

Thai – German Cooperation

Tracing Tsunami Impacts On- and Offshore in the Andaman Sea Region

„TRIAS“

German Participating Institutions (10 PIs)

- **Leibniz Institute for Marine Sciences (IfM – GEOMAR), Kiel**
- **Kiel University**
 - Institute of Geosciences**
 - Institute of Geography**
- **Centre for Marine Tropical Environments (ZMT), Bremen**
- **Bremen University, Centre for Marine Environmental Science (MARUM)**
- **Hamburg University, Institute for Marine Science**
- **Marburg University, Institute of Geography**
- **Heidelberg University, Department of Geography**
- **Braunschweig University, Leichtweiß-Institute for Hydraulic Engineering and Water Resources**
- **Passau University, Institute for South East Asian Studies**

INTRODUCTION

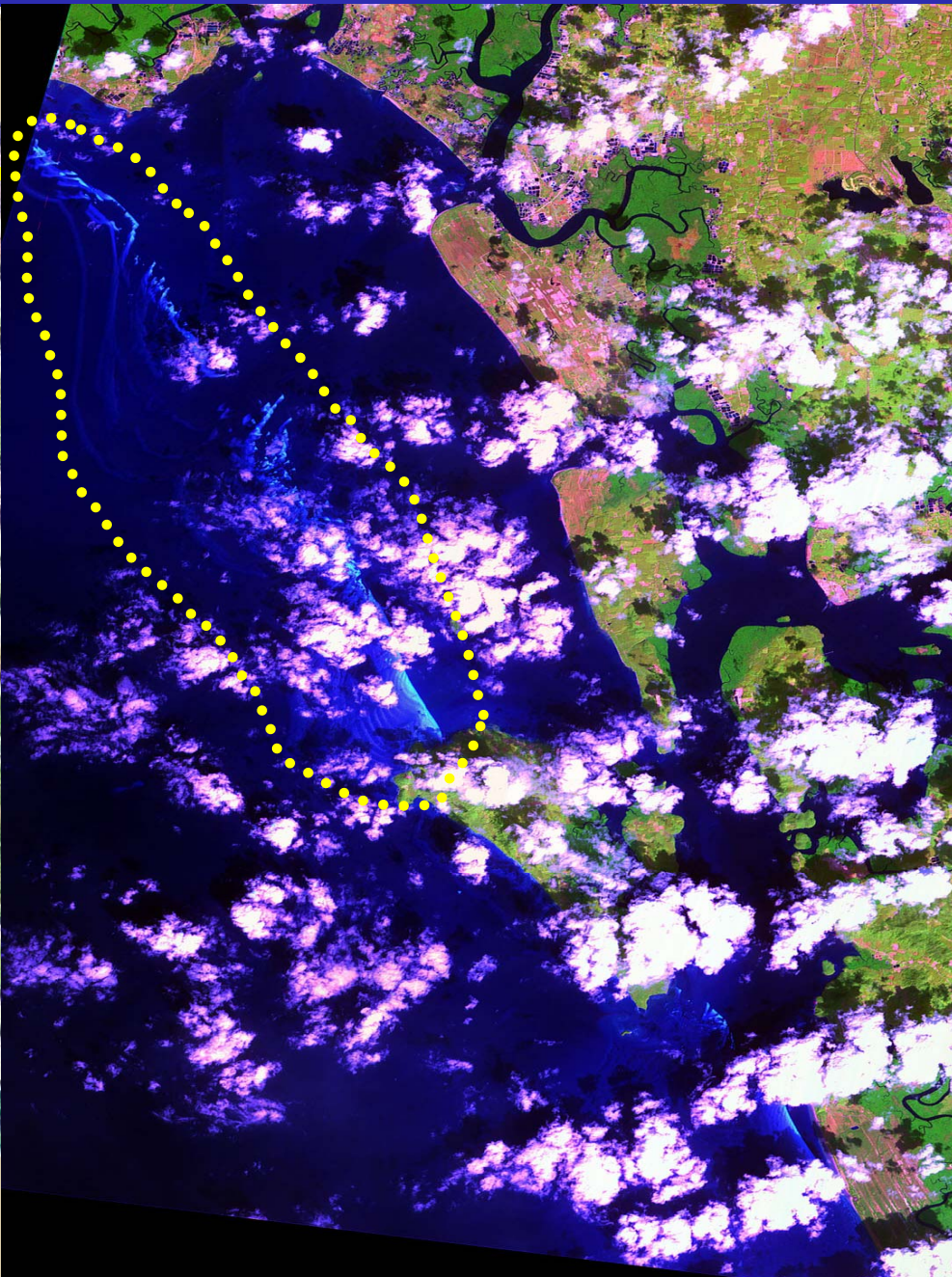
Thai Participating Institutions (13 partners)

- **Chulalongkorn University**
 - Southeast Asia START Regional Centre**
 - Department of Marine Sciences**
 - Unit of Disaster and Land Information Studies**
 - Faculty of Engineering, Dept. of Survey Engineering**
 - Environmental Research Institute**
- **Prince of Songkla University, Biogeochemical and Environmental Change Research Unit**
- **Suranaree University of Technology, School of Remote Sensing**
- **Department of Mineral Resources, Environmental Geology Division**
- **Mangrove Forest Research Centre, Dept. of Marine and Coastal Resources**
- **Asian Institute of Technology, Klong Luang, Pathumthani**
- **Phuket Marine Biological Centre**
- **Asian Institute of Technology, School of Civil Engineering**
- **WWF International, Thailand Prog., Marine and Coastal Resources**

INTRODUCTION

CRISP - SPOT Quicklook Search

04:01 UTC
Waves are hitting the shore



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Scene ID : 42623340412260401151I/1

INTRODUCTION



Source: US Geological Survey

INTRODUCTION



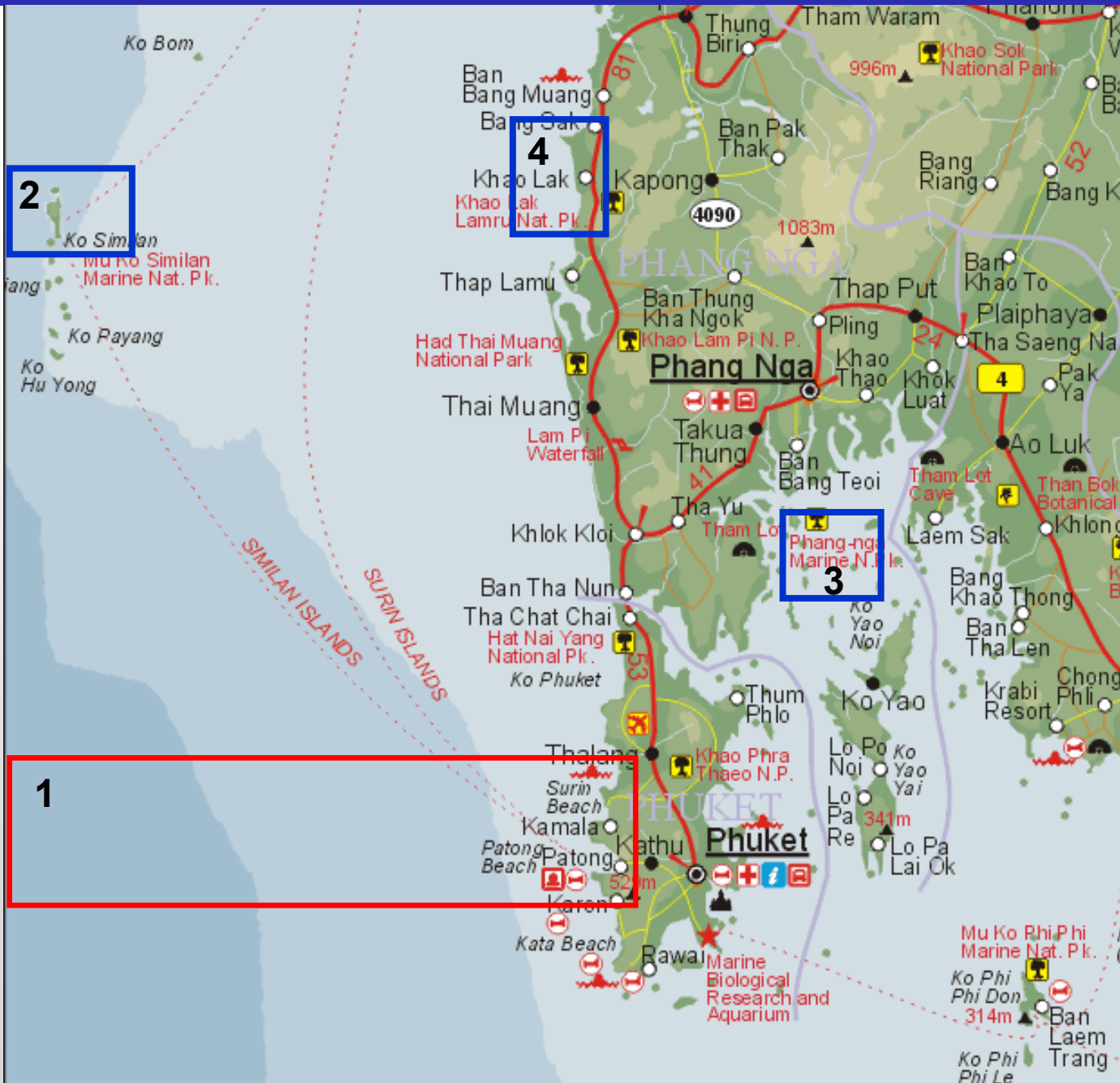
OBJECTIVE

- **To draw a clear picture about the destructive forces and processes of the December 2004 tsunami and past tsunamis**
- **To elaborate and suggest measures how to avoid or mitigate future tsunami impacts and destructions in Thailand**

KEY QUESTIONS

- **Where and how can tsunamis be triggered in the Andaman Sea?**
- **How often have tsunamis struck this coast in the recent past?**
- **How does a tsunami wave propagate from offshore via the shelf and nearshore zone onto the adjacent low lying land areas?**
- **What are the impacts of tsunami waves to the seafloor topography, to the sediment cover and to the marine & littoral ecosystems while progressing onshore?**
- **How does the loaded backflow from land to sea loaded influence the marine biotic and abiotic system?**
- **How is tsunami wave energy attenuated in the nearshore zone, beachfront and hinterland and how is this attenuation influenced by the presence of natural barriers such as coastal forests?**
- **What factors determine the tsunami-related vulnerability of low-lying coastal areas, their population, communities and economies?**
- **Which kind of socio-economic, institutional and/or other factors make coastal societies or communities resilient against tsunami impacts?**
- **How can risk management, including early warning, be improved to prevent or mitigate future tsunami disasters along this coast?**

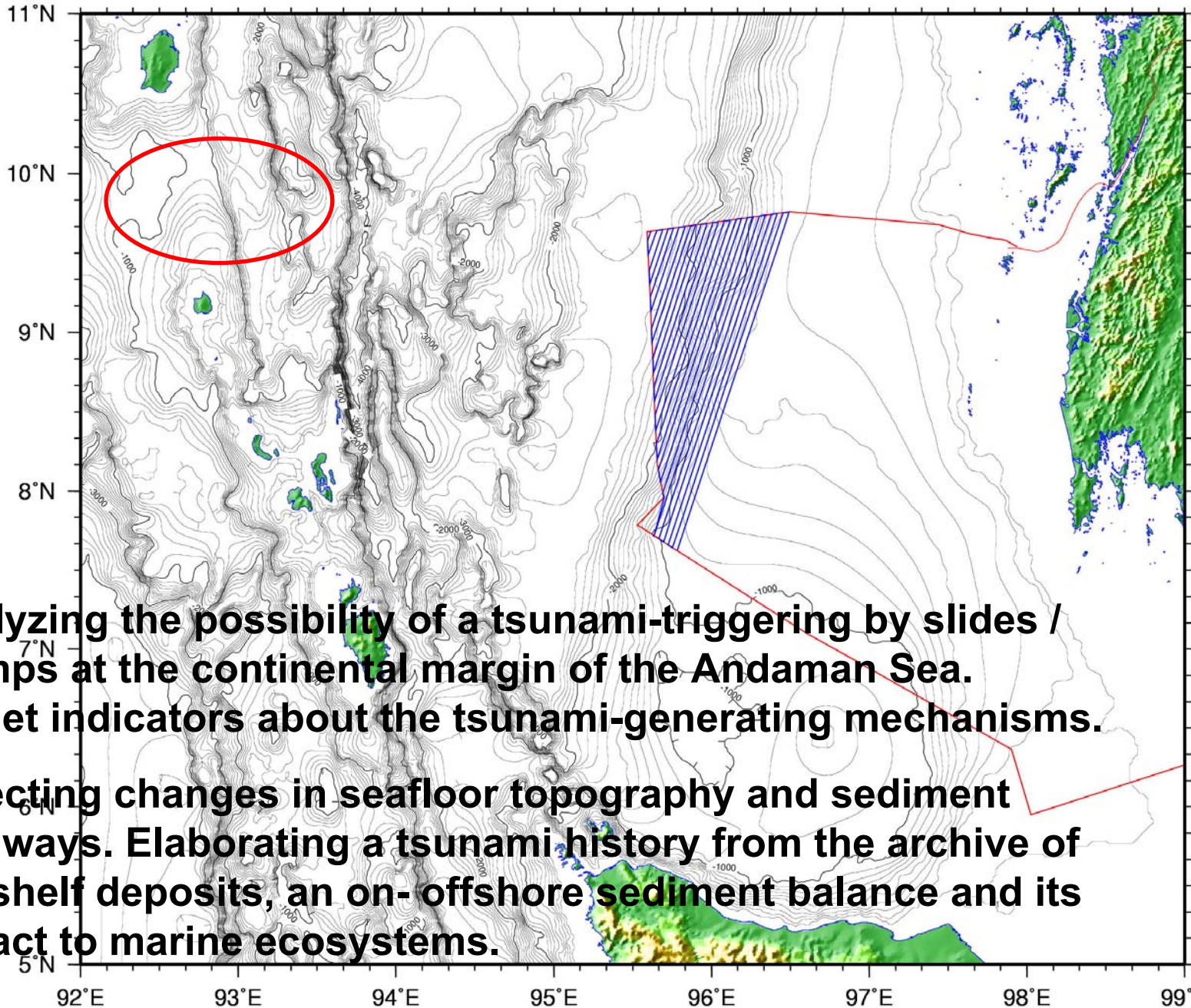
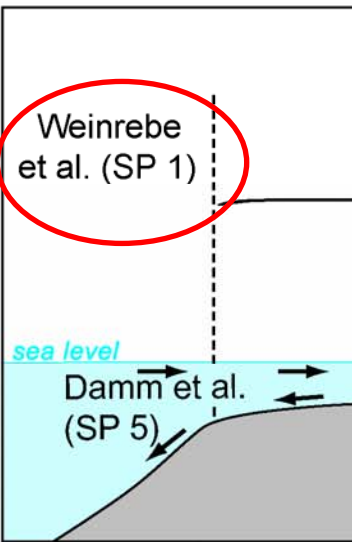
INVESTIGATION AREAS



1) Most of the investigations along a corridor from offshore to onshore.

2 – 4) For special purpose focus on Similan (2) Islands, Phang Nga Bay (3) and Khao Lak / Cape Pakarang region (4)

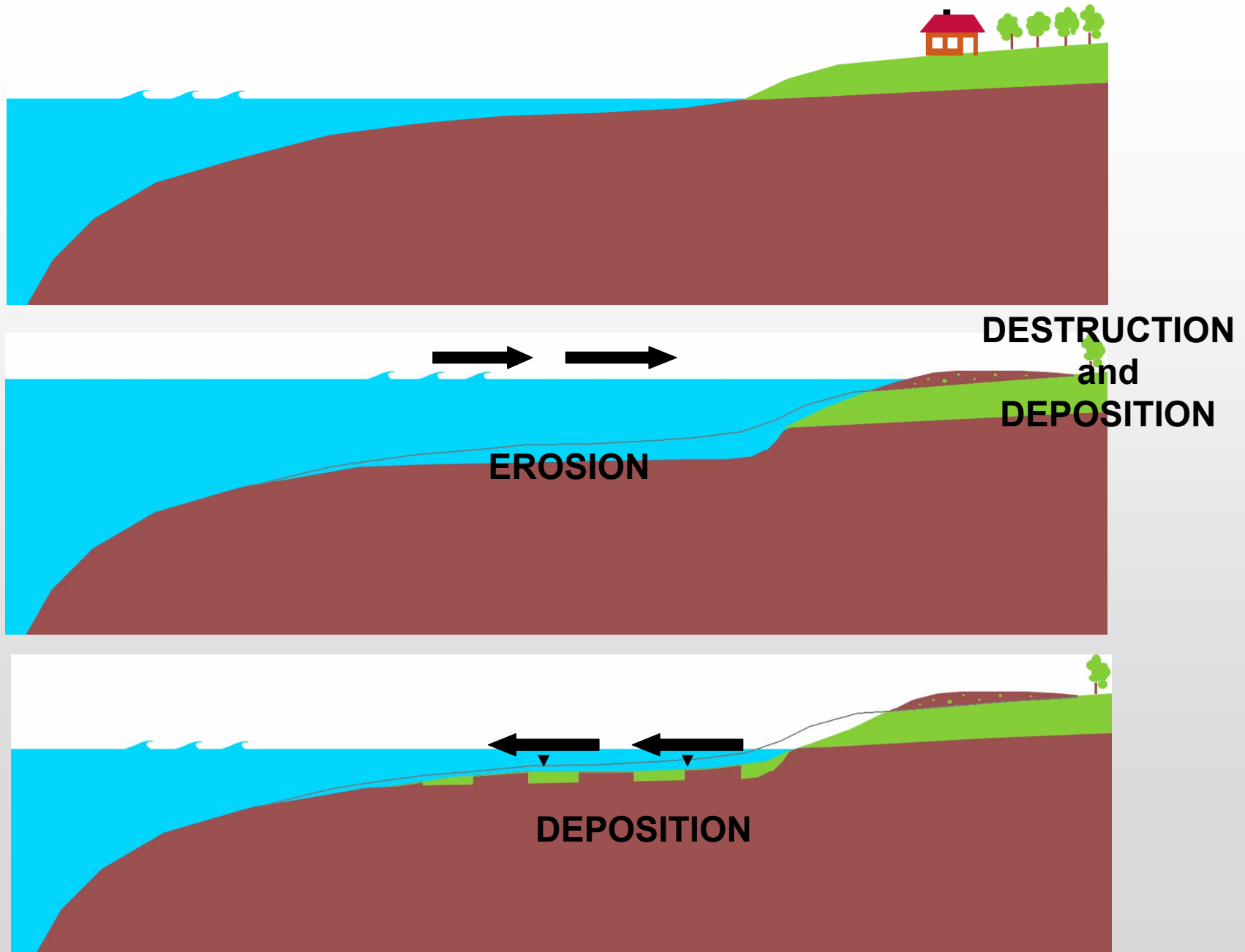
ISSUES OF THE SUBPROJECTS



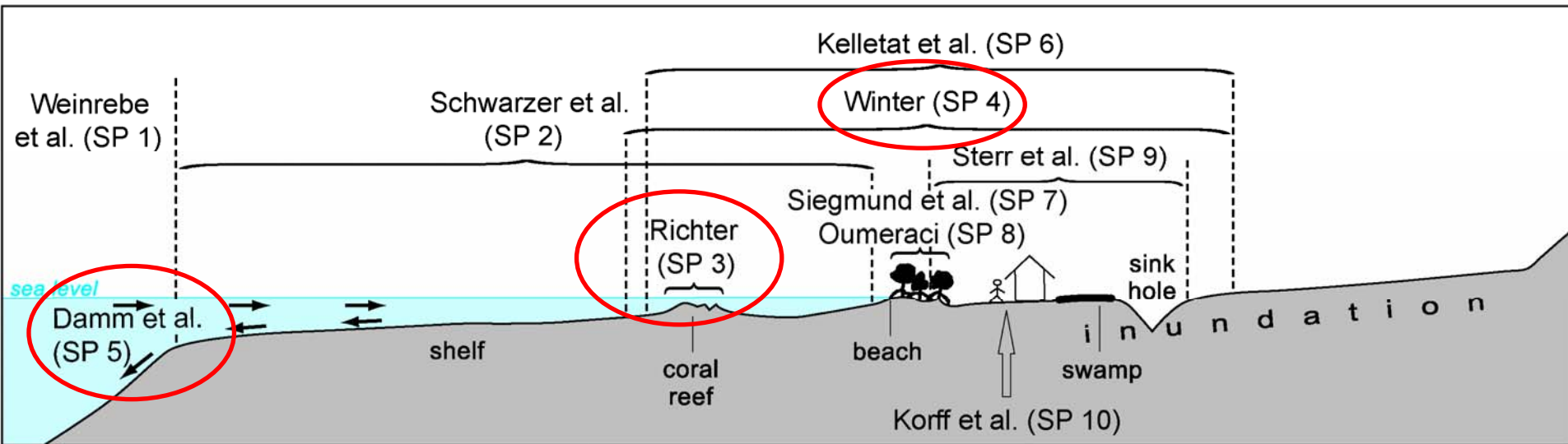
SP 1: Analyzing the possibility of a tsunami-triggering by slides / slumps at the continental margin of the Andaman Sea. To get indicators about the tsunami-generating mechanisms.

SP 2: Detecting changes in seafloor topography and sediment pathways. Elaborating a tsunami history from the archive of the shelf deposits, an on-offshore sediment balance and its impact to marine ecosystems.

ISSUES OF THE SUBPROJECTS

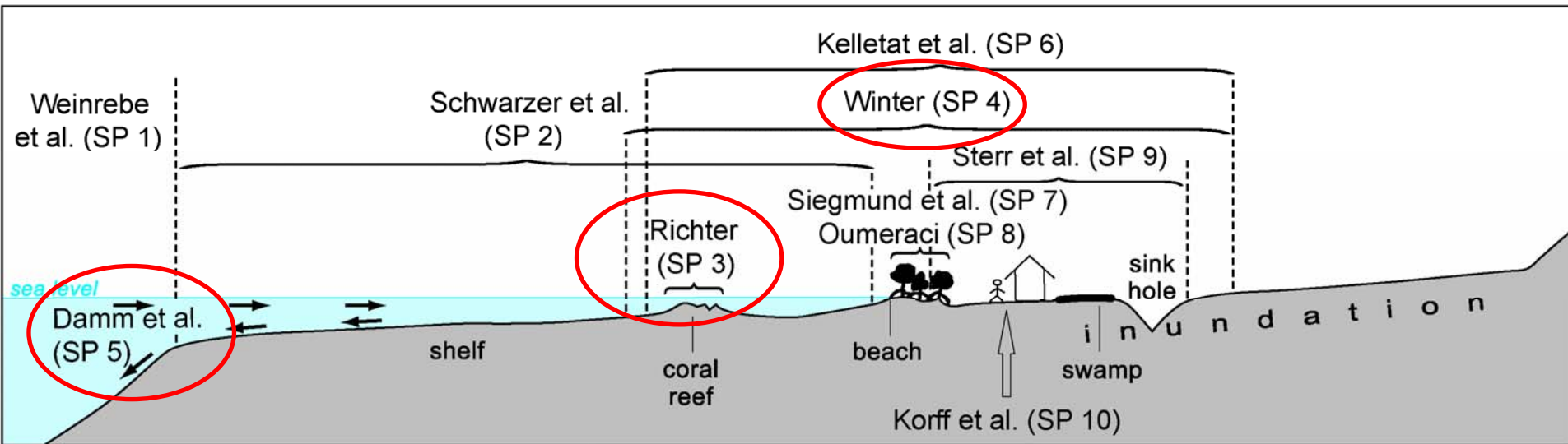


ISSUES OF THE SUBPROJECTS



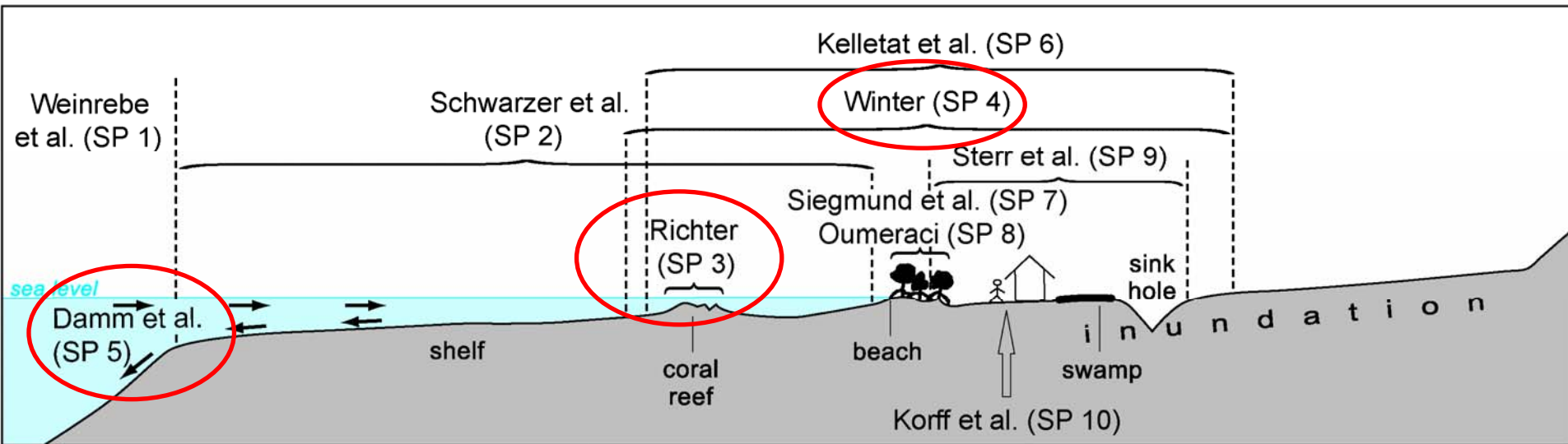
SP 3: Explore the role of solitons in cross-slope transport between cold, food- and nutrient-rich Andaman Sea pycnocline waters and coral reef and adjacent upper slope benthic communities on the continental margin. It will assist in the rehabilitation of the tsunami-damaged coral reefs.

ISSUES OF THE SUBPROJECTS



SP 4: Numerical modelling of wave propagation and run-up during the Dec. 26, 2004 tsunami. Validation of different models by comparing measured tsunami run-up characteristics with results from numerical model simulations.

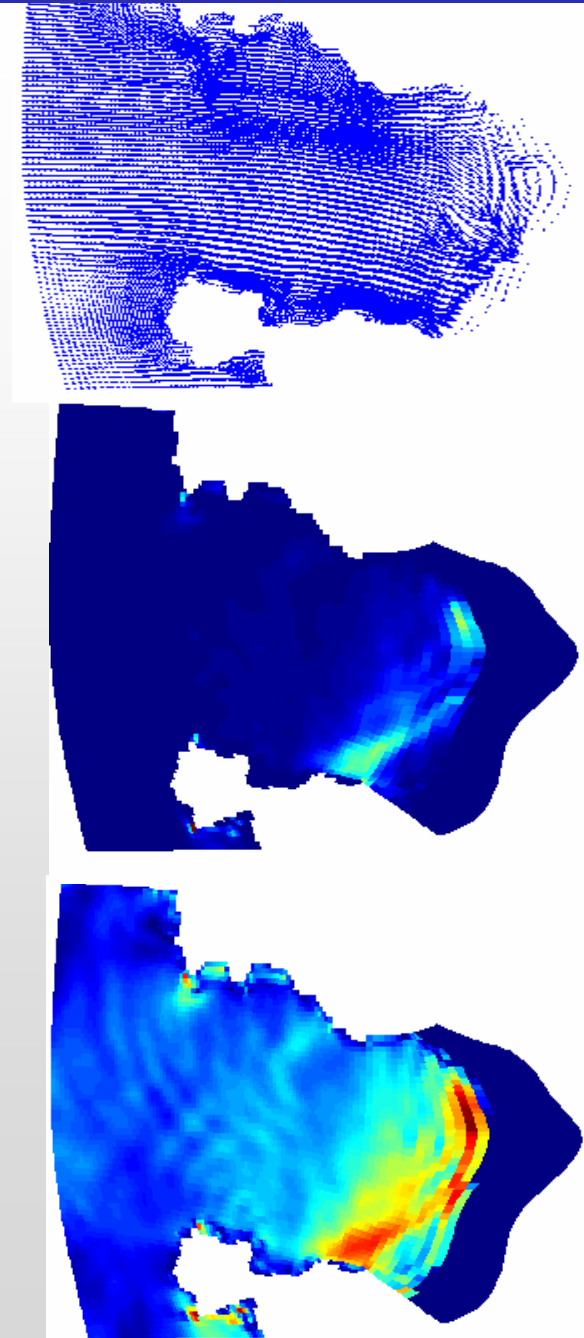
ISSUES OF THE SUBPROJECTS



Sp 5: Numerical modelling of the circulation and hydrography of the Andaman Sea and coastal waters of Thailand. Nesting with a fine scale model to provide boundary conditions with a high resolution for special areas of interest.

Model Application

- The verified models serve as tools for the simulation of hydrodynamic and transport processes
- Describe Hydro- and Sediment Dynamics of different coastal systems under average and extreme forcing
- Compare different coastal settings: Foreshore, Headlands, Mangroves, Coral reefs
- Evaluate the effect of super-imposed tides, surges and tsunami waves.



ISSUES OF THE SUBPROJECTS



Karst towers (mogotes) in Phang Nga Bay. Inside sheltered embayments, sink-holes (cockpits) at different water depths are excellent geo-archives for (paleo-) tsunami research. Photograph: D. Kelletat, 02/2005.

ISSUES OF THE SUBPROJECTS

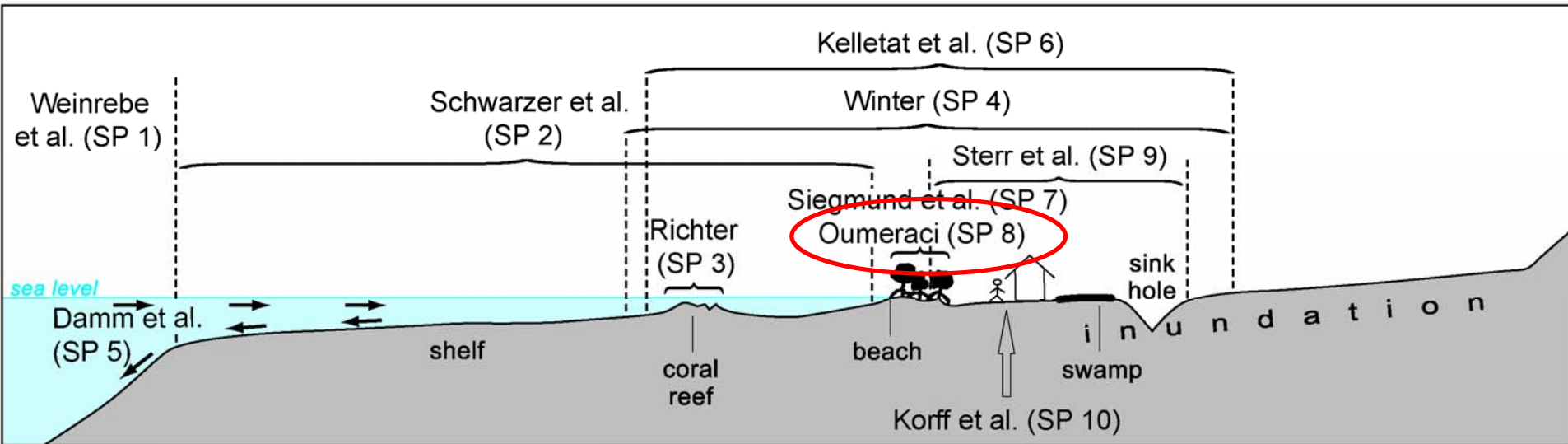


Generation of the **protection index** for costal ecosystems is mainly based on a multi-temporal analysis, based on **remote sensing**, of **various vegetation formations** and **damage patterns of coastal infrastructure** with various spatial resolutions.

Based on field observations, areas with dense vegetation show less destruction by the tsunami waves than areas without vegetation.

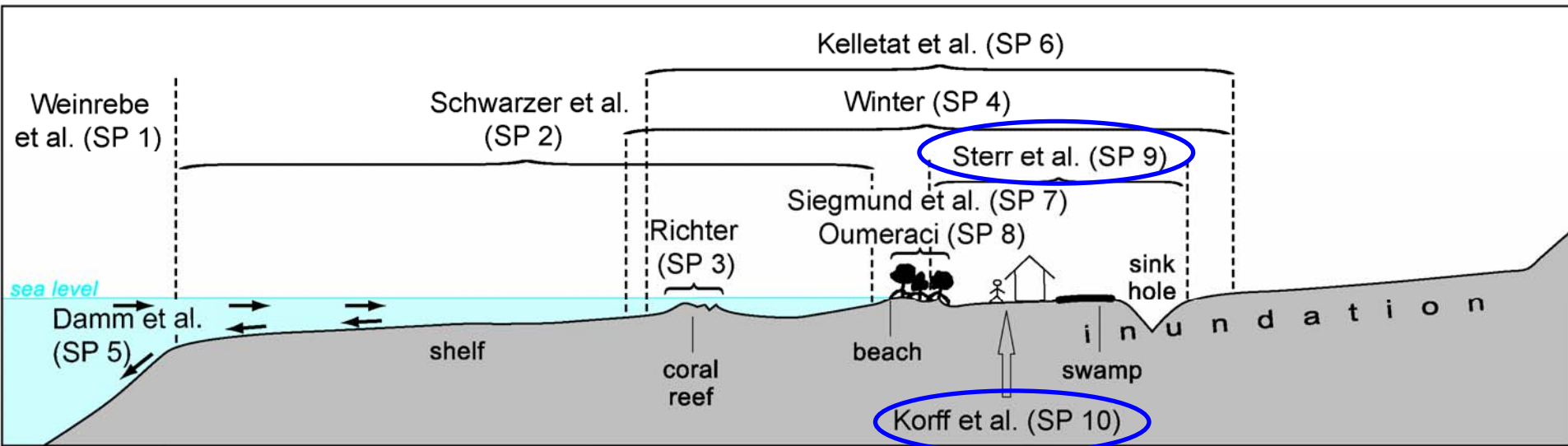
ISSUES OF THE SUBPROJECTS

Issues of the subprojects



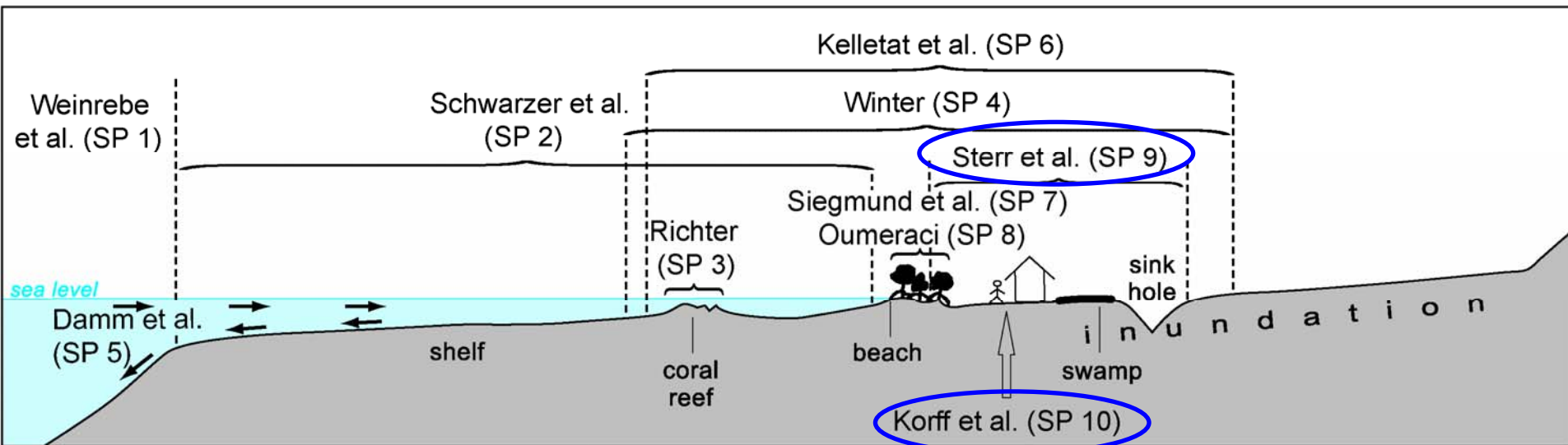
SP 8: Generating a scientific knowledge base and developing / validating prediction models for the tsunami attenuation performance of coastal forests. This will essentially be achieved through a forest parameterization methodology, an extensive **laboratory experiment program and **field data analyses**.**

ISSUES OF THE SUBPROJECTS



SP 9: Assessment and evaluation of tsunami risks in flood-prone coastal areas and communities. Assisted by remote sensing techniques and field surveys, quantitative indicators are to be derived for ecologic, economic and social vulnerability as well as for local resilience. Combining these indicators yields a generic methodology which supports short-term and long-term risk management

ISSUES OF THE SUBPROJECTS



SP 10: Comparing local and global interactions in disaster prevention and recovery in two regions strongly hit by the 2004 tsunami: Khao Lak, Thailand and Aceh, Indonesia. An analysis of institutions and their dynamics between supra-local organizations and local communities provides a sound basis for sustainable disaster prevention strategies

SUMMARY

- **Within the framework there is a common focus on tsunamis and impacts.**
- **Research issues of the individual projects are inter-linked by deliverables to each other.**
- **The subprojects are aiming at providing complementary answers to the key questions about tsunamis and their potential impacts.**

Thank you for your attention