Geophysical Research Abstracts
Vol. 15, EGU2013-9704, 2013
EGU General Assembly 2013

Towards a certification process for tsunami early warning systems

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The natural disaster of the Boxing Day Tsunami of 2004 was followed by an information catastrophe. Crucial early warning information could not be delivered to the communities under imminent threat, resulting in over 240,000 casualties in 14 countries. This tragedy sparked the development of a new generation of integrated modular Tsunami Early Warning Systems (TEWS).
While significant advances were accomplished in the past years, recent events, like the Chile 2010 and the Tohoku 2011 tsunami demonstrate that the key technical challenge for Tsunami Early Warning research on the supranational scale still lies in the timely issuing of status information and reliable early warning messages in a proven workflow.
A second challenge stems from the main objective of the Intergovernmental Oceanographic Commission of UNESCO (IOC) Tsunami Programme, the integration of national TEWS towards ocean-wide networks: Each of the increasing number of integrated Tsunami Early Warning Centres has to cope with the continuing evolution of sensors, hardware and software while having to maintain reliable inter-center information exchange services. To avoid future information catastrophes, the performance of all components, ranging from individual sensors, to Warning Centers within their particular end-to-end Warning System Environments, and up to federated Systems of Tsunami Warning Systems has to be regularly validated against defined criteria.
Since 2004, GFZ German Research Centre for Geosciences (GFZ) has built up expertise in the field of TEWS. Within GFZ, the Centre for GeoInformation Technology (CeGIT) has focused its work on the geoinformatics aspects of TEWS in two projects already, being the German Indonesian Tsunami Early Warning System (GITEWS) and the Distant Early Warning System (DEWS). This activity is continued in the TRIDEC project (Collaborative, Complex, and Critical Decision Processes in Evolving Crises) funded under the European Union's seventh Framework Programme (FP7).
TRIDEC focuses on real-time intelligent information management in Earth management and its long-term application: The technical development is based on mature system architecture models and industry standards. The use of standards already applies to the operation of individual TRIDEC reference installations and their interlinking into an integrated service infrastructure for supranational warning services. This is a first step towards best practices and service lifecycles for Early Warning Centre IT service management, including Service Level Agreements (SLA) and Service Certification.
While on a global scale the integration of TEWS progresses towards Systems of Systems (SoS), there is still an absence of accredited and reliable certifications for national TEWS or regional Tsunami Early Warning Systems of Systems (TEWSoS). Concepts for TEWS operations have already been published under the guidance of the IOC, and can now be complemented by the recent research advances concerning SoS architecture. Combined with feedback from the real world, such as the NEAMwave 2012 Tsunami exercise in the Mediterranean, this can serve as a starting point to formulate initial requirements for TEWS and TEWSoS certification:
Certification activities will cover the establishment of new TEWS and TEWSoS, and also both maintenance and enhancement of existing TEWS/TEWSoS. While the IOC is expected to take a central role in the development of the certification strategy, it remains to be defined which bodies will actually conduct the certification process.
Certification requirements and results are likely to become a valuable information source for various target groups, ranging from national policy decision makers, government agency planners, national and local government preparedness officials, TWC staff members, Disaster Responders, the media and the insurance industry.