

**AP21**

**Future changes in extreme precipitation in the northern foothills of the Tatra Mountains based on climate model simulations**

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**Abstract**

The assessment future changes of extreme precipitation events are usually based on available global climate model (GCM) or regional climate model (RCM) simulations. In this study a delta change method has been used (S.C. van Pelt et al., 2012) to get a better description of the range of changes in extreme precipitation events. Four RCM simulations of the 1961-1990 and 2061-2090 climate for A1B SRES greenhouse gas emission scenario were available for the northern foothills of the Tatra Mountains. To increase the size of this four-member RCM ensemble, five additional GCM simulations were analysed. The climate responses from these models are used to modify observations (1961–1990) of precipitation data from 11 meteorological stations with an advanced delta change approach. It is found that the range of future of extreme precipitation across the four-member RCM ensemble change is similar to the results from the GCM ensemble. Heavy precipitation events are of high importance due to their major role as flood generating factor. The costs of extreme meteorological events have exhibited a rapid upward trend in recent decades and have large impacts on society.

In two years: 1997 and 2010 Poland was affected by large floods. Precipitation recorded on the northern slopes of the Tatra Mountains is the highest in Poland and largely contribute to flood generation. The northern foothills of the Tatra Mountains belong to the drainage basin of the largest Polish river – the Vistula. The Tatra Mountains (“Tatry”), located in two countries – Slovakia and Poland – are the highest range of the massive arch of the Carpathian Mountains. The mean annual precipitation at Kasprowy Wierch (1991 m a.s.l.) for the period 1951-2012 was 1765 mm, nevertheless, the record-high annual maximum precipitation at this station was 2599 mm in 2001 (with monthly maximum of 651 mm in July 2001). Even higher annual precipitation values were recorded in 2001 at two other stations: 2628 mm at Hala Gasienicowa and 2770 mm at Dolina Pieciu Stawow (Z.W. Kundzewicz et al., 2014). The increase of precipitation is more pronounced during the warm part of the year (May-October), especially for summer months, when the floods occurred most often.

This study shows an intensification of precipitation extremes in the future for all of 11 meteorological station used. The study was realised within the FLORIST project (Flood risk

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on the northern foothills of the Tatra Mountains, supported by a grant from the Swiss government through the Swiss Contribution to the enlarged European Union (PSPB No. 153/2010)), to analyse future changes in probability of extreme precipitation and future risk of floods.