**Survey on Ocean Data Requirements for Tsunami Warning Services**

**Background**

This survey is being used to help guide an international workshop which will explore novel, cost-effective ways to detect and monitor tsunamis once generated in a way that meets early warning needs

The workshop will be hosted by the WMO/IOC Data Buoy Cooperation Panel ([DBCP](https://www.ocean-ops.org/dbcp/doc/DBCP%20Strategy/DBCP%20Strategy%202022-2027.pdf)) in collaboration with both the IOC Working Group on Tsunamis and Other Hazards Related to Sea-Level Warning and Mitigation Systems ([TOWS-WG](http://www.ioc-tsunami.org/index.php?option=com_content&view=article&id=417&Itemid=364&lang=en)) and the IOC Tsunami Unit. The workshop will be an important contribution to the IOC's Ocean Decade [Tsunami Programme](http://www.ioc-tsunami.org/) in support of the *Safe Ocean* outcome of the [UN Decade of Ocean Science for Sustainable Development](https://www.oceandecade.org/).

The workshop will focus on innovative, cost-effective tsunami detection and monitoring solutions driven by the requirements that we are seeking through this survey. The imperative for new solutions is motivated by the objective to increase timeliness and accuracy of tsunami warnings, whilst also reducing the significant costs associated with running the current technology (tsunameter DART systems) relied upon by all Tsunami Service Providers (TSPs) and many National Tsunami Warning Centres (NTWCs) around the world. The new solution may or may not necessarily be located in the deep ocean, but rather close enough to the location of tsunami generation to maximise the warning lead times.

It is anticipated that workshop participants will be drawn from a wide spectrum of disciplines, both traditional and non-traditional in relation to tsunami observations and detection. Participation will be encouraged from the government, academic and commercial sectors. The workshop is expected to be held over the next 6 to 12 months.

This survey is being sent to TSPs and national agencies/centres with a responsibility for the provision of tsunami threat information and early warnings. The requirements that we are seeking information on fall into three requirement categories:

* Customer/user requirements
* Operational requirements and
* Technology requirements.

Customer/user requirements refer to the information that is needed to determine the nature and characteristics of the tsunami and its potential impact. For example, the need to know: a) What observational data are required to determine whether a tsunami has been generated once a potential seismic or non-seismic generating source of a tsunami has occurred (e.g. undersea earthquake, submarine landslide, volcano collapse, meteo-tsunamis); b)Through use of the observations in forecasting tools, when a tsunami will arrive at the shoreline, where will be potentially impacted the hardest, how accurate does this information (observations and forecasts) need to be, and how best to verify forecasts/warnings.

Operational requirementsrefer to the information that is needed in relation to operating the tsunami detection systems. For example, the need to know: The cost of operations needs to be less than X dollars per year, the uptime of the detection service needs to be greater than Y%, the data needs to be of a minimum quality threshold, what is the minimum maintenance frequency, the detection systems need to mitigate against vandalism, the optimal number and locations of the tsunami detection systems, etc.

Technology requirementsrefer to the information that is needed in relation to the tsunami detection system. For example, the need to know: Method to measure the tsunami wave height, the measurement frequency that you need, the accuracy of the data required, timeliness/latency of the communication of the measurement to shore, susceptibility to false alarms, the cost of the technology, maintenance requirements, existing infrastructure to leverage, etc.

The workshop will be focused on innovative, cost-effective technology solutions that are primarily driven by the customer/user requirements and operational requirements and that can replace DART technology. Consequently, please focus your responses in relation to the detection and monitoring of tsunamis.

**Proposed survey questions (NB there will be fields requesting contact details et cetera)**

1. Do you:
	1. Directly monitor and/or utilise sea level data in your tsunami threat evaluation and tsunami warnings? If no, please explain why you don't
	2. Utilise already analysed sea level information provided as part of tsunami threat information provided by Tsunami Service Providers (TSPs) for your region?
	3. Utilise sea level data directly from your own national or international sources?
2. Do you have direct access to sea level data to be able to use it for tsunami detection and warning if you need to? If yes,
	1. How do you presently access it?
3. If you don’t have direct access to sea level data to be able to use it for tsunami detection and warning:
	1. Would you like access?
	2. How would you like to access it?
	3. Please explain any access issues you may have
4. Do your requirements for tsunami early warnings address all three requirement categories (customer/user, operational, technology)? If no,
	1. Which categories do your requirements address? (*Provide as check list*)
5. Describe your baseline requirements\* (see examples of requirements below and please focus on customer/user and operational related requirements)
6. Are your requirements prioritised? If yes, how have you prioritised them i.e., what are the criteria used?
7. What tsunami detection and monitoring technology do you currently rely on?
8. What gaps or issues do you have (e.g., requirements that are not met or only partially met) in relation to your baseline requirements?
9. If you are addressing any of the gaps/issues, please describe what you would like to do or what you are doing/planning so that you can fully meet your requirements?
10. Have you heard of any new or emerging technology that is promising for tsunami early warnings? If yes,
	1. What is the new or emerging technology?
	2. Please provide a contact for the new or emerging technology (e.g., an email address)
11. Are there emerging customer and/or operational requirements for your tsunami early warning service? If yes,
	1. What are these emerging requirements?
	2. When do you need these emerging requirements addressed, and why?
12. Do you have documentation detailing your requirements? If YES:
	1. Can you share your documented requirements with us?
	2. How recently was your documented list of requirements reviewed (month and year)?
	3. When will you next update your list of requirements (month and year)?
13. Is there anything else that you would like to add?

**Supplementary questions**

1. Would you like to be kept up-to-date with the development of the workshop? If yes, please provide name, job title, email details, and the reason of interest of those who would like to be kept up-to-date
2. Would you be interested in participating in the workshop (noting that we are likely to have to limit the number of participants that can participate in person, although arrangements will be made for online participation if necessary and if possible)?
3. Would you be interested in helping to write the workshop report?
4. Do you have a report or document related to this topic or any assessment of available tsunami technology conducted by you, that you can please share us with?
5. Would you be interested in being on the workshop organizing committee?
* ***Baseline requirements might include, but not limited to:***
	1. Whether need to monitor for waves generated by:
		1. Seismic sources
		2. Non-seismic sources
	2. Minimum time for a tsunami to be detected after generation by a possible source
	3. Minimum time for a tsunami to be detected before impacts a coastline
	4. Data receipt mechanism (e.g. email, GTS, website (please specify which site), etc)
	5. Data resolution (time and space)
	6. Data quality control requirements
	7. Data archive requirements
	8. Whether need station metadata on data quality, reliability, location (e.g. whether also well-sited for tsunami detection if a tide gauge)

**Proposed timelines for completing the survey:**

Feedback on survey form from TOWS-WG TT TWO by 21 Jan

Revise survey form as necessary and send to NTWCs and relevant WGs of each ICG by 26 Jan

Responses from NTWCs and WGs by 11 Feb

Analyse results by 18 Feb

Report results to TT TWO 22 Feb