Geophysical Research Abstracts
Vol. 14, EGU2012-1632, 2012
EGU General Assembly 2012

Characterisation of flood events in Switzerland based on weather patterns

P. Froidevaux, O. Martius, and R. Weingartner
Oeschger Centre for Climate Change Research and Institute of Geography, University of Bern, Bern, Switzerland

It is important to learn more about flood triggering weather patterns in Switzerland for two reasons: (i) projections of flood frequencies in a warmer climate are strongly limited by the ability of climate models to represent the complex small-scale processes associated with typical flood triggers like heavy precipitation and snow melt. Information about flood triggering weather situations can be used in a more indirect approach to estimate changes in future flood frequencies.
(ii) Flood frequencies in Switzerland show strong decadal variability suggesting that decadal variations in the synoptic atmospheric flow might influence flood probabilities (Schmocker-Fackel and Naef, 2010). However relations with temperature trends or the North Atlantic Oscillation are complex and ambiguous and Schmocker-Fackel and Naef (2010) expressed the need for a better understanding of the synoptic-scale atmospheric flood triggers.

A detailed analysis of the weather patterns that trigger flood events in Switzerland is a challenge (i) due to the complex topography (Jura mountains, Swiss Plateau and Alps) that affects both the precipitation and the run-off and (ii) due to the broad range of hydrological regimes. We account for the second factor by using existing hydrological classifications of the studied flood events (e.g. rain on snow, showers versus frontal precipitation, combination of different factors, see Diezig and Weingartner, 2007 and Helbling et al., 2006).

We perform a meteorological characterization of annual flood events in the last 40 years for a selection of mesoscale catchments in Switzerland. The characterization is done separately for each hydrological regime and for different topographical regions and consists in two steps: (i) we use operational weather classifications of MeteoSwiss to describe the typical flood-associated weather regimes and (ii) we identify typical flood-related atmospheric characteristics by using the ERAinterim reanalysis dataset and a dense network of observations of temperature, precipitation, snow cover and river discharge.
Once such a classification is achieved, future changes in the frequency of the flood-associated weather patterns will be studied.

Diezig, R. and R. Weingartner, 2007: Hochwasserprozesstypen - Schlüssel zur Hochwasserabschätzung. Wasser und Abfall 4: 18-26.
Helbling, A., C. Kan and S. Vogt, 2006: Dauerregen, Schauer oder Schmelze - welche Ereignisse lösen in der Schweiz die Jahreshochwasser aus?. Wasser Energie Luft, 98(3): 249-254
Schmocker-Fackel, P. and F. Naef, 2010: More frequent flooding? changes in flood frequency in Switzerland since 1850. Journal of hydrology, 381 (1-2), 1-8.