

DFG-Round Table Discussion Programme “Nearshore and Onshore Tsunami Effects”

Main Results of Session 4

A tentative list (Table 1) of possible research areas was prepared by Professor Liu (Chairman) and Professor Lynett (Provocateur). The list was submitted to discussion and completed in the course of the session (Table 2). However, in both lists (Tables 1 and 2) no consideration has been made (i) of the priority of research topics, and (ii) of the fact that a number of topics are dealt within ongoing research projects or will be addressed in planned research projects. These aspects will be considered in the identification of possible “Joint Project Clusters” in Session 5.

Table 1: Tentative list of research needs submitted for discussion by Prof. Liu and Prof. Lynett

1. Modeling nearshore and onshore tsunami propagation

- a) Understanding and implementing various dissipative processes
- b) Developing hybrid numerical models
- c) Validating numerical model (experiment and field data)

2. Erosion, Transport and Deposition of Sediments by Tsunami

- a) Physical and mathematical modeling of bed processes and transport
- b) Morphological changes
- c) Hydrodynamic information contained in deposits
- d) Debris flow
- d) Impact loads

3. Natural Barriers

- a) Understanding performance of and dependence on natural structures

4. Man-Made Barriers

- a) Selection Criteria
- b) Structure Performance
- c) Geotechnical aspects – soil stresses, foundation failure, scour

5. Integration and System Performance

- a) Coupled performance and integrity of entire defense system
- b) Pilot/demonstration studies
- c) Engineering design document/guidelines

Table 2: Revised list of research needs in the course of discussion in Session 4

I. Hazard Analysis

1. Modeling nearshore and onshore tsunami propagation

- a. Understanding and implementing various dissipative processes
- b. Developing hybrid numerical models. Utilization and development of a new numerical methodology
- c. Validating numerical models with experimental and field data and establishing benchmark problems for inter-model comparison with established skill scores
- d. Parameterization of submodel and subgrid scale processes
- e. Quantifying and calibrating historical data, guidelines, combining with other data (expertise by historians, true?)
- f. Improvement of physical laboratory tsunami waves from numerical models
- g. Laboratory experiments for modeling of barriers etc. and for quantifying sediment transport
- h. Prototype investigations, measuring in the field

2. Erosion, Transport and Deposition of Sediments by Tsunami

- a. Physical and mathematical modeling of bed processes and transport
- b. Morphological and sediment changes
- c. Hydrodynamic information contained in deposits
- d. Debris flow and Impact loads
- e. Identifying tsunamogenic sediments onshore and offshore (geological and morphological changes, erosion over the time)

3. Mitigation Methods Using Man-Made Structures and Natural Barriers

- a. Selection Criteria
- b. Artificial Barriers
- c. Natural Barriers
- d. Hybrid Methods
- e. Hydraulic Performance of barriers
- f. Geotechnical aspects – soil stresses, foundation failure, scour

4. Integration and System Performance

- a. Coupled performance and integrity of entire defense system
- b. Pilot/demonstration studies
- c. Engineering design document/guidelines
- d. Expected benefits from all our activities (disaster risk reduction)
- e. Cost/benefit relation (evacuation or strong protection structure)
- f. What kind of data is really needed from the geosciences

II. Disaster Risk Reduction

5. Risk Assessment

- a. Probabilistic tsunami hazard modeling
- b. Vulnerability assessment
- c. Risk reduction
- d. Social impacts, human behavior
- e. Periodically occurrence of earth quakes

6. Training and Awareness

- a. Public educational aspects for the people / education of scientists
- b. Public memory

7. Integrated Coastal Zone management