Geophysical Research Abstracts
Vol. 17, EGU2015-7796, 2015
EGU General Assembly 2015

On the Development of Multi-Hazard Early Warning Networks: Practical experiences from North and Central America.

David Mencin (1), Kathleen Hodgkinson (1), John Braun (2), Charles Meertens (1), Glen Mattioli (1), David Phillips (1), Fredrick Blume (1), Henry Berglund (1), Otina Fox (1), and Karl Feaux (1)

(1) UNAVCO, Boulder, CO, United States (mencin@unavco.org), (2) University Corporation for Atmospheric Research, Boudler, CO

The GAGE facility, managed by UNAVCO, maintains and operates about 1300 GNSS stations distributed across North and Central America as part of the EarthScope Plate Boundary Observatory (PBO) and the Continuously Operating Caribbean GPS Observational Network (COCONet). UNAVCO has upgraded about 450 stations in these networks to real-time and high-rate (RT-GNSS) and included surface meteorological instruments. The majority of these streaming stations are part of the PBO but also include approximately 50 RT-GNSS stations in the Caribbean and Central American region as part of the COCONet and TLALOCNet projects. Based on community input UNAVCO has been exploring ways to increase the capability and utility of these resources to improve our understanding in diverse areas of geophysics including seismic, volcanic, magmatic and tsunami deformation sources, extreme weather events such as hurricanes and storms, and space weather.

The RT-GNSS networks also have the potential to profoundly transform our ability to rapidly characterize geophysical events, provide early warning, as well as improve hazard mitigation and response. Specific applications currently under development with university, commercial, non-profit and government collaboration on national and international scales include earthquake and tsunami early warning systems and near real-time tropospheric modeling of hurricanes and precipitable water vapor estimate assimilation. Using tsunami early warning as an example, an RT-GNSS network can provide multiple inputs in an operational system starting with rapid assessment of earthquake sources and associated deformation which informs the initial modeled tsunami. The networks can then can also provide direct measurements of the tsunami wave heights and propagation by tracking the associated ionospheric disturbance from several 100's of km away as the waves approaches the shoreline. These GNSS based constraints can refine the tsunami and inundation models and potentially mitigate hazards. Other scientific and operational applications for high-rate GPS include glacier and ice sheet motions, tropospheric modeling, and better constraints on the dynamics of space weather.

Our operational system has multiple communities that use and depend on a Pan-Pacific real-time open data set. The ability to merge existing data sets and user communities, seismic and tide gauge observations, with GNSS and Met data products has proven complicated because of issues related to meta-data, appropriate data formats, data quality assessment in real-time and specific issues related to using these products in operational forecasting. Additional issues related to data access across national borders and cognizant government sanctioned "early warning" agencies, some committed to specific technologies, methodologies, internal structure and further constrained by data policies make a truly operational system an on-going work in progress.

We present a short history of evolving a very large and expensive RT-GNSS network originally designed to answer specific long term scientific questions about structure and evolution of North American plate boundaries into a much needed national hazard system while continuing to serve our core community in long term scientific studies. Out primary focus in this presentation is an analysis of our current goals and impediments to achieving these broader objectives.