

ANALYSIS AND MODELLING OF THE 2010 FLOOD IN THE HUPSEL BROOK CATCHMENT, THE NETHERLANDS

Brauer C.C.¹, Kloosterman, P.¹, Teuling, A.J.¹, Overeem, A.^{1,2}, Van der Velde, Y.^{1,3}, Hazenberg, P.¹, Warmerdam, P.M.M.¹ and Uijlenhoet R.¹

(1) *Hydrology and Quantitative Water Management Group, Wageningen University, P.O. Box 47, 6700 AA, Wageningen, The Netherlands, claudia.brauer@wur.nl*

(2) *Royal Netherlands Meteorological Institute, De Bilt, The Netherlands,*

(3) *Department of Physical Geography and Quaternary Geology, Stockholm University, Sweden*

On 26 August 2010 the eastern part of The Netherlands and the bordering part of Germany were struck by a series of rainfall events. The maximum 24-hour rainfall sum, 160 mm, occurred at the 6.5 km² Hupsel Brook catchment, which has been the experimental watershed employed by Wageningen University since the 1960s (Figure 1). This exceptionally heavy rainfall event (return period > 1000 years) triggered an unprecedented flash flood in the Hupsel Brook catchment (see Figure 2).

We analyzed the rainfall event and the resulting flood in detail. This study improved our understanding of the dynamics of such lowland flash floods and the results have been published in *Hydrology and Earth System Science* (Brauer et al., 2011). During this extreme event some thresholds became apparent that do not play a role during average conditions and are not incorporated in rainfall-runoff models.

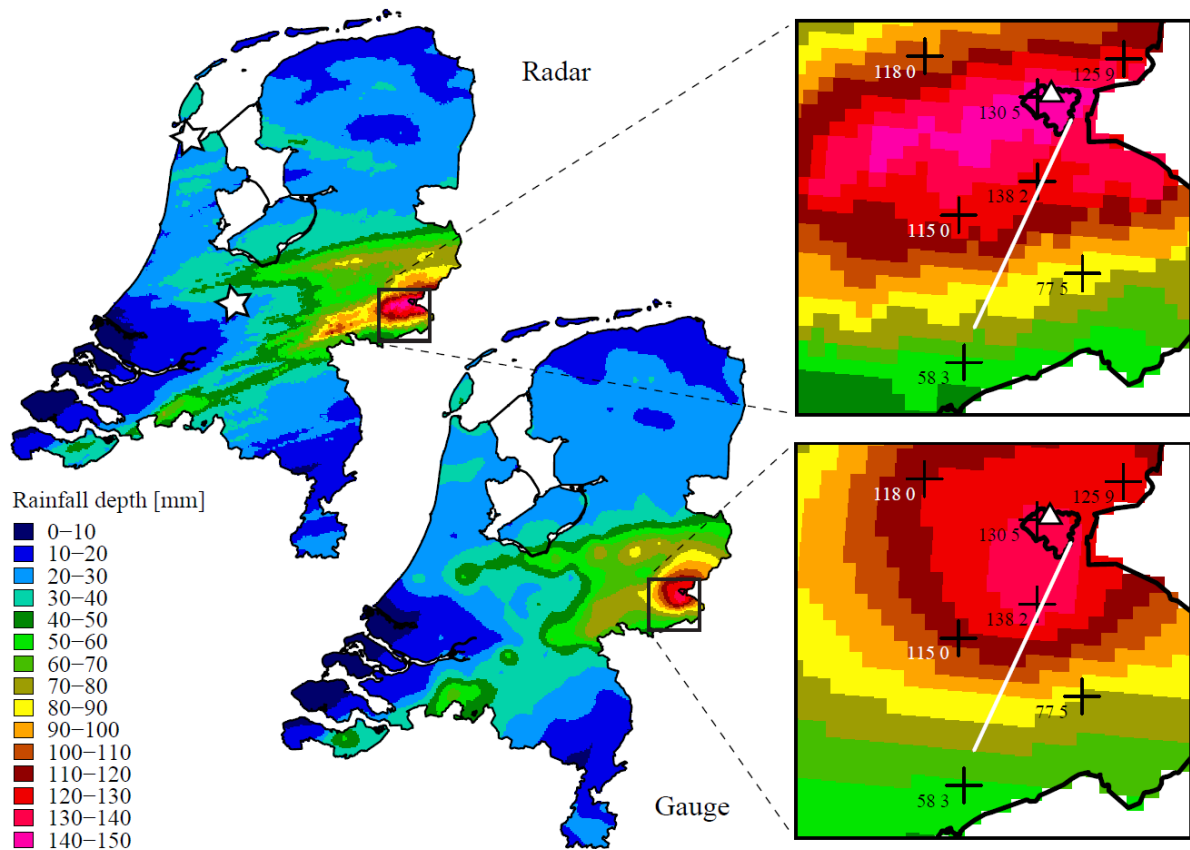


Figure 1: Daily rainfall depths measured by the radars (stars) and interpolated from rain gauges (plusses) (taken from Brauer, 2011).

At the ERB conference, we will present a detailed analysis of this extreme event, focusing on

1. the measured soil moisture, groundwater and discharge response of the catchment,
2. the thresholds we found,
3. the manner in which these processes and thresholds are incorporated in some well-known conceptual hydrological models and
4. how well these models are able to simulate the rainfall-runoff processes during the 2010 flash flood.

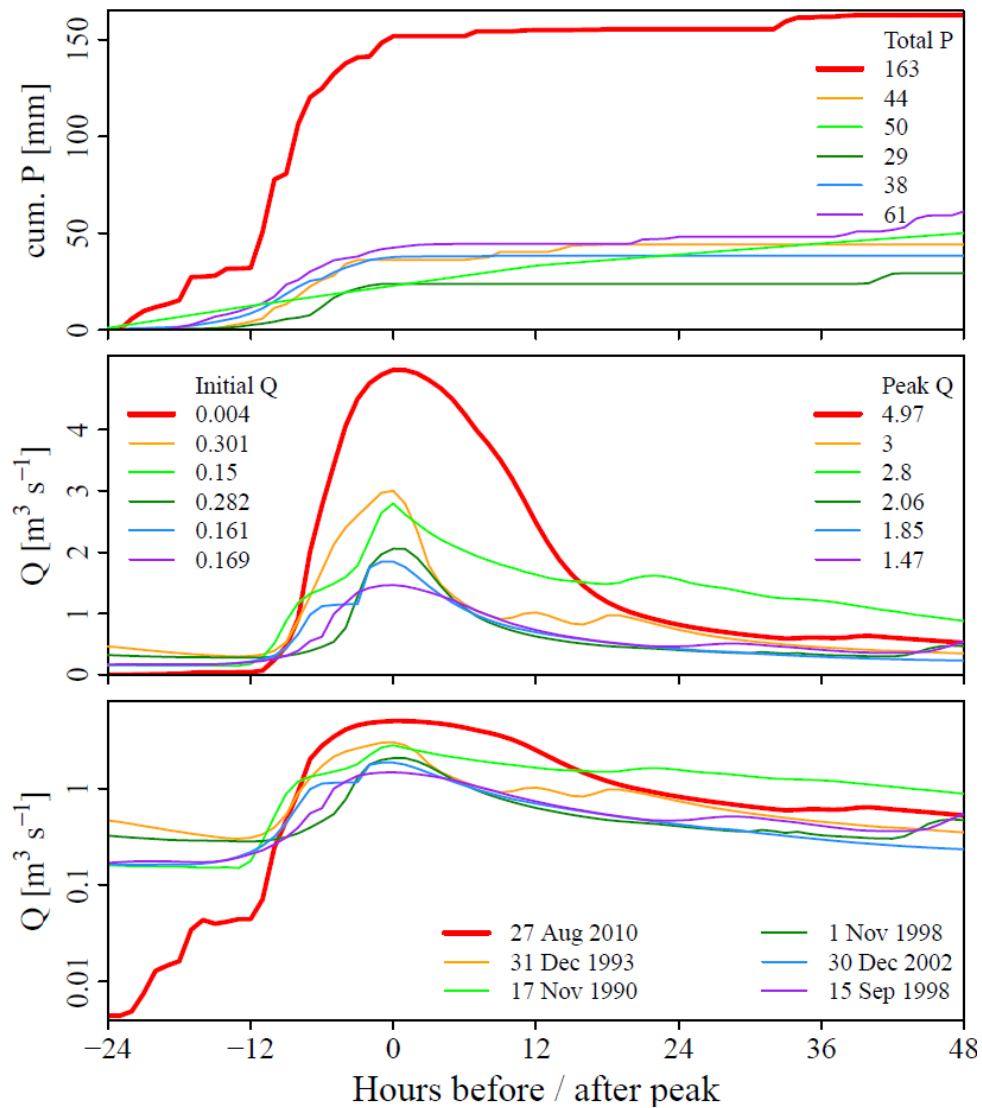


Figure 2: Cumulative precipitation (top) and discharge on linear (middle) and logarithmic axis (bottom) of the six highest discharges since 1969 (taken from Brauer, 2011).

REFERENCES

Brauer, C.C., Teuling, A.J., Overeem, A., Van der Velde, Y., Hazenberg, P., Warmerdam, P.M.M. and Uijlenhoet, R.: Anatomy of extraordinary rainfall and flash flood in a Dutch lowland catchment, *Hydrol. Earth Syst. Sci.*, 15, 1991-2005, 2011.