

## ***Interactive comment on “Multi-scale hydrometeorological observation and modelling for flash-flood understanding” by I. Braud et al.***

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General

This paper gives a clear account of the monitoring philosophy to document the variability of active hydrological processes between and during flash floods from the hillslope scale to the regional scale. Although a suitable event has not yet occurred that will provide a comprehensive test for the developed network, the ambitious network and programme at all scales and at all stages of the hydrological cycle already provides suitable material for publication.

However, I am concerned about the absence of a clear definition of a flash flood. The paper makes a distinction between ‘normal’ and ‘extreme’ behaviour in floods (p1876

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line 20). Does this imply that all extreme floods are flash floods? How would the authors distinguish between normal floods and flash floods given that there are many definitions of ‘flash floods’ (eg Douvinet and Delahaye, 2010). For example, did all 144 rain events having daily precipitation amounts greater than 190 mm during the 1958–94 period in southern France listed by Jacq (1994) generate flash floods – or did intense rainfall events of short duration of much lower total rainfall also generate flash floods on small to medium catchments. Is a flash flood characterised by the magnitude of its peak or by the rapidity of its onset (ie the rate of rise of the hydrograph)? (p 1874 line1). How rapid does the onset of the flood need to be to be categorised as a flash flood? Does the intense rainfall of the Mediterranean region require a different definition of a flash flood from those in more temperate areas as described by Douvinet and Delahaye?

Were any of the events in autumn 2012 considered to be flash floods? If they were ‘normal’ was this because they did not produce exceptional peak flows or because they did not have rapid onset?

Given the availability of historical data (at least on rainfall) did they consider or calculate the risks of not getting a suitable event during the period of the project? Given the limited spatial extent of many flash floods is there particularly a risk that no events may occur on the three small catchments (Valescure, Tourgueille, Gazel) for many years.

Specific comments

P 1879 line 9 et seq. With respect to hillslope monitoring, different network arrangements are made for the Gard and the Ardèche catchments on the basis of what are ‘thought’ to be the dominant modes of surface runoff. You should give some basis for this judgement or ‘thought’. P1879 line 11 and 20 The word ‘exposition’ in French does not mean the same in English. Presumably ‘exposure’ is intended P1879 line 22 ‘shaley’ Better simply ‘shale’. In fact better ‘shale lithology’ and ‘granite lithology’. P1882 line 2 repetition of ‘soil’ p 1887 line 10 ‘succion’ is French. English is ‘suction’.

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P1889 line 2 Spelling 'trough' P 1890 line 29 Each class is considered statistically homogeneous what facilitates the study of its properties along aggregation (Lepioufle et al., 2012). I don't understand this sentence! Rerword. P1892 line 9 'and a morphodynamical expertise of the site'. Please explain what this is. P 1902 line 28 'Nevertheless, low maximum peak discharges are recorded, as compared to historical values in both catchments (maximum peak discharge at the Ardèche at Sauze St-Martin recorded at about  $4500\text{m}^3\text{ s}^{-1}$ , and maximum daily discharge of  $2510\text{m}^3\text{ s}^{-1}$ ). So, what were the comparative discharges during the event in  $\text{m}^3\text{ sec}^{-1}$  ? Page 1903 'Figure 11 shows the simultaneous behaviour of the electrical conductivity (EC), isotopic composition  $^{18}\text{O}$ , Ca, Al and TOC concentration of the streamwater in the Valescure catchment ( $3.9\text{ km}^2$ ) during the 9–10 November 2012 flood event. You do not comment on the fact that EC, Al TOC and CA appear to rise well before the main increase in discharge and peak before the discharge peak. Why is this? All this section seems to refer to 'normal' flood events rather than flash floods. Under my own definition of flash floods, infiltration excess as well as saturation excess surface flow will occur during extremely intense short period rainfall. In this case the proportion of 'new' water is likely to be much higher. I.e., there is an intensity threshold over which the results for the normal modelled floods may no longer apply.

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