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Integrated water-vapour dynamics over Switzerland during severe precipitation in August 2005

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Severe precipitation affected much of Switzerland over the period 21-23 August 2005. The precipitation was heaviest across central and eastern parts of the country, with some places recording 48-hour totals of 200mm or more. This lead to landslides in the northern Alps and unprecedented flooding on the banks of rivers and lakes. A higher than normal freezing level in the Alps contributed to less snow being stored on the mountains, contributing to a greater runoff in the rivers. Atmospheric water vapour maps of the event have been made from a network of Global Positioning System (GPS) receivers located at 31 points across Switzerland (Morland et al., 2006, Morland and MÃd'tzler, 2006). These maps have been created using the STARTWAVE database at the University of Bern (Switzerland), which is an atmospheric database comprising a combination of GPS sensors, microwave radiometers, sun photometers, radiosonde and weather station reports for Switzerland and other European countries (Morland et al., 2005). The maps take into account the altitudinal variation, covering the range from 300 to 3600 m above sea level, leading to a successful scheme, which allows the production of hypothetical maps of integrated water vapour (IWV) above a standard altitude of 500m for the whole country. The maps show IWV values of greater than 40 mm for periods of up to 24 hours above central Switzerland during the period of most intense precipitation. Because more than 200mm of precipitation fell within 48 hours, and since only a percentage of the 40 mm total column water vapour can be rained out at any one time, a persistent dynamic influx of water vapour, combined with steady precipitation processes over 24-48 hours is needed to explain this severe event. Comparisons of the GPS water vapour data with that of total precipitation measured in rain gauges and precipitation estimated from operational Swiss weather radar will be undertaken. Comparisons will also be made between the GPS data and the output of

the operational model of the European Centre for Medium Range Weather Forecasting (ECMWF). Further comparisons with a higher resolution model such as the Alpine Model (aLMo) of the Swiss Meteorological Service will also be undertaken.

References

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