



Mapping storm velocity over catchments: Distribution and scale dependence for flash flood-inducing storms.

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The concept of catchment-scale storm velocity permits examination of storm motion and velocity from the perspective of a distance metric imposed by the drainage network structure of a catchment. This paper aims to examine the distribution and scale-dependency of catchment scale storm velocity values for major flash flood-inducing storms. Eight extreme flash flood-inducing storms occurred in Europe in the period 1999 to 2008 are examined. Analyses are carried out for a set of basins that range in area from 7 to 982 km². It is shown that the distribution of catchment-scale storm velocity depends on basin-averaged rain rate and catchment size. Hourly velocity values corresponding to maximal rain rates during the flood producing period exhibit a non linear dependence on basin scale and may attain values as high as 2 m s⁻¹. Integration of velocity over the catchment response time leads to a reduction of maximal velocities. Response-time integrated maximal storm velocity shows a peak for catchment scales in the range of 20-100 km², with values up to 1 m s⁻¹.