



## Early detection of thunderstorms using satellite and radar observations

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Between 1972 and 2012 the weather related damages in Switzerland summed up to 8.000 mio. Euro (Hilker et al, 2009); of those, 23% are caused by thunderstorms. Warnings based on nowcasting are an essential mean to reduce this costs. At present two systems are run at MeteoSwiss for the nowcasting of thunderstorms, TRT (Hering et al, 2008) and COALITION (Nisi et al, 2014). TRT is based on radar observations and NWP model data, while COALITION aims at the detection of severe convection in the early development by exploiting observations of the MSG satellite, the Swiss dual-polarization Doppler weather radar network and other sources.

In this presentation we examine approaches to identify convectively active regions based on satellite and radar observations. In a pre-convective environment satellite observations provide the most useful observations to discover convective initiation. An optimal detection method is able to recognize convective initiation with a long leading time and a small false alarm rate. Furthermore, the cell's properties – such as mean cloud top height, cloud water, cell area and motion – should be as continuous in time as possible to allow for robust statistical nowcasting of the cell development in the near future. In these respects we compare two methods based on satellite observations with each other: a method based on based on IR brightness temperatures, their differences and temporal trends (Mecikalski et al., 2010) and the RDT algorithm (Autonés, 2012). In the mature stage of the thunderstorm development radar observations add valuable information about the precipitation intensity and type, the vertical extent and the internal structure of the convective cells. Also for radar observations we investigate possible cell definitions according to the same criteria and outline the design of a multi-sensor cell definition to bridge the gap between the pre-convective and mature stage. In the end the suitability of the monitored cell properties as predictors for the further convective development is discussed.

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