Workshop Output WS 2.4.A

Title of workshop: Remote sensing techniques and data for natural hazard research

Prepared by

Moderators	**Martin Rutzinger**
Participants*	**Brožová, Natalie; Cristea, Nicoleta; Marchetti, Giulia; Zieher, Thomas; Ueno, Kenichi; Fernández, Alfonso; Zhao, Wei; Racoviteanu, Adina E.; Aggarwal, Anubha**

* Workshop participants that have submitted contributions to the workshop

General questions to please be answered in the workshop reporting

1) What was the focus of the workshop? Methodological issues and advancements or thematic issues (systems knowledge, transformation knowledge, target knowledge). Please check and fill in the matrix in the output section.

Methodological issues and advancements	**Thematic issues**		
	System knowledge	Transformation knowledge	Target Knowledge
Remote sensing platforms and derived information for selected topics in natural hazard research	Remote sensing as tool for investigating natural hazard processes such as avalanches, glacier lake outburst floods, landslides. Remote sensing for parameter extraction such as snow cover, mapping of geomorphology and grain sizes in river bed systems, precipitation, temperature, displacement rates.	No	No

1) Which key points were discussed in the workshop as a whole? (This should be more a synthesis and not simply a summary of the key points in each presentation)
   - Requirement of open data and open science approach for better comparability and comprehensive studies
   - Requirement of standardized reference data and ground truth collection as a basis for workflow calibration and standardized error assessment.
   - Best practice procedures for comprehensive remote sensing studies
2) What is your opinion on the current state of knowledge concerning your topic(s) (focusing on mountain regions)? *Please check and fill in the matrix on the following page.*

Overall assessment of the state of:

What is your personal opinion on the current state of knowledge concerning the topic(s) addressed in your workshop. Please tick the appropriate field. Brief explanations are appreciated.

State of knowledge	Very good	Good	Poor	Very poor	Not appropriate	*Comments*
Global			x			
Regional			x			
Scattered case study-based knowledge		x				*Demand of benchmark sites for remote sensing in mountain areas*
Knowledge about past states/trends				x		*Limitation of available sensors and data sets looking into the past. Existing data sets require reanalysis*
Knowledge about current situation		x				*Standardized procedures for ground truthing and error assessment reporting are required*
Knowledge about future states/trends/thresholds						*Remote sensor systems will improve in resolution (spatial, temporal, radiometric, spectral); open data and open science approaches are needed for fast innovation of methods and developments in natural hazard applications*
Knowledge about the system						*Data and method driven approaches should meet process understanding. Natural hazard science should understand limitations of remote sensing methods (is the method/data of choice the appropriate on for a specific analysis?).*
Knowledge about shaping pathways to more sustainable development (transformation knowledge)						*Not applicable*
Knowledge about envisaged goals (target knowledge)						*Not applicable*

Ideas for questions to potentially be answered by the moderators after the workshop in the reporting (please delete what is not useful):

1) Were there any new insights and/or findings presented? If yes, which ones?
   - New potential of high-resolution multispectral satellite remote sensing
   - High potential of high-definition topography data by topographic LiDAR
   - New potential of precipitation analysis by satellite remote sensing

2) What was the main message/consensus of your workshop?
   - Open data and open science approaches should be fostered

3) Were major uncertainty issues identified and discussed? If yes, which ones?
   - Demand for accurate and comprehensive reference data, in order to know the potential and limitations of remote sensing analysis

4) Was there any significant controversy (if so, what?) that requires new data (or further exploration of existing data) to resolve the issue? (explain)
   - No

5) Were new research questions raised? If yes, would working on these questions need to involve other disciplines (which ones)?
   - No

6) Did the workshop identify research topics (e.g. environmental drivers other than climate) that are, in your opinion, currently greatly underrepresented in mountain research, but should urgently be addressed?
   - Standardization of remote sensing variables should be further fostered

Further Comments