

FACTSHEET

Project Management



German Indonesian Tsunami Early Warning System

Establishment of a Tsunami Early Warning System in the Indian Ocean – The German Contribution



HELMHOLTZ CENTRE POTSDAM
GFZ GERMAN RESEARCH CENTRE FOR GEOSCIENCES

An Early Warning System for the Indian Ocean

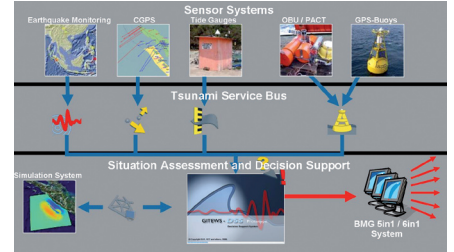
The Sumatra earthquake of December 26, 2004 was the second largest ever detected rupture in the Earth's crust. Already after about 12 minutes the seismic waves were automatically recorded and analysed at the GFZ in Potsdam (Germany) and at other seismological centres worldwide. Only a few minutes after the detection of the earthquake the first tsunami waves hit the coastlines of Northern Sumatra.

Shortly after the Tsunami Disaster where almost a quarter of a million humans lost their lives, Germany offered technical support for the installation and implementation of a Tsunami Early Warning System in the Indian Ocean. Since March 14, 2005 Indonesia and Germany have been officially working together to implement a Tsunami Early Warning System in Indonesia. This implementation will be largely completed this year. A joint cooperation on the optimization, operation and maintenance of the system is further planned up to March 2010.

The Components

In more than 90 % a tsunami is caused by an submarine earthquake. A fast and correct seismological recording and evaluation is therefore essential for the warning system. But based on seismological measurements it is mostly impossible to decide whether a tsunami has arisen or not. Therefore the detection of a tsunami is carried out directly on the ocean. Thus the system includes a seismological network

consisting of broadband seismometers as well as GPS stations and a network of GPS buoys additionally equipped with ocean bottom pressure sensors and a tide gauge network. The GPS functionality is an important technical improvement compared to other buoy systems used for example in the Pacific.



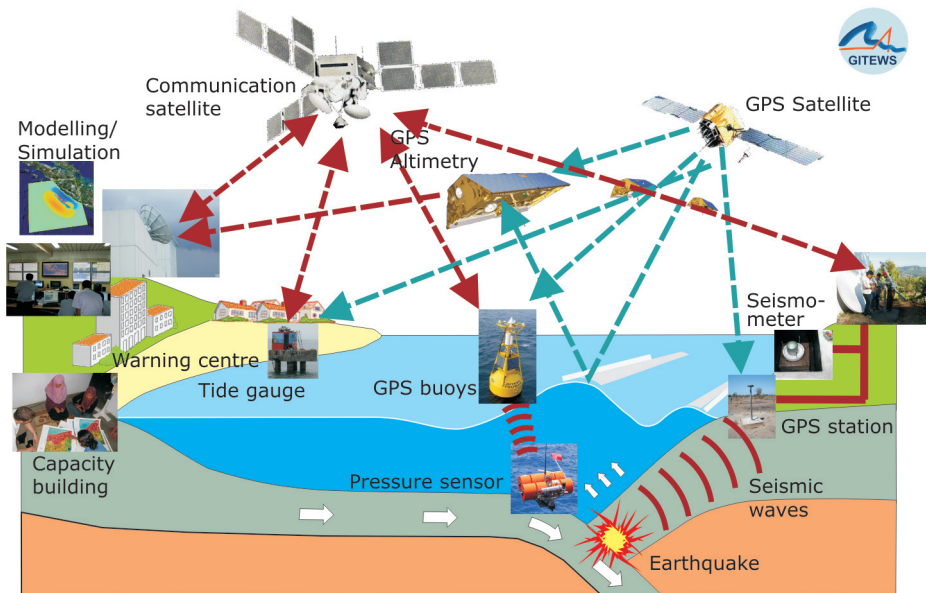
The respective sensors are connected by satellite communication to the Early Warning and Mitigation Centre operated by the Indonesian Meteorological and Geophysical Agency (BMG) in Jakarta. In this Warning Centre the on-line data-streams are processed, and, on the basis of the sensor data, tsunami simulations can be provided rapidly and used in a Decision Support System for the generation of a fast and detailed picture of the actual situation.

Tsunami simulations are of particular importance for the whole warning process. Based on a few measured data an overall picture has to be calculated. A couple of seconds after the earthquake the modelling results will give an estimation on the wave height, the time of arrival and the inundation areas. Since warning times in Indonesia are extremely short, thousands of different scenarios are pre-calculated and collected in databases. Using



SPONSORED BY THE





GITEWS is a project of the German Federal Government to aid the reconstruction of the tsunami-prone region of the Indian Ocean. It is accomplished by a consortium of nine institutions.

Project Coordination:

Helmholtz Centre Potsdam
 GFZ German Research Centre for Geosciences
 Dr. Jörn Lauterjung
 Telegrafenberg
 14473 Potsdam
 Germany
 (lau@gfz-potsdam.de)

Further information:

<http://www.gitews.org>

Partners in Germany:

GFZ German Research Centre for Geosciences (coordination)
 Alfred Wegener Institute for Polar and Marine Research (AWI)
 Federal Institute for Geosciences and Natural Resources (BGR)
 German Aerospace Centre (DLR)
 GKSS Forschungszentrum (GKSS)
 Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ)
 Consortium German Marine Research (KDM)
 Leibniz Institute of Marine Sciences (IfM-GEOMAR)
 United Nations University Bonn (UNU)
 Federal Ministry of Education and Research (BMBF)

Indonesian and International Partners:

Meteorological and Geophysical Agency (BMG)
 National Coordinating Agency for Surveys and Mapping (BAKOSUR-TANAL)
 Agency for the Assessment and Application of Technology (BPPT)
 Technical Institute Bandung (ITB)
 Indonesian Institute for Science (LIPI)
 Ministry for Research and Technology (RISTEK)
 United Nations Educational Scientific and cultural Organization (UNESCO)
 China Earthquake Administration (CEA)
 Japan Agency for Marine-Earth Science and Technology (JAMSTEC)
 Japan Meteorological Agency (JMA)
 National Oceanic and Atmospheric Administration (NOAA)

risk and vulnerability maps of the affected coastal regions detailed warning dossiers are produced and disseminated to the respective authorities, agencies and population.

The system is designed in an open and modular structure based on the most recent developments and standards of information technology. Therefore, the system can easily integrate additional sensor components or can be expanded for other purposes using large parts of the infrastructure in a sustainable manner.

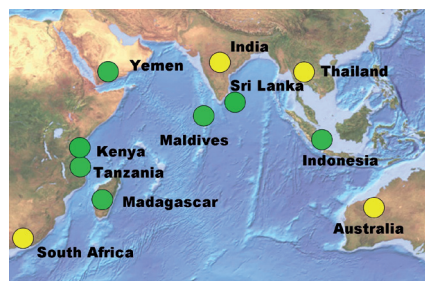
An integral part of the project is capacity building which concentrates on academic and engineering training and education for the operation of such a system. The fastest warning is useless as long as the gap to the so called "last mile to the beach" is not closed. The population in the threatened area needs to be informed in time, but they also need to be trained how to react properly. The people need to be instructed about evacuation plans and how to behave in a case of emergency. All these activities are accompanied by various activities like organisational consulting.

International Cooperation

The German-Indonesian activities are fully integrated into the overall UN plans and strategies for the establishment of global and regional Early Warning Systems. These activities are coordinated by the Intergovernmental Oceanographic Commission (IOC) of UNESCO with

four Intergovernmental Coordination Groups (Indian Ocean, North East Atlantic and Mediterranean, Caribbean, Pacific Ocean). Furthermore, the activities are brought to the attention of the global coordination activity GEOSS (Global Earth Observing System of Systems).

Concrete cooperation work in numerous fields for the establishment of the Early Warning System in Indonesia is underway with a number of other countries, i.e. Japan, China, France and USA. In the Indian Ocean Region the German Project cooperates with Sri Lanka, the Maldives, Yemen, Madagascar, Tanzania and Kenya to build up equipment mainly for seismological monitoring and processing. Close ties have been established to Australia, South Africa and India for the real-time exchange mainly of seismological, but also of sea level data.



Natural hazards such as the tsunami catastrophe 2004 cannot be prevented by a tsunami early warning system, but through GITEWS the number of victims in the event of a tsunami wave can be kept at a minimum.