concentration (Bq/m^2), exposure dose in terms of TEDE (μSv) at **1 day** from the release starting time at **10 / 100 km**

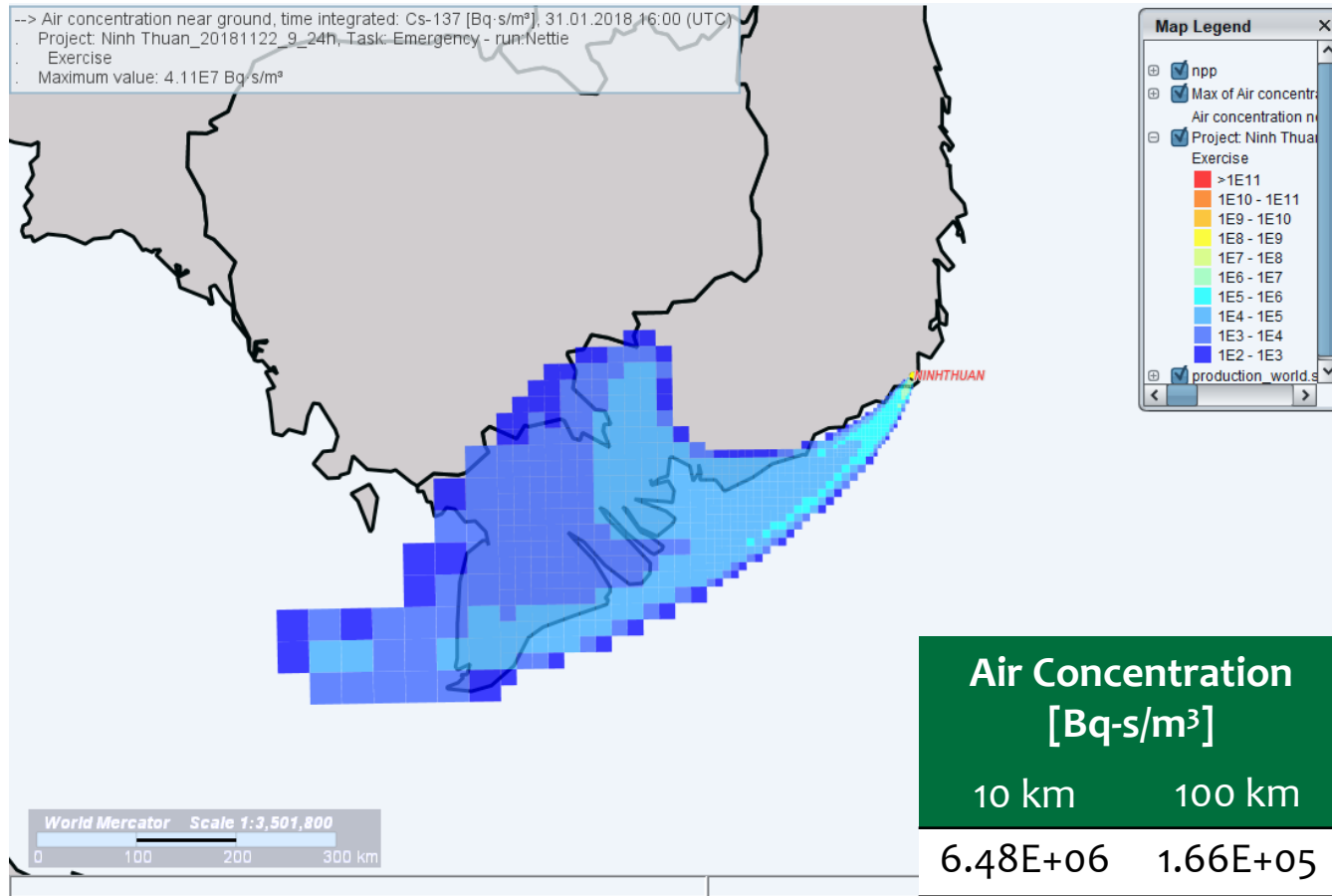
Results – Air Concentration (I-131; 1 day)

NPP1(Jan 30)



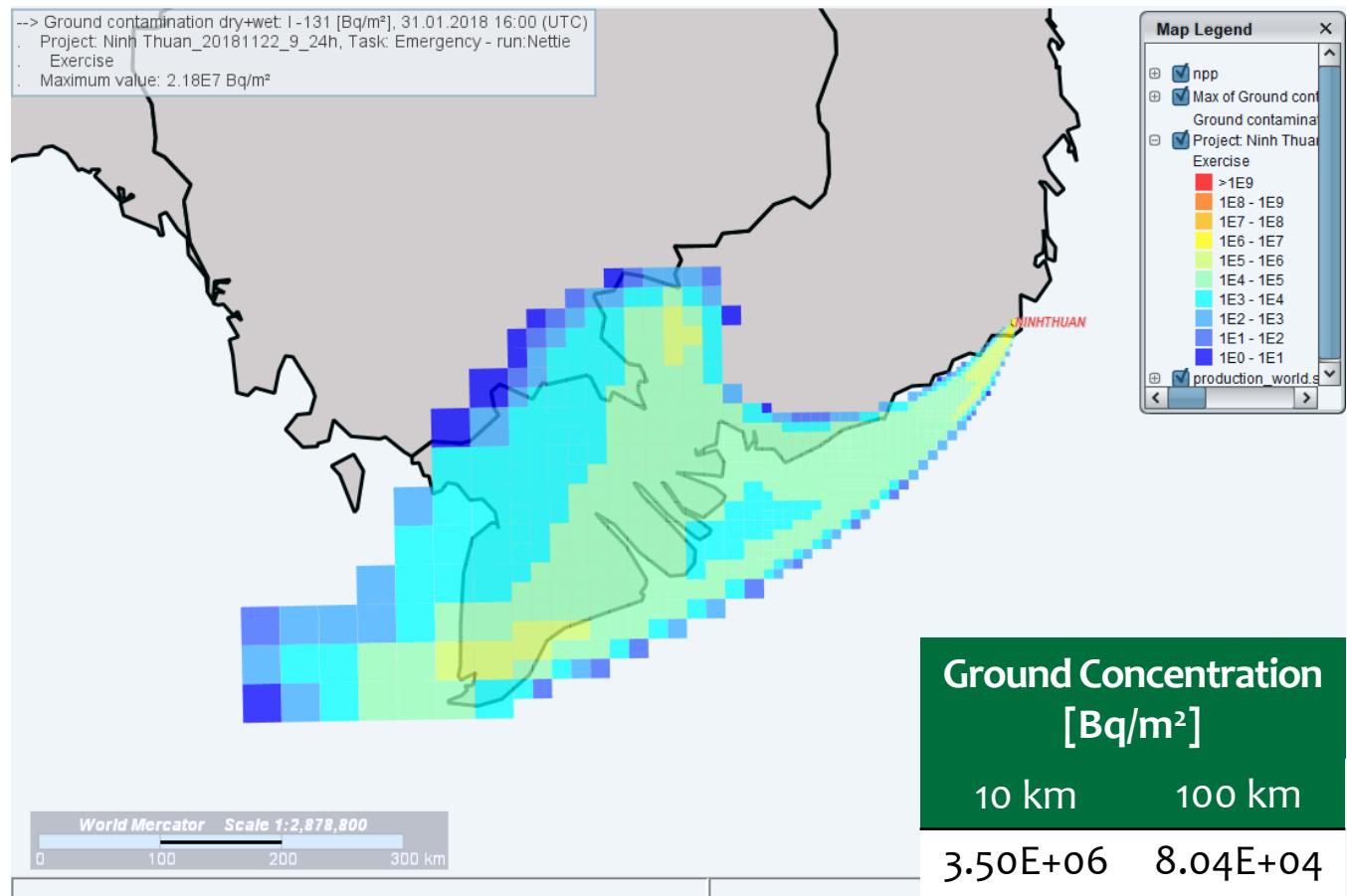
Results – Air Concentration (Cs-137; 1 day)

NPP1(Jan 30)



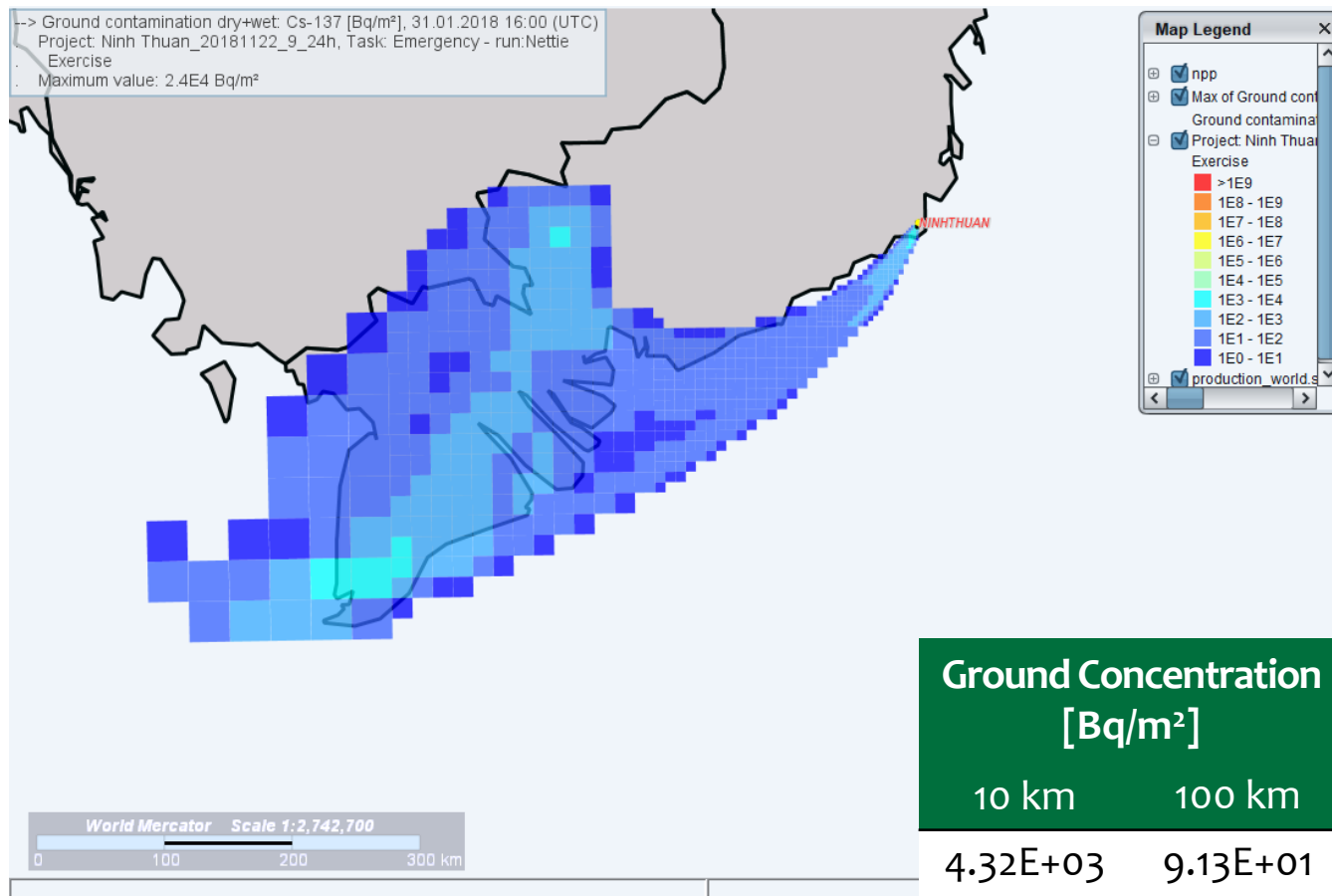
Results – Ground Concentration (I-131; 1 day)

NPP1(Jan 30)



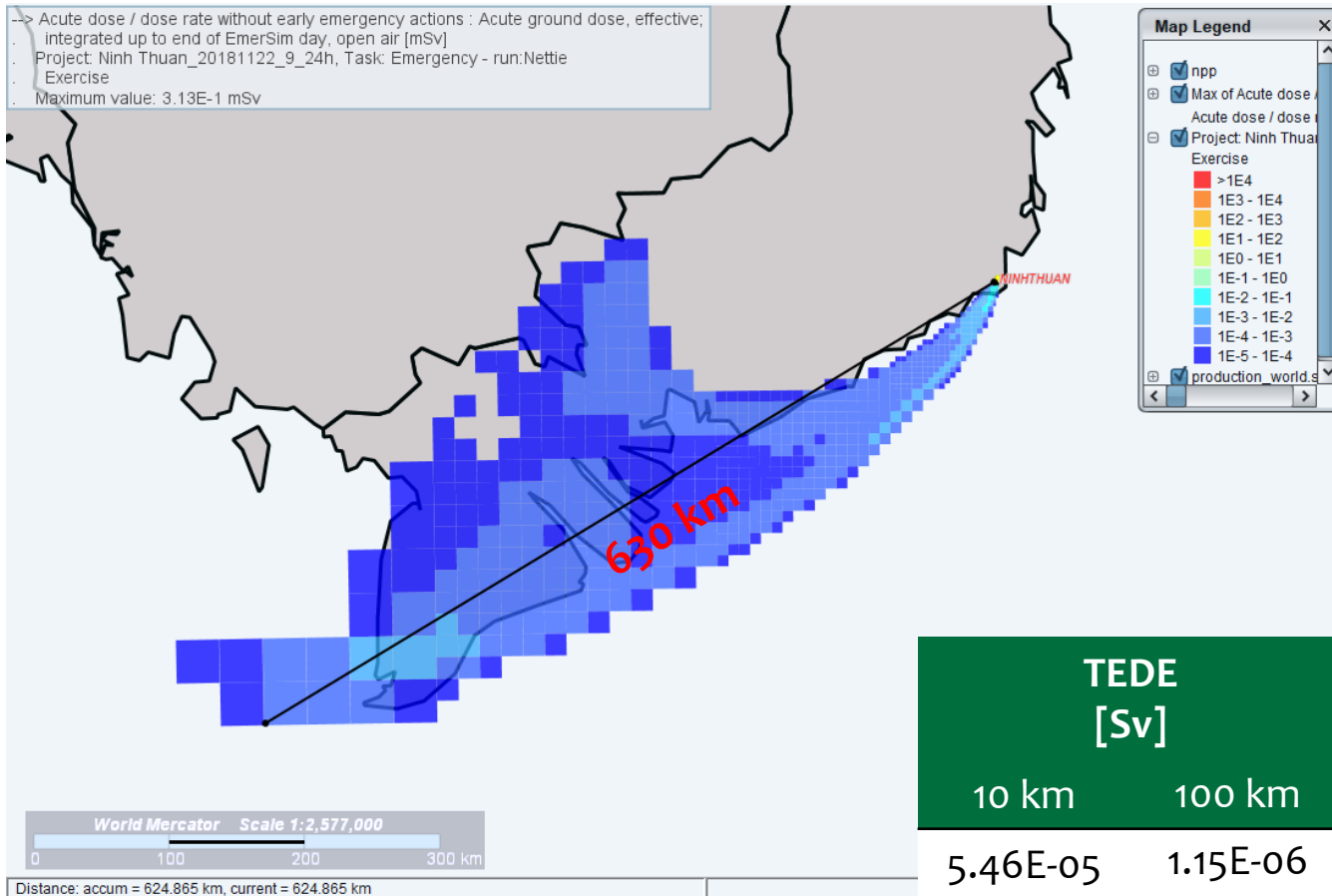
Results – Ground Concentration (Cs-137; 1 day)

NPP1(Jan 30)



Results – TEDE (1 day)

NPP1(Jan 30)



Comparison



Results – Comparison

NPP2 (Jan 18)

Items	JRODOS		ARGOS	
	10 km	100 km	10 km	100 km
Air concentration (I-131) [Bq-s/m ³]	3.90E+09	4.83E+08	2.13E+09	1.12E+08
Air concentration (CS-137) [Bq-s/m ³]	2.47E+07	3.36E+06	1.27E+07	6.53E+05
Ground concentration (I-131) [Bq/m ²]	6.25E+06	1.34E+06	1.08E+06	5.83E+04
Ground concentration (Cs-137) [Bq/m ²]	1.16E+04	1.80E+03	6.59E+03	3.47E+02
TEDE [Sv]	5.44E-05	6.50E-06	8.69E-03	6.08E-04

Results – Comparison

NPP2 (Jan 18)

Items	JRODOS		ARGOS	
	10 km	100 km	10 km	100 km
Air concentration (I-131)	1.00	1.00	0.55	0.23
Air concentration (CS-137)	1.00	1.00	0.51	0.19
Ground concentration (I-131)	1.00	1.00	0.17	0.04
Ground concentration (Cs-137)	1.00	1.00	0.57	0.19
TEDE	1.00	1.00	159.74	93.54

Results – Comparison

NPP2 (Nov 24)

Items	JRODOS		ARGOS	
	10 km	100 km	10 km	100 km
Air concentration (I-131) [Bq-s/m ³]	2.18E+09	5.03E+07	1.75E+09	3.34E+07
Air concentration (CS-137) [Bq-s/m ³]	1.33E+07	3.16E+05	1.04E+07	2.00E+05
Ground concentration (I-131) [Bq/m ²]	6.39E+06	2.01E+05	9.45E+05	1.82E+04
Ground concentration (Cs-137) [Bq/m ²]	7.29E+03	5.38E+02	5.83E+03	1.12E+02
TEDE [Sv]	8.65E-05	3.26E-06	1.77E-05	3.71E-07

Results – Comparison

NPP2 (Nov 24)

Items	JRODOS		ARGOS	
	10 km	100 km	10 km	100 km
Air concentration (I-131)	1.00	1.00	0.80	0.66
Air concentration (CS-137)	1.00	1.00	0.78	0.63
Ground concentration (I-131)	1.00	1.00	0.15	0.09
Ground concentration (Cs-137)	1.00	1.00	0.80	0.21
TEDE	1.00	1.00	0.20	0.11

Results – Comparison

NPP1(Jan 30)

Items	JRODOS		ARGOS	
	10 km	100 km	10 km	100 km
Air concentration (I-131) [Bq-s/m ³]	1.04E+09	2.62E+07	1.33E+09	2.89E+07
Air concentration (CS-137) [Bq-s/m ³]	6.48E+06	1.66E+05	7.97E+06	1.73E+05
Ground concentration (I-131) [Bq/m ²]	3.50E+06	8.04E+04	6.87E+05	1.49E+04
Ground concentration (Cs-137) [Bq/m ²]	4.32E+03	9.13E+01	4.35E+03	9.46E+01
TEDE [Sv]	5.46E-05	1.15E-06	6.76E-03	1.46E-04

Results – Comparison

NPP1(Jan 30)

Items	JRODOS		ARGOS	
	10 km	100 km	10 km	100 km
Air concentration (I-131)	1.00	1.00	1.28	1.10
Air concentration (CS-137)	1.00	1.00	1.23	1.04
Ground concentration (I-131)	1.00	1.00	0.20	0.19
Ground concentration (Cs-137)	1.00	1.00	1.01	1.04
TEDE	1.00	1.00	123.81	126.96

30

NACAC



Conditions

Constant Wind

- Release characteristics
 - Location: Not specified
 - Release amount
 - Cs-137: 1×10^{17} Bq
 - Release period: 24 hours
 - Release height: 0 (10) meters
 - Heat content: 0 kW
 - Weather data specification
 - Wind direction: West
 - Wind speed: See next page
 - Stability class: See next page
 - Rain: 0 mm/h
 - Mixing height: 1 / 3 km
 - Terrain: flat
 - Results to be compared
 - Cloud shine dose
 - 24 hour after release
 - Ground shine dose
 - 1 year after release
 - Inhalation dose
 - 50 years after release
- At 50, 100, 250, 500 km to the west

Conditions

Constant Wind (Bounding Case)

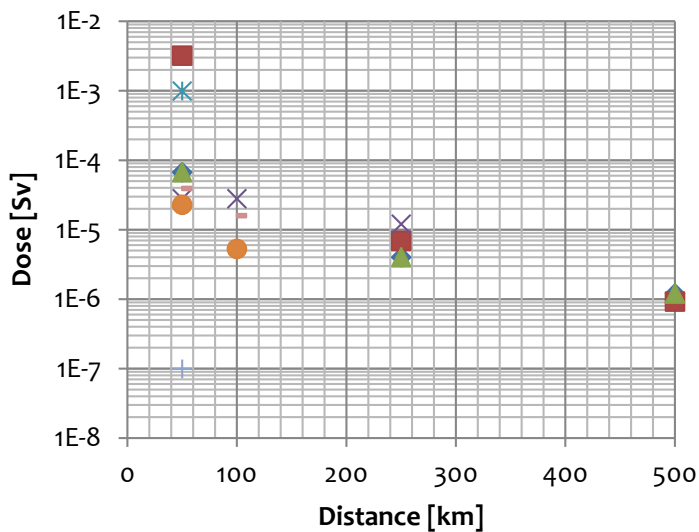
Case	Wind Direction	Wind Speed [m/s]	Weather Stability Class	Mixing Height [m]	Release (Starting) Time	Cloud Cover	Release Period [h]
A1	W	1	A	1600	Day	Clear	24
A2	W	1	F	200	Night	Clear	24
A3	W	1	A	1600	Day	Clear	8
B1	W	4	D	560	Night	Cloudy	24
B2	W	4	C	800	Day	Cloudy	24
B3	W	4	D	560	Night	Cloudy	8
C1	W	2	F	200	Night	Moderate	24
C2	W	2	B	1200	Day	Moderate	24
C3	W	2	F	200	Night	Moderate	8

Results – Cloud Shine

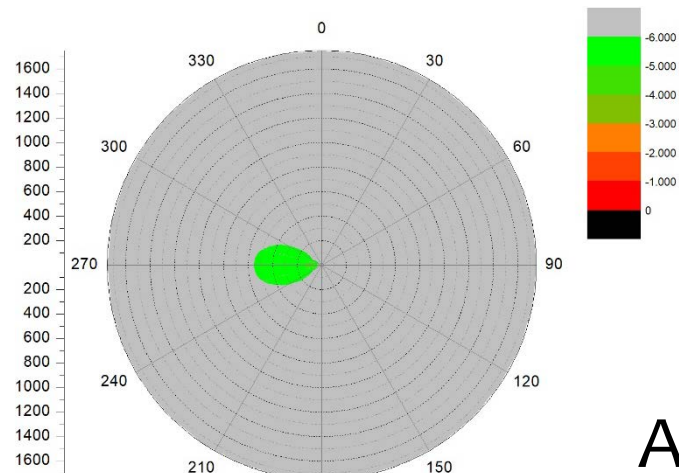
Constant Wind – Case A

Case	Wind Direction	Wind Speed [m/s]	Weather Stability Class	Time of Release	Cloud Cover
A	W	1	A/F	Day/Night	Clear

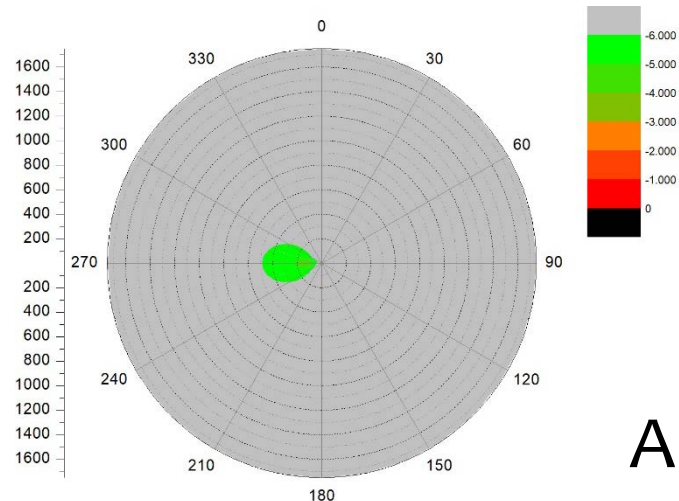
Cloud Shine (1 m/s; Clear)



- ◆ NACAC-A1 ■ NACAC-A2 ▲ NACAC-A3 × ARGOS-A1
- ✱ ARGOS-A3 ● JRODOS-A1 + JRODOS-A2 - JRODOS-A3



A1



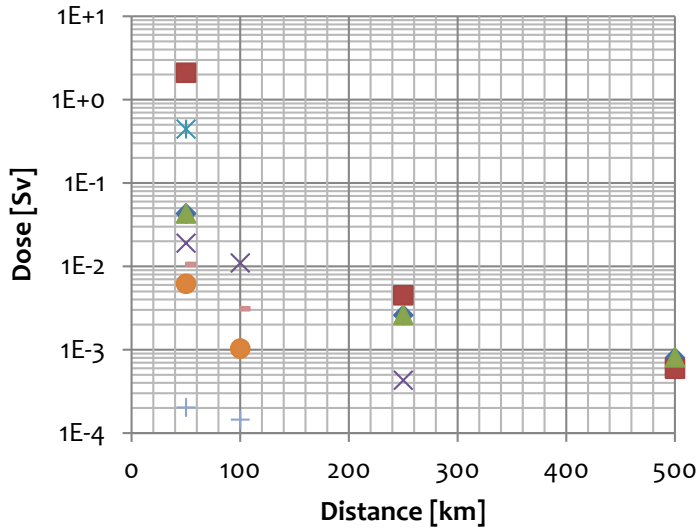
A2

Results – Ground Shine

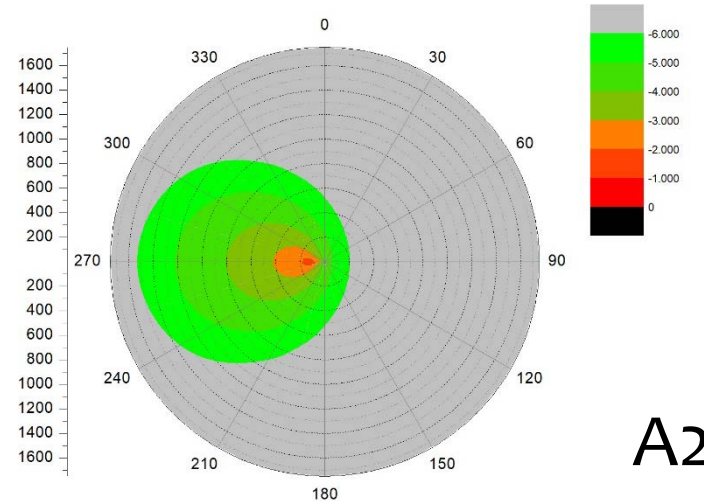
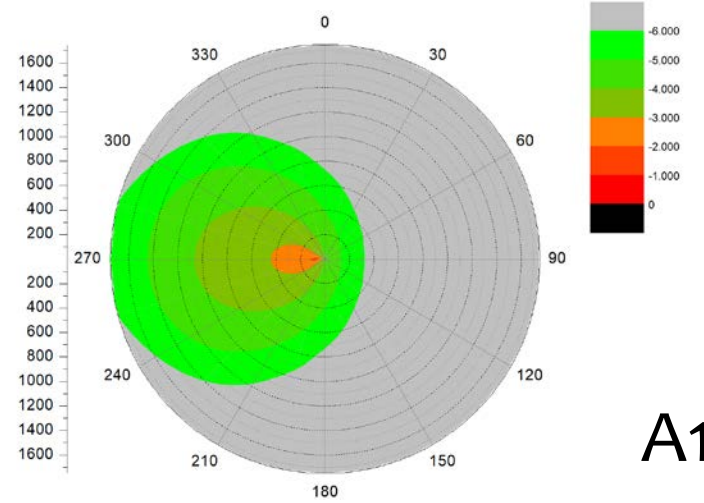
Constant Wind – Case A

Case	Wind Direction	Wind Speed [m/s]	Weather Stability Class	Time of Release	Cloud Cover
A	W	1	A/F	Day/Night	Clear

Ground Shine (1 m/s; Clear)



- ◆ NACAC-A1 ■ NACAC-A2 ▲ NACAC-A3 × ARGOS-A1
- × ARGOS-A3 ● JRODOS-A1 + JRODOS-A2 - JRODOS-A3

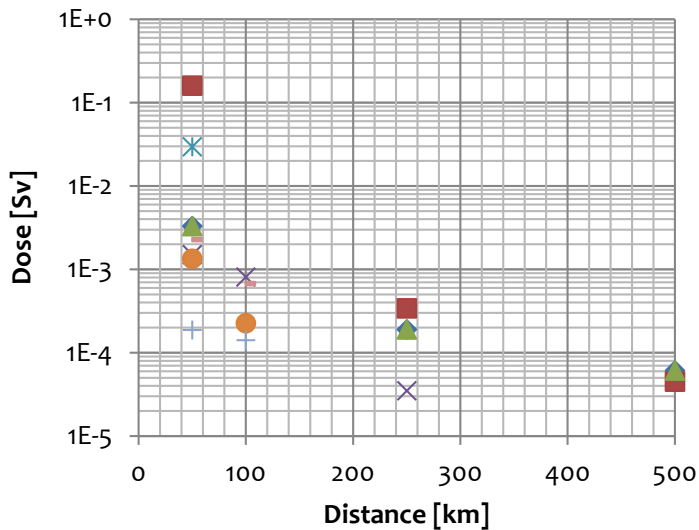


Results – Inhalation

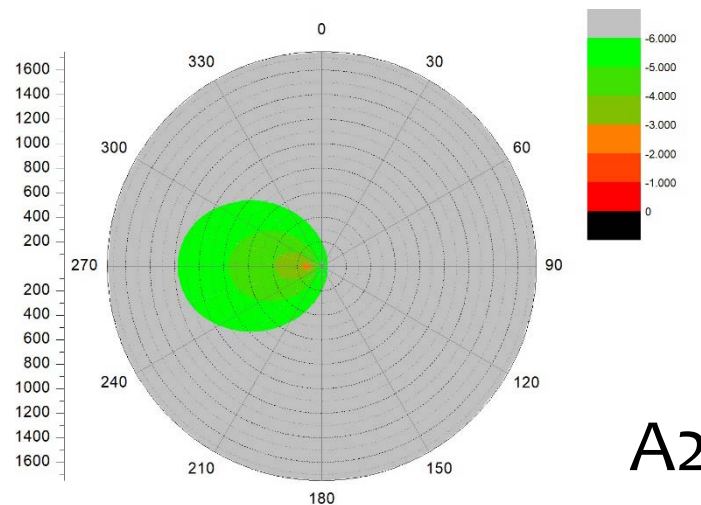
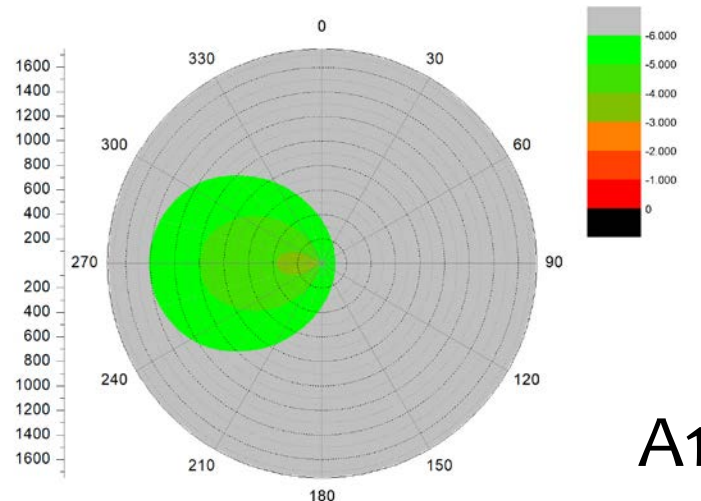
Constant Wind – Case A

Case	Wind Direction	Wind Speed [m/s]	Weather Stability Class	Time of Release	Cloud Cover
A	W	1	A/F	Day/Night	Clear

Inhalation (1 m/s; Clear)



- ◆ NACAC-A1 ■ NACAC-A2 ▲ NACAC-A3 × ARGOS-A1
- ✕ ARGOS-A3 ● JRODOS-A1 + JRODOS-A2 - JRODOS-A3

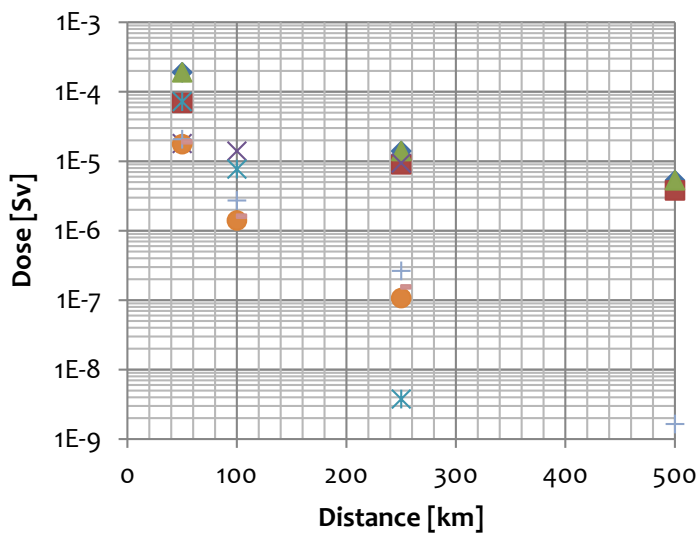


Results – Cloud Shine

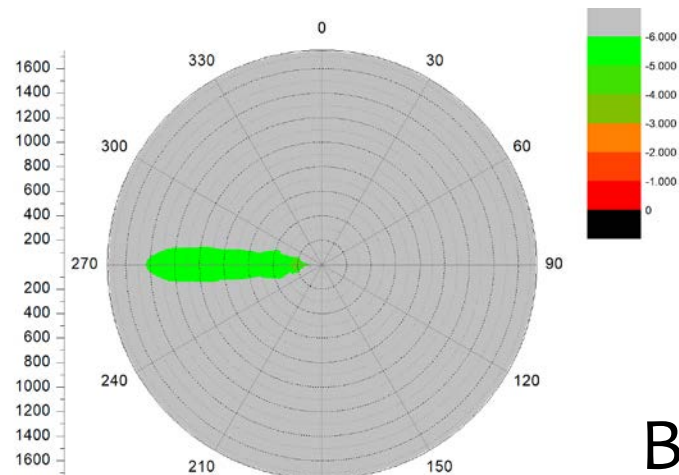
Constant Wind – Case B

Case	Wind Direction	Wind Speed [m/s]	Weather Stability Class	Time of Release	Cloud Cover
B	W	4	D/C	Night/Day	Cloudy

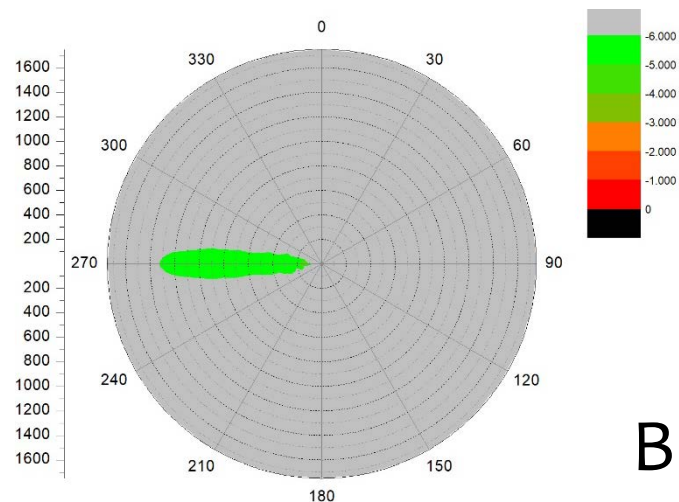
Cloud Shine (4 m/s; Cloudy)



- ◆ NACAC-B1 ■ NACAC-B2 ▲ NACAC-B3 ✕ ARGOS-B1
- ✕ ARGOS-B3 ● JRODOS-B1 + JRODOS-B2 - JRODOS-B3



B1



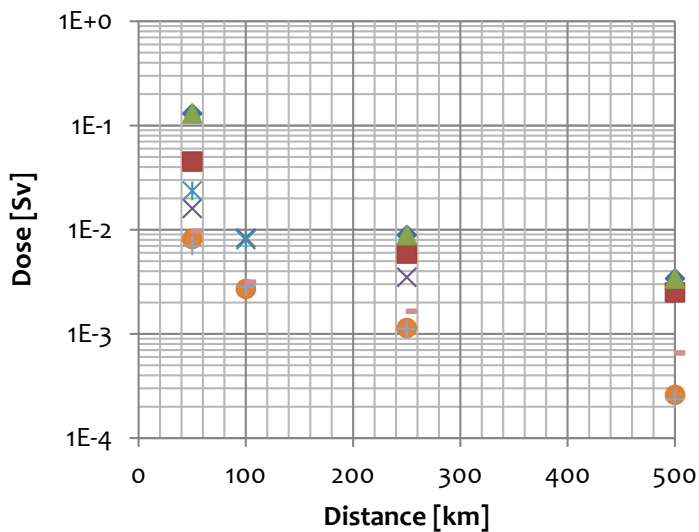
B2

Results – Ground Shine

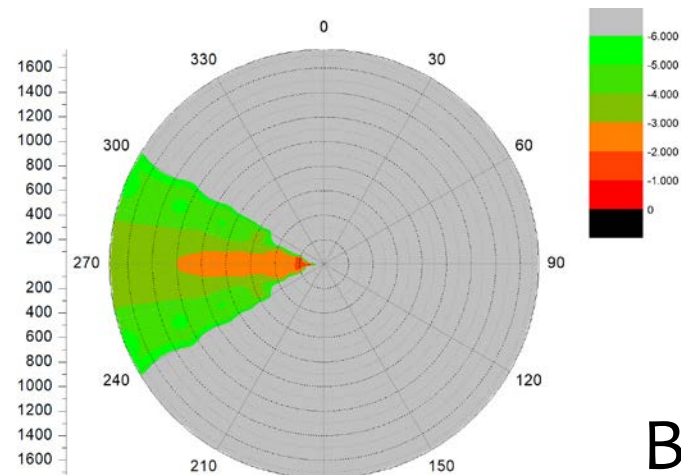
Constant Wind – Case B

Case	Wind Direction	Wind Speed [m/s]	Weather Stability Class	Time of Release	Cloud Cover
B	W	4	D/C	Night/Day	Cloudy

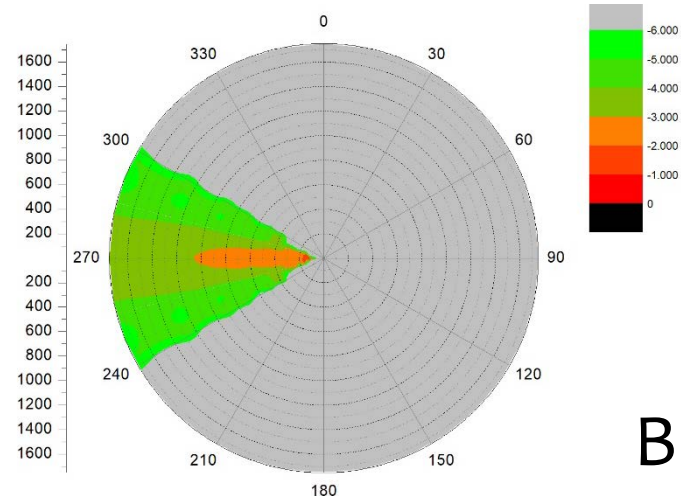
Ground Shine (4 m/s; Cloudy)



- ◆ NACAC-B1 ■ NACAC-B2 ▲ NACAC-B3 × ARGOS-B1
- ✱ ARGOS-B3 ● JRODOS-B1 + JRODOS-B2 - JRODOS-B3



B1



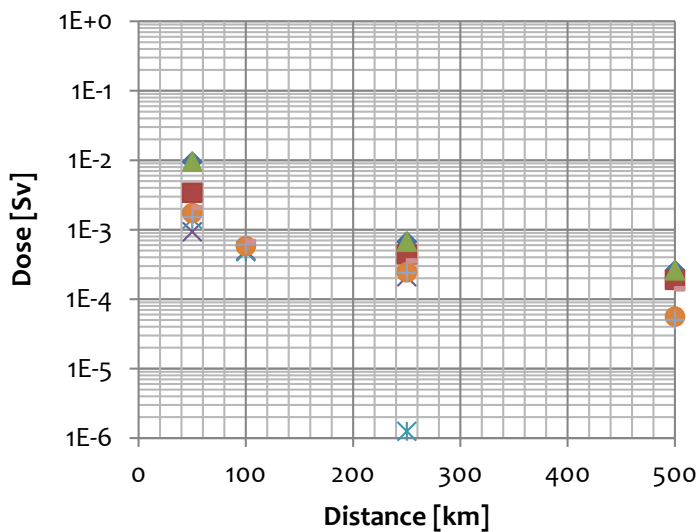
B2

Results – Inhalation

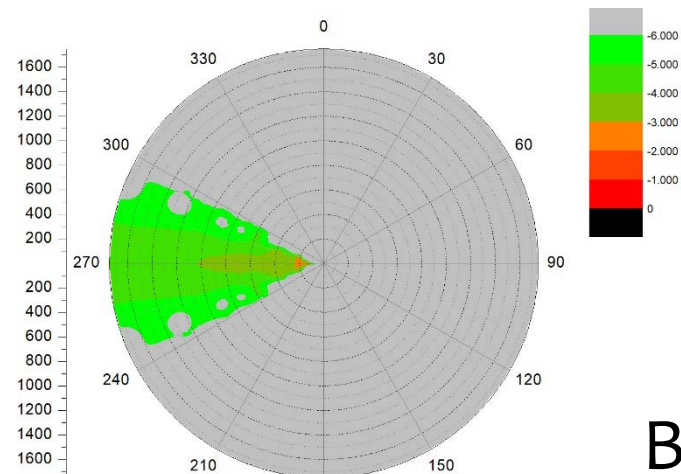
Constant Wind – Case B

Case	Wind Direction	Wind Speed [m/s]	Weather Stability Class	Time of Release	Cloud Cover
B	W	4	D/C	Night/Day	Cloudy

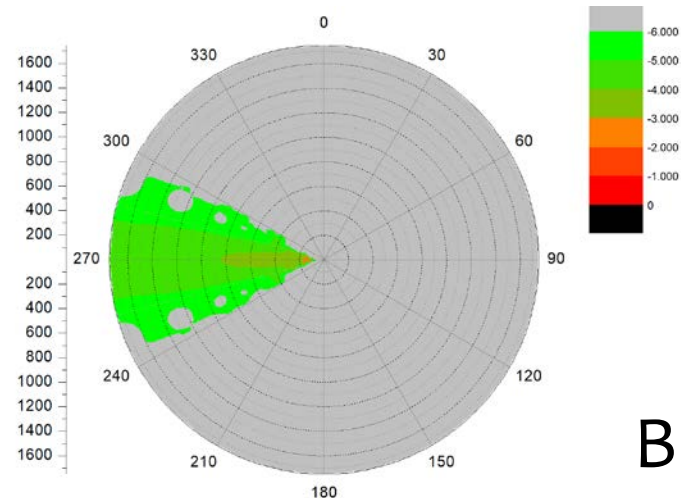
Inhalation (4 m/s; Cloudy)



- ◆ NACAC-B1 ■ NACAC-B2 ▲ NACAC-B3 ✕ ARGOS-B1
- ✕ ARGOS-B3 ● JRODOS-B1 + JRODOS-B2 - JRODOS-B3



B1



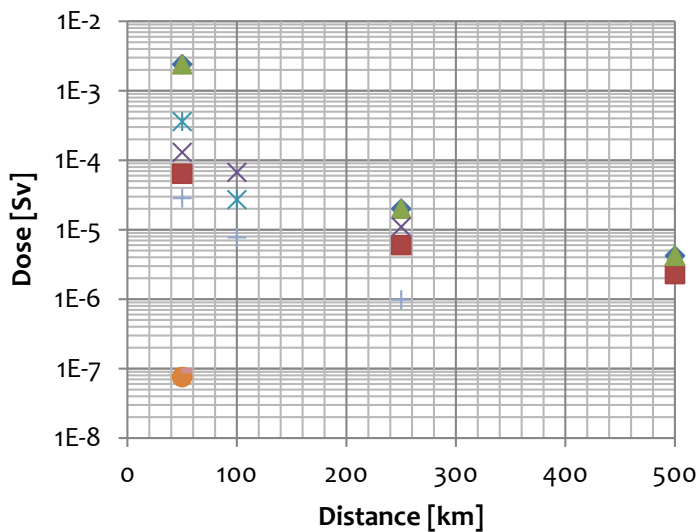
B2

Results – Cloud Shine

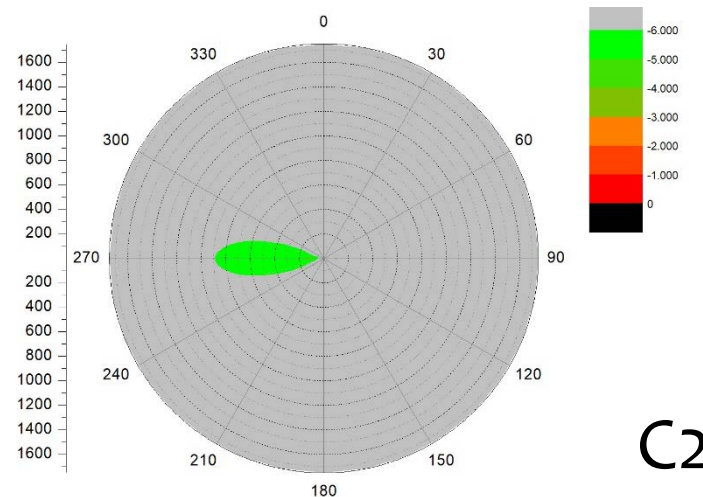
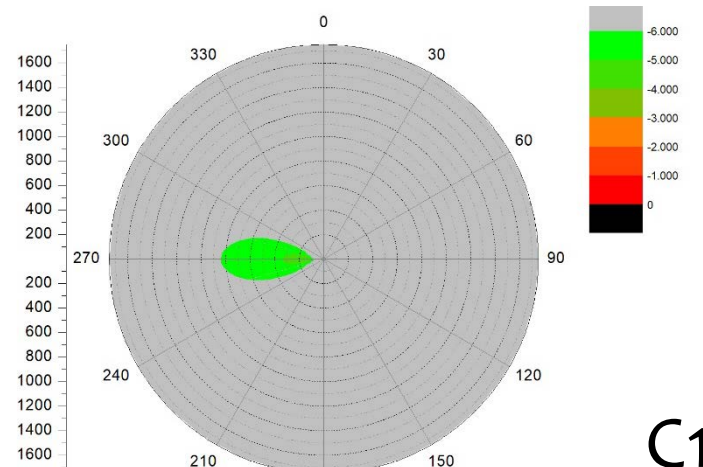
Constant Wind – Case C

Case	Wind Direction	Wind Speed [m/s]	Weather Stability Class	Time of Release	Cloud Cover
C	W	2	F/B	Night/Day	Moderate

Cloud Shine (2 m/s; Moderate)



- ◆ NACAC-C1 ■ NACAC-C2 ▲ NACAC-C3 × SNRSI-C1
- × SNRSI-C3 ● JRODOS-C1 + JRODOS-C2 - JRODOS-C3



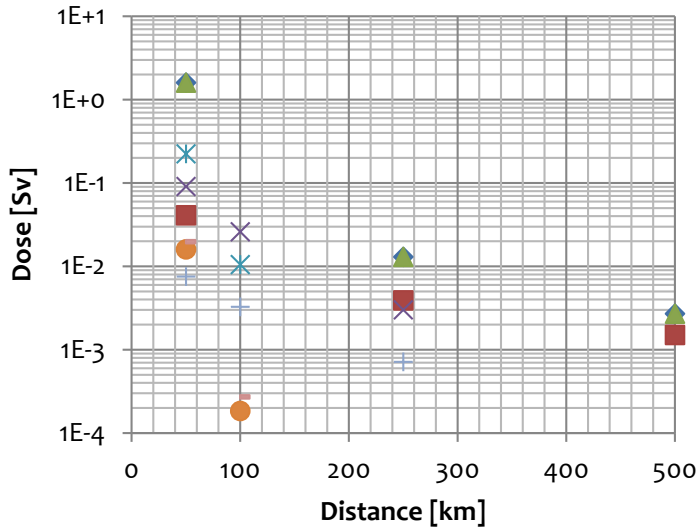
40

Results – Ground Shine

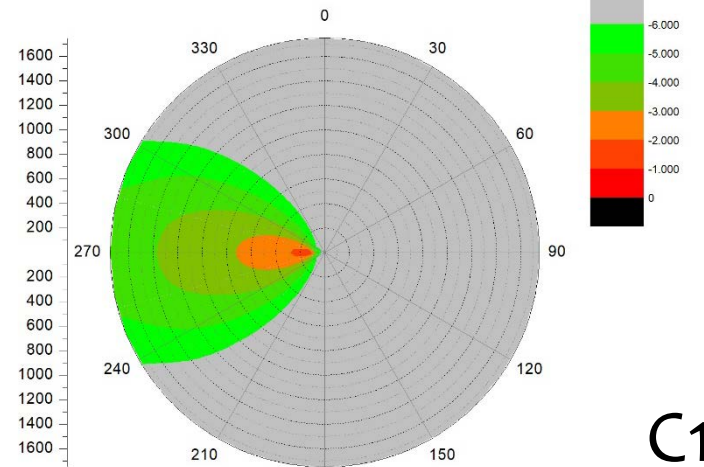
Constant Wind – Case C

Case	Wind Direction	Wind Speed [m/s]	Weather Stability Class	Time of Release	Cloud Cover
C	W	2	F/B	Night/Day	Moderate

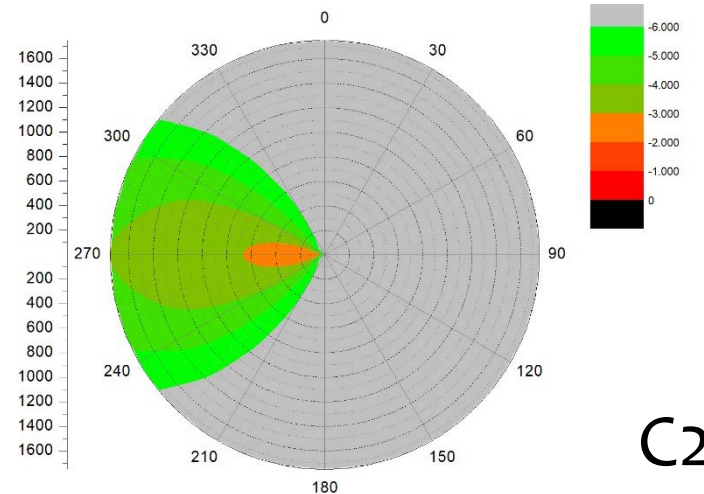
Ground Shine (2 m/s; Moderate)



- ◆ NACAC-C1 ■ NACAC-C2 ▲ NACAC-C3 × SNRSI-C1
- ✱ SNRSI-C3 ● JRODOS-C1 + JRODOS-C2 - JRODOS-C3



C1



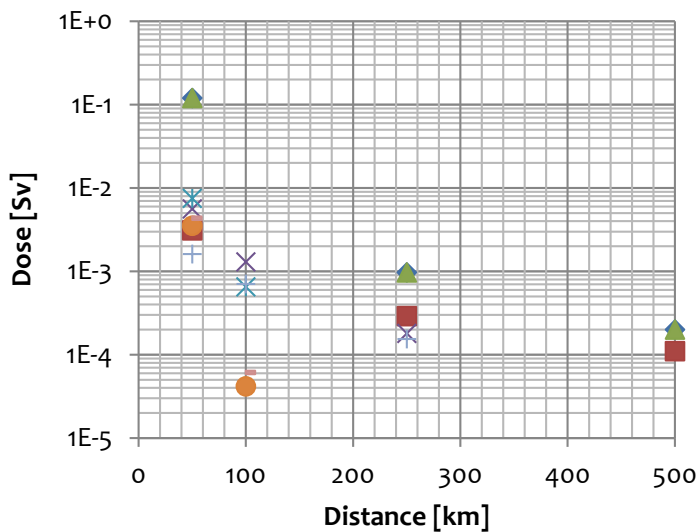
C2

Results – Inhalation

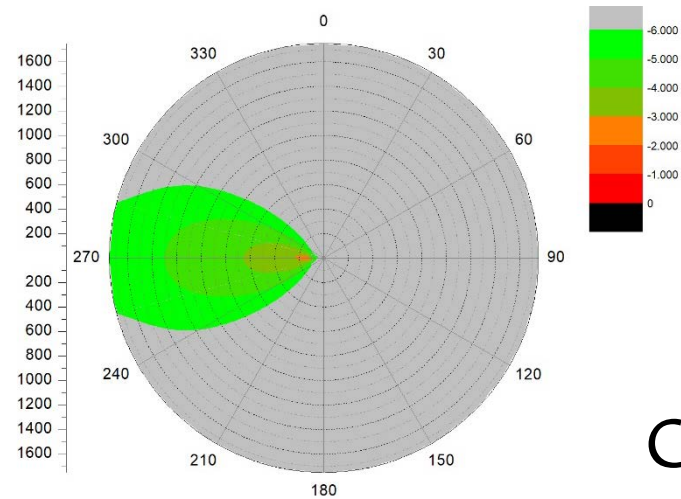
Constant Wind – Case C

Case	Wind Direction	Wind Speed [m/s]	Weather Stability Class	Time of Release	Cloud Cover
C	W	2	F/B	Night/Day	Moderate

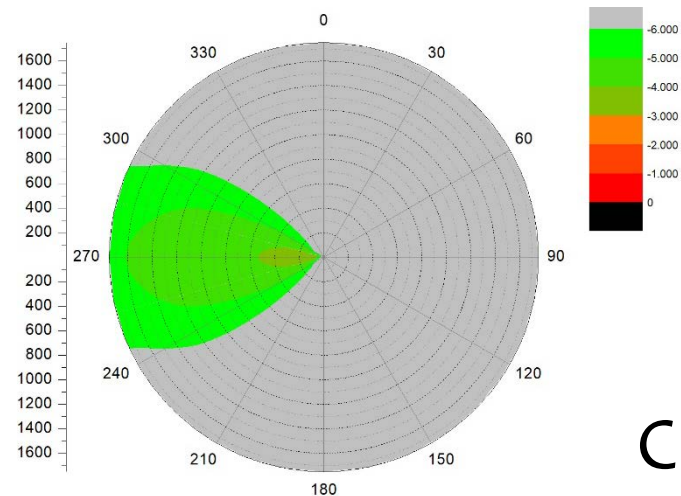
Inhalation (2 m/s; Moderate)



- ◆ NACAC-C1 ■ NACAC-C2 ▲ NACAC-C3 × SNRSI-C1
- × SNRSI-C3 ● JRODOS-C1 + JRODOS-C2 - JRODOS-C3



C1



C2

Comparison

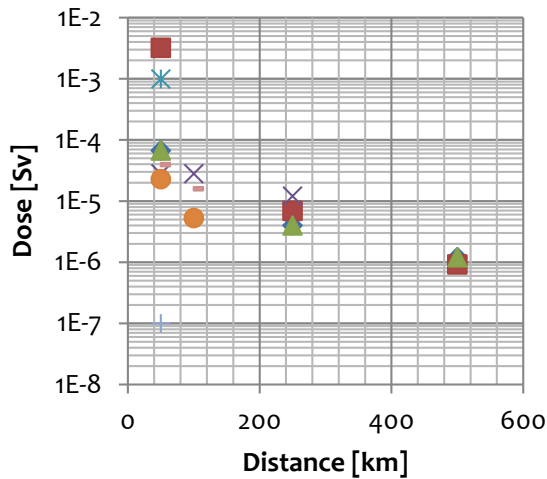


Results – Cloud Shine

Constant Wind – All Cases

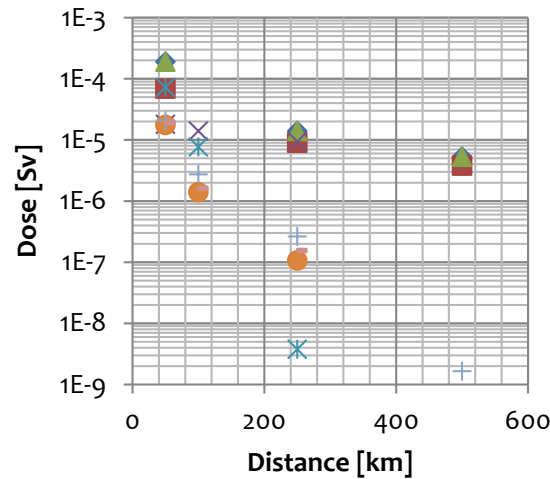
Case	Wind Direction	Wind Speed [m/s]	Weather Stability Class	Time of Release	Cloud Cover
A	W	1	A/F	Day/Night	Clear
B	W	4	D/C	Night/Day	Cloudy
C	W	2	F/B	Night/Day	Moderate

Case A



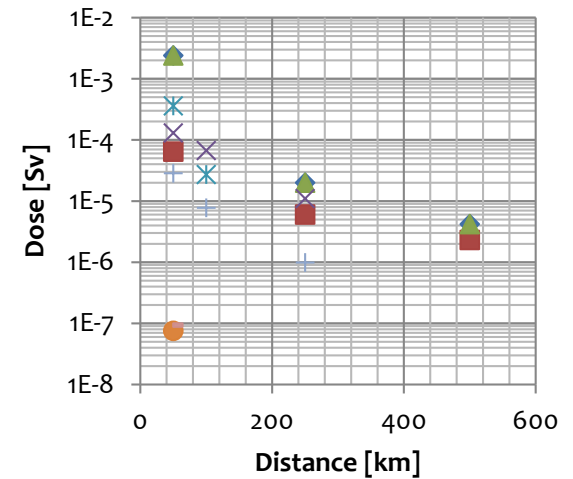
◆ NACAC-A1 ■ NACAC-A2 ▲ NACAC-A3
 × ARGOS-A1 × ARGOS-A3 ● JRODOS-A1
 + JRODOS-A2 - JRODOS-A3

Case B



◆ NACAC-B1 ■ NACAC-B2 ▲ NACAC-B3
 × ARGOS-B1 × ARGOS-B3 ● JRODOS-B1
 + JRODOS-B2 - JRODOS-B3

Case C



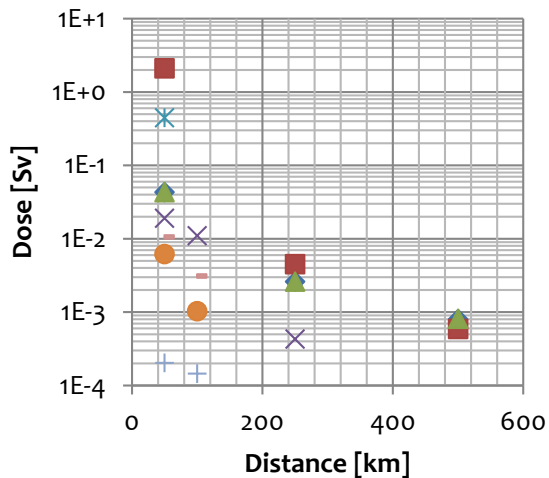
◆ NACAC-C1 ■ NACAC-C2 ▲ NACAC-C3
 × SNRSI-C1 × SNRSI-C3 ● JRODOS-C1
 + JRODOS-C2 - JRODOS-C3

Results – Ground Shine

Constant Wind – All Cases

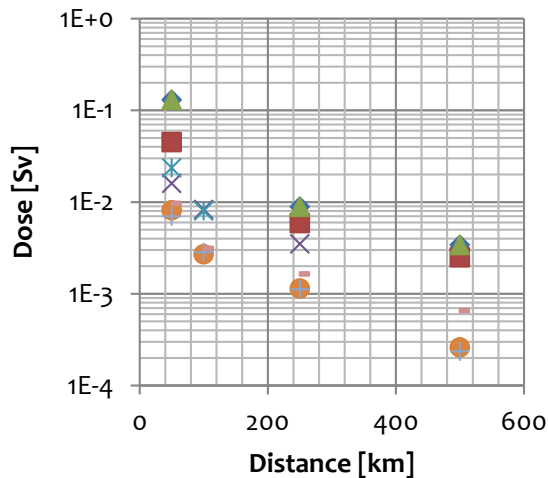
Case	Wind Direction	Wind Speed [m/s]	Weather Stability Class	Time of Release	Cloud Cover
A	W	1	A/F	Day/Night	Clear
B	W	4	D/C	Night/Day	Cloudy
C	W	2	F/B	Night/Day	Moderate

Case A



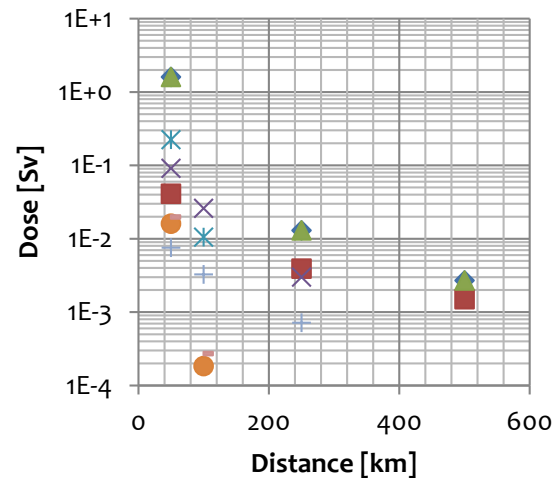
- ◆ NACAC-A1 ■ NACAC-A2 ▲ NACAC-A3
- × ARGOS-A1 × ARGOS-A3 ● JRODOS-A1
- + JRODOS-A2 - JRODOS-A3

Case B



- ◆ NACAC-B1 ■ NACAC-B2 ▲ NACAC-B3
- × ARGOS-B1 × ARGOS-B3 ● JRODOS-B1
- + JRODOS-B2 - JRODOS-B3

Case C



- ◆ NACAC-C1 ■ NACAC-C2 ▲ NACAC-C3
- × SNRSI-C1 × SNRSI-C3 ● JRODOS-C1
- + JRODOS-C2 - JRODOS-C3

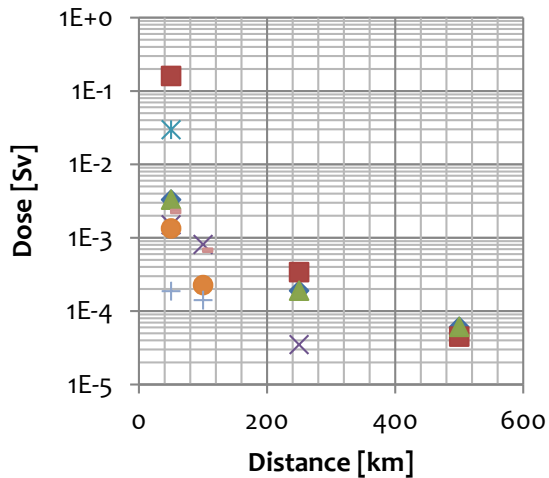


Results – Inhalation

Constant Wind – All cases

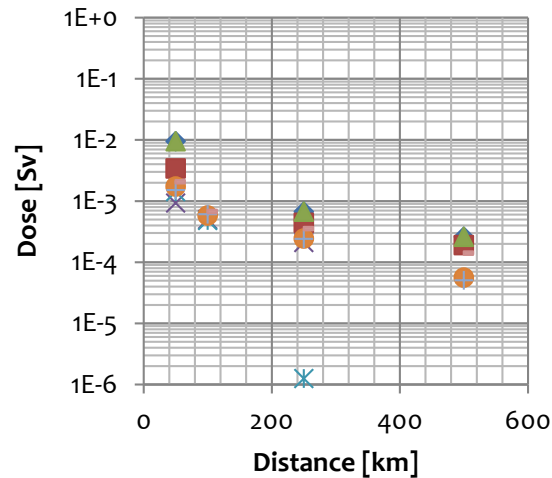
Case	Wind Direction	Wind Speed [m/s]	Weather Stability Class	Time of Release	Cloud Cover
A	W	1	A/F	Day/Night	Clear
B	W	4	D/C	Night/Day	Cloudy
C	W	2	F/B	Night/Day	Moderate

Inhalation (1 m/s; Clear)



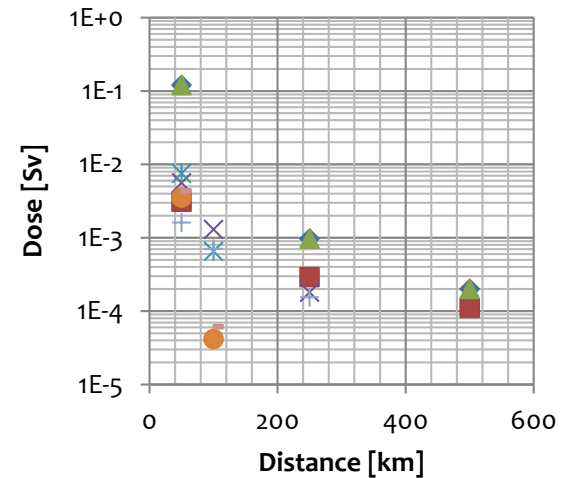
◆ NACAC-A1 ■ NACAC-A2 ▲ NACAC-A3
 × ARGOS-A1 * ARGOS-A3 ● JRODOS-A1
 + JRODOS-A2 - JRODOS-A3

Inhalation (4 m/s; Cloudy)



◆ NACAC-B1 ■ NACAC-B2 ▲ NACAC-B3
 × ARGOS-B1 * ARGOS-B3 ● JRODOS-B1
 + JRODOS-B2 - JRODOS-B3

Inhalation (2 m/s; Moderate)



◆ NACAC-C1 ■ NACAC-C2 ▲ NACAC-C3
 × SNRSI-C1 * SNRSI-C3 ● JRODOS-C1
 + JRODOS-C2 - JRODOS-C3

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