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A fully automatic processing chain to produce Burn Scar Mapping products, using the full Landsat archive over Greece

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Remote sensing tools for the accurate, robust and timely assessment of the damages inflicted by forest wildfires provide information that is of paramount importance to public environmental agencies and related stakeholders before, during and after the crisis. The Institute for Astronomy, Astrophysics, Space Applications and Remote Sensing of the National Observatory of Athens (IAASARS/NOA) has developed a fully automatic single and/or multi date processing chain that takes as input archived Landsat 4, 5 or 7 raw images and produces precise diachronic burnt area polygons and damage assessments over the Greek territory.
The methodology consists of three fully automatic stages: 1) the pre-processing stage where the metadata of the raw images are extracted, followed by the application of the LEDAPS software platform for calibration and mask production and the Automated Precise Orthorectification Package, developed by NASA, for image geo-registration and orthorectification, 2) the core-BSM (Burn Scar Mapping) processing stage which incorporates a published classification algorithm based on a series of physical indexes, the application of two filters for noise removal using graph-based techniques and the grouping of pixels classified as burnt to form the appropriate pixels clusters before proceeding to conversion from raster to vector, and 3) the post-processing stage where the products are thematically refined and enriched using auxiliary GIS layers (underlying land cover/use, administrative boundaries, etc.) and human logic/evidence to suppress false alarms and omission errors.
The established processing chain has been successfully applied to the entire archive of Landsat imagery over Greece spanning from 1984 to 2012, which has been collected and managed in IAASARS/NOA. The number of full Landsat frames that were subject of process in the framework of the study was 415. These burn scar mapping products are generated for the first time to such a temporal and spatial extent and are ideal to use in further environmental time series analyzes, production of statistical indexes (frequency, geographical distribution and number of fires per prefecture) and applications, including change detection and climate change models, urban planning, correlation with manmade activities, etc.