Workshop Output WS 1.2.A

Title of workshop: Challenges in Quantifying and Simulating the Land-Atmosphere Exchange in Mountain regions

Prepared by

Moderators	**Wohlfahrt, Galvagno, Rotach**
Participants*	**Els, Hellström, Scholz, Bertoldi, Sauter, Stiperski, Karl, Ochoa-Sanchez, Goger, Stöckl, Gray, Lamprecht**

* 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
x			

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)
The goals of the workshop were to discuss the state-of-the-art with regard to land-atmosphere interactions in mountain areas and the associated uncertainties and to identify priorities for future research aimed at reducing the most prominent uncertainties. The discussion revolved around three main points: (i) What are the major uncertainties regarding land-atmosphere exchange in mountains? (ii) What are the corresponding key processes? What are the corresponding key ecosystems/land cover types?

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.*
The workshop participants agreed upon that the intrinsic lack of homogeneous conditions in complex terrain is incompatible with current theoretical understanding of land-atmosphere exchange. As a consequence of the lack of a valid theoretical framework, both modeling and measurements of land-atmosphere exchange in mountain terrain are challenged by large uncertainties. Key processes that were identified in this context were the nature of turbulence and the magnitude of advection and these were found to be relevant from natural to man-made ecosystems/land cover types found in mountain areas. A particular challenge is the fact that the processes under consideration an extremely wide range of scales and scale-separation, which e.g. is necessary for numerical modeling, is often impossible.

Overall assessment of the state of land-atmosphere exchange over mountains:

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		*Which region?*
Scattered case study-based knowledge		X				*Where?*
Knowledge about past states/trends					X	
Knowledge about current situation					X	
Knowledge about future states/trends/thresholds					X	
Knowledge about the system				X		
Knowledge about shaping pathways to more sustainable development (transformation knowledge)					X	
Knowledge about envisaged goals (target knowledge)				X		

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?
2) What was the main message/consensus of your workshop?
3) Were major uncertainty issues identified and discussed? If yes, which ones?
4) Was there any significant controversy (if so, what?) that requires new data (or further exploration of existing data) to resolve the issue? (explain)
5) Were new research questions raised? If yes, would working on these questions need to involve other disciplines (which ones)?
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?

Further Comments