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Improving operational Flood Assessment - Where Satellites make the Difference

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Satellite imagery has been used for various purposes in the domain of hydrology and flood monitoring in particular for a long time. While for some purposes like catchment characterisation the application of earth observation data as information source is commonly accepted, the routine observation of flood situations has only rarely been conducted in an operational framework. The low temporal resolution of radar satellite data and incapability of optical sensors to penetrate through clouds have been among the main limiting factors for a rapid assessment of inundated areas. This paper presents current possibilities and limitations of using today's satellite systems for the observation of flood situations at local to regional scale and reflects the accessibility and suitability of different satellite systems for this purpose.

An overview of current spatial and temporal observation capacity is given and it is presented how the synergistic use of different satellite systems can help to overcome observation gaps. The paper discusses approaches on how to best exploit satellite imagery for the purpose of routine flood extent mapping and how satellite-derived flood extent information can best be combined with reference information like topographic maps or very high resolution digital elevation data for estimating flood parameters.

In a second part of the paper, different examples on how optical and radar satellite data are used in the context of the DLR's Center for Satellite Based Crisis Information (ZKI) to map flood situations in near real-time are presented. In this context, a special focus is set on examples of the recently launched German radar satellite TerraSAR-X which provides operationally high quality radar observations at up to one meter pixel

spacing. The potential of this new class of radar satellite imaging instruments, shifting radar observations from the decametre to the meter range, and how this may impact on hydrological monitoring, is discussed.

The paper concludes with an outlook on how routine satellite observation may even be better exploited when coupled with hydrological modelling approaches. Within this context, synergistic approaches for assimilation, calibration and cross validation of remote sensing and modelling techniques are expected to improve the flood impact assessment and for the derivation of flood parameters which are otherwise not directly accessible by means of remote sensing alone.