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Preface

The GITEWS Project (German-Indonesian Tsunami Early Warning System)

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Tsunami early warning became a big issue after the 26 December 2004 Sumatra-Andaman Earthquake of Magnitude 9.3 and the subsequent destructive tsunami, which killed more than 225 000 people in the region of the Indian Ocean.

Just a few days after the event, right between Christmas and New Years Eve, a group of German scientists started to develop a concept for a tsunami early warning system for the region. This draft concept was presented to the German Government on 13 January 2005, where the former German Chancellor Gerhard Schröder decided to support the proposed action.

At the end of January 2005, on the occasion of the Hyogo Kobe-Conference in Japan, the German Minister for Education and Research (BMBF), Edelgard Bulmahn presented the German proposal to the attending audience. The first reactions, to be honest, were quite skeptical. Within the next month a large number of negotiations were started, ending with a positive reaction by Indonesia. By 14 March 2005 the so-called Joint Declaration, a kind of roadmap for the installation of the planned tsunami early warning system, between Indonesia and Germany was signed, and the GITEWS project (**G**erman **I**ndonesian **T**sunami **E**arly **W**arning **S**ystem) was started.

The main scientific and technological challenge for the set-up of an Early-Warning System in Indonesia is the tectonic setting of the so-called Sunda-Arc-Structure, an active continental margin almost parallel and close to the Indian Ocean coastline of Indonesia resulting in tsunami arrival times of about 30–40 min after the occurrence of an earthquake. Therefore complete new technologies and scientific concepts have been developed to reduce early-warning times down to 5–10 min. This includes the integration of near real-time GPS deformation monitoring as well as new modeling techniques and decision supporting procedures.

A number of important milestones has taken place since Boxing Day 2004:

Already a couple of months after the severe tsunami catastrophe the first sensor stations were installed in Indonesia. The rapid recording of seismic parameters requires a dense seismic network with stations as close to the epicentre as possible. Thus the first seismological station was installed on Nias Island off Northern Sumatra in June 2005. Another five months later, in November 2005, the first two GPS-buoys have been deployed with the German research vessel R/V Sonne off coast of Sumatra to register abrupt sea level changes immediately.

Since then the sensor network, consisting of seismic-, GPS-, tide gauge stations, and buoy-systems, has been continuously expanded.

But even with a sophisticated seismic network the determination of reliable information on earthquake location, depth and size within a couple of minutes has been an enormous challenge. Thus a special evaluation software, called SeisComP 3.0, has been developed at the GFZ, German Research Centre for Geosciences to determine the earthquake location, the depth, and the magnitude within the minimum possible time. This software went into operation at the Tsunami Warning Centre in Jakarta in September 2007 just in time to successfully prove its capabilities to evaluate the earthquake parameters of the Bengkulu quake sequence at 12–13 September. A stable solution for the main shock estimating a moment magnitude of 7.9, based on 25 stations, was available after 4 min and 20 s, leading to the first tsunami alert ever disseminated originally by BMKG (Badan Meteorologi, Klimatologi dan Geofisika) in less than 5 min.

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The tsunami early warning system was inaugurated by the Indonesian president on 11 November 2008 barely four years after the project has started. Before March 2010, however, the interaction between the different components must be improved and optimized; personnel needs to be trained and eventual problems in the daily operation have to be dealt with.

Besides the technical training and academic education which is of importance to operate such a system GITEWS offers a substancial capacity building programme. 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.

Germany is the largest donor country in the context of the building up of a tsunami early warning system in Indonesia. Consequently the German scientific contributions to all the different aspects of tsunami early warning were essential during the International Bali-Conference “Towards Safer Coastal Communities”, 12–14 November 2008.

To ensure the German and international support and to guarantee the permanent independent operation of the established warning system it has been considered to set up an operating company in Indonesia, following a public-private partnership model. The operating company or further subcontractors should be responsible for the maintenance, software updates and the spare parts supply. Following this model, BMKG will then be responsible for the national wide tsunami warning.

The GITEWS project has raised a lot of international visibility and – as we think – finally convinced its early critics to convert into supporters at last. We hope that this special issue of NHESS will contribute to a kind of scientific sustainability and will encourage the next generation of young scientists.

The initial scientific and political work carried out by Edelgard Bulmahn, Rolf Emmermann, Peter Herzig, Reinhold Ollig, Christoph Reigber, Irmgard Schwaetzer, Friedrich-Wilhelm Wellmer, and Jochen Zschau is highly acknowledged.

Discussions with the members from the later GITEWS steering committee and its scientific advisory board were stimulating and very fruitful. Without the personal engagement of those mentioned ahead and the large number of scientists, engineers, and technicians in Germany and Indonesia the GITEWS project would have never become such a success.

The GITEWS project is carried out through a large group of scientists and engineers from GFZ German Research Centre for Geosciences (consortium leader) and its partners from the Alfred Wegener Institute for Polar and Marine Research (AWI), the German Aerospace Center (DLR), the GKSS Research Centre, the German Marine Research Consortium (KDM), the Leibniz Institute for Marine Sciences (IFM-GEOMAR), the United Nations University’s Institute for Environment and Human Security (UNU-EHS), the Federal Institute for Geosciences and Natural Resources (BGR), the German Agency for Technical Cooperation (GTZ), as well as from Indonesian and other international partners. Funding was and still is provided by the German Government through its Federal Ministry for Education and Research (BMBF) with an amount of 50 Million Euros (Grant 03TSU01).