

Understanding and lessons learned from the tsunami generated by the Hunga Tonga-Hunga Ha'apai volcano eruption on 15 January 2022 for development of Tsunami Warning and Mitigation System for tsunamis generated by volcanoes and other non-seismic sources

8th Joint ICG/PTWS– IUGG/JTC Technical Workshop in association with the ICG/PTWS sessions

1st Joint Workshop was held in conjunction with the ICG/ITSU (now PTWS) in 1985

11 September 2023, ICG/PTWS-XXX

Web page (IUGG) Additional information available on IUGG JTC web page (<https://tsunamicommission.ipma.pt/home/>) and ICG/PTWS-XXX session web sites

Format: Invited Talks, Panel, Discussion
Poster Session

● **Co-organizers**

Kingdom of Tonga, IUGG JTC, ICG/PTWS

● **Venue**

Fa'onelua Convention Centre, Nuku'alofa, Kingdom of Tonga

● **Date**

11 September 2023

● **Workshop Language**

English

● **Scientific Committee:**

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● Objectives of the workshop

The tsunami caused by the eruption of Hunga Tonga-Hunga Ha'apai volcano on 15 January 2022, hit Tonga with tsunami runups of more than 10m and caused severe damage to the coast of Tonga. The tsunami reached most Pacific coasts, even those located far away from the source area. The tsunami were also observed in the Caribbean and Mediterranean seas and in the Atlantic and Indian oceans.

In addition to tsunamis originated at the volcano location, tsunamis were also generated by the eruption-induced air pressure Lamb waves, which made several circles around the globe. This event was a real challenge for the existing Tsunami Warning Services and attracted very high scientific interest: the research on various aspects of this tsunami is still ongoing.

The first goal of the UN Ocean Decade Tsunami Programme (2021-2030) is to develop the tsunami warning system to issue timely and reliable tsunami warnings for all types of tsunami sources. The development of the warning system for non-seismic tsunamis is a challenge.

The second goal of the UN Ocean Decade Tsunami Programme aims to make 100% of communities around the world that are at tsunami risk to be prepared and resilient to tsunamis. For local seismic and landslide tsunamis that hit in minutes, and for volcano-generated tsunamis, there are currently no effective warning systems; communities must be aware of their risks, and be 'Tsunami Ready' to respond to both seismic and non-seismic tsunami sources.

In the workshop, the HTHH event will be reviewed and the mechanisms of tsunami generation and lessons learned from the HTHH event will be discussed. It is expected that the workshop presentations and panel discussion will contribute to the development of a warning system for volcanically-generated tsunamis.

● Agenda

0800-0830: Registration

08:30 – 08:45

Opening of ICG/PTWS-XXX session: Chair ICG/PTWS Mr. Yuji Nishimae

Opening of Workshop

- Chair, IUGG JTC: Dr. Yuichiro Tanioka
- Chief Secretary and Acting CEO for the Ministry of Meteorology, Energy, Information, Disaster Management, Environment, Climate Change and Communications. (MEIDECC)

08:45 – 09:00: Group photo session

09:00 – 09:30

Keynotes 1 (30 min talk)

Historical Perspectives on Non-seismic Tsunamis: Their Science and Development of Tsunami Warnings – Dr. Emile Okal (Remote)

09:30 – 11:30 (20 min talk each followed by Discussion)

Session 1: Overview of tsunami caused by eruption of the Hunga Tonga-Hunga Ha’apai volcano on 15 January 2022

Moderator: Dr. Laura Kong (ITIC Director)

TIME	TENTATIVE TITLE	SPEAKER
09:30 – 09:50	Overview of the tsunami in Tonga: Tsunami Warning	Mr. ‘Ofa Fa’anunu
09:50 – 10:10	Overview of the tsunami in Tonga: Tsunami Emergency Response	Mr. Mafua Maka
10:10 – 10:30	Overview of the Tonga tsunami in the near field - Tonga Post-Tsunami Field Survey Results	Mr. Taaniela Kula
10:30 – 11:00	Overview of the Tonga tsunami around the world	Dr. Alexander Rabinovich
11:00 – 11:30	Discussion with speakers	All

11:30 – 14:30 (20 min talk each followed by Discussion)

Session 2: Mechanism of tsunami generation for HTHH

Moderator: Dr. Alexander Rabinovich (IUGG JTC Vice-chair)

TIME	TENTATIVE TITLE	SPEAKER
11:30 – 11:50	HTHH Volcanic Eruption and other active Tonga Trench volcanoes – what happened and what next	Dr. Shane Cronin (online)
11:50 – 12:10	Generation mechanism of the far-field tsunami due to the 2022 Tonga eruption	Dr. Yuichiro Tanioka

12:10 – 13:20 Lunch

Session 2: Mechanism of tsunami generation for HTHH (continued)

TIME	TENTATIVE TITLE	SPEAKER
13:20 – 13:40	Tsunami generation and impact in the far-field	Dr. Vasily Titov
13:40 – 14:00	Back-projection of ocean observations showing a clear data-driven tsunami source migrating along the Kermadec trench at the speed of sound	Dr. Anthony Jamelot
14:00 – 14:30	Discussion with speakers	All

14:30 – 15:00 Keynotes 2 (30 min)

Historical Perspectives on Non-seismic Tsunamis: Location, Damage and Fatality rate – Dr. V. K. ‘Slava’ Gusiakov (Remote)

15:00 – 15:15 Coffee Break**15:15 – 16:30 (15 min talk each followed by Q&A, Discussion)****Session 3: Lessons and learned on tsunami warning and mitigation**

Moderator: Ms. Ashleigh Fromont (National Emergency Management Agency, NZ)

TIME	TENTATIVE TITLE	SPEAKER
15:15 – 15:30	JMA's tsunami operation for tsunami generated by volcanoes	Mr. Yoshitaka Kon (JMA)
15:30 – 15:45	Stromboli Volcano, Italy Tsunami Warning System	Dr. Mauricio Repepe (University of Florence)
15:45 – 16:00	Krakatau Volcano, Indonesia Tsunami Warning System	Mr Januar Arifin (Indonesia BMKG)
16:00 – 16:30	Discussion with speakers (30 min)	All

16:30 – 18:00**Session 4: Panel Discussion****Theme: How can we predict and mitigate for tsunami generated by volcanoes?**

Moderator: Dr. Bill Fry, PTWS WG 2 Chair

1. Overview - Setting the Scene: Tsunami Generated by Volcanoes (TGV), IOC Report (Feb 2023):
Mr Francois Schindele, TOWS Ad-Hoc TT on Tsunami Generated by Volcanoes

2. Panel Discussion

Panelists:

- a. Dr. Chip McCreery (Director PTWC)
- b. Dr. Laura Kong (Director ITIC)
- c. Mr. Francois Schindele
- d. Ms. Eslin Garaebiti (Vanuatu) (TBC)
- e. Dr. Alexander Rabinovich (IUGG JTC Vice-chair)
- f. Dr. Mauricio Repepe (IGNV)

18:00 – 18:15: Closing Addresses

Chair, ICG/PTWS: Mr. Yuji Nishimae

● **Poster Session**