



Working Group F Thematic workshop

FLASH FLOODS AND PLUVIAL FLOODING



**THE REAL TIME USE OF SOIL MOISTURE SENSORS
TO IMPROVE THE ACCURACY OF FLOOD FORECASTING MODELS
AND FOR THE DETECTION OF THE LANDSLIDES TRIGGER
IN UMBRIAN CATCHMENTS IN THE TERRITORY OF COMPETENCE
OF THE TIBER RIVER BASIN AUTHORITY**

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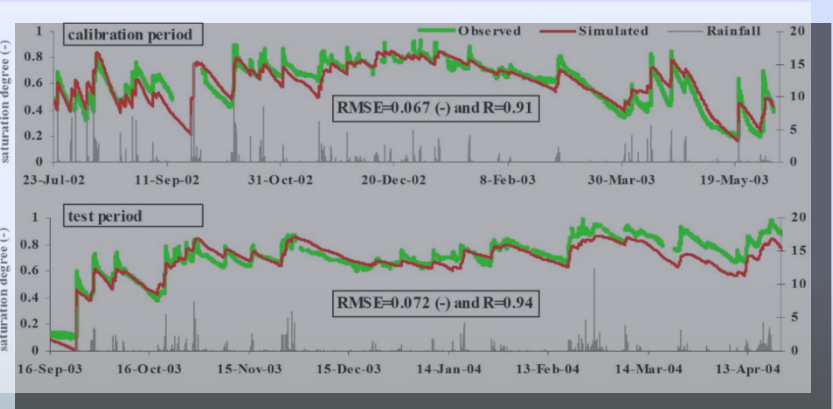
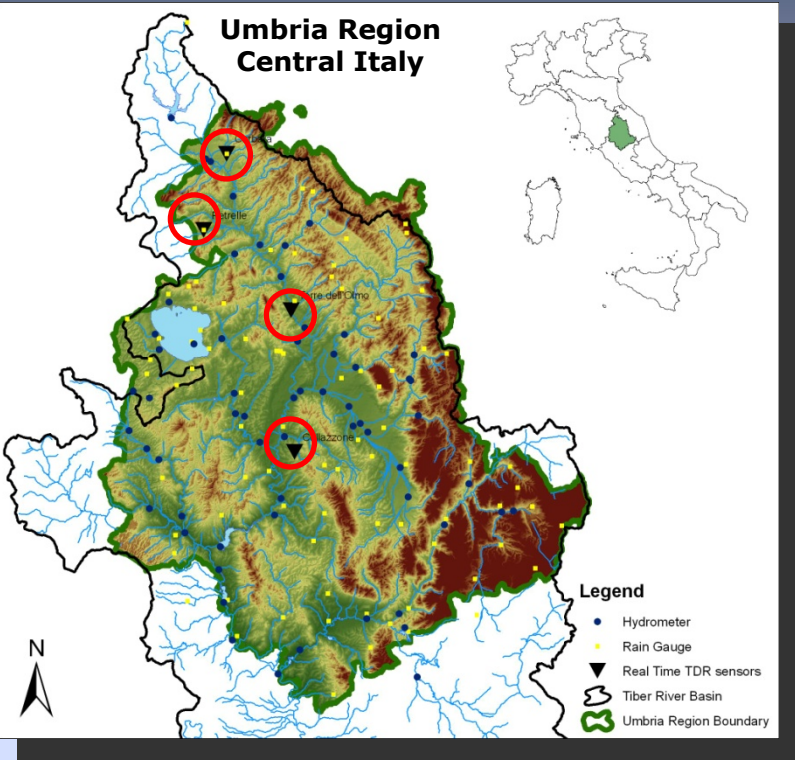
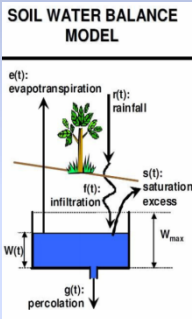
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The soil moisture in the vadose zone represents a key factor in the modelling of the hydrologic cycle and is significant for the forecast of both floods and shallow landslide triggering.

The estimation of soil moisture can be addressed by field measurements like TDR.

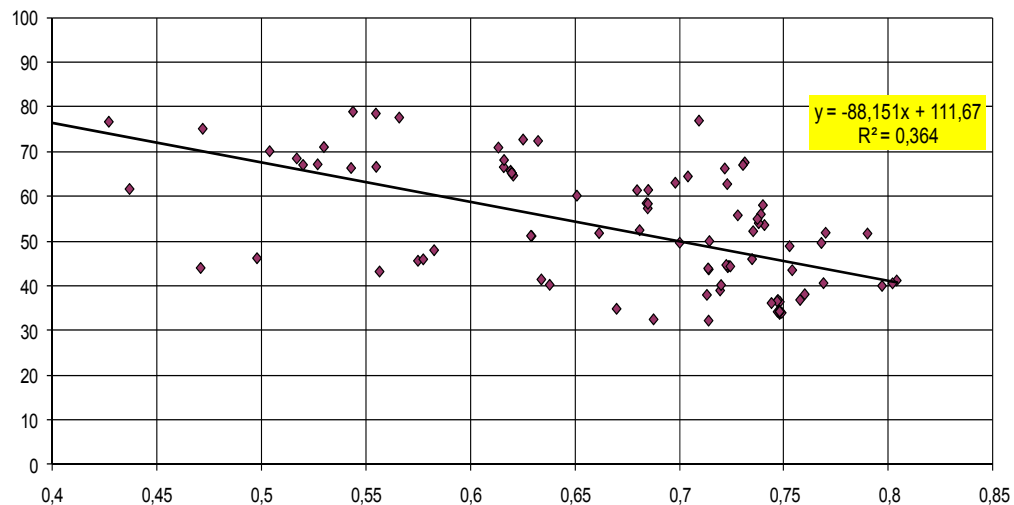
The real time TDR data were used for the development of the structure of a continuous real time physically based soil water balance model and also for its parameterization.



The soil water balance model was tested with experimental measurements made in a multi-year period in two experimental areas of Central Italy (Brocca et al., 2008), achieving satisfactory results during calibration and verification.



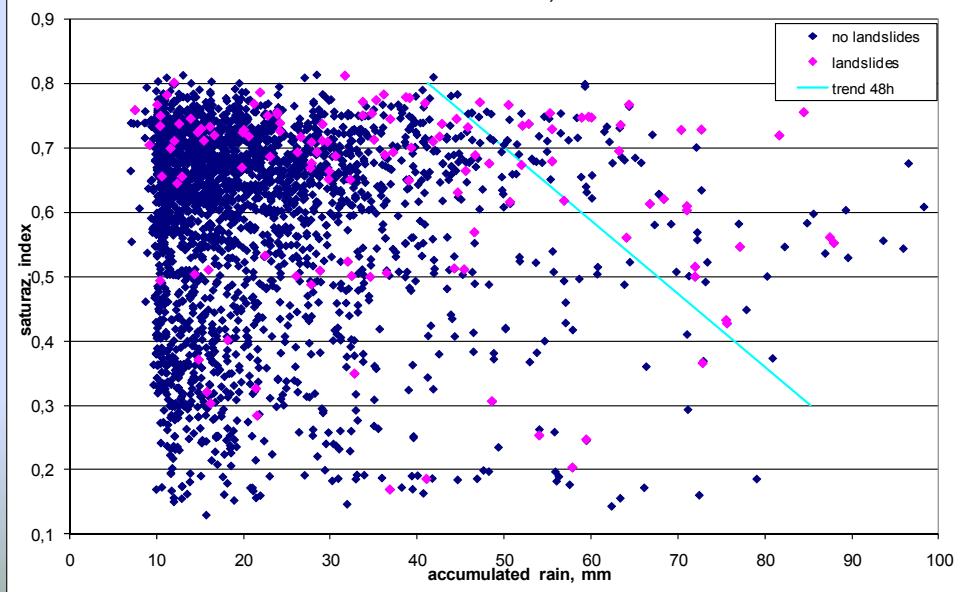
soil moisture - accumulated rain 48h



The analysis of several landslide events demonstrated the strong influence of the soil moisture content on the triggering of landslides (Ponziani et al, 2009).

These figures show that the accumulated rainfall needed to trigger a landslide decrease with increasing soil moisture.

rain events - landslide events, 48 h accumulated rain

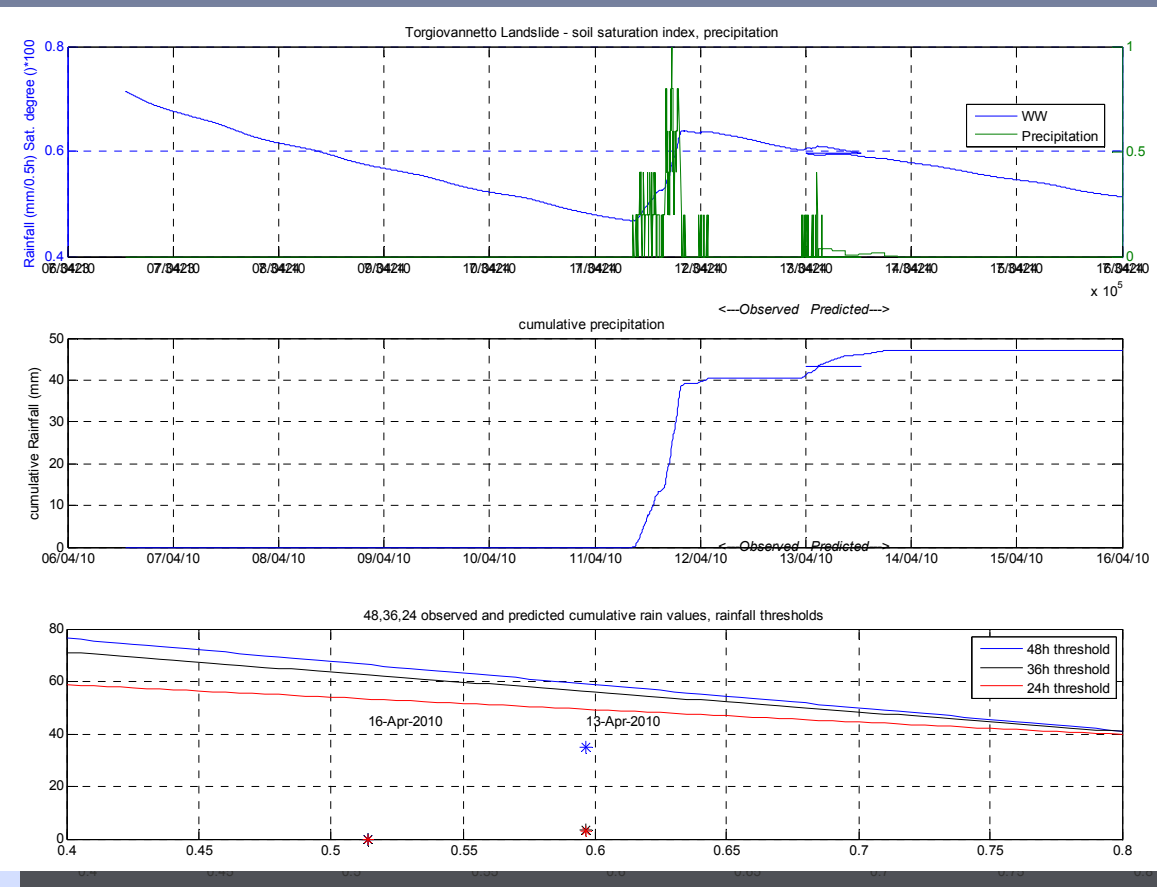




Conclusions

The CFD is testing a procedure aimed to the evaluation of the soil moisture content at regional and local scale, and the emission of pre-alert advices in case of intense meteorological event observed or predicted.

The real time soil moisture data, even though referred to few points, can furnish a reliable estimation of the average conditions of the water content at the catchment scale, allowing to improve the reliability, robustness and performances of the soil water balance model as well as of the rainfall thresholds.



References

Ponziani F., Pandolfo C., Stelluti M., Berni N., and Brocca L.: "Test and calibration of rainfall thresholds for use in a regional civil defense emergency management system". European Geosciences Union - General Assembly 2009 Vienna, Austria, 19 – 24 Aprile 2009.

Brocca, L., Melone, F., Moramarco, T. (2008). On the estimation of antecedent wetness condition in rainfall-runoff modeling. *Hydrological Processes*, 22, 629-642.



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Thank for your attention.