Reviewer 1
We are very grateful to the reviewer for his/her constructive critiques and comments. In the following, we state the referee's comments (in blue) followed by the response and actions taken (in black).

Add brief summaries to figure captions to clarify key observations, especially in Figures 8–9 and 16–17.

The captions are extended to include a summary of observations in Figures 8-9 for Tohoku 2011, 13-14 for Alaska 2018 and 16-17 for Tateyama 2009 events.

Four test cases are presented, highlighting different strengths of the methodology. While satisfactory agreement is observed for many DART buoy observations, some cases show larger deviations. How do the authors explain variations in model performance across different test cases? For example, were there consistent factors (like earthquake depth, distance from hydrophone) that influenced prediction accuracy? Could the authors include a summary table comparing key performance metrics (RMSE, computational time) to provide a clearer picture of strengths and limitations?

The following description has been added, along with two new tables and an extended table, to illustrate the model's sensitivity to the source and its variations across different locations.

Among the four case studies discussed in the paper, Sumatra was triggered by a large oblique-slip earthquake with a significant vertical component and prolonged duration, whereas Tohoku and Tateyama involved thrust fault movements. Tohoku was a high-magnitude, long-duration bottom-shaking event, while Tateyama was weaker and shorter in duration. In contrast, the Alaska case was characterised by a strike-slip fault, dominated by horizontal motion and moderately shorter duration compared to Sumatra and Tohoku. Despite its large magnitude, the horizontal motion in Alaska resulted in only a minor tsunami. The vertical ground motion played a critical role in tsunami generation for Sumatra, Tohoku, and Tateyama, whereas the horizontal motion in Alaska limited tsunami generation. Consequently, model performance depends heavily on earthquake magnitude and vertical motion, as defined by the dip angle, with better results observed for large, vertically dominant ground motions. Furthermore, the accuracy of model predictions improves when the gauges are closer to the hydrophones. The reason is that AGWs are less dissipated due to interactions with the seafloor geometry, allowing the *inverse model* to better capture and estimate the fault geometry. (see Table 1).
From an observational perspective, ground-truth data for the Sumatra case are limited to a few selected locations, as summarized in Table 2, while DART buoy observations were available for the Tateyama, Tohoku, and Alaska cases, as outlined in Table 3. The accuracy of the model at observation locations is further influenced by two key factors. The first is the ratio of the shortest distance to the direct distance (SD/DD) between the epicentre and the observation points; a ratio closer to 1 indicates wave propagation over relatively consistent depths, aligning well with the assumptions of the *direct model*. The second is the proximity of the observations to the source, as observations closer to the epicentre, reflected

Table 1: Summary table for 4 case studies Ekström et al., 2012).

Case	**Sumatra**	**Tateyama**	**Tohoku**	**Alaska**
Date	26/12/2004	12/08/2009	11/03/2011	23/01/2018
Time (GMT)	01:01:09	22:48:55	05:47:32	09:32:04
Lon	94.26	140.68	143.05	-149.12
Lat	3.09	32.74	37.52	56.22
Moment Magnitude (Mw)	9	6.6	9.1	7.9
Depth [km]	28.6	55.2	20	33.6
Half Duration [s]	95	4.8	70	22.3
Strike [°]	329	55	203	257
Dip [°]	8	18	10	80
Slip [°]	110	130	88	4
Type	Oblique-slip	Thrust	Thrust	Strike-slip
Hydrophone	H08S1	H11N1	H11N1	H11N1
Lon	71.01	166.89	166.89	166.89
Lat	-6.34	19.71	19.71	19.71
Distance [km]	2786	3005	3039	5427
Acoustic Travel Time [s]	1856	2003	2026	3485

Table 2: Direct Distance (DD), ration between Shortest Distance to Direct Distance (SD/DD) and Travel Time (TT) for Sumatra 2004.

Location	**Lat**	**Lon**	**DD [km]**	**SD/DD**	**TT [hr]**
Madras Bandar	13.14	80.45	1885	1.08	3.0
Batticaloa	7.71	81.69	1483	1.03	2.2
S Maldives	-0.74	73.20	2379	1.06	3.5
Phuket	7.88	98.40	702	1.24	2.1
Banda Aceh	5.55	95.32	298	1.85	1.1

in shorter travel times, tend to show higher model accuracy.

Reference

Ekström, Göran, Meredith Nettles, and A. M. Dziewoński. "The global CMT project 2004–2010: Centroid-moment tensors for 13,017 earthquakes." Physics of the Earth and Planetary Interiors 200 (2012): 1-9.

Table 3: DART buoy stations legend: Direct Distance (DD), ration between Shortest Distance to Direct Distance (SD/DD) and Travel Time (TT) for Tateyama 2009, Tohoku 2011 and Alaska 2018 events.

				Tateyama			Tohoku			Alaska		
Index	**DART**	**Lat**	**Lon**	**DD [km]**	**SD/DD**	**TT [hr]**	**DD [km]**	**SD/DD**	**TT [hr]**	**DD [km]**	**SD/DD**	**TT [hr]**
1	21418	38.71	148.67	992	1.11	1.5	509	1.08	0.7	4867	1.07	6.2
2	21413	30.55	152.12	1137	1.09	1.7	1139	1.07	1.4	5317	1.07	6.7
3	52404	20.94	132.31	1544	1.01	2.4	2115	1.10	2.9	7385	1.06	9.4
4	21419	44.46	155.74	1851	1.08	2.6	1312	1.05	1.7	4003	1.09	5.2
5	52401	19.29	155.77	2145	1.10	3.0	2373	1.06	3.0	6097	1.05	7.7
6	21416	48.04	163.49	2567	1.04	3.4	2027	1.05	2.5	3287	1.13	4.4
7	52405	12.88	132.33	2364	1.06	3.4	2939	1.07	3.9	8110	1.06	10.3
8	52402	11.58	154.59	2771	1.04	3.7	3106	1.02	3.8	6885	1.06	8.7
9	21415	50.17	171.84	3214	1.05	4.3	2678	1.07	3.4	2645	1.13	3.6
10	21414	48.94	178.27	3602	1.05	4.7	3088	1.04	3.8	2315	1.11	3.1
11	52403	4.03	145.60	3247	1.13	4.8	3733	1.09	5.0	8120	1.06	10.5
12	46413	48.67	-174.59	4107	1.04	5.3	3602	1.04	4.5	1896	1.10	2.5
13	46408	49.63	-169.87	4460	1.05	5.8	3950	1.05	4.9	1554	1.06	2.1
14	46402	50.44	-165.02	4812	1.05	6.2	4297	1.04	5.3	1219	1.07	1.7
15	46403	52.65	-156.93	5374	1.06	6.9	4844	1.05	6.1	626	1.04	0.9
16	52406	-5.33	165.08	4979	1.07	7.0	5283	1.05	7.0	7990	1.04	10.5
17	46409	55.30	-148.50	5904	1.07	7.7	5359	1.07	6.8	89	1.05	0.1
18	46410	57.50	-144.00	6148	1.09	8.2	5594	1.09	7.4	356	1.20	0.6
19	51407	19.63	-156.51	6371	1.05	8.3	6119	1.06	7.9	4091	1.09	5.6
20	55012	-15.80	158.50	5739	1.07	8.4	6145	1.07	8.6	9350	1.08	12.7
21	51425	-9.50	-176.25	6574	1.08	8.7	6726	1.05	8.4	7701	1.04	9.9
22	46419	48.76	-129.62	7332	1.04	9.8	6801	1.03	8.9	1544	1.02	2.4
23	46404	45.86	-128.78	7521	1.04	10.0	7000	1.04	9.1	1809	1.02	2.7
24	46407	42.60	-128.90	7666	1.05	10.1	7161	1.04	9.3	2078	1.06	3.1
25	46411	39.35	-127.01	7971	1.06	10.5	7477	1.04	9.7	2464	1.04	3.6
26	46412	32.25	-120.70	8860	1.05	11.5	8385	1.05	10.7	3435	1.05	5.0
27	55023	-14.80	153.59	5478	1.08	8.0	5921	1.07	8.2	9493	1.10	13.3
28	56003	-15.02	117.99	5829	1.06	8.9	6403	1.07	9.4	11563	1.06	15.9