Geophysical Research Abstracts
Vol. 18, EGU2016-14611, 2016
EGU General Assembly 2016
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ESA Fire CCI product assessment

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Vegetation fires are a major disturbance in the Earth System. Fires change the biophysical properties and dynamics of ecosystems and alter terrestrial carbon pools. By altering the atmosphere's composition, fire emissions exert a significant climate forcing.

To realistically model past and future changes of the Earth System, fire disturbances must be taken into account. Related modelling efforts require consistent global burned area observations covering at least 10 to 20 years. Guided by the specific requirements of a wide range of end users, the ESA fire_cci project is currently computing a new global burned area dataset. It applies a newly developed spectral change detection algorithm upon the full ENVISAT-MERIS archive (2002 to 2012). The algorithm relies on MODIS active fire information as "seed". A first, formally validated version has been released for the period 2006 to 2008. It comprises a pixel burned area product (spatial resolution of 333 m) with date detection information and a biweekly grid product at 0.5 degree spatial resolution.

We compare fire_cci burned area with other global burned area products (MCD64, GFED4(s), GEOLAND) and a set of active fires data (hotspots from MODIS, TRMM, AATSR and fire radiative power from GFAS). Output from the ongoing processing of the full MERIS timeseries will be incorporated into the study, as far as available.

The analysis of patterns of agreement and disagreement between fire_cci and other products provides a better understanding of product characteristics and uncertainties.

The intercomparison of the 2006-2008 fire_cci time series shows a close agreement with GFED4 data in terms of global burned area and the general spatial and temporal patterns. Pronounced differences, however, emerge for specific regions or fire events. Burned area mapped by fire_cci tends to be notably higher in regions where small agricultural fires predominate. The improved detection of small agricultural fires by fire_cci can be related to the increased spatial resolution of the MERIS sensor (333 m compared to 500 in MODIS). This is illustrated in detail using the example of the extreme 2006 spring fires in Eastern Europe.