海洋レーダ研究集会
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海洋短波レーダーを用いた 2024年日向灘地震の津波震源インバージョン

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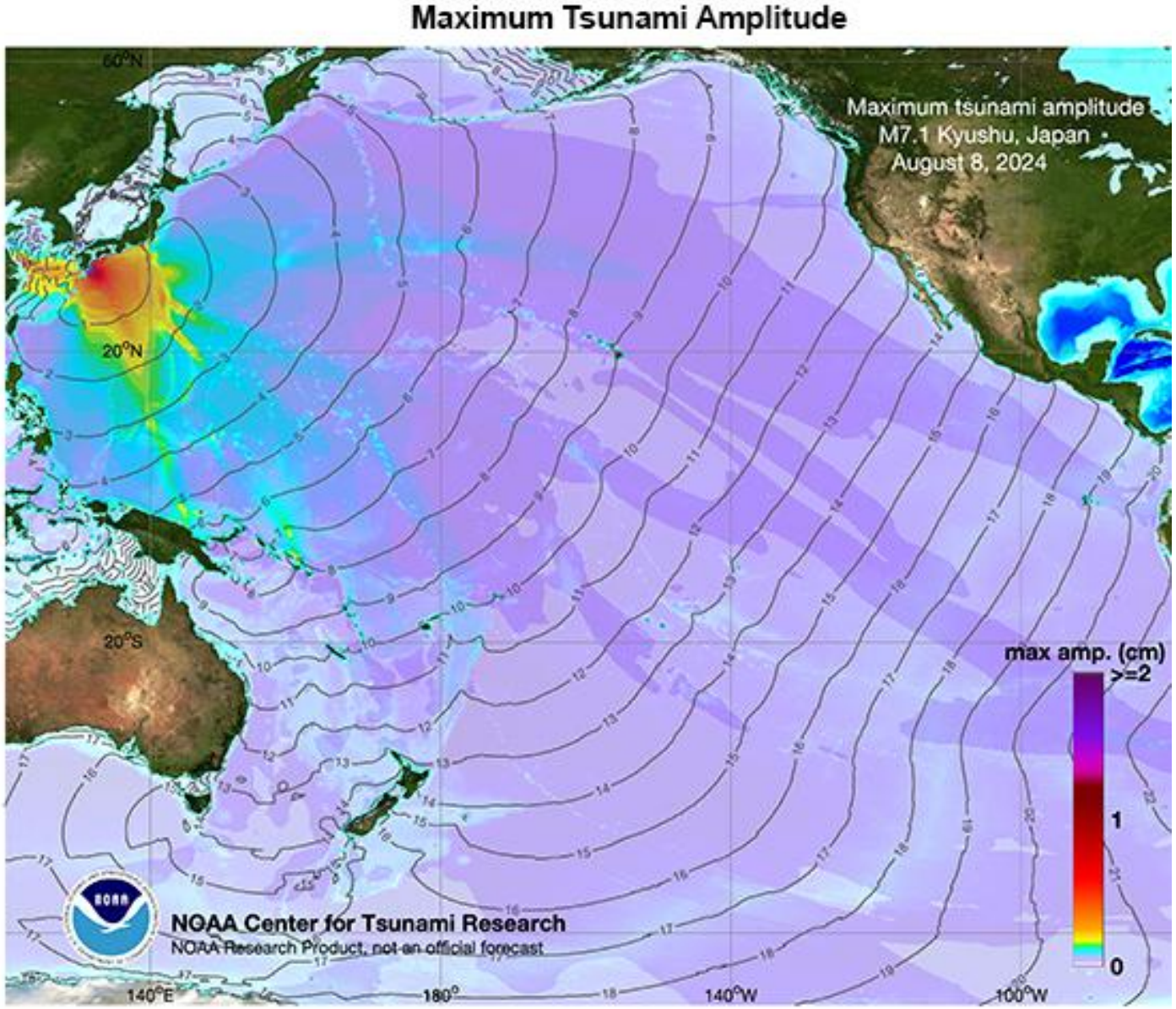
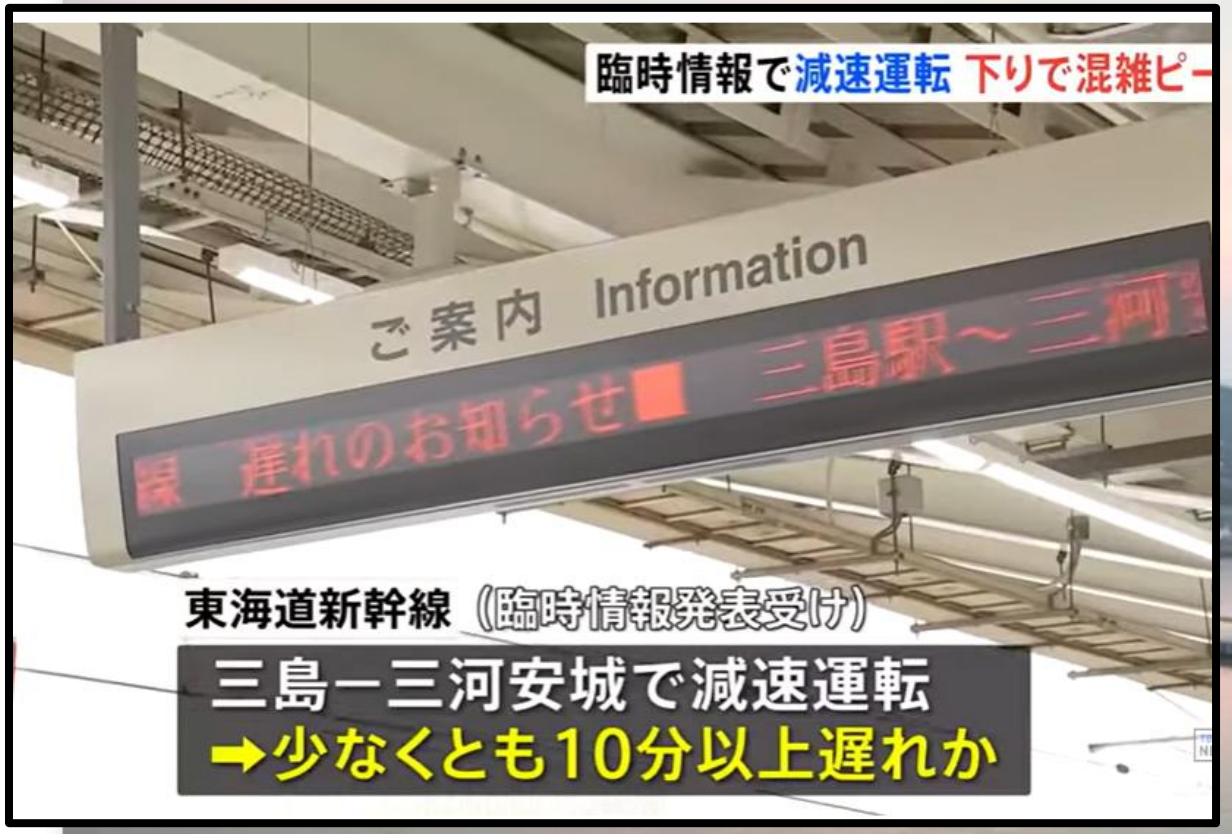
Japan Agency for Marine-Earth Science and Technology

科研費 KAKENHI

2024 Hyuganada earthquake (Mw 7.1)

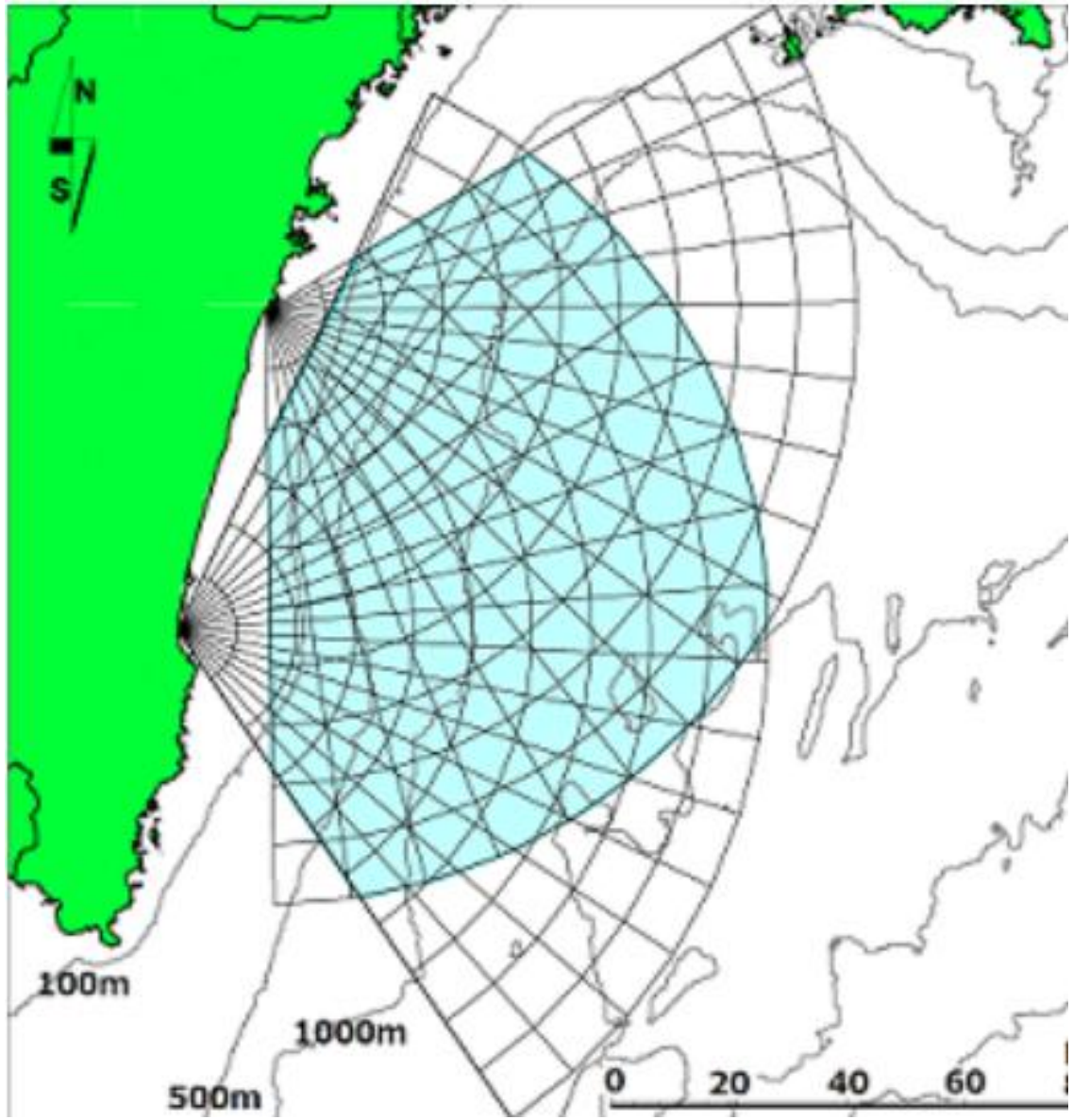


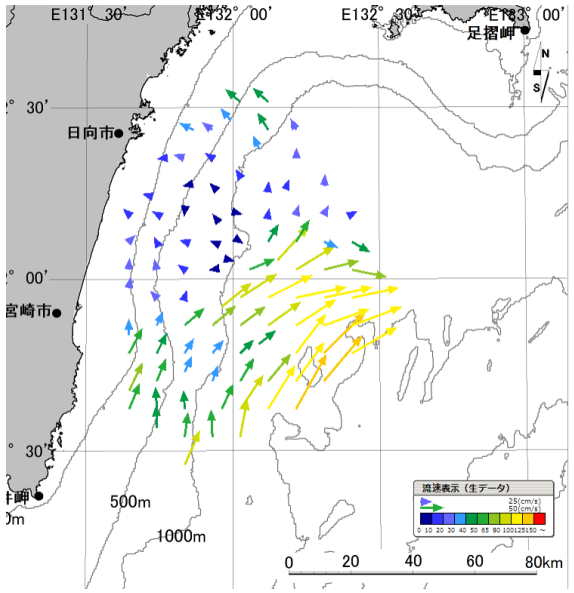
(Figure Source: JMA; USGS; NOAA)



(Figure Source: TBS News; News NNN)

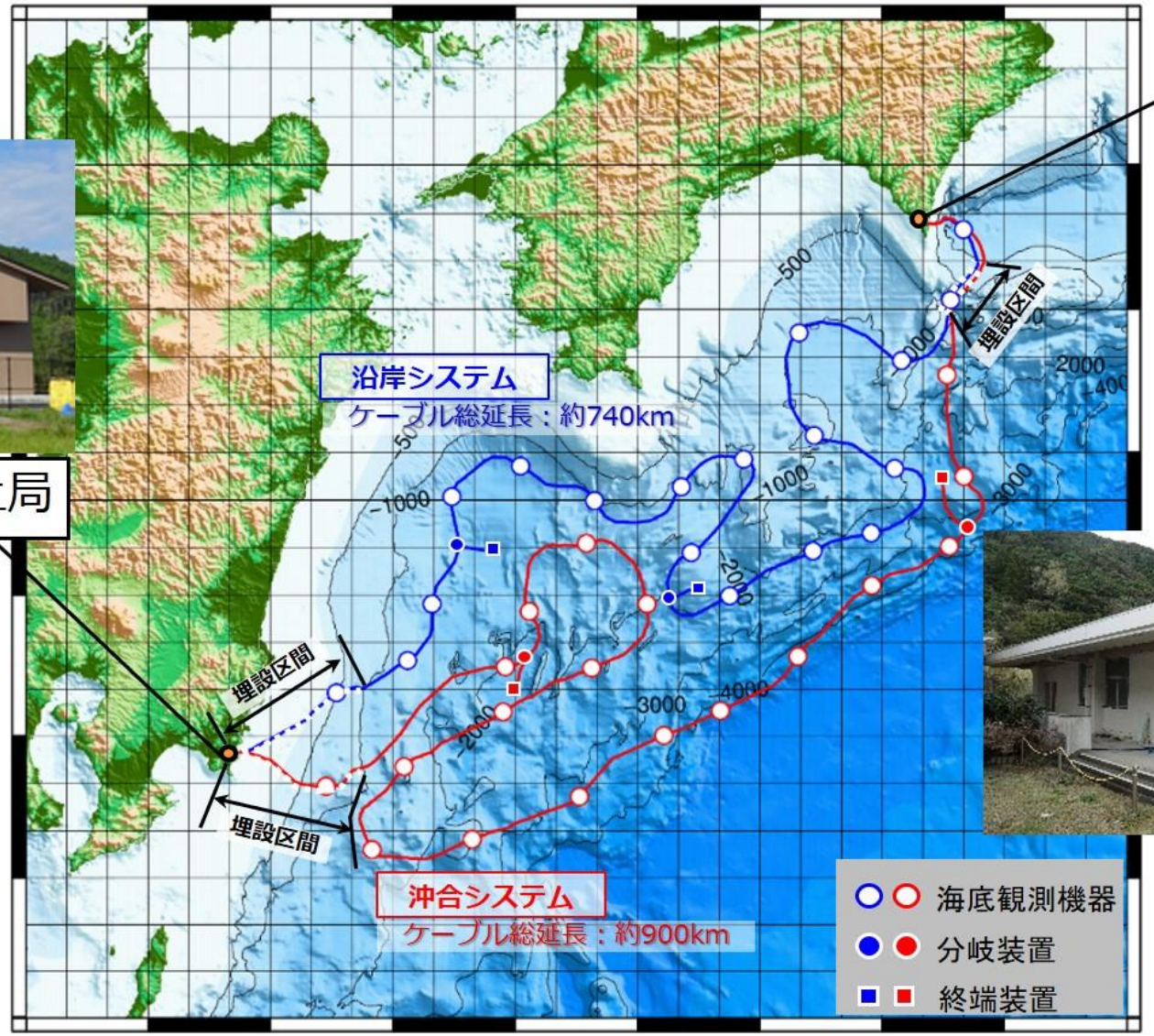
High-Frequency Ocean Radar System in Miyazaki Prefecture

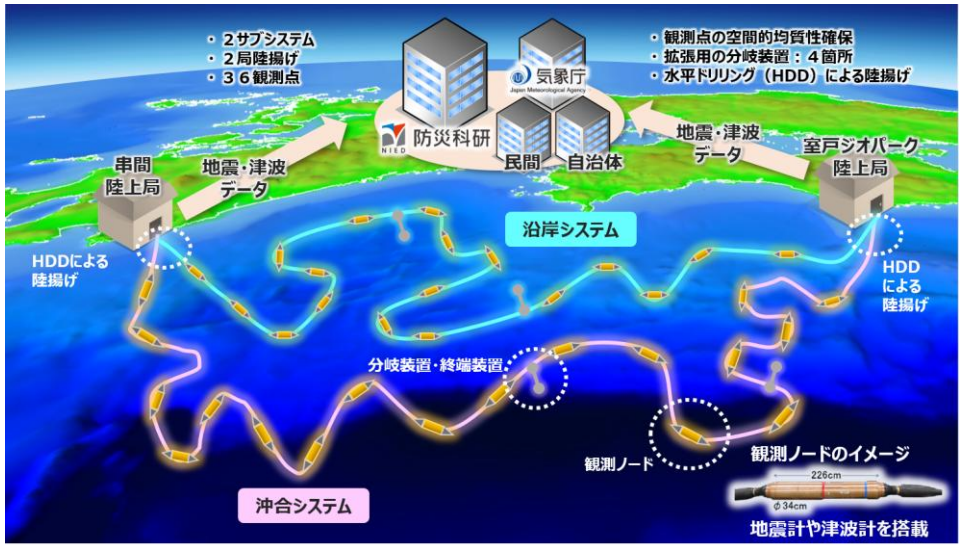




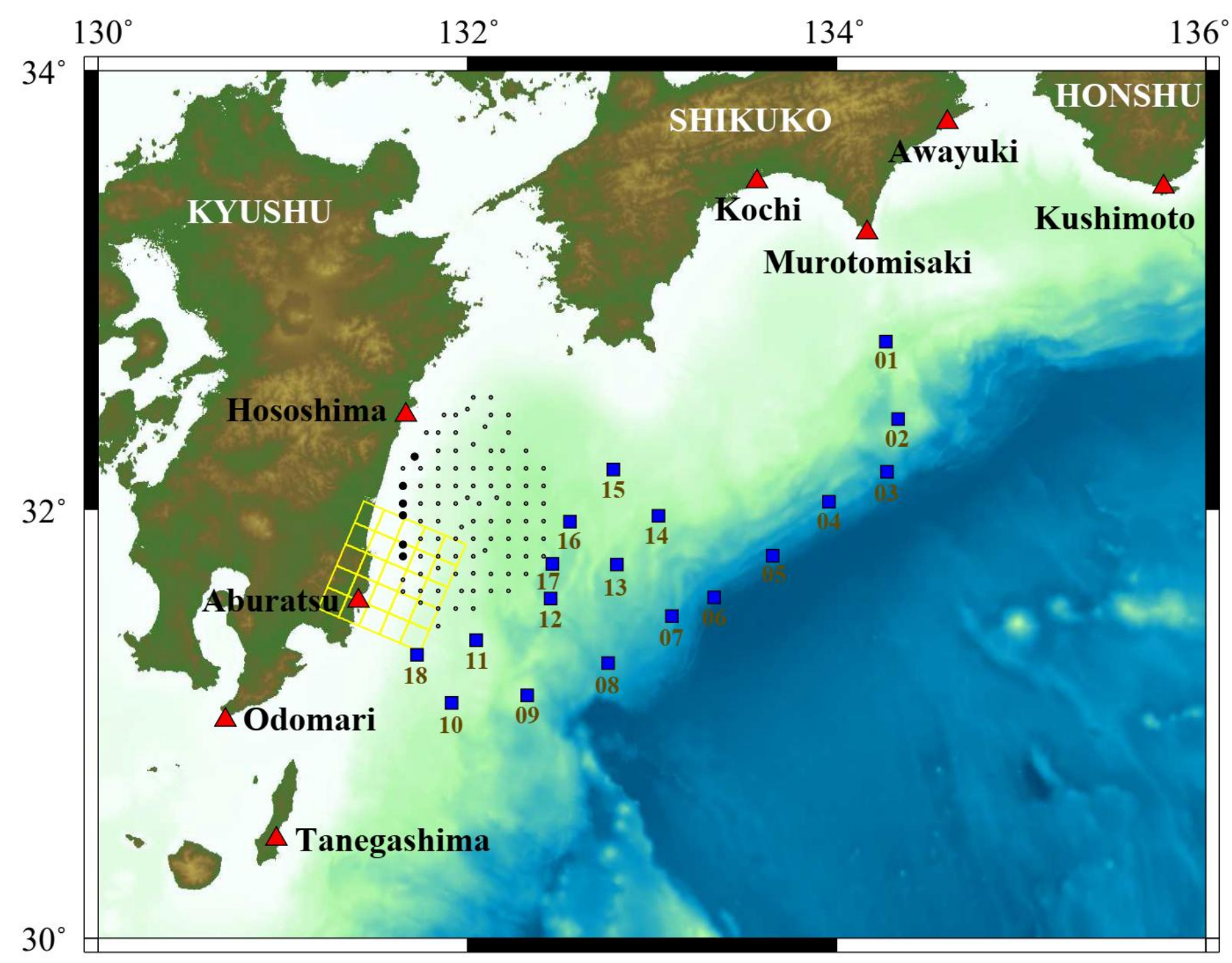
(Figure Source: Miyazaki Prefecture)

Nankai Trough Seafloor Observation Network for Earthquakes and Tsunamis (N-net)



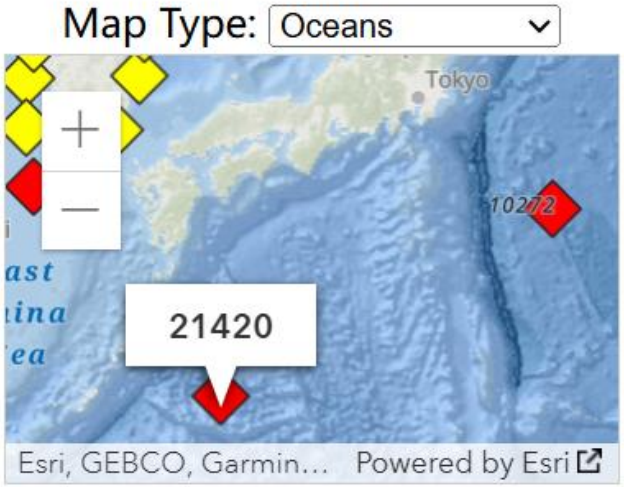


(Figure Source: NIED)

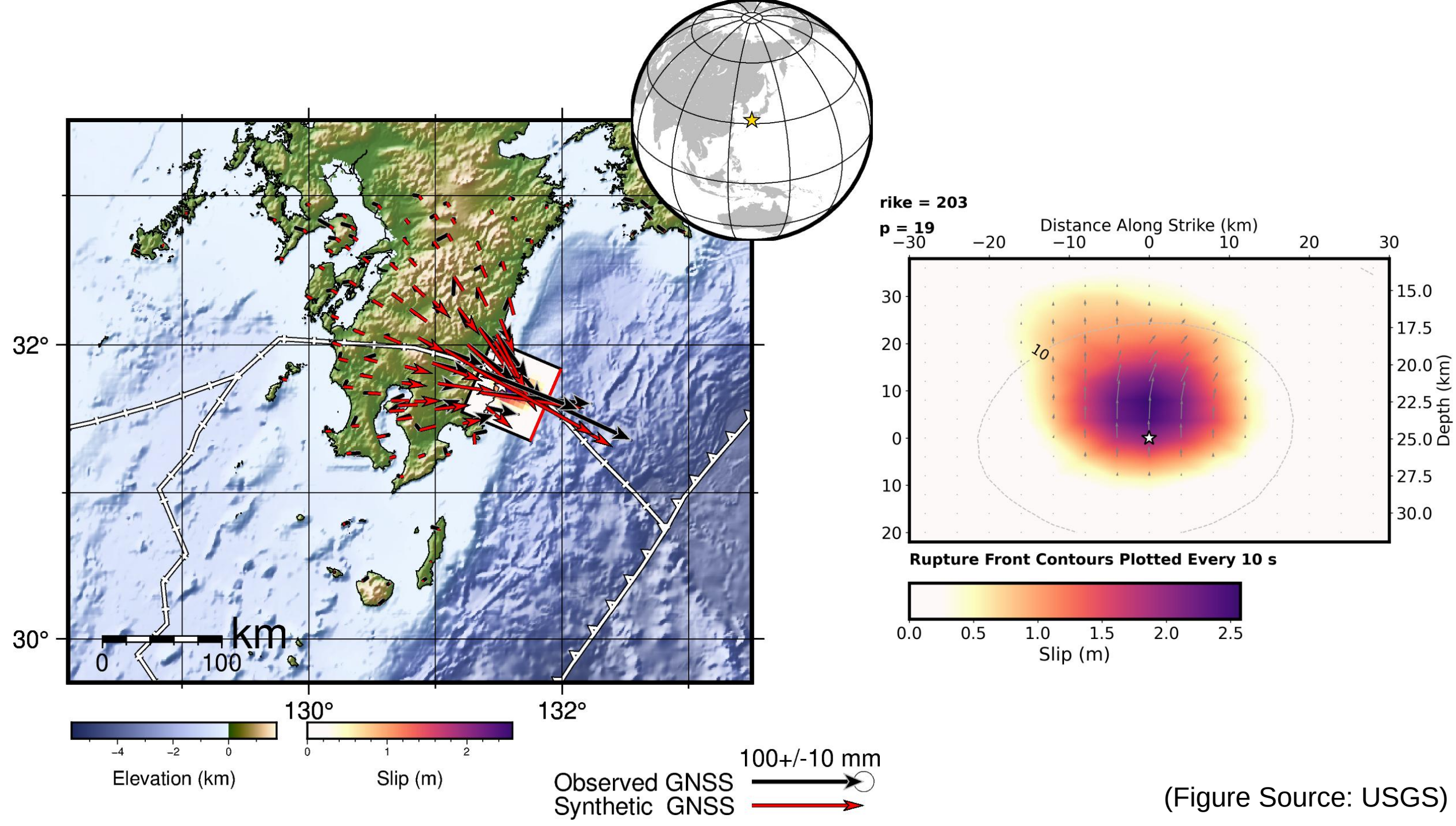


Tide Gauge

N-net



DART 21420 (NOAA)

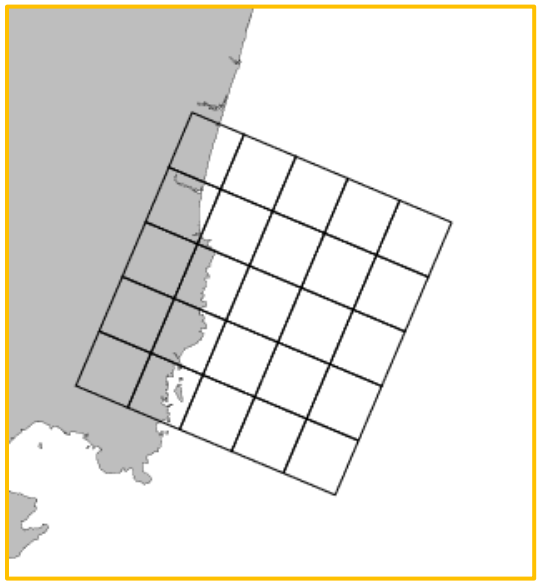


(Figure Source: USGS)

Inversion Scheme

$$\boldsymbol{L(X)} = \left\| \begin{pmatrix} \boldsymbol{G}_p(t) \\ \boldsymbol{G}_r(t) \\ \beta \boldsymbol{S} \end{pmatrix} \boldsymbol{X} - \begin{pmatrix} \boldsymbol{O}_p(t) \\ \boldsymbol{O}_r(t) \\ 0 \end{pmatrix} \right\|^2$$

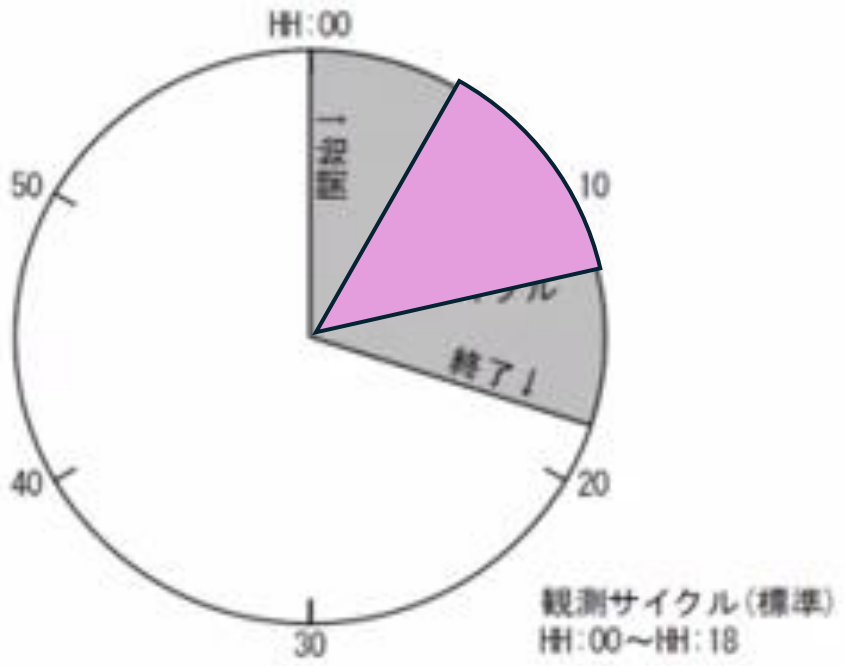
$\boldsymbol{X}$: Slip of subfault
$\boldsymbol{G}_p$, $\boldsymbol{G}_r$: Green's function matrices of N-net and high frequency radar
$\boldsymbol{O}_p$, $\boldsymbol{O}_{tsu}$: Observations of N-net and HFR
$\boldsymbol{S}$: Laplacian operator matrix that controls the model smoothness, $\beta = 0.01$



5 x 5 = 25 subfaults

Each subfault:
12 km x 12 km

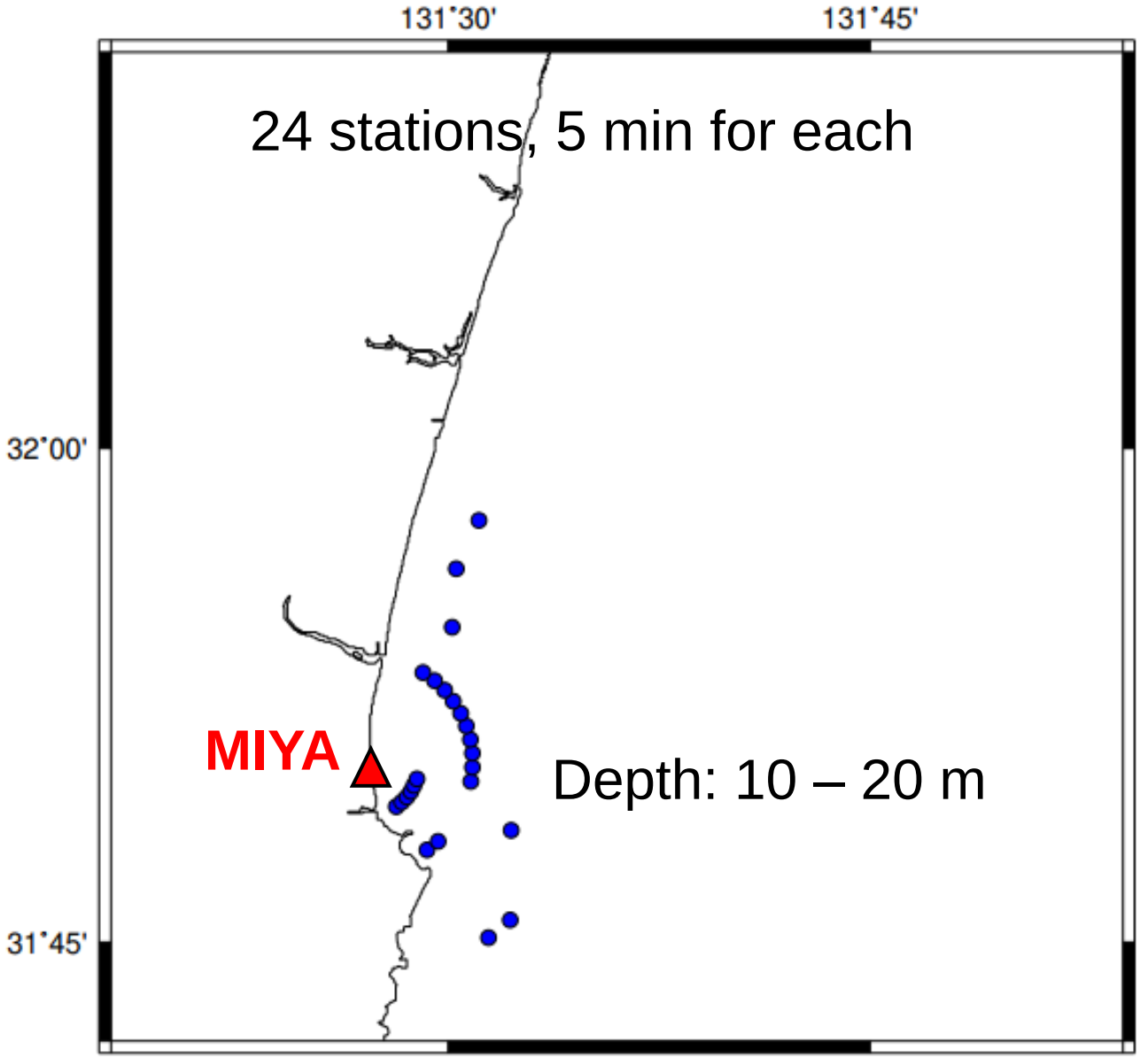
depth	strike	dip	rake	lat	long	
12.84546	203	19	76	31.83787	131.992	#E01
12.84546	203	19	76	31.73846	131.9424	#E02
12.84546	203	19	76	31.63906	131.8928	#E03
12.84546	203	19	76	31.53965	131.8432	#E04
12.84546	203	19	76	31.44025	131.7936	#E05
16.75227	203	19	76	31.87777	131.8815	#E06
16.75227	203	19	76	31.77836	131.8319	#E07
16.75227	203	19	76	31.67896	131.7823	#E08
16.75227	203	19	76	31.57955	131.7327	#E09
16.75227	203	19	76	31.48014	131.6831	#E10
20.65909	203	19	76	31.91766	131.771	#E11
20.65909	203	19	76	31.81826	131.7214	#E12
20.65909	203	19	76	31.71885	131.6718	#E13
20.65909	203	19	76	31.61944	131.6222	#E14
20.65909	203	19	76	31.52004	131.5726	#E15
24.56591	203	19	76	31.95756	131.6605	#E16
24.56591	203	19	76	31.85815	131.6109	#E17
24.56591	203	19	76	31.75875	131.5613	#E18
24.56591	203	19	76	31.65934	131.5117	#E19
24.56591	203	19	76	31.55994	131.4621	#E20
28.47273	203	19	76	31.99746	131.55	#E21
28.47273	203	19	76	31.89805	131.5004	#E22
28.47273	203	19	76	31.79865	131.4508	#E23
28.47273	203	19	76	31.69924	131.4012	#E24
28.47273	203	19	76	31.59983	131.3516	#E25



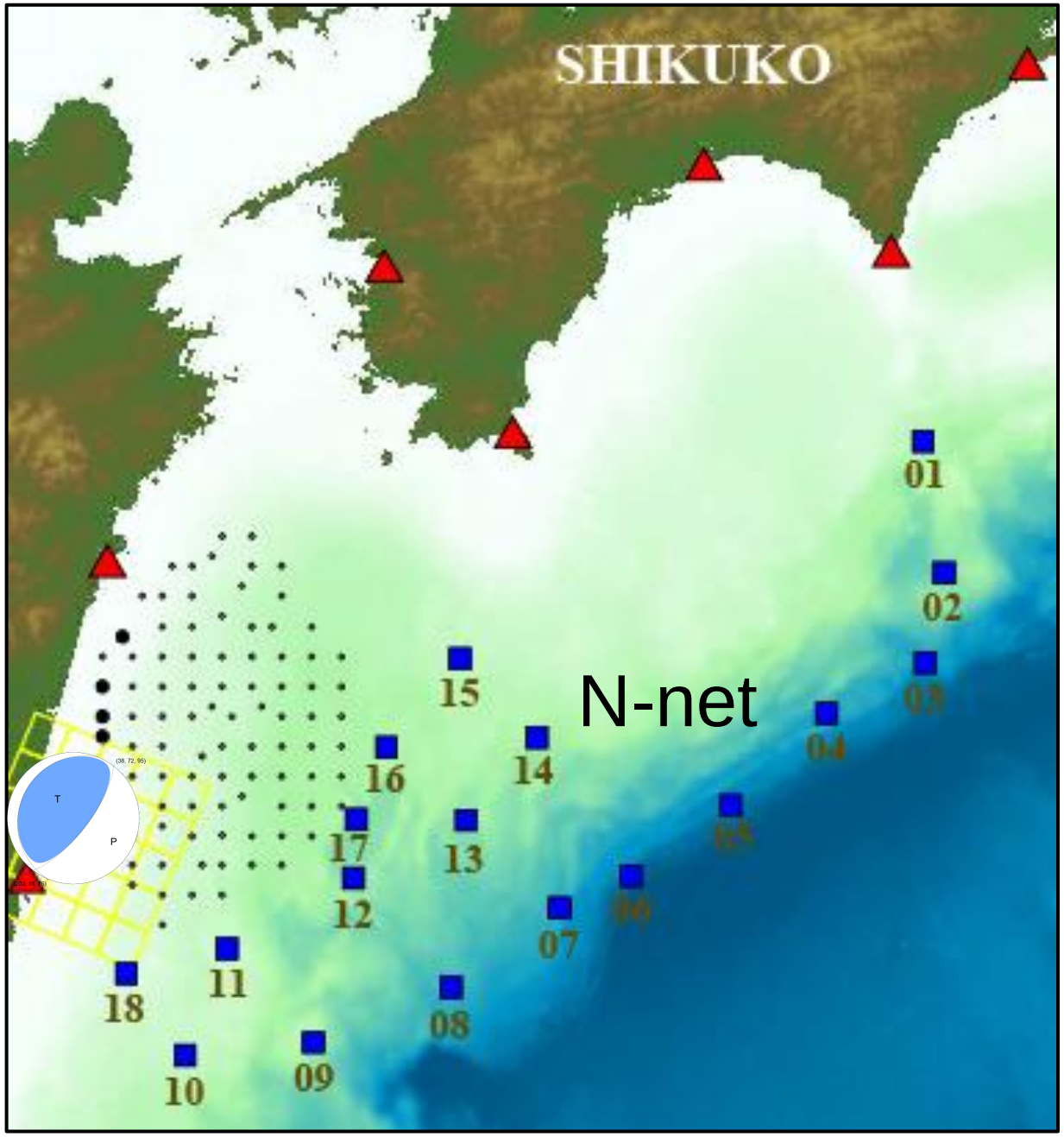
観測サイクル

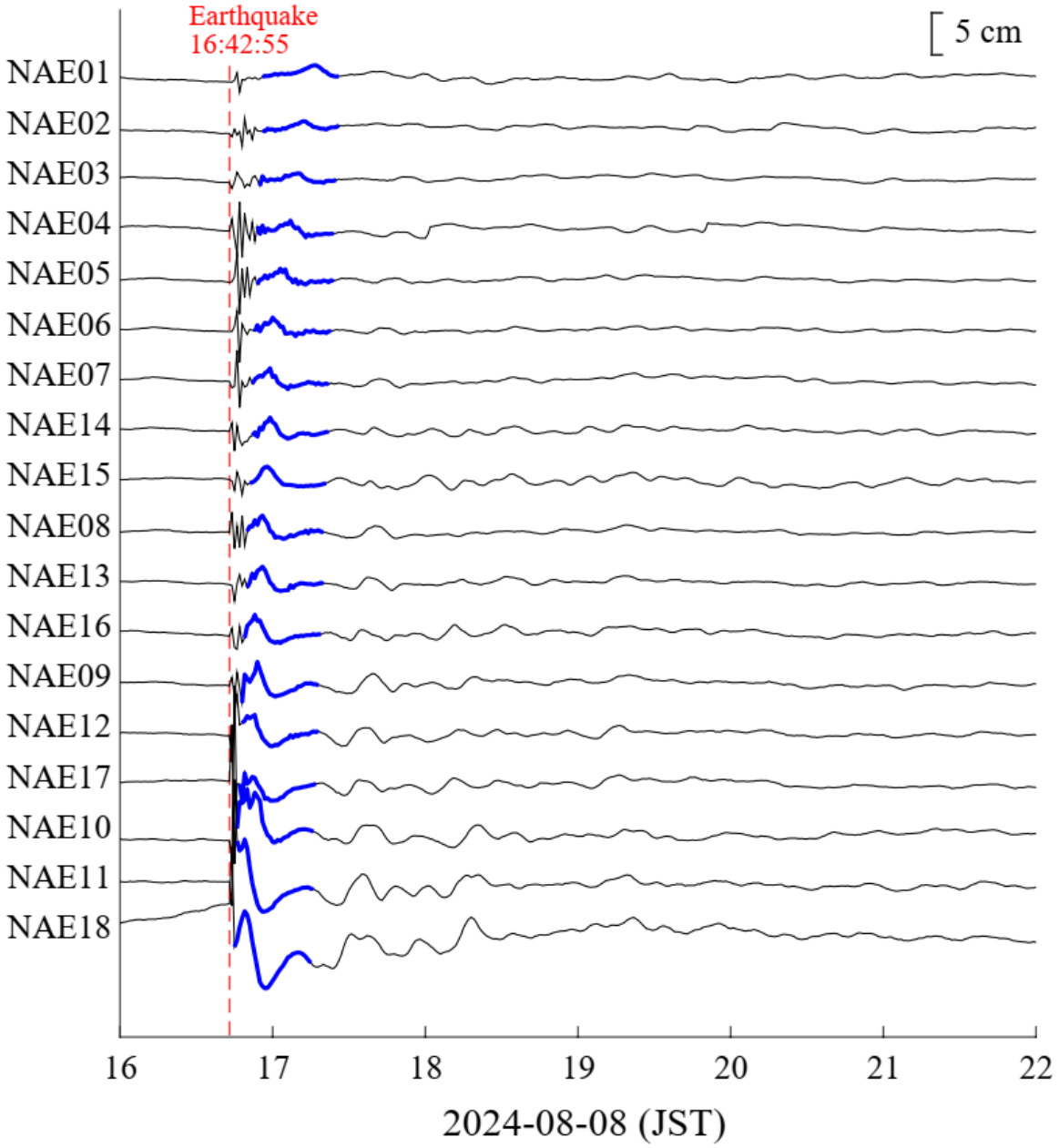
表-1　観測時間と流速分解能（f＝24.515MHz，1掃引0.5s）

観測時間(min)	掃引回数	流速分解能(cm/s)
1	128	9.56
2	256	4.78
4	512	2.39
8	1024	1.20
17	2048	0.60
34	4096	0.30



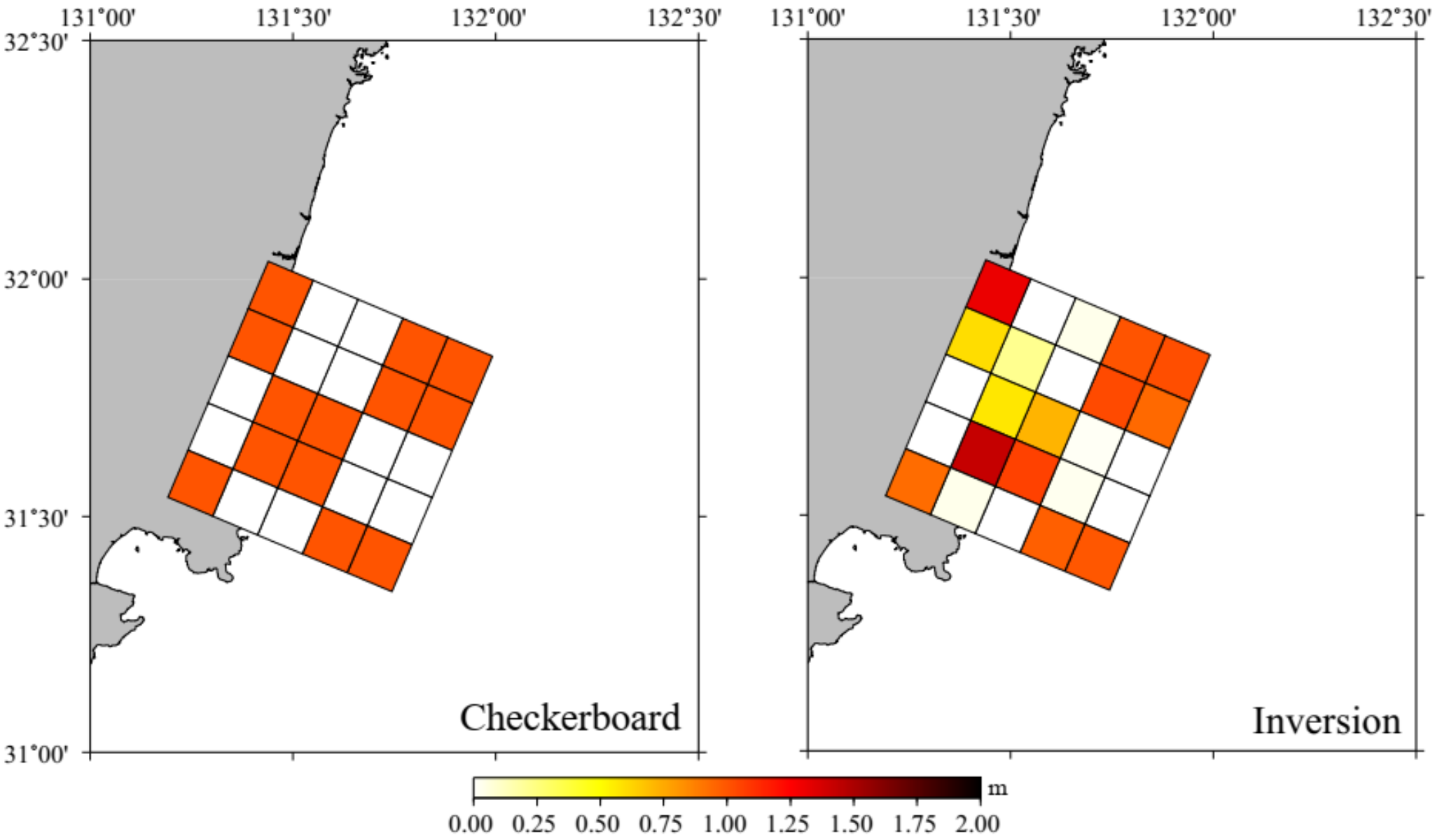
HFR Points (24) used for Inversion

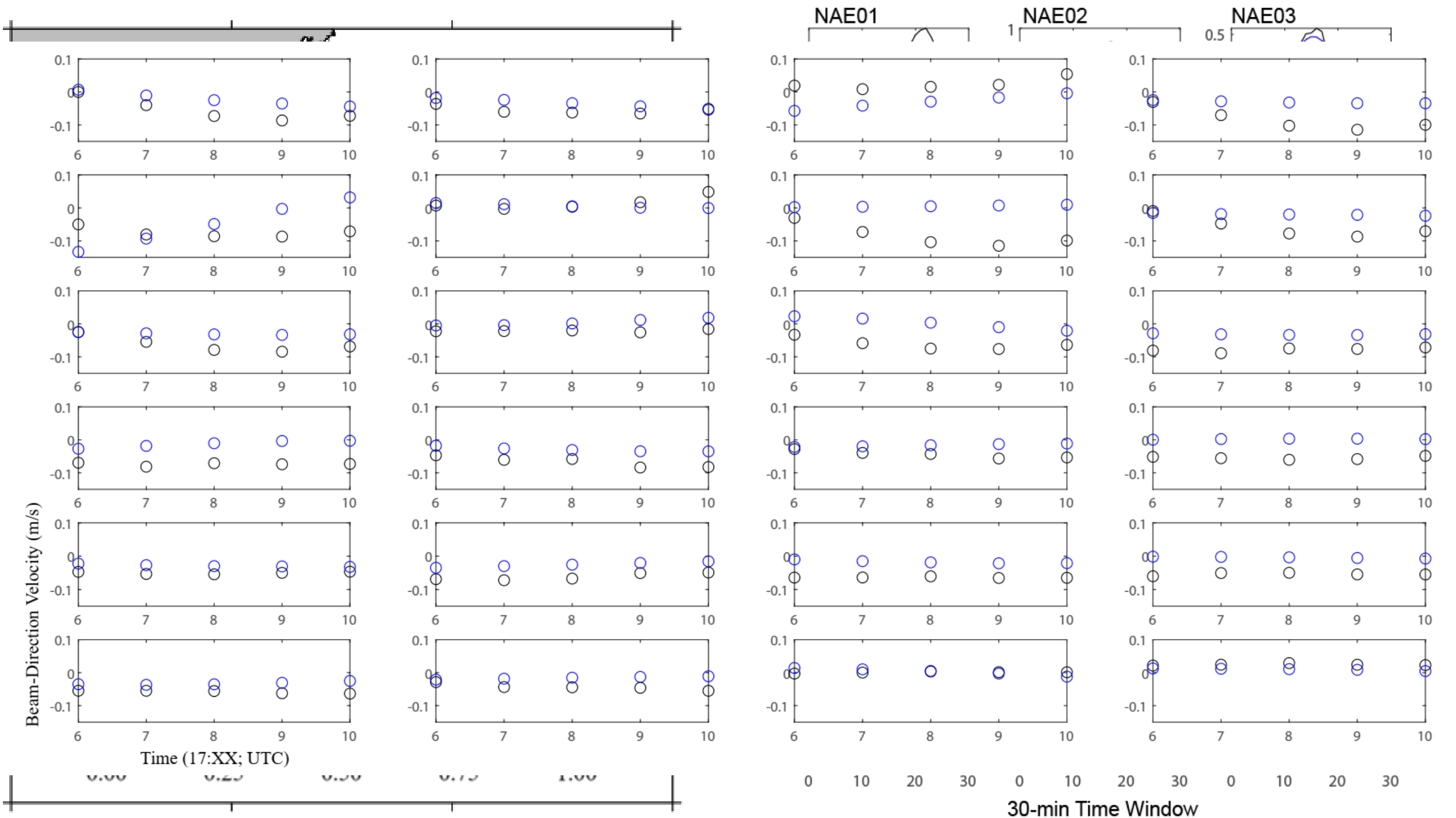


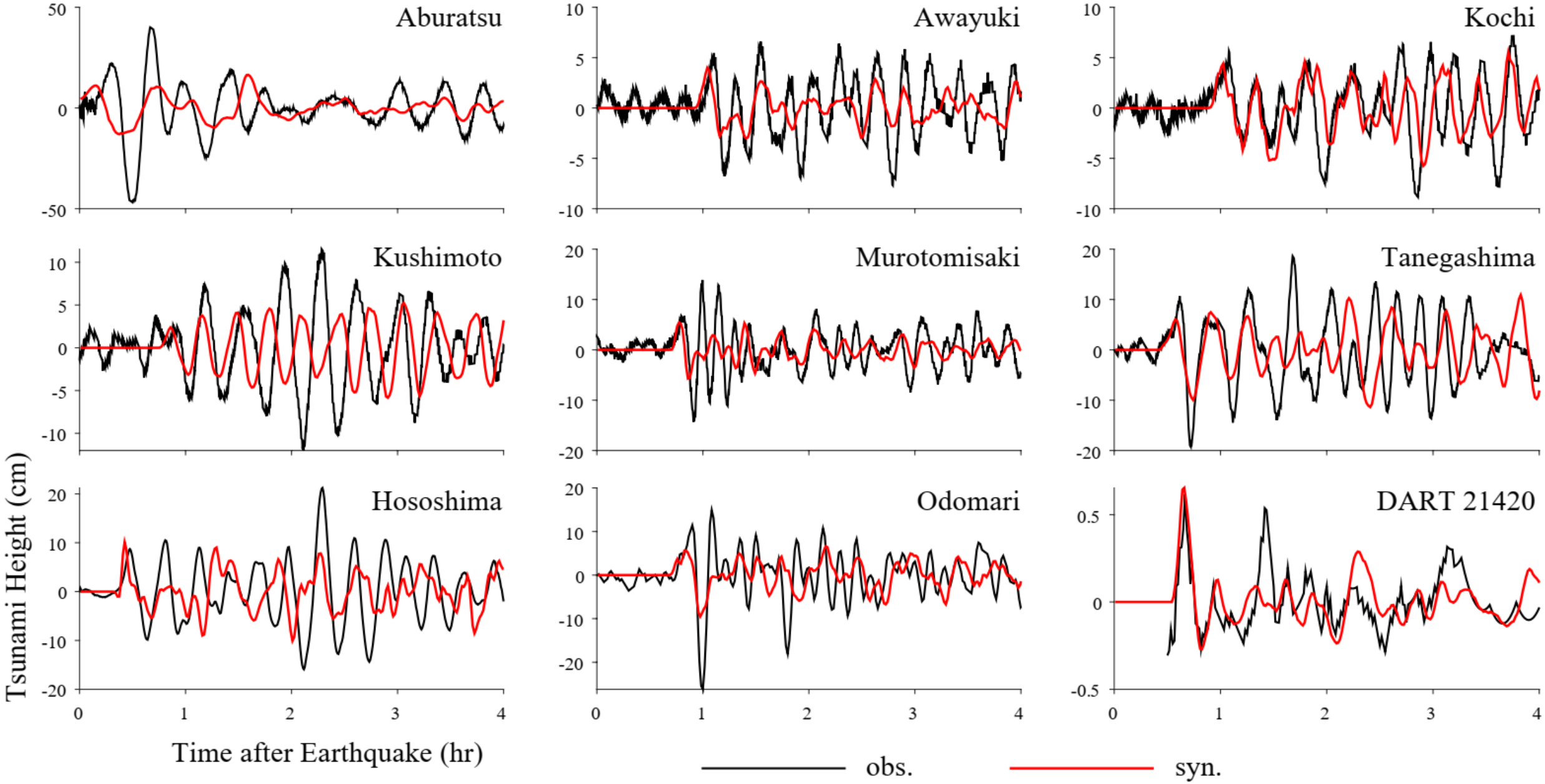


18 stations, 30 min for each

Checkerboard Test




NAE01
NAE02
NAE03
Beam-Direction Velocity (m/s)
Time (17:XX; UTC)
30-min Time Window


Aburatsu
Awayuki
Kochi
Kushimoto
Murotomisaki
Tanegashima
Hososhima
Odomari
DART 21420
Tsunami Height (cm)
Time after Earthquake (hr)
obs.
syn.

Conclusion

- Joint Inversion of the 2024 Hyuganada Earthquake
- Finite fault model with 5 x 5 subfaults
- Maximum slip: 0.81 m, Magnitude Mw = 6.9

Program

- Only one land station available -> Beam-direction only
- Only shallow points available -> Nonlinear problem

Thank you for your attention!

One-Hour Records