On the Job Training on

Tsunami Inundation Modelling and Mapping and Development of Tsunami Hazards Maps for Implementation of UNESCO-IOC Tsunami Ready Pilot Sites in Madagascar, Maldives, Seychelles and Sri Lanka

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Tsunami Inundation Modelling and Mapping

TIMM #: 1.6 Review of pilot sites and available datasets

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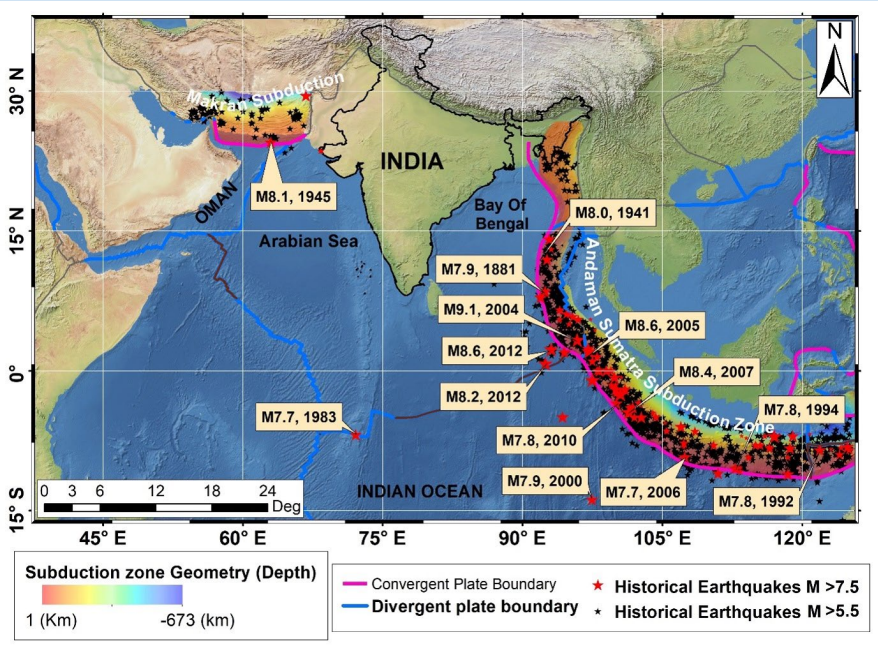
Criteria for Selection of Pilot Sites

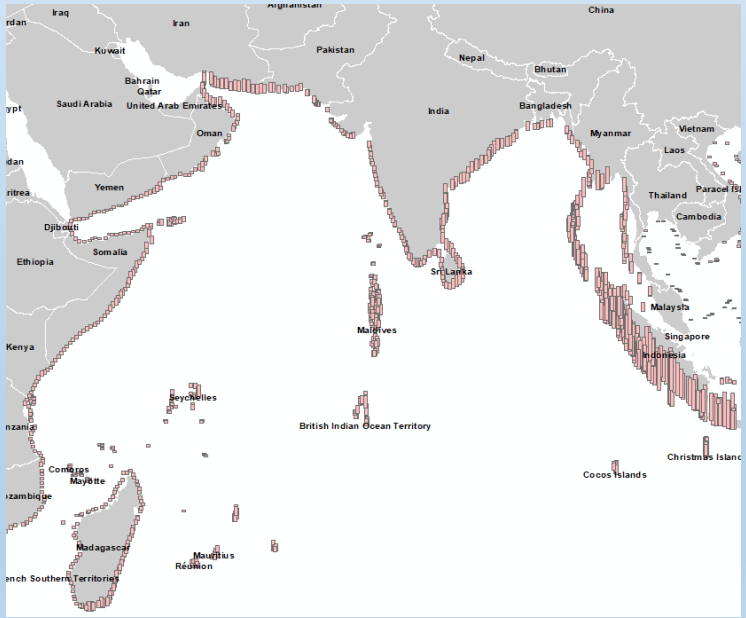
- Tsunami hazard exposure
- Population and infrastructure vulnerability
- Historical tsunami records
- Availability of topographic and bathymetric data
- Coastal geomorphology
- Accessibility of supporting datasets

History



Scenario

Probability



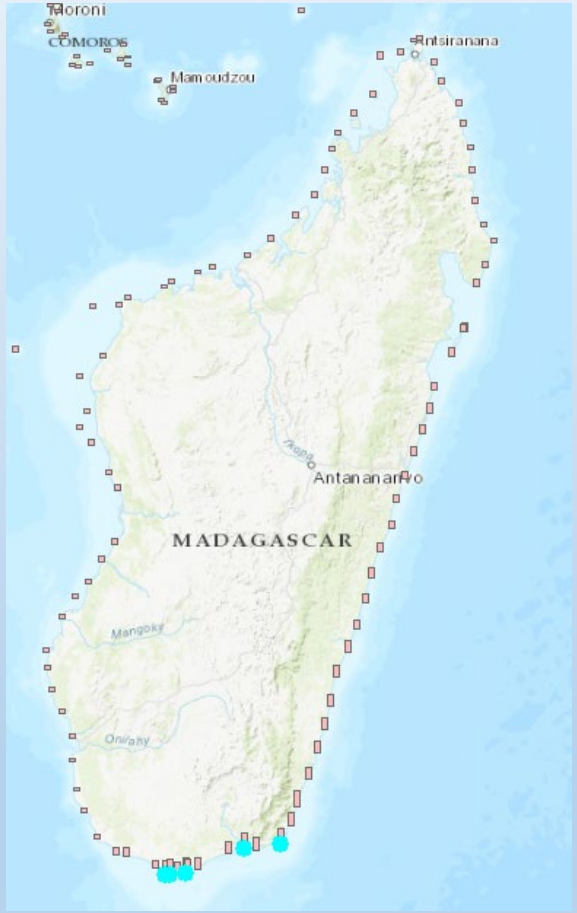
Highly vulnerable Areas

(Based on the probabilistic tsunami amplitudes in 1000y recurrence)

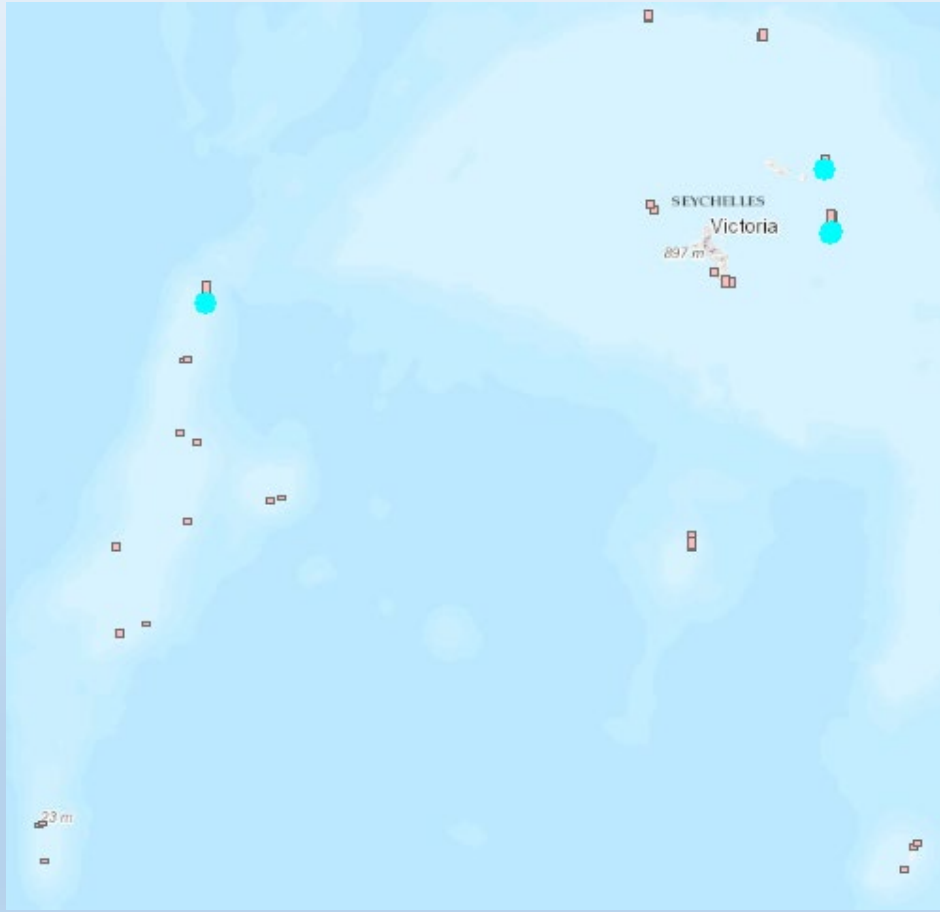
Maldives

Sri Lanka

Madagascar



Seychelles



Key Datasets Required for Tsunami Inundation Mapping and sources

- **Digital Elevation Model (DEM) / Topography**
- **Bathymetry data**
- **Coastline and shoreline data**
- **Land use / land cover**
- **Administrative boundaries**
- **Tide and sea level data**
- **Historical tsunami data**
- **Satellite imagery**

Bathymetric Data Sources
- **Multibeam bathymetry surveys**
- **Single beam surveys**
- **GEBCO bathymetry**
- **National hydrographic datasets**

Important aspects:
- Depth resolution
- Nearshore coverage
- Data gaps

Satellite and Remote Sensing Data
- **Sentinel-2 imagery**
- **Landsat imagery**
- **High-resolution commercial imagery**
- Used for:
  - coastline extraction
  - land use mapping
  - validation

Topographic Data Sources
- **LiDAR surveys**
- **SRTM DEM**
- **ASTER DEM**
- **National topographic datasets**
- **Drone-based surveys (if available)**

Key considerations:
- Resolution
- Vertical accuracy
- Coverage

Supporting Data
- **Population data**
- **Critical infrastructure**
- **Road networks**
- **Evacuation routes**
- **Building footprints**

Purpose:
- Risk and vulnerability analysis.

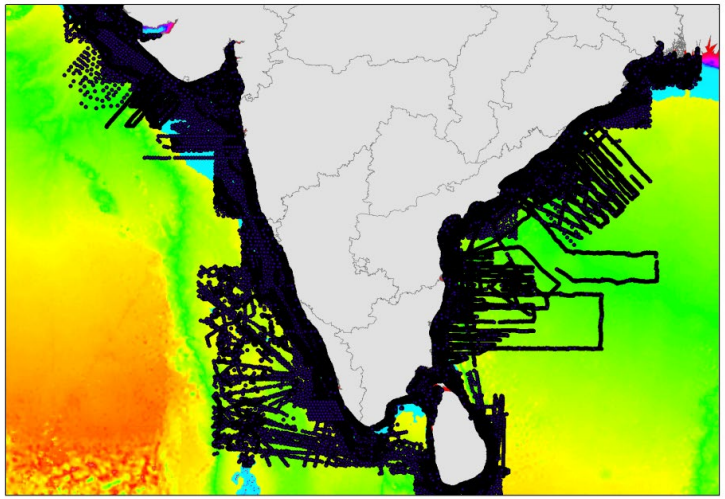
Bathymetry data, Sources and merging

Bathymetry

Method of Generation of bathymetry data
Survey from sea
- Single Beam Echosounder (SBE)
- Multibeam echosounders (MBE)
- Sounding

Satellite:
- Optical characteristics and inhering water depth
- Wave characteristics
- Bathymetric LIDAR

Example: NHO Charts, SBE, MBE from ship for deep areas, coastal Jetski fitted with SBE and GPS



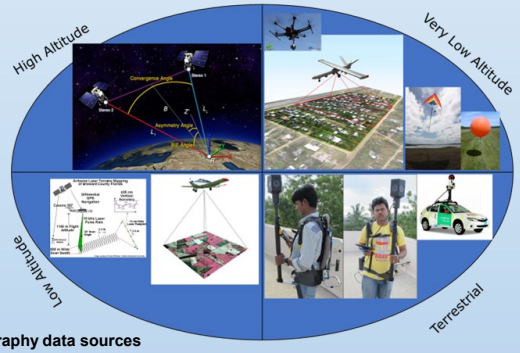
Topography

Method of Generation of Topographic data
Survey from sea
- GPS, RTK, Levelling, etc
- 360 degree street mapping

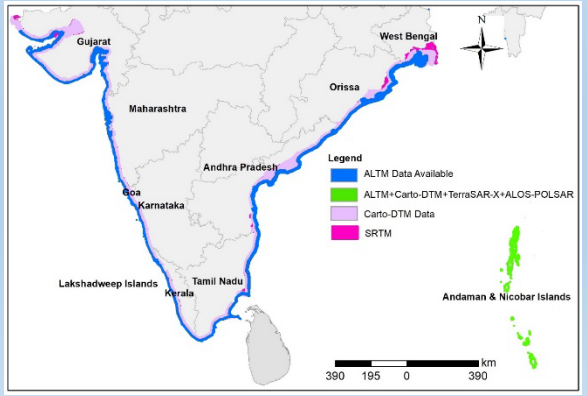
Remote Sensing (Photogrammetry and LiDAR mapping)
- Drones
- Aerial

Satellite:
- Oprical:Satellite Stereo
- Microwave: Interferometric

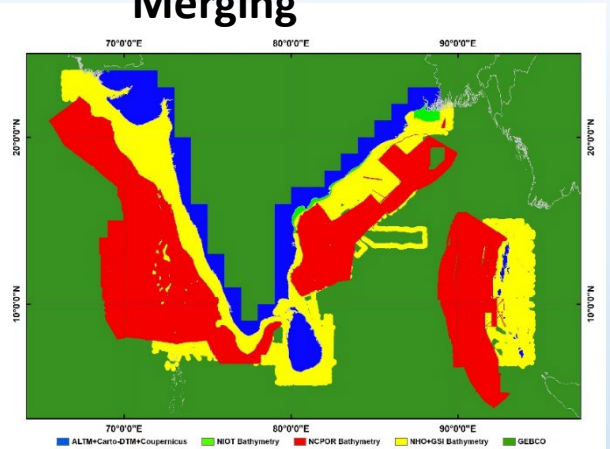
Examples of Topographic Mapping Techniques

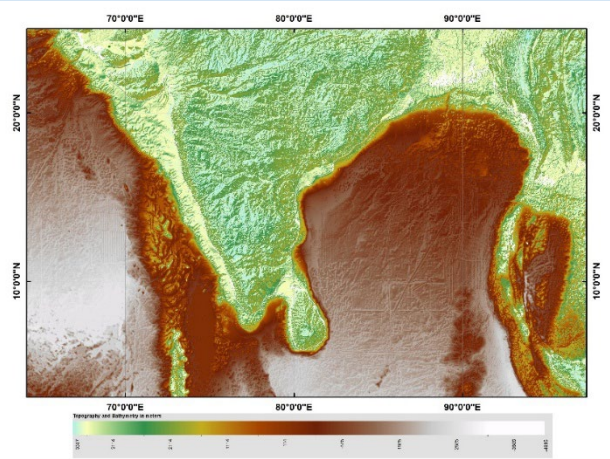


Topography data sources
- ALTM
- Carto-DTM
- RTK



Merging





Challenge	Details
Different Resolutions	Land data often finer than ocean data
Data Voids	Deep ocean areas lack measurements
Vertical Datums	Mean Sea Level vs. EGM96, NAVD88, etc.
Edge Matching	Seamless transitions at coastlines
Coordinate Systems	UTM vs geographic, projections
Units	Meters vs. feet, positive up vs. down

Let us explore the Opensource data available on: https://freegisdata.rtwilson.com/

Thank you