The combined use of the RST-FIRES algorithm and geostationary satellite data to timely detect fires

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Timely detection of fires may enable a rapid contrast action before they become uncontrolled and wipe out entire forests. Remote sensing, especially based on geostationary satellite data, can be successfully used to this aim. Differently from sensors onboard polar orbiting platforms, instruments on geostationary satellites guarantee a very high temporal resolution (from 30 to 2,5 minutes) which may be usefully employed to carry out a "continuous" monitoring over large areas as well as to timely detect fires at their early stages.

Together with adequate satellite data, an appropriate fire detection algorithm should be used. Over the last years, many fire detection algorithms have been just adapted from polar to geostationary sensors and, consequently, the very high temporal resolution of geostationary sensors is not exploited at all in tests for fire identification. In addition, even when specifically designed for geostationary satellite sensors, fire detection algorithms are frequently based on fixed thresholds tests which are generally set up in the most conservative way to avoid false alarm proliferation. The result is a low algorithm sensitivity which generally means that only large and/or extremely intense events are detected.

This work describes the Robust Satellite Techniques for FIRES detection and monitoring (RST-FIRES) which is a multi-temporal change-detection technique trying to overcome the above mentioned issues.

Its performance in terms of reliability and sensitivity was verified using data acquired by the Spinning Enhanced Visible and Infrared Imager (SEVIRI) sensor onboard the Meteosat Second Generation (MSG) geostationary platform. More than 20,000 SEVIRI images, collected during a four-year-collaboration with the Regional Civil Protection Departments and Local Authorities of two Italian regions, were used. About 950 near real-time ground and aerial checks of the RST-FIRES detections were performed. This study also demonstrates the added value of the RST-FIRES technique to detect starting/small fires and its sensitivity from 3 to 70 times higher than any other similar SEVIRI-based products.