



DLR contributions to UN Activities

Rapid Mapping services and applications for emergency response

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German Aerospace Center (DLR)



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in der Helmholtz-Gemeinschaft

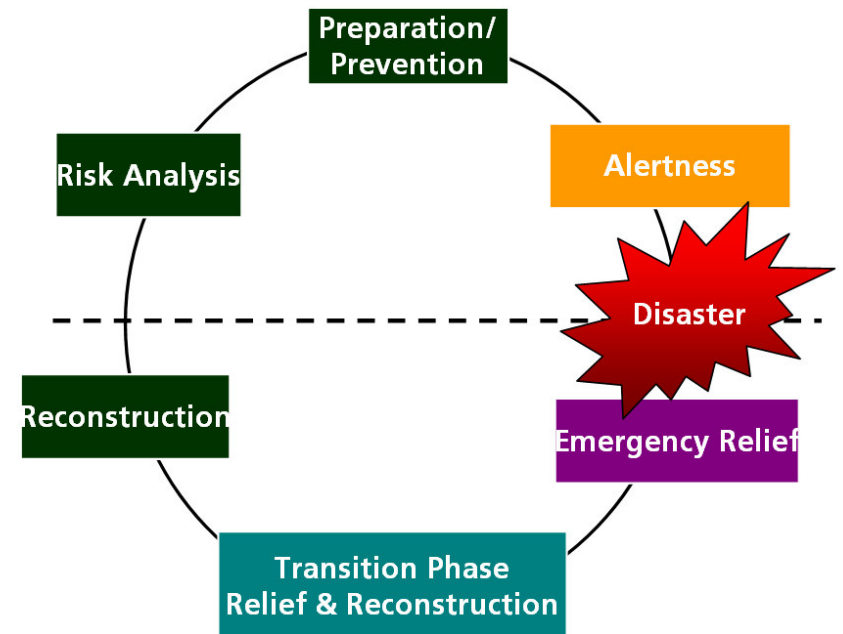


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- Disaster Management and Civil Security
 - Emergency Mapping (UN SPIDER, UN OCHA, UN WFP)
 - Early Warning and Mitigation (UNESCO IOC)
- Environmental Monitoring
 - Contributions to UN Conventions (UNCBD, UNCCD, UNFCCC)
 - World cultural heritage (UNESCO)
- Education and Capacity Building
 - PhD program (UN University)
 - Capacity Building

Increasing demand for EO based information

- Increasing demand for timely information in case of
 - Natural and environmental disasters
 - Humanitarian relief activities
 - Threats to civil security
- DLR develops R+D solutions
 - Risk analysis, preparedness, prevention and early warning
 - Emergency response and rapid assessment of the situation
 - Recovery and reconstruction





Center for Satellite Based Crisis Information

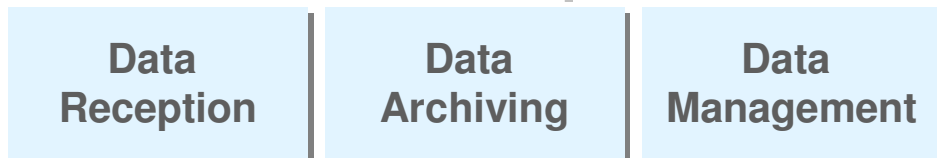
– Emergency Mapping & Disaster Monitoring –
a service of DFD

IKONOS
TerraSAR-X
...



Stations
Networks
Archives

Technical Expertise



German Remote Sensing Data Center

Applications Competence



German Remote Sensing Data Center

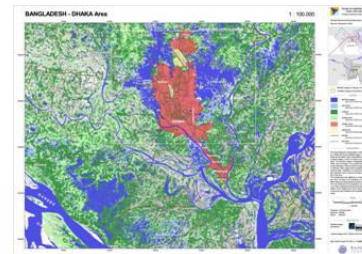


Political Decision Makers

Situation Centres

Relief Organisations

Public



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Center for Satellite Based Crisis Information

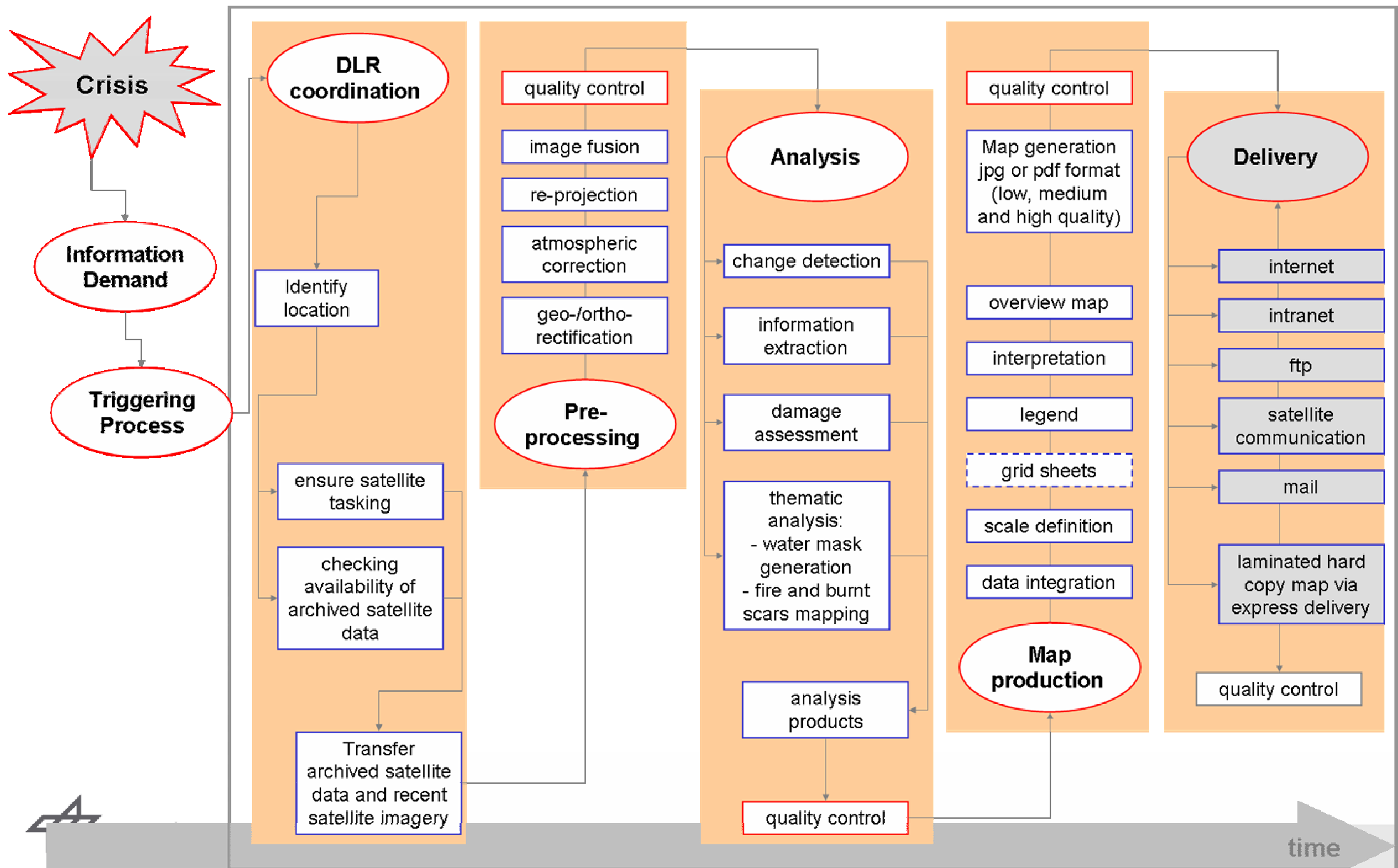
– Emergency Mapping & Disaster Monitoring –

a service of DFD

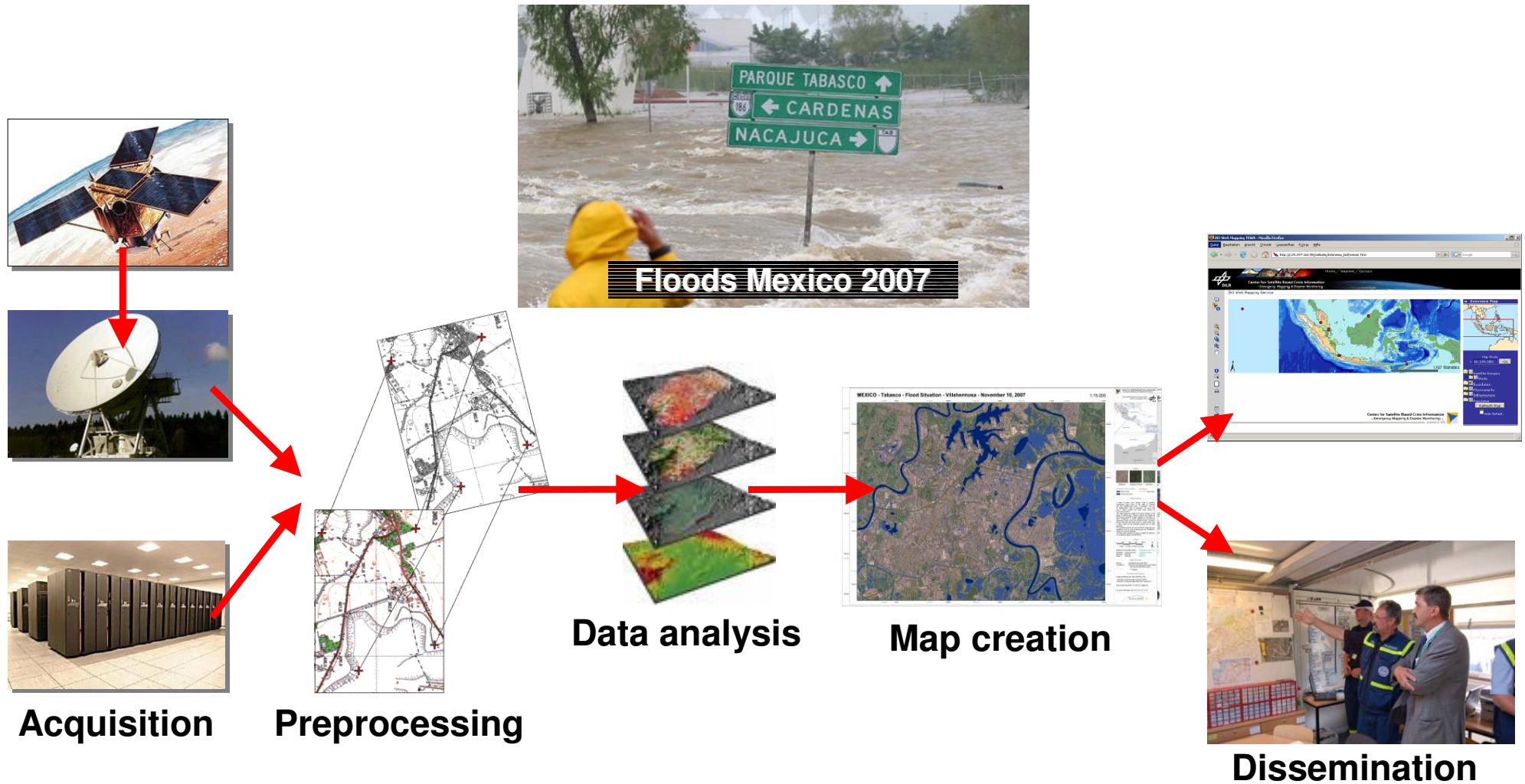
- Rapid emergency mapping
- Basic maps and damage assessment maps
- 24 hours/7days duty in case of disasters
- Established contact point in Germany, Europe as well as in international institutions
- Key partner in the development and implementation of the European GMES Core Service “Emergency Response”



Rapid Mapping Workflow

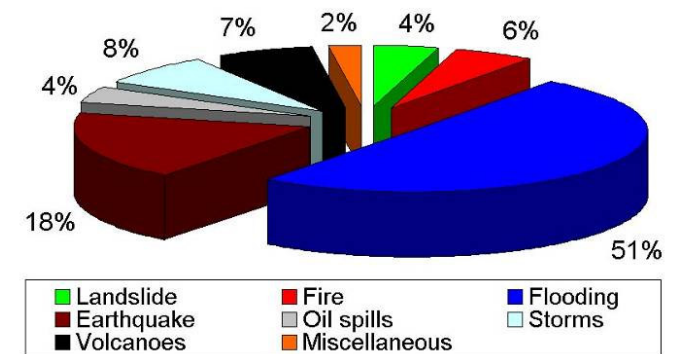


DLR – ZKI Rapid Mapping workflow

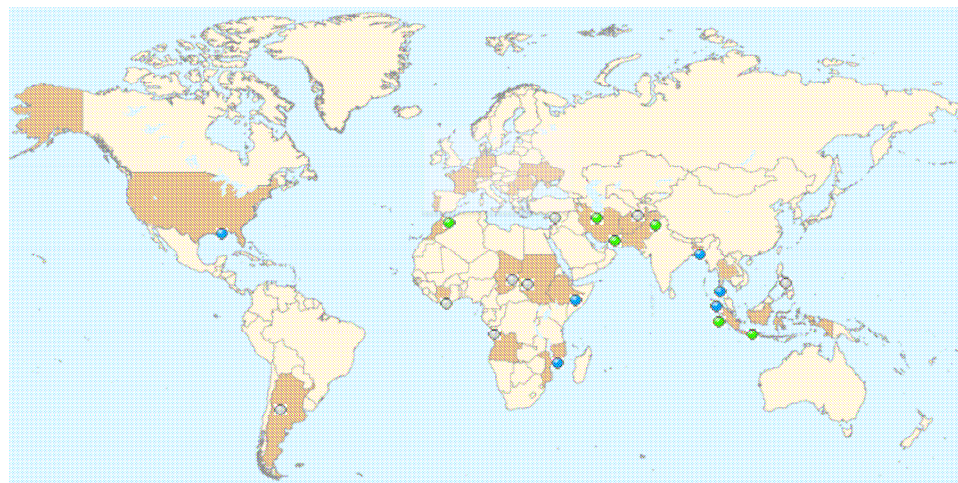


International Charter Space and Major Disasters

- International agreement among Space Agencies to support with space-based data and information relief efforts in the event of emergencies caused by major disasters
 - Space Agencies contribute satellite data
 - Multi-satellite data acquisition planning
 - Fast data turn-around – priority acquisition
 - Archive retrievals and spacecraft tasking
 - Data processing at pre-determined level
- Members: ESA, CNES, CSA, CONAE, USGS, NOAA, CNSA, JAXA, ISRO, BNSC/DMC
- DLR assumes the Charter project management in case of an ESA inquiry since July 2002



DLR-ZKI Worldwide Contributions to Disaster Management



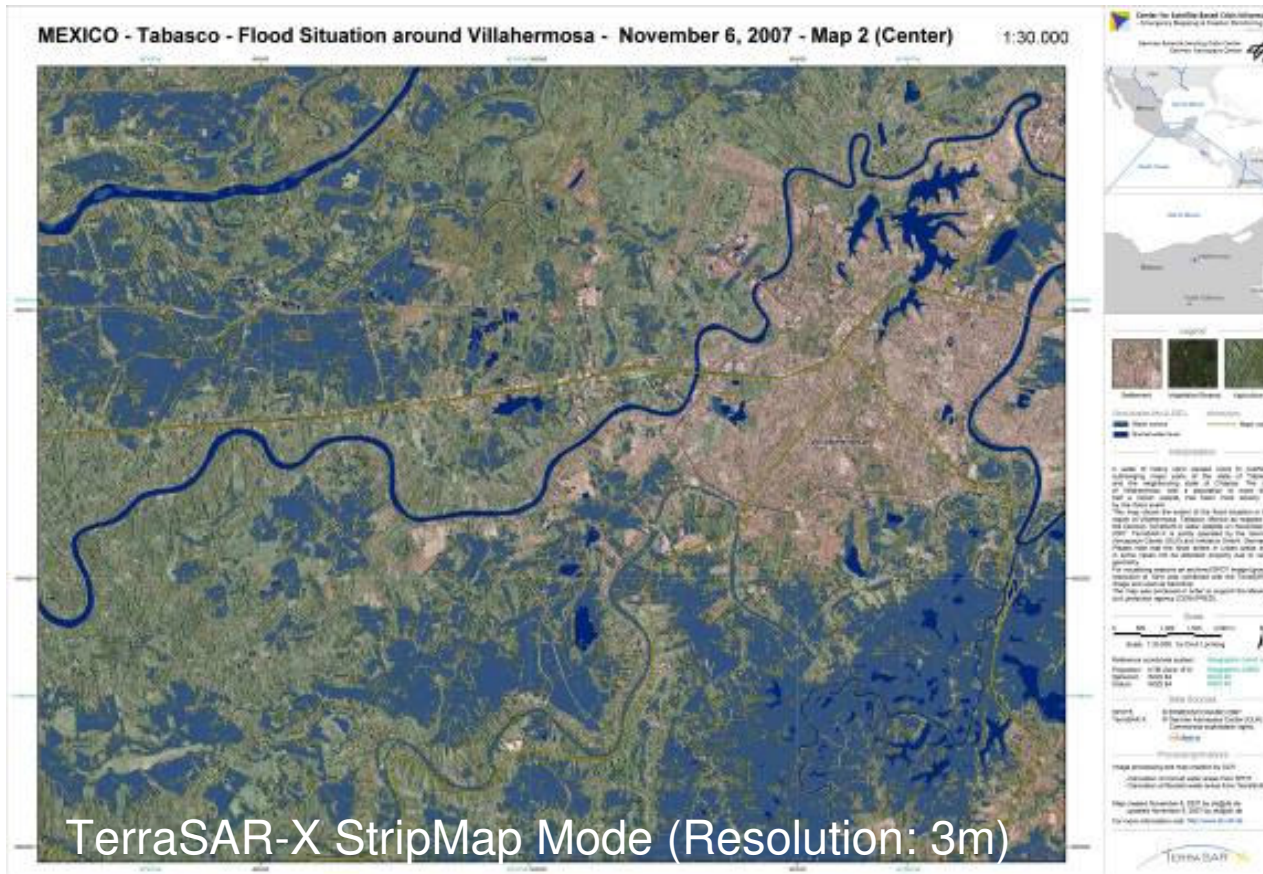
● Flood ● Earthquake ● Fire ● Others ● International activities

- Cyclone 'Nargis' in Myanmar, 2008
- Floods in Namibia, 2008
- Oil spill in Antarctica, 2007
- Cyclone 'Sidr' in Bangladesh, 2007
- Oil pollution in the Black Sea, 2007
- Floods in Mexico, 2007
- GNEX 07 Emergency Exercise
- Forest fires in Southern Europe, 2007
- Forest fires on Canary Islands, 2007
- Flood in SW England, 2007
- Flood in Middle England, 2007
- G8 Summit Heiligendamm 2007
- Earthquake in Indonesia 2007
- Flood in Mozambique 2007
- GNEX 06 Emergency Exercise
- Environmental Assessment in Ivory Coast 2006
- Oil Spill in the Mediterranean 2006
- Earthquake in Indonesia 2006
- Danube flood in Romania 2006
- Flooding in Hungary 2006
- Elbe Flood 2006
- Mudslide, Philippines 2006
- Earthquake, Pakistan 2005
- Hurricane Katrina, USA 2005
- Flood, Germany 2005
- Forest fires, Portugal 2005
- Flood, East Ethiopia 2005
- Marburg virus in Angola, Angola 2005
- EURATECH Exercise, France 2005
- Earthquake, Indonesia 2005
- Tsunami in the Indian Ocean 2004
- Humanitarian disaster, Chad 2004
- Humanitarian disaster, Sudan/Darfur 2004
- Flood, Bangladesh 2004
- Forest fires, Portugal 2004
- Earthquake, Iran 2004
- Earthquake, Morocco 2004
- Earthquake, Iran 2003
- Rhone flood, South France 2003
- Forest fires, Portugal 2003
- Missed mountaineer, Andes 2003
- Elbe flood, Germany 2002
- Humanitarian relief, Afghanistan 2001
- Flood, Mozambique 1999/2000
- Civil war, Kosovo 1999



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Mexico – Flooding around Villahermosa, Nov. 2007



- Based on radar satellite images the ZKI produced crisis maps of disaster areas to support the activities of the Mexican civil protection (CENAPRED)
- Cooperation concerning geobasis data and map products exchange with UN OCHA

Bangladesh - Cyclone „Sidr“, Nov. 2007



- The International Charter 'Space and Major Disasters' was triggered on behalf of UN WFP, which asked for support, demanding satellite based information on the impact of Sidr
- DLR/ZKI took over the project management and provided satellite image maps to UN WFP and other users

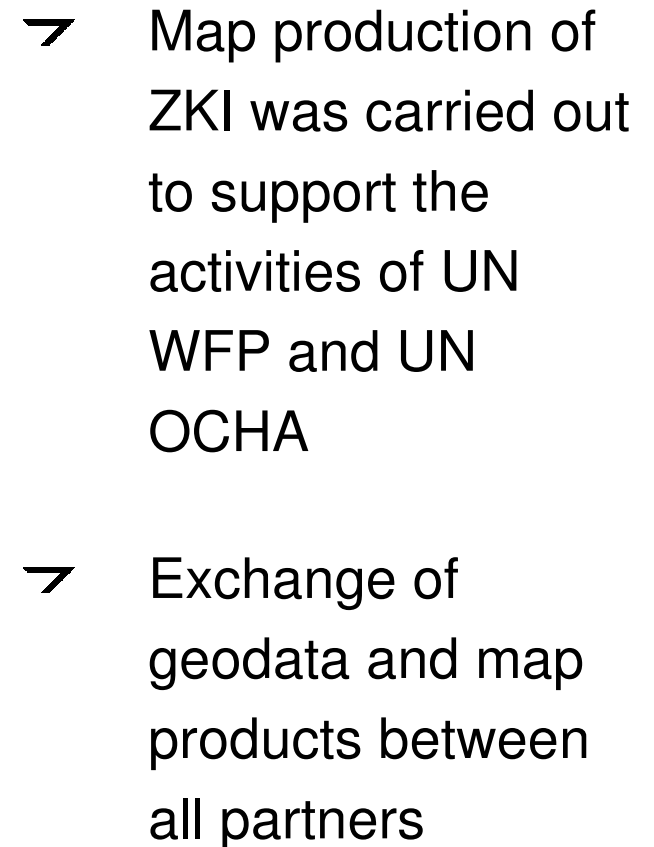
A wide, horizontal image showing a view of Earth from space. The Earth's curved horizon is visible on the left side, with a dark, starry background. The Earth's surface is covered in green land and blue oceans, with white clouds scattered across the scene. The image is oriented horizontally, with the Earth's curve running from left to right.



7

7

7

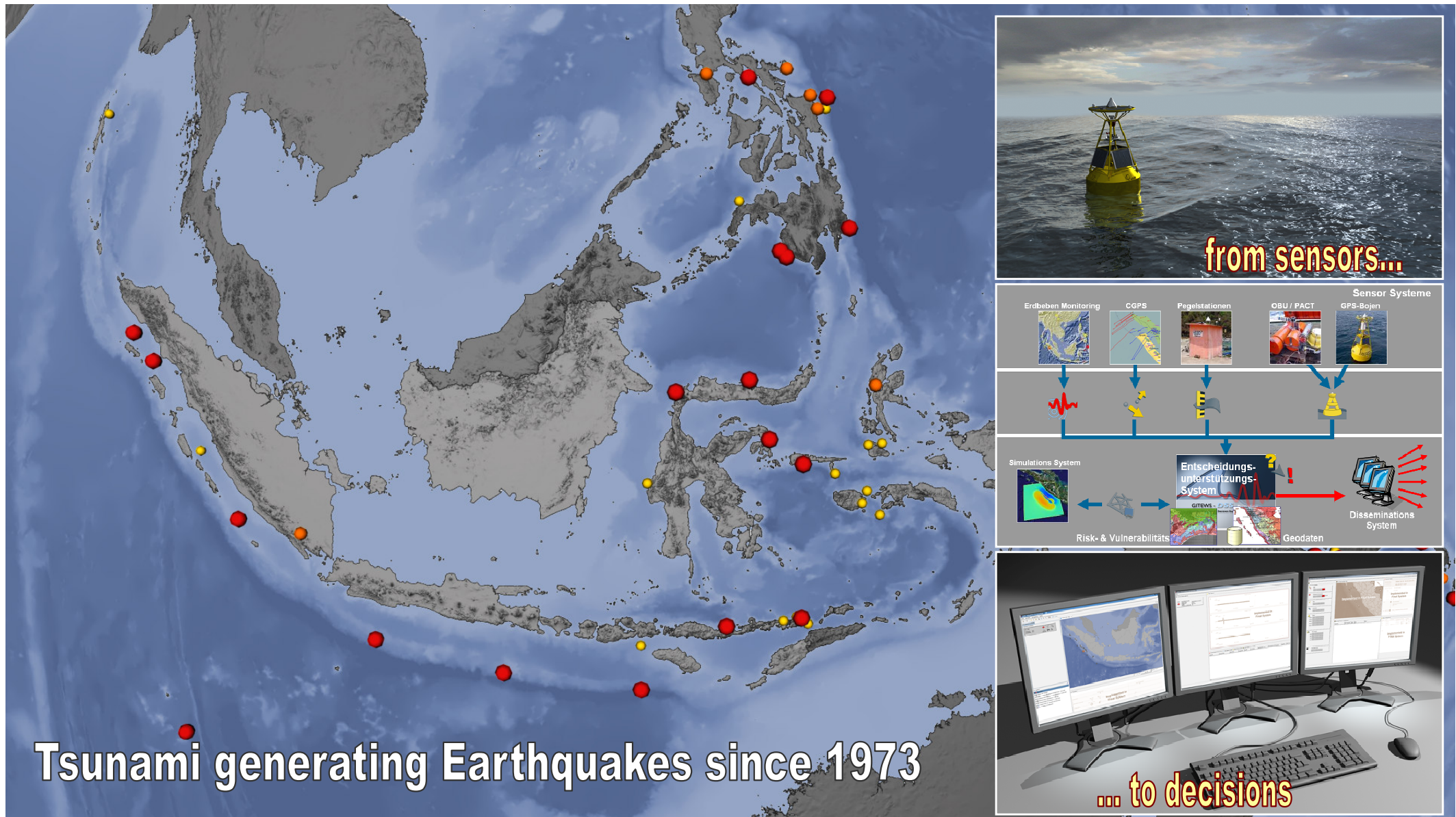




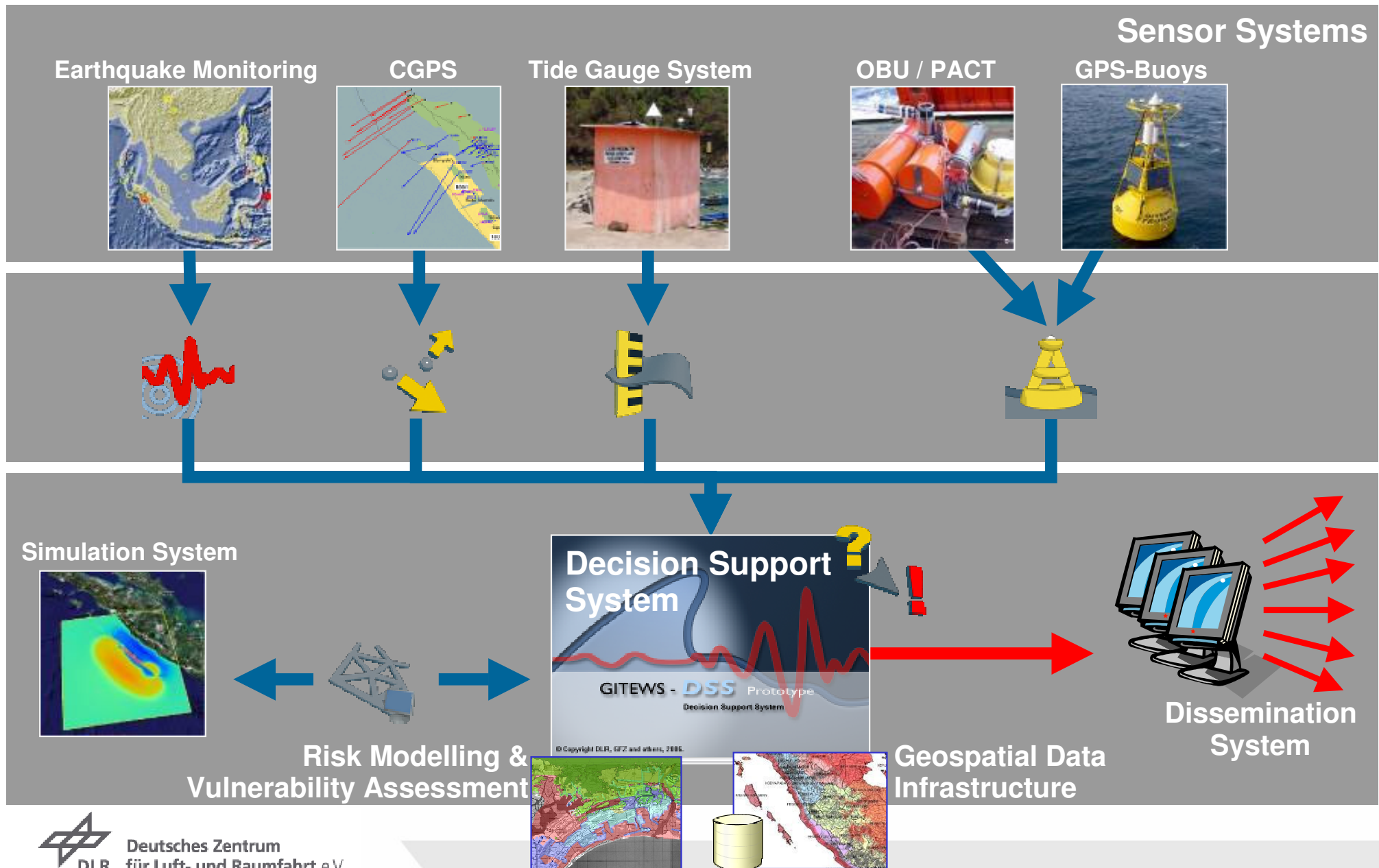
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German contribution for Indian Ocean Tsunami Early Warning System



German contribution for Indian Ocean Tsunami Early Warning System

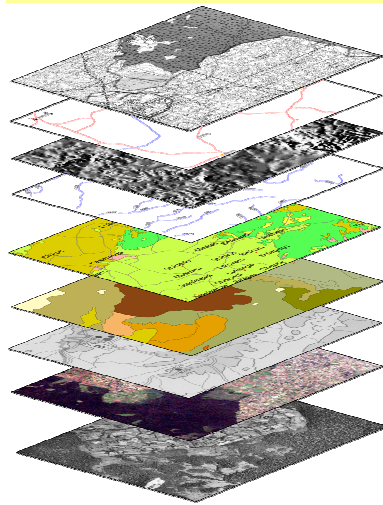


Risk and vulnerability modelling

**Geodatabase,
statistical data**

(Geo-)Statistical and GIS Analysis

**Vulnerability
Assessment**



Street network

DGM

Population

land use

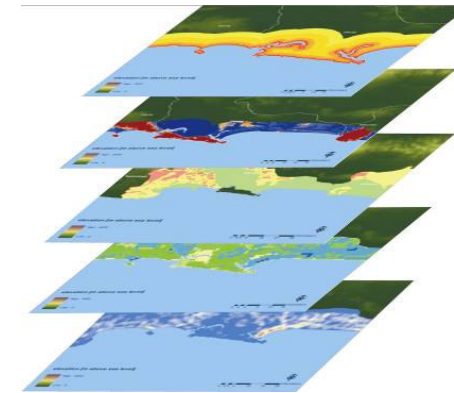
income source

...

Exposed Population

Reachable Safe areas

...



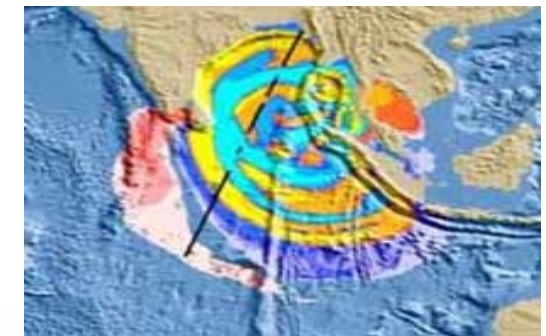
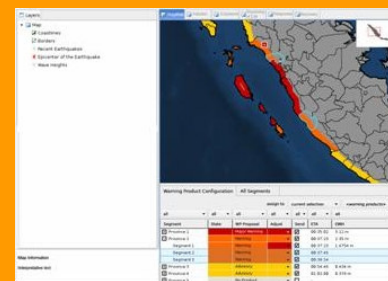
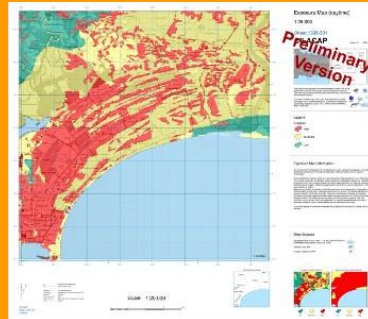
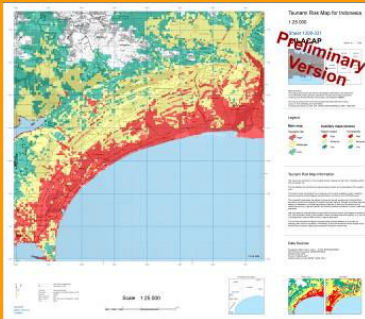
Product

(Geo-)Statistical and GIS Analysis

**Hydraulic
Modelling**

**Hazard maps, Risk zoning, Evacuation planning,
Decision Support for Early Warning**

Propagation, Inundation



The DSS user interface: What the decision maker will see

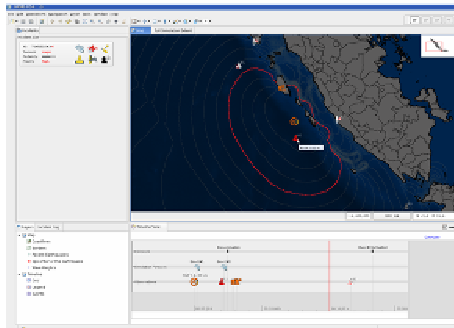
Situation Perspective

Observations Perspective

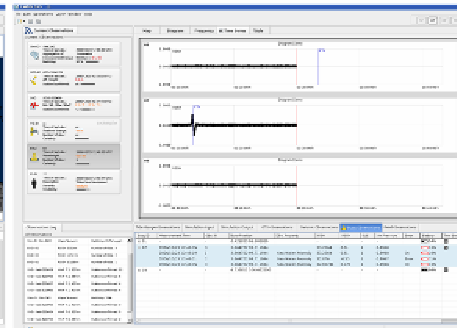
Decision Perspective

Product Perspective

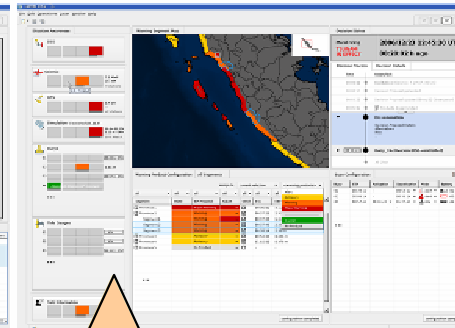
Confirmation Panel



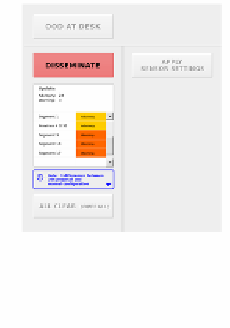
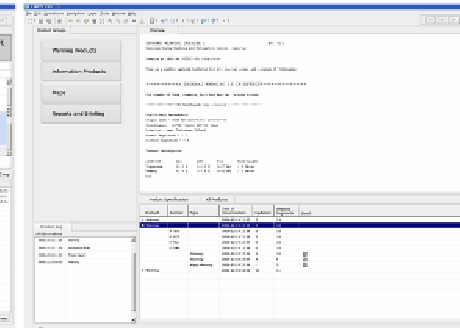
Prototype v0.5 (Dec. 2007)



Prototype v0.5 (Dec. 2007)



Prototype v0.5 (Dec. 2007)



**Decision
Support**

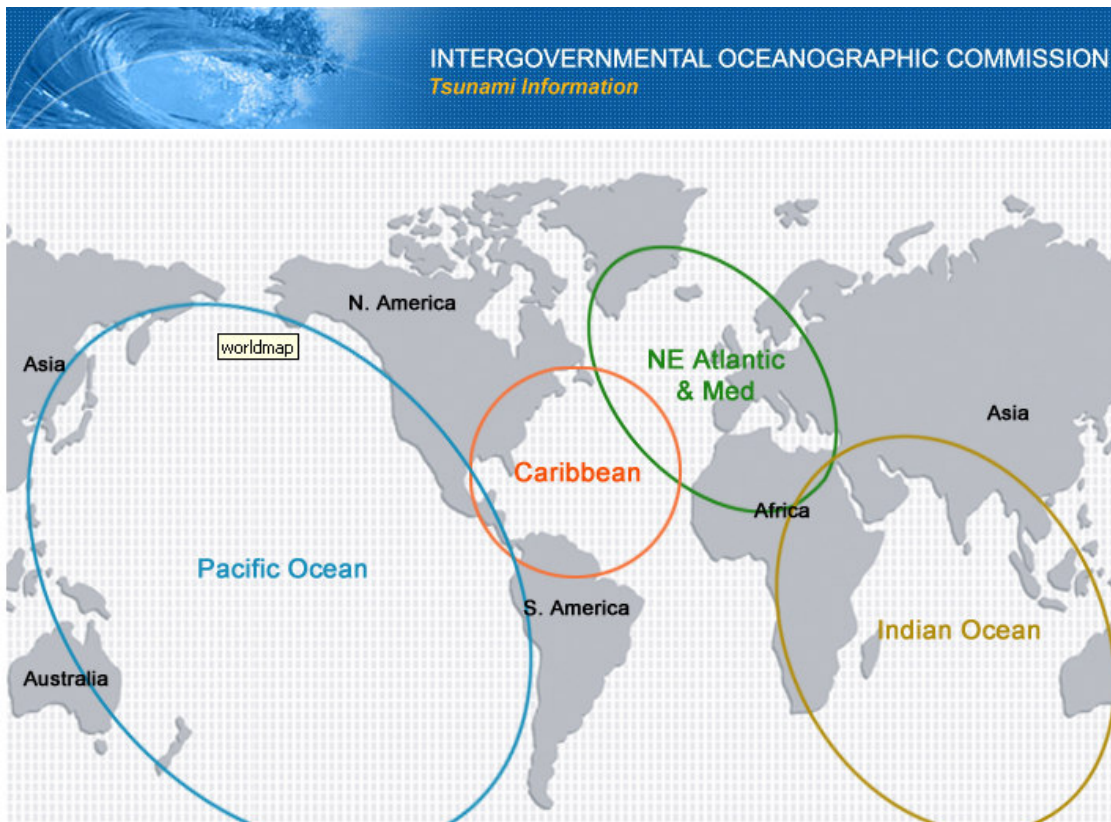
**Situation
Awareness**

**Data Ingestion,
Processing and Modelling**

Sensors, Baseline (Geo) Data

UNESCO-IOC coordination for Tsunami Early Warning

- Activities are integrated into Intergovernmental Oceanographic Commission of UNESCO

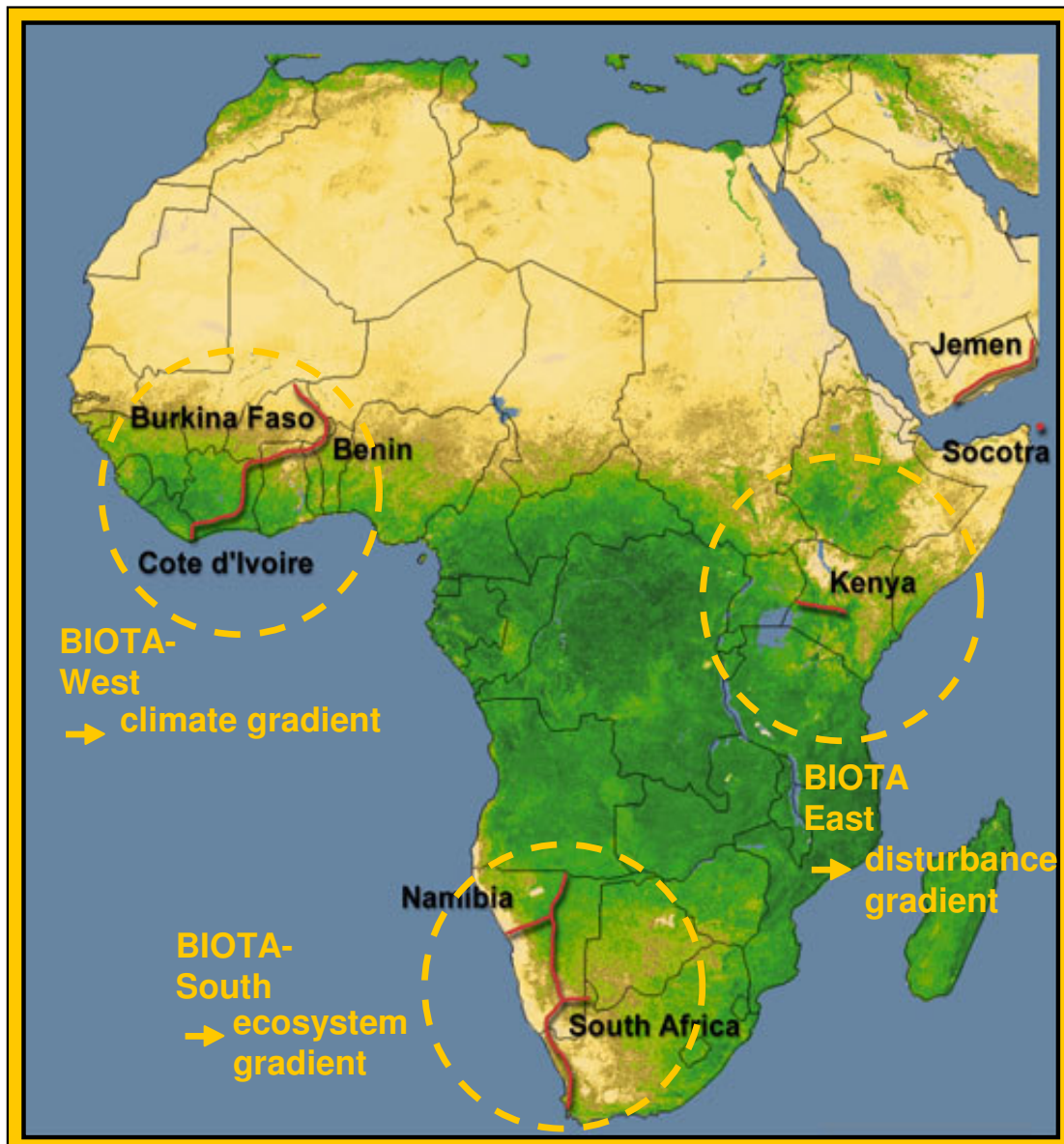




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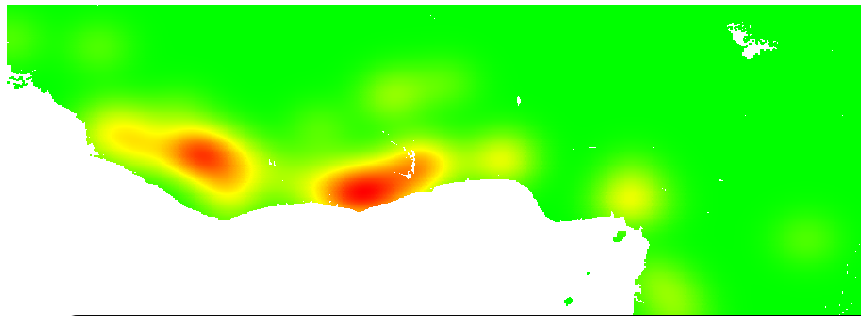
Biodiversity Research in Africa – Project BIOTA



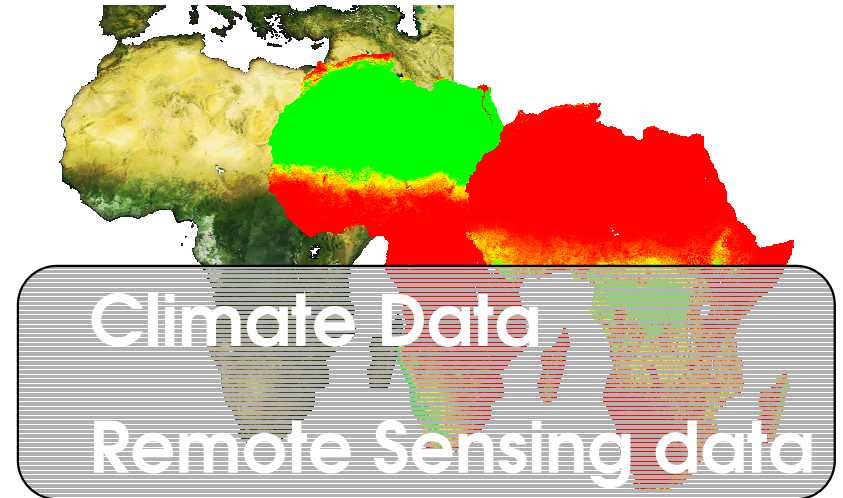
- Analysis of Biodiversity Changes in Africa
- Integrated Research Project
- Funding: German Ministry for Education and Research (BMBF)
- German contribution to UN Convention on Biological Diversity (UNCBD)



Example: Species Habitat Mapping

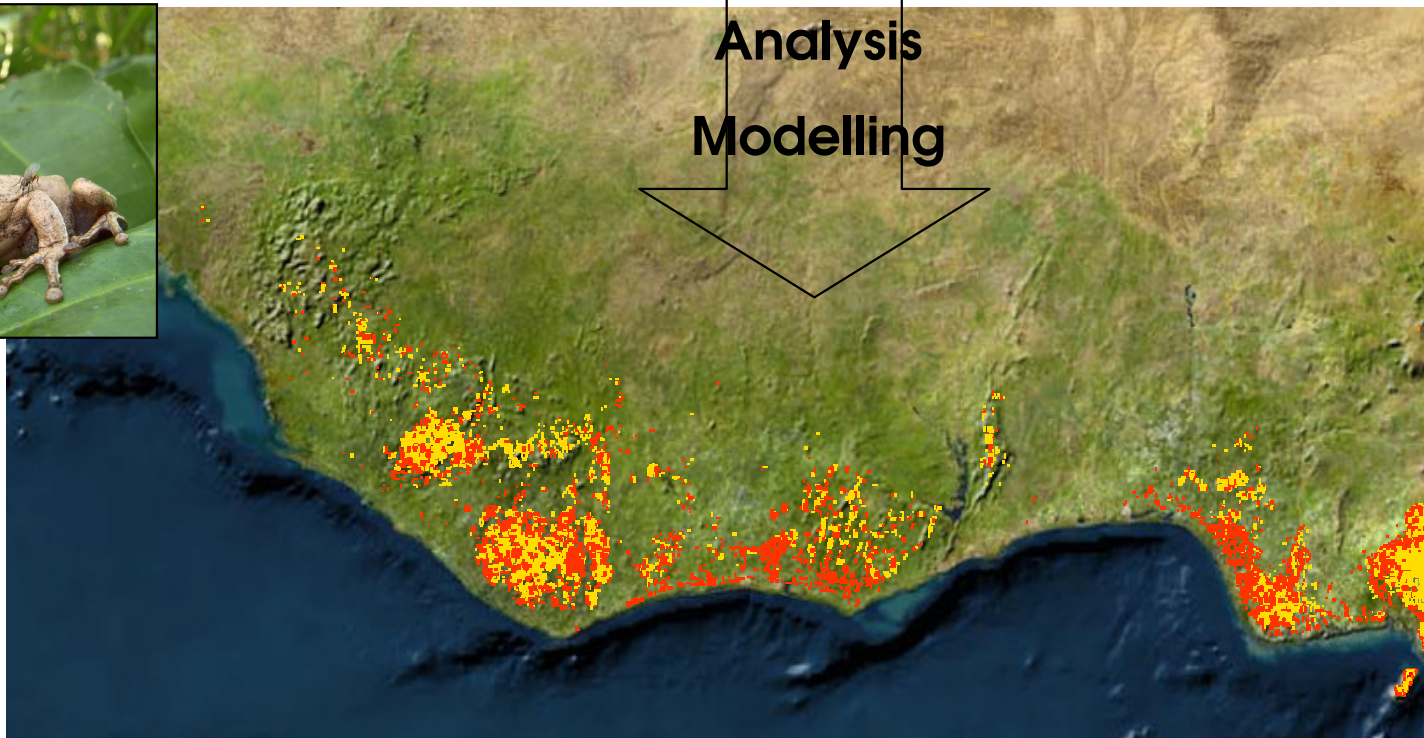


Species Distribution



Climate Data
Remote Sensing data

Analysis
Modelling

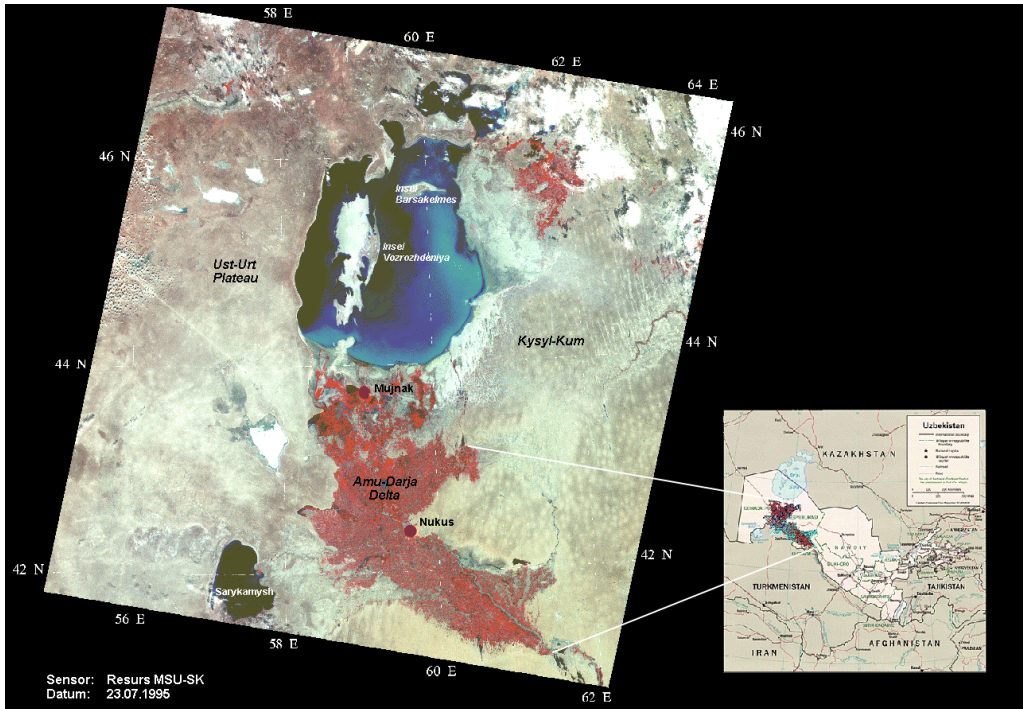


Predicted
habitat
Suitability:
very high

high



Economic and ecological restructuring of Land- and Water Use in Khorezm (Uzbekistan)



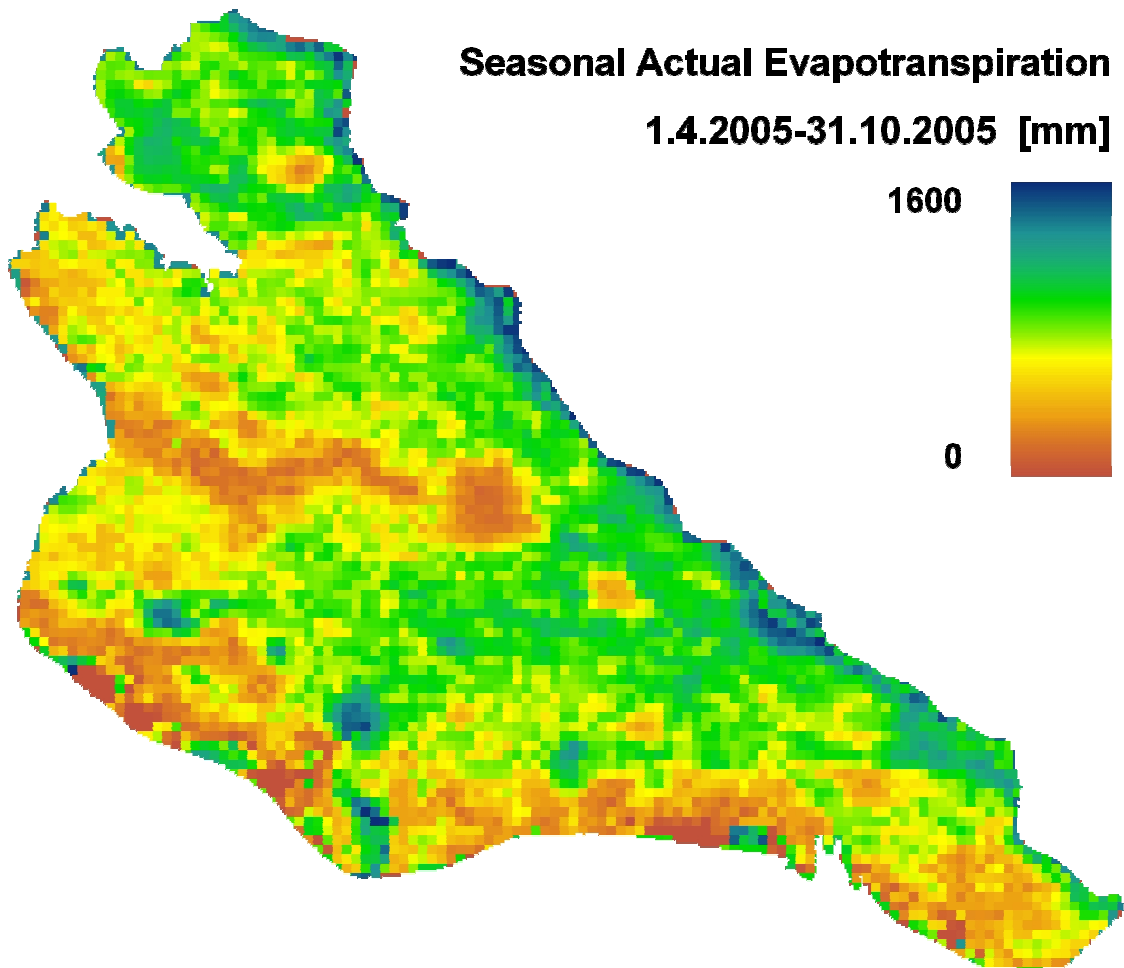
Integrated research approach:

- Natural Resources Management
- Agricultural Production
- Economy
- Society and Institutions

Joint project:

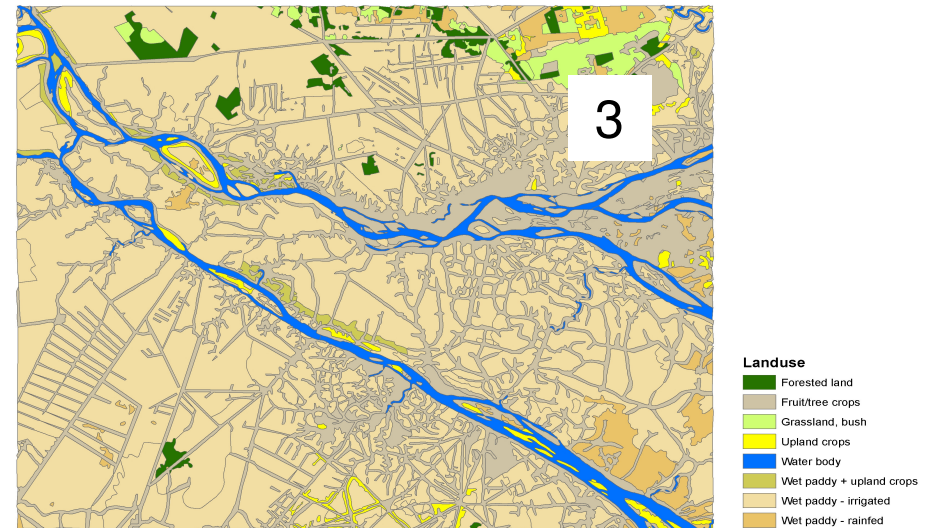
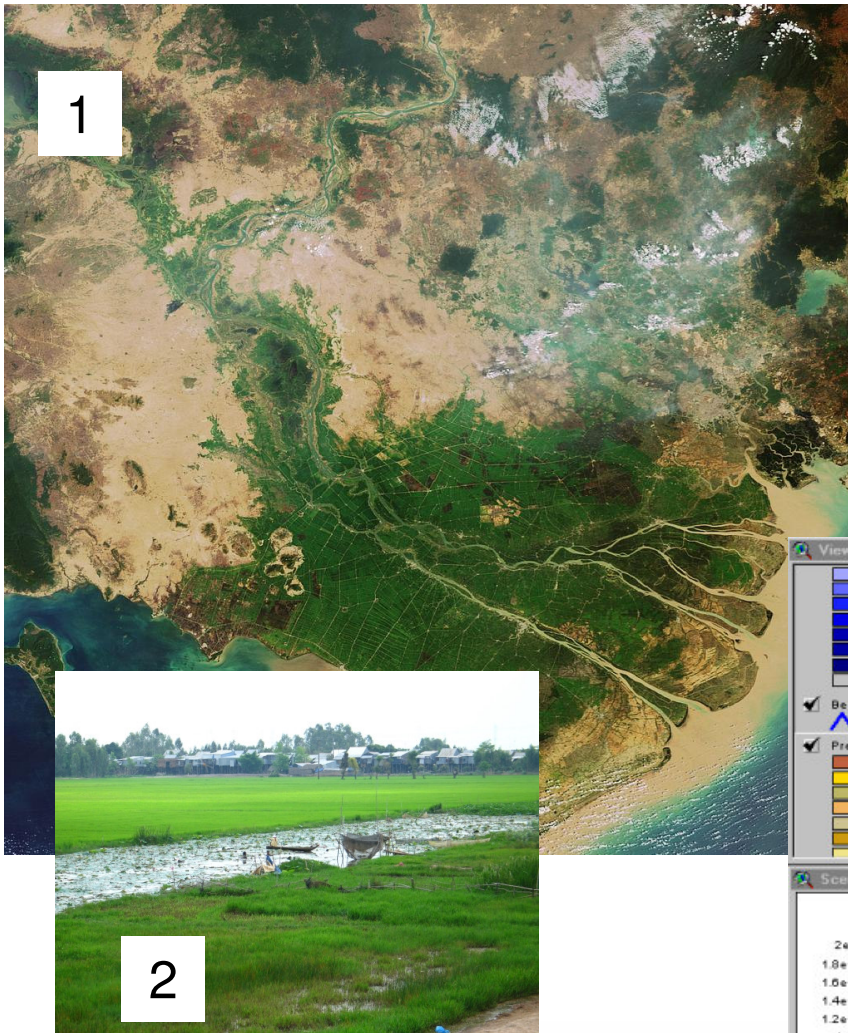
- Center for Development Research, Bonn
- German Aerospace Center (DLR)
- Partner organizations in Uzbekistan
- UNESCO

Example: Irrigation Management

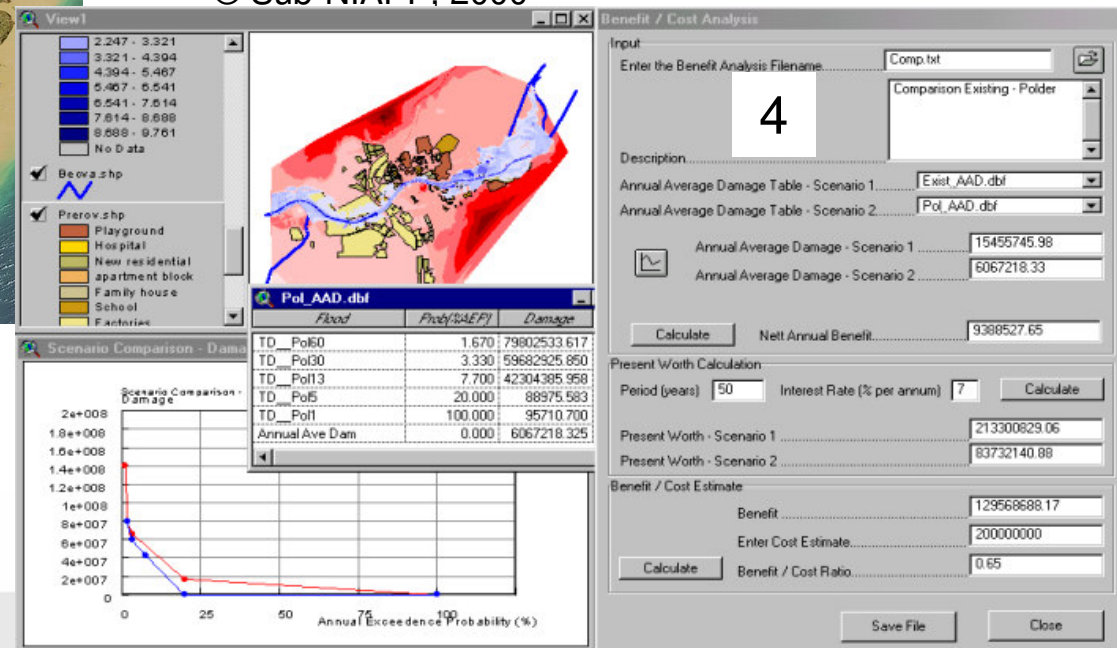


- **Input: MODIS biophysical parameters (LST, ϵ , albedo, NDVI, LAI)**
- **Method: Surface Energy Algorithm for Land (SEBAL)**
- **Applications: Water Balances, Irrigation Performance Indicators**

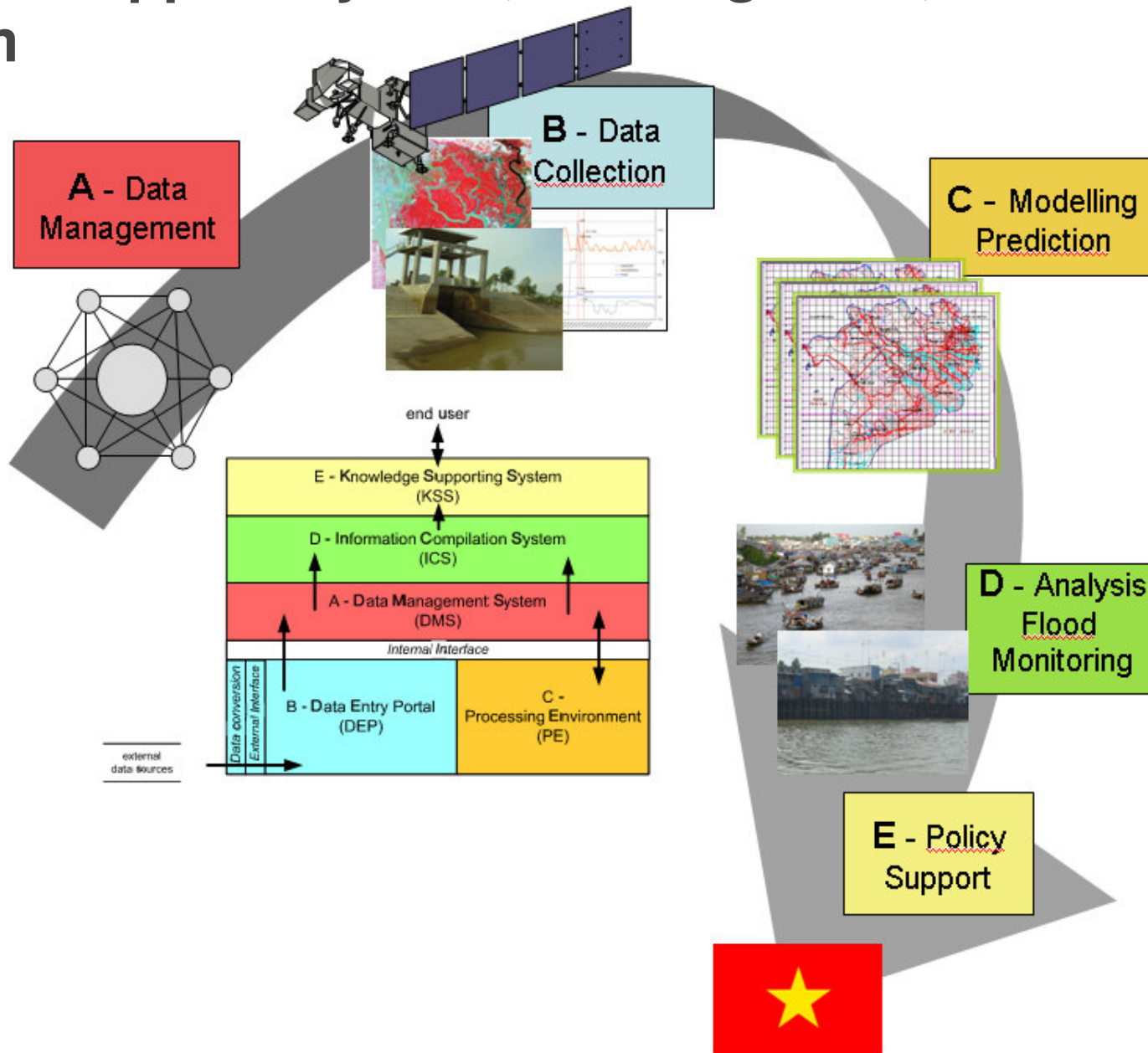
Decision support on sustainable development of the Mekong Delta, Vietnam



© Sub-NIAPP, 2000



Decision Support System, Mekong Delta, Vietnam

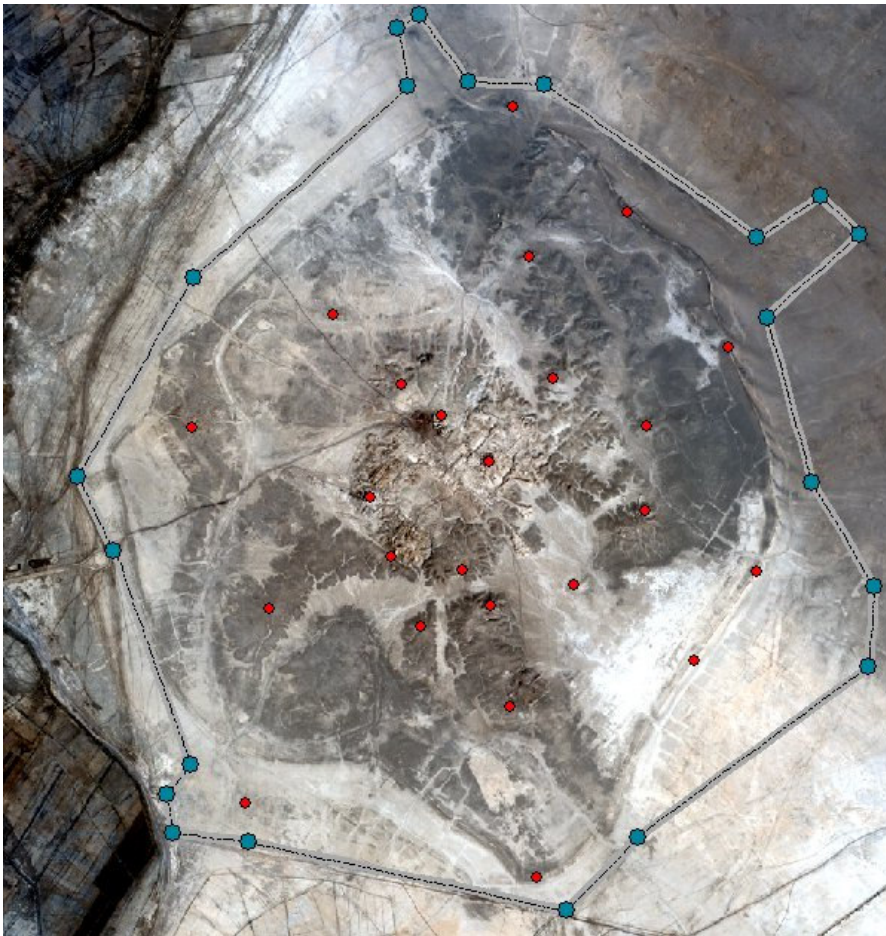




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Mapping of Archaeological Sites of Uruk, Iraq



- Monitoring of World Heritage sites
- Research project in cooperation with UNESCO and German Archeological Institute
- IKONOS data to detect illegal digging and to better map the extent of known excavations



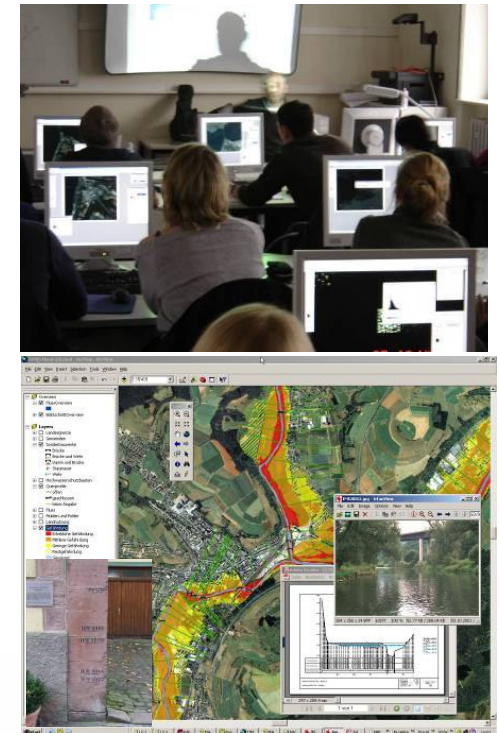
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Education and Capacity Building

- Cooperation with UN University - Institute for Environment and Human Security (UNU-EHS)
 - PhD programs
 - Research in vulnerability and risk assessment

- Capacity Building
 - Training courses
 - Simulations and Real-time exercises
 - Technical Hands-on Training e.g. for



Training Material: Indian Ocean Tsunami Early Warning System



Contents

1. Introduction	
1.1. Purpose and Scope	1_4
1.2. Intended Readership	1_4
1.3. Document Conventions	1_5
1.4. Structure of this Document	1_6
2. Background	
2.1. Tsunamis	2_3
2.2. Disaster Management	2_5
2.3. Situation Awareness and Decision Support	2_6
2.4. Risk and Vulnerability Modeling	2_6
2.5. Tsunami Modeling	2_6
3. GITEWS Concept	
3.1. Overview	3_3
3.2. Sensor Systems	3_3
3.3. Tsunami Modeling	3_3
3.4. Decision Support	3_4
3.5. Risk and Vulnerability Modeling	3_5
3.6. Geospatial Data Repository	3_5
3.7. Capacity Building	3_5
4. GITEWS Early Warning Process	
4.1. Overview	4_3
4.2. Baseline	4_3
4.3. Decision Support System	4_4
4.4. Roles and Tasks	4_4
5. GITEWS Early Warning and Mitigation Center	
5.1. Overview	5_2
5.2. Workplace	5_3
5.3. Hardware Concept	5_4
6. GITEWS Decision Support System	
6.1. Overview	6_3
6.2. Architecture	6_4
6.3. Components	6_4
6.4. Interfaces	6_4
6.5. Graphical User Interface	6_5

11. DSS Graphical User Interface

Outline

The focus of this chapter lies on how sensor system and simulation data, situation assessments, and decision proposals are visualized in the DSS GUI. This includes efficient information aggregation concepts, ontologies, symbology, color scheme, and spatiotemporal visualization methods supporting the COOD in his overall situation awareness and decision making process. In addition, the reader is familiarized with interaction and operation concepts.

The DSS graphical user interface is designed as multiple-screen desktop application providing for each user (primary COOD) task the corresponding setup. The GUI concepts aim at an efficient, clear, and flexible user interface which aids the user particularly in time-critical, stressful scenarios to perceive and assess the overall situation immediately and correctly and to make the appropriate decision in the available time frame.

Therefore the main objectives and tasks of the DSS GUI include:

- Visualization of all incoming pre-processed sensor and simulation data
- Visualization of sensor system status and DSS status information
- Provision of reasonable decision proposals
- Visualization of the decision process state
- Provision of facilities for the generation and dissemination of warning, map, and other DSS products

The concepts described in this chapter relate not only to the DSS prototype but also to the overall planning and development efforts which aim at the final system 2008. Feedback is appreciated.

At the end of this chapter, an evaluation of the DSS GUI concepts is outlined which is currently being performed by the department "Interface Design" of the University of Applied Sciences Potsdam. First results indicate, that the DSS GUI conception as it is described in this chapter corresponds largely to its requirements. The results of this evaluation will be incorporated into the final design of the user interface.



Figure 11.1: The GITEWS Decision Support System consisting of multiple screens

2nd. UN-OOSA SPIDER Workshop in Bonn UN-OOSA + UN-EHS + DLR



GNEX'07 – 2nd European Emergency Exercise, Oct. 2007



- A one-week near real time exercise on applying satellite imagery for supporting international crisis response mechanisms in Europe
- DLR-ZKI coordinated the exercise and provided satellite image maps
- About 18 European research institutes and at least 60 scientists successfully worked together to produce the requested information

Capacity Building Examples

AMC – Field Training activity on Cyprus 2007

➤ **European Community Assessment Mission Course** jointly organised by THW and Johanniter International Assistance (JUH) in the framework of EU project LIME





Final remarks

- DLR is actively involved in research projects in support of civil security, environmental monitoring and sustainable development worldwide
- DLR provides through ZKI the German contribution for European and international civil protection and UN humanitarian relief using earth observation
- Capacity Building is an integrated part of the DLR activities in environmental monitoring and disaster management and is available for third parties.
- DLR is supporting the UN Program Space based Information for Disaster Management and Emergency Response (SPIDER)



Thank you for your attention !