



Stratospheric intrusions as precursors to heavy Alpine precipitation - variability and trends

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Heavy precipitation events can cause serious destruction in the Alpine region, by triggering secondary catastrophic events such as landslides and rock fall. It has been shown in case studies that a close dynamical link exists between the occurrence of elongated intrusions of stratospheric air, so called streamers, over western Europe and episodes of heavy precipitation along the southern Alps (Massacand et al., 98).

The significance of this link is studied using an observation-based climatology of Alpine precipitation (Frei and Schär, 98) and a climatology of streamers derived from the ERA-40 data set. A strong link between the two phenomena can be confirmed. Climatologically about three quarters of the extreme precipitation events are accompanied by a stratospheric intrusion.

Here we investigate the pronounced seasonal variability of the phenomenon. It can be shown, that besides the presence of the streamer, the southerly moisture flux towards the Alps is acting as a key factor in determining the severity of the precipitation events. Trends of the streamer frequency, intensity and in the southerly moisture flux are studied over the period of investigation. The number and intensity of the “heavy precipitation” streamers shows no significant trend but the ability of the streamers to trigger extreme precipitation appears to have increased over time. A possible explanation for this might be the significantly positive trend in the southerly moisture flux that is found.