National Oceanography Centre

19TH SESSION OF THE ICG/NEAMTWS
UK NATIONAL REPORT

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NATIONAL OCEANOGRAPHY CENTRE
WITH CONTRIBUTION FROM USAMA KADRI, CARDIFF UNIVERSITY

IMPROVEMENTS IN UK MONITORING AND DETECTION

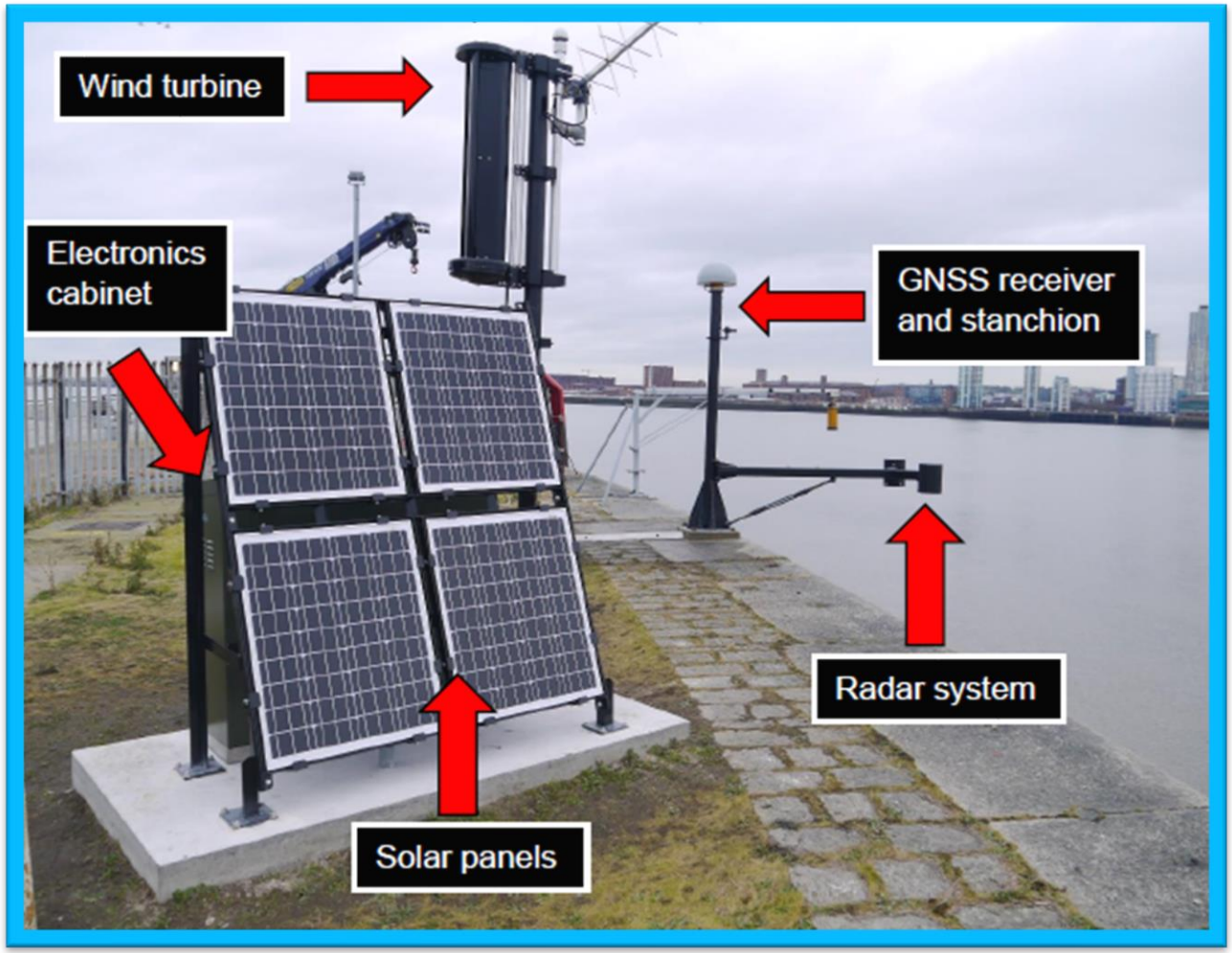
National Oceanography Centre

- UK National Tide Gauge Network of ~43 gauges is ageing and only affords 15 min averaged sampling, so is unsuitable for tsunami monitoring and detection
- Data quality has deteriorated and the network no longer meets the instrumentation and accuracy standards demanded for monitoring mm-scale trends and contributing to assessments of sea level change
- Exacerbated by insufficient land motion observations at tide gauges (a major area of uncertainty)
- In 2021, UK National Oceanography Centre won funding install ‘state of the art’ tide gauges at 3 of the 7 sites that afford the longest records, in order to preserve data continuity

IMPROVEMENTS IN UK MONITORING AND DETECTION

National Oceanography Centre

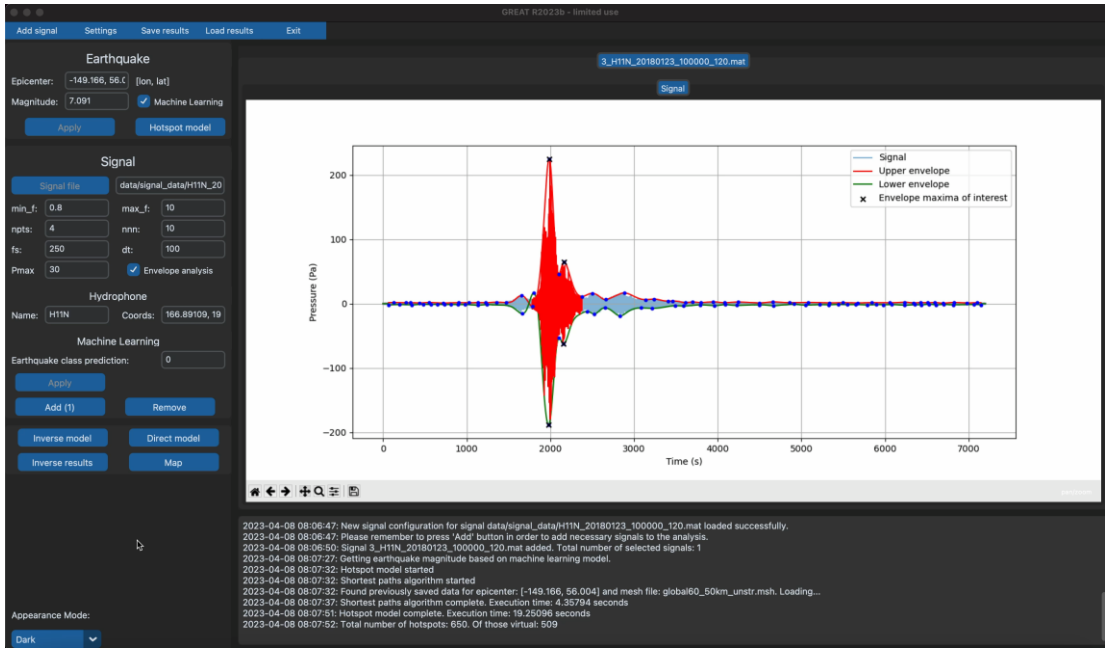
- Renewably-powered systems (where possible) monitoring sea level, significant wave height, atmospheric pressure, vertical land motion. GNSS-IR eliminates the need for ongoing manual levelling.
- Provide 1 min sampling for tsunami detection
- In 2024, the NOC won UKRI Strategic Capital funding to install tide gauges at the final 4 of the 7 key long-term sites (Aberdeen, North Shields, Lerwick, Stornoway). Project commences April 2025.



Alfred Lock, Liverpool

Improvements in Monitoring and Detection : Usama Kadri, Cardiff University
Operational Software: Global Real-time Early Assessment of Tsunami (GREAT)

Detection → Warning → Dissemination

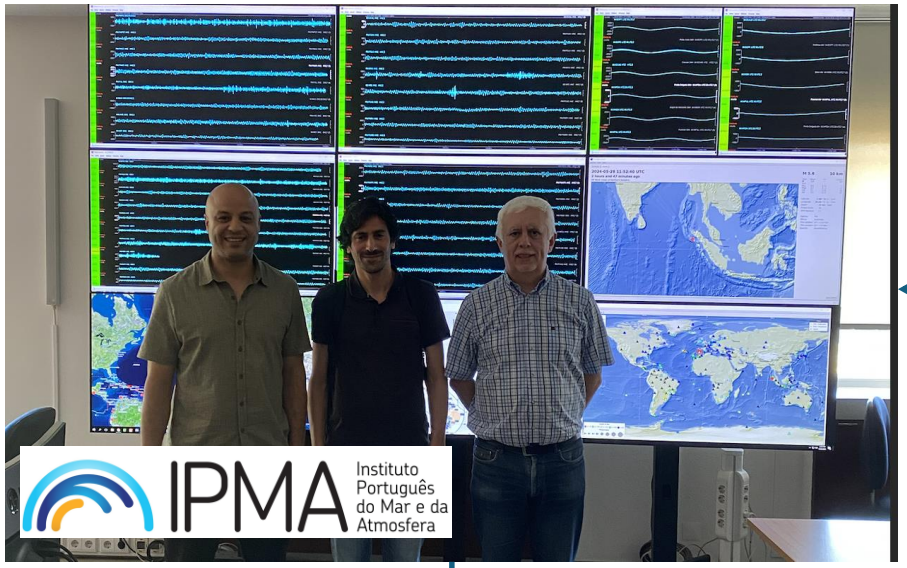


- Provides **initial assessment** based on EQ epicentre, sensors' locations, and required evacuation time.
- Detects signals; **categorises** earthquakes / events; **analyses** hydroacoustic data; calculates **tsunami size**
- Operates **automatically**, and **manually** (after training)
- Hydrophones & Tide-gauges data are already integrated; other data sources can be integrated, e.g., seismic/GNSS, SMART cables, ...

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

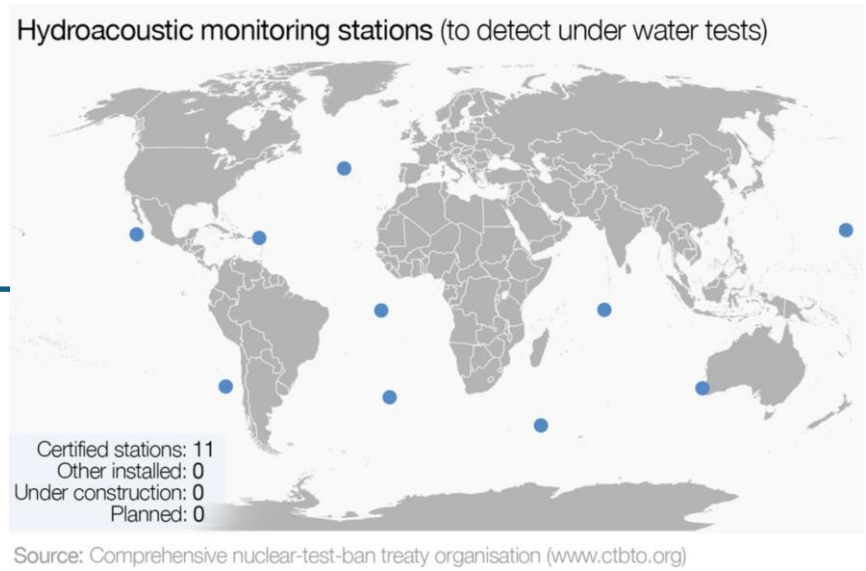
Access to IMS/CTBTO Real-Time Hydroacoustic Data

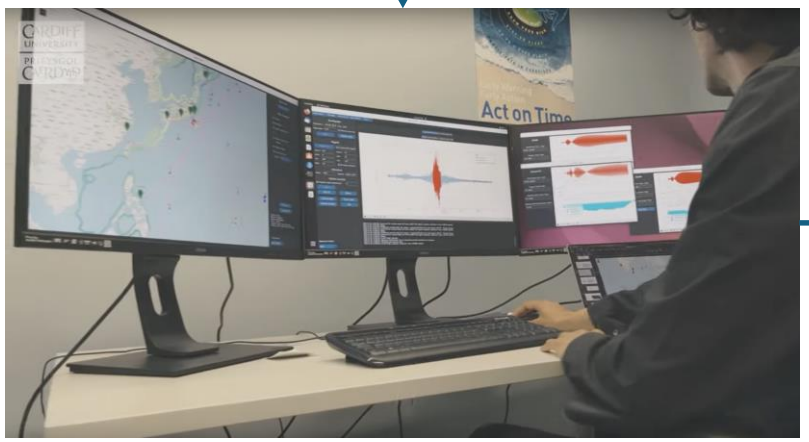
Software deployed at IPMA June 2024



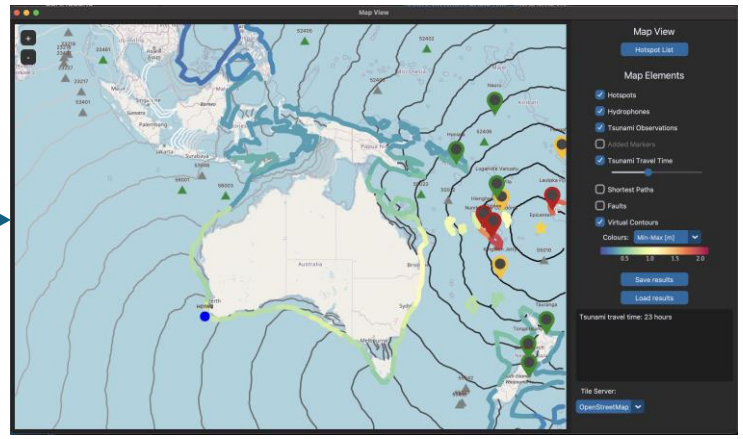
CTBTO hydroacoustic data

Real-time access





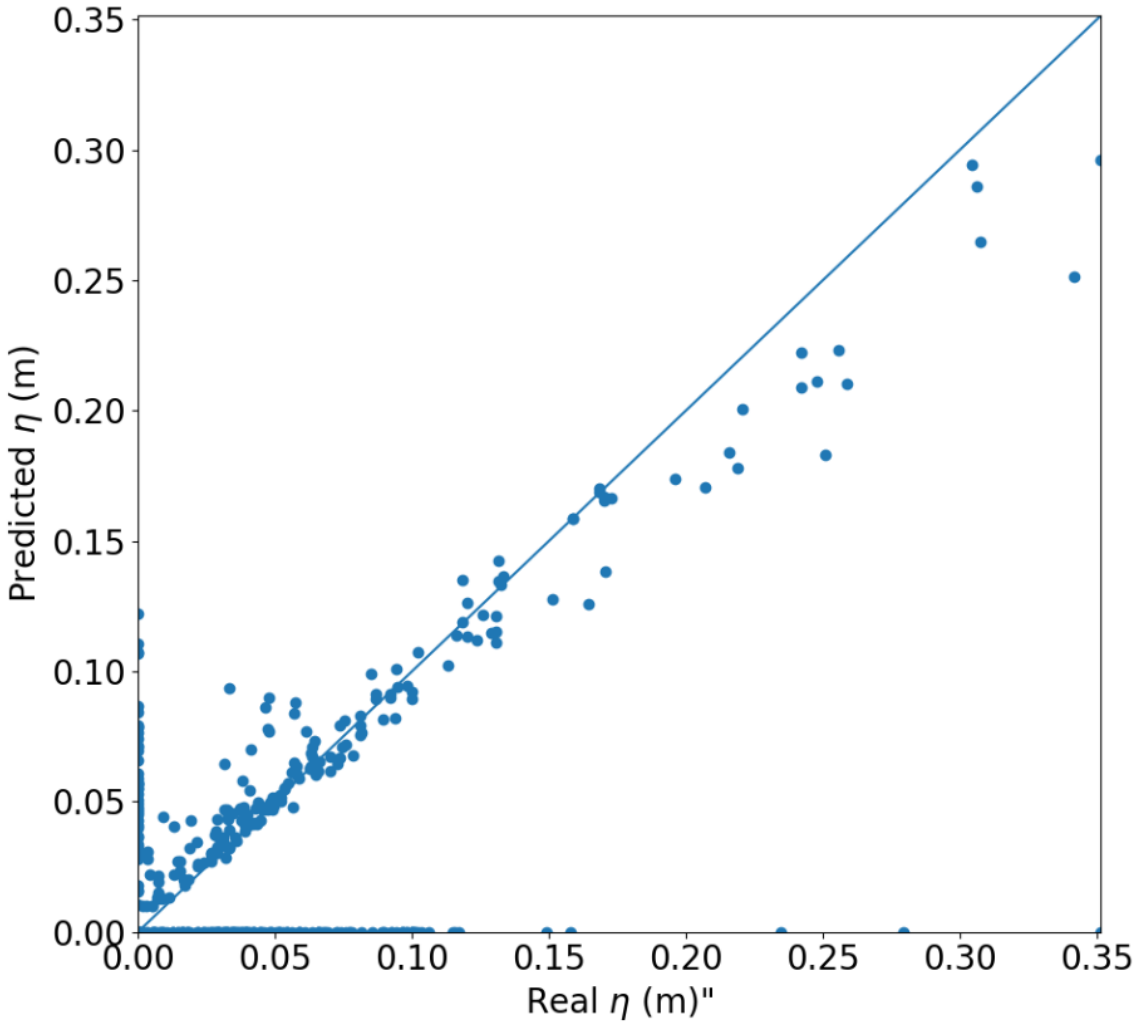
Cardiff University Tsunami Centre, UK



- Assess Tsunami globally & benefit coastal communities, including SIDS and LDCs
- Fully automated operational software is being developed (expected by January 2025)

Integrating a new Machine Learning model

- Implemented a new **machine learning** model to predict surface elevation at any given location.
- The model is a combination of a random forest **classification & regression** models.
- It uses **pressure signal**, earthquake epicentre and locations features:
  - ➢ Classifies if an event is tsunamigenic or not
  - ➢ Uses regression to predict the Tsunami size



Evaluation of surface elevation machine learning model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