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New operational geostationary fire detection and fire radiative power products from the European Land Surface Analysis Satellite Applications Facility (LandSAF)

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Biomass burning is globally significant source of trace gases and aerosols and a major mechanism controlling both land-cover change and exchanges of carbon between the land and atmosphere. Quantitative estimates of biomass burning emissions are required for many earth science applications, including for operational forecasting of atmospheric state, where such data are required in close to real-time. This is possible only via a satellite remote sensing approach, ideally utilising the high temporal frequency available from geostationary orbit. This work describes a new European "fire thermal anomaly (FTA)" product that has been developed to meet these requirements, and which includes both repetitive detection of actively burning fires at 15 minute intervals (thus allowing analysis of the complete biomass burning diurnal cycle) and quantification of the fires radiative power output (which has been shown to relate closely to the rate of fuel consumption and thus trace gas, carbon and aerosol emission). The FTA product is derived from multi-spectral observations provided by the Meteosat SEVIRI imaging radiometer, including all fire-affected regions of Africa, Europe and part of eastern South America. Two product versions are to be delivered operationally to users by the Land Surface Analysis Satellite Applications Facility (http://landsaf.meteo.pt/), a pixel-level product made available at the full spatio-temporal resolution of the original SEVIRI observations, and a gridded "integrated" product available at hourly time-steps at a reduced spatial scale. This work details examples of the information content, performance characteristics and accuracy of both product types, and provides examples of their use in delineating major biomass burning events and patterns in the main fire-affected areas covered. It is anticipated that these products will provide valuable input to a variety of earth science applications, including real-time forecast models linking pollutant emissions from fires to models of atmospheric chemistry and transport.