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A Total Validation Approach for assessing the RST technique in forest fire detection and monitoring

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Several studies have shown that high temporal resolution sensors such as AVHRR (Advanced Very High Resolution Radiometer) aboard NOAA (National Oceanic and Atmospheric Administration) satellites, MODIS (Moderate Resolution Imaging Spectroradiometer) aboard EOS (Earth Observing System) satellites and, more recently, SEVIRI (Spinning Enhanced Visible and Infrared Imager) aboard MSG (Meteosat Second Generation) platforms, are suitable for detecting and monitoring forest fires. At the same time, many satellite-based techniques have been proposed for fire detection, but most of them, based on single image fixed-thresholds, often generate false alarms mainly due to the contribution of the reflected solar radiation in daytime, atmospheric effects, etc., so that they result to have scarce reliability when applied in an operational scenario. Other algorithms, which are quite reliable thanks to their multitemporal and/or contextual nature, may turn out to be hardly applicable so that they cannot be inserted in whatever operative schemes.
An innovative approach, named RST - Robust Satellite Technique, already applied for the monitoring of major natural and environmental risks has been recently used for fire detection and monitoring.
The RST approach is based on local (in space and time) thresholds which are automatically computed on the basis of long temporal series of satellite data. It demonstrated already good performances in many cases of applications, but recently for the first time a total validation approach (TVA) was experimented in collaboration with administrators, decision makers and local agencies, in order to evaluate the actual reliability and sensitivity of RST in a pre-operational context. TVA, based on a systematic study of the origin of each hot spot identified by RST, allowed us to recognize most of them as actual thermal anomalies (associated to small fires, to variations of thermal emission in industrial plants, etc.) and not as false alarms simply because not associated to officially documented forest fires.
Some results of recent campaigns both of winter and summer fire detection and monitoring in Italy will be shown and discussed.