A Canadian First: NOAA brings tsunami Digital Elevation Model training to Victoria, BC

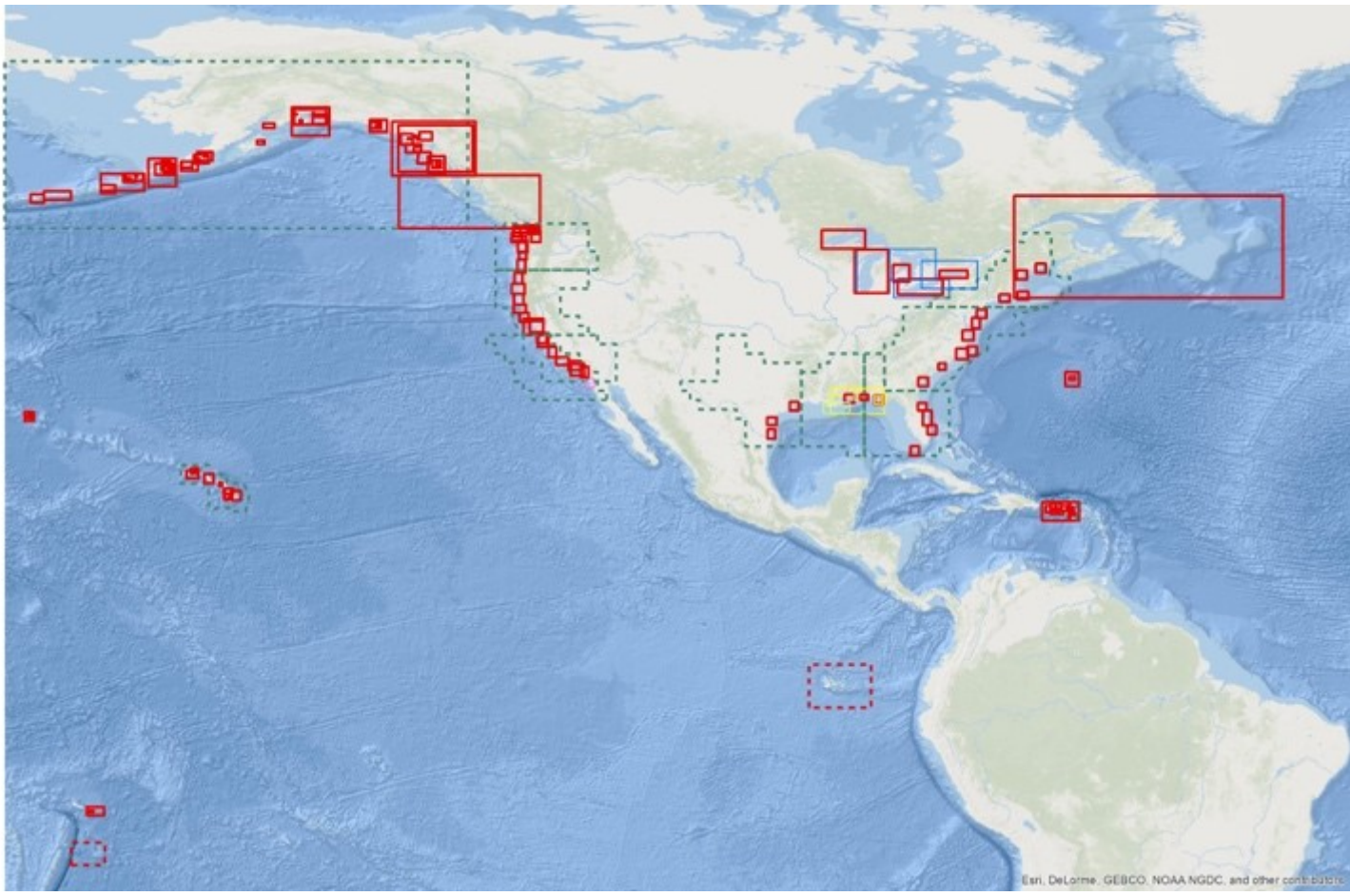
Submitted by Max Kasprzik Tue, 2016-05-10 11:41

When Kelly Carignan, University of Colorado scientist, visited Victoria, British Columbia for the first time in April 2016, she was surprised that no tsunami evacuation routes were posted in this coastal city. ?In northern California you see a lot of tsunami hazard zone signs,? says Kelly.

Fortunately for Victoria, Kelly was in town to lead a ground-breaking workshop that will contribute to improved emergency preparedness efforts in Canada?s coastal communities.

Kelly Carignan (left) and Matthew Love (right) with his wife (middle) have developed global tsunami
DEM standards through their work with NOAA/NCEI.

For the last decade, Kelly and her colleague, Matthew Love, have been working with National Center for Environmental Information (NCEI) at the National Ocean & Atmospheric Administration (NOAA) to develop high-resolution Digital Elevation Models (DEM) of US coastal regions *(see map below)*. DEMs are a vital tool in tsunami forecasting and water level inundation modelling and NCEI has defined the global standards being used by tsunami planning and warning centres.



In addition to developing tsunami DEMs in the US (locations shown above in red), the NOAA/NCEI team has worked with emergency preparedness teams in tsunami-prone areas such as Myanmar, Seychelles, southern India, and Sri Lanka. Click here to find out more about the international DEM train program.

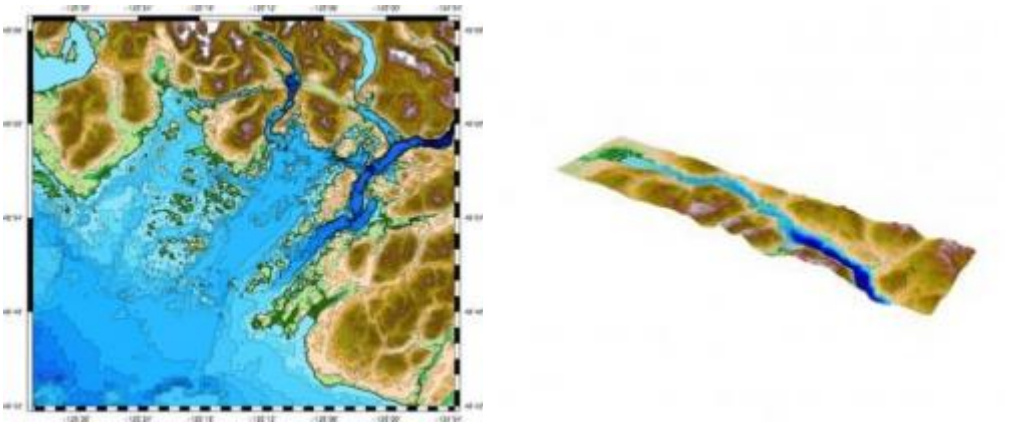
With support from Emergency Management BC (EMBC), Ocean Networks Canada (ONC) invited Kelly and Matthew to bring their DEM expertise to British Columbia to lead a workshop from 18 ? 22 April 2016 at the University of Victoria (UVic). This DEM training session brought together ten participants from ONC, UVic, GeoBC, Canadian Hydrographic Service (CHS) and Alberni-Clayoquot Regional District (ACRD). These key members of the local DEM community learned the painstaking process involved in developing a tsunami DEM using a variety of data sources, software and rigorous methodologies.

DEM Workshop participants. From left to right: top row: Neil Dangerfield (CHS), Peter Wills (CHS), Tania Insua (ONC), Matthew Love (NCEI/NOAA), Kelly Carignan (NCEI/NOAA). Second row: Nazma Panjwani (UVic), Karen Douglas (ONC), Aaron McMillan (GeoBC), Azadeh Ramesh (GeoBC), Anne Balantyne (CHS), Lori Wilson (ACRD). Front row: Kim Tenhunen (UVic).

Unlike other DEMs for land or sea, tsunami modelling presents a unique challenge; tracking powerful, landward-moving waves involves a sophisticated integration of both land-based topographic data (elevation) and ocean-based bathymetric data (water depth) into one seamless data set. As the workshop participants discovered, this task is extremely complex, detailed, and time-consuming. It involves gathering, editing and integrating multiple data formats from a variety of sources to create the single high-resolution data set needed for a tsunami DEM. All these datasets also need to be referenced to the same tidal reference (datum), which varies along British Columbia?s coast.

An effective DEM is dependent on sourcing good quality data, which in itself is no simple task. High resolution data are not always available, and the data that do exist may be in different

formats, different resolutions or missing altogether. While developing a detailed DEM of the Port Alberni area (as seen below), workshop participants identified a lack of high-resolution data for a waterfront campground on the edge of the city. The importance of understanding how a tsunami would affect an area at the head of a deep-water ocean inlet identified the need to source higher resolution data for this particular location.



DEM of Barkley Sound and Port Alberni. These DEMs are one of the required inputs to be able to model tsunami inundation for the City of Port Alberni.

?I always knew the process for DEM was complex, but I now understand the level of effort that it takes to combine all the data,? says workshop host, Tania Insua. Tania is ONC?s Ocean Analytics Program Manager and regularly runs tsunami wave propagation models.

By bringing together a variety of international and local collaborators, this workshop created an important opportunity for DEM workshop participants to connect, for the first time, to learn from the NOAA experts, and to share data sources. Each organization brings a vital piece of the puzzle: GeoBC and ACDR have topographic data; CHS and ONC have bathymetric data; and ONC and UVic are running tsunami inundation models. Additionally, NOAA?s National Tsunami Warning Center provides tsunami alerts to EMBC. As a result of this group?s efforts, the creation of DEM and tsunami inundation models for Canada?s coastal areas will improve the preparedness of the at-risk areas, and inform and strengthen the collaboration with the NOAA Tsunami Warning Centre and EMBC. ?It is impossible to get British Columbia coastal communities tsunami ready in isolation; to be effective, it is vital for all the agencies to collaborate,? cautions Tania.

?Environmental issues don?t recognize borders,? comments Matthew Love. ?Data collaboration is important, so we can all work together to mitigate hazards.?

This shared learning experience has opened the door for international communication and collaboration to improve tsunami preparedness in British Columbia and the rest of the Canada. It is a first step, but an important one that will enable other communities to prepare.

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