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ESA Fire CCI Burned Area Product Updates

Emilio Chuvieco, M. Lucrecia Pettinari, Joshua Lizundia, Aitor Bastarrika, Ekhi Roteta, Kevin Tansey, Marc Padilla, James Wheeler, Jose Miguel Pereira, Duarte Oom, Manuel Campagnolo, Thomas Storm, Johannes Kaiser, Angelika Heil, Florent Mouillot, Vanesa Moreno, Chao Yue, Philippe Ciais, Pierre Laurent, Guido van der Werf, Ioannis Bistinas, Philip Lewis, Jose Gómez Dans, James Brennan

GOFC-GOLD Fire IT – 20-23 November 2017

Objectives of Phase 2

- Improve User requirement analysis.
- Extend long term time series of global BA.
- Create a small-fire database for Africa.
- Improve uncertainty characterization.
- Extend validation to include spatio-temporal patterns.
- Extend climate assessment and intercomparison.

BA product specifications

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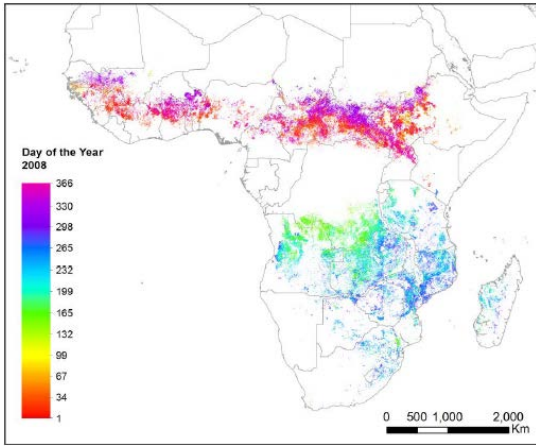
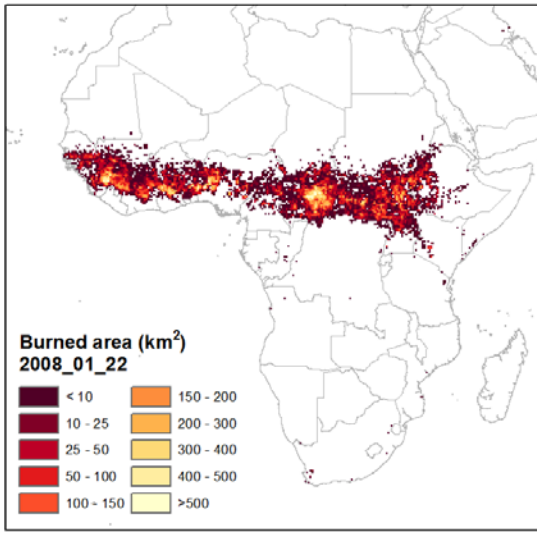
- Pixel product:
  - Monthly files, continental tiles, GeoTiff format:
  - 4 Variables: Day of detection (1-366), Confidence level (0-100), Burned land cover (derived from LC_cci), Sensor detecting.
- Grid product:
  - 15-day global files at 0.25 x 0.25 degree. NetCDF format.
  - 23 variables: total burned area, standard error, fraction of burnable area, fraction of observed area, number of patches and burned area of each land cover.





Global Products

- Fire_cci v4.1:
  - Based on MERIS FRS (300m) data.
  - Time series from 2005-2011.
- Fire_cci v5.0:
  - Based on MODIS RNIR channels (250 m).
  - Time series from 2001-2016.
- Future products (in progress):
  - LTDR : Extend backwards to 1982
  - Sentinel-3: OLCI and SLSTR.

- Both algorithms:
  - Hybrid: HS + reflectance changes.
  - Two phases: seed + growing.
  - Tile based.
- Auxiliary data:
  - MCD14ML HS.
  - LC_cci.

Fire_cci BA product v4.1 (based on MERIS FRS data)

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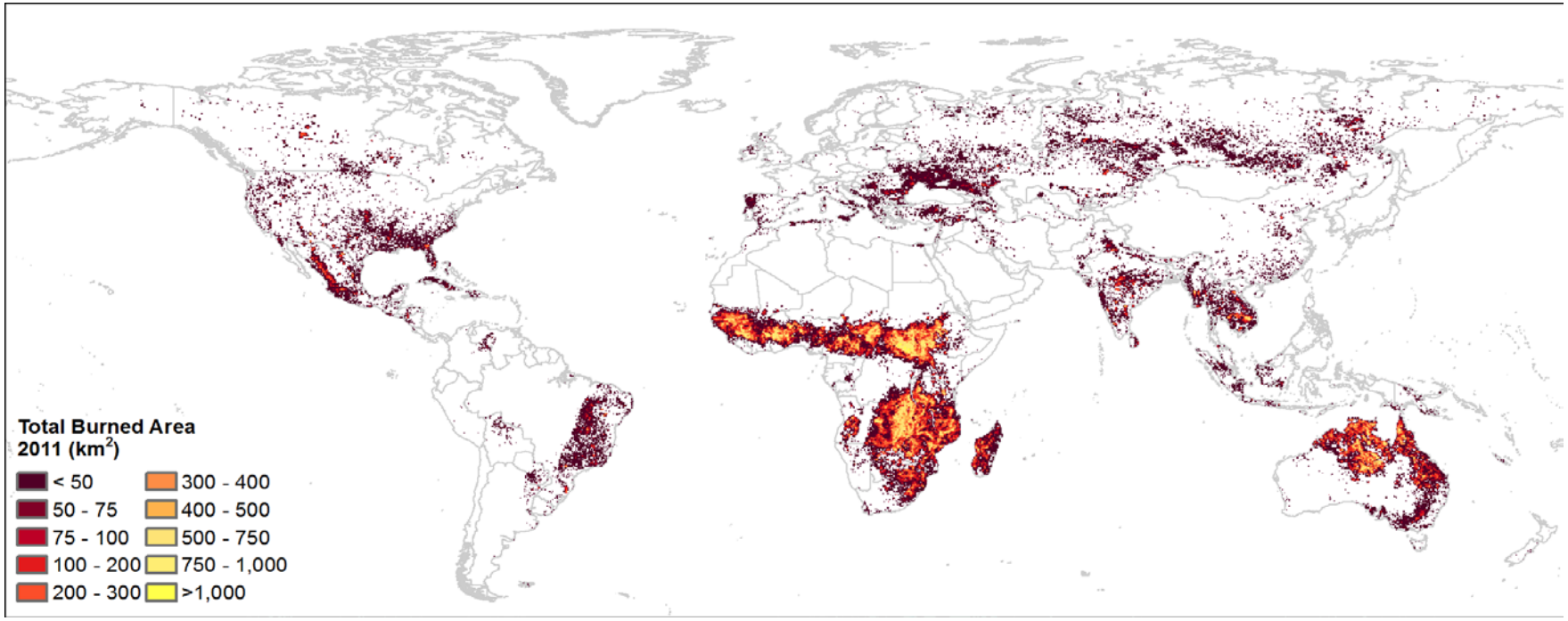
Annual composites



Products download from researchers of 48 countries

Chuvieco et al., 2016, GCB

Fire_cci BA product v5.0 (based on MODIS RNIR data)

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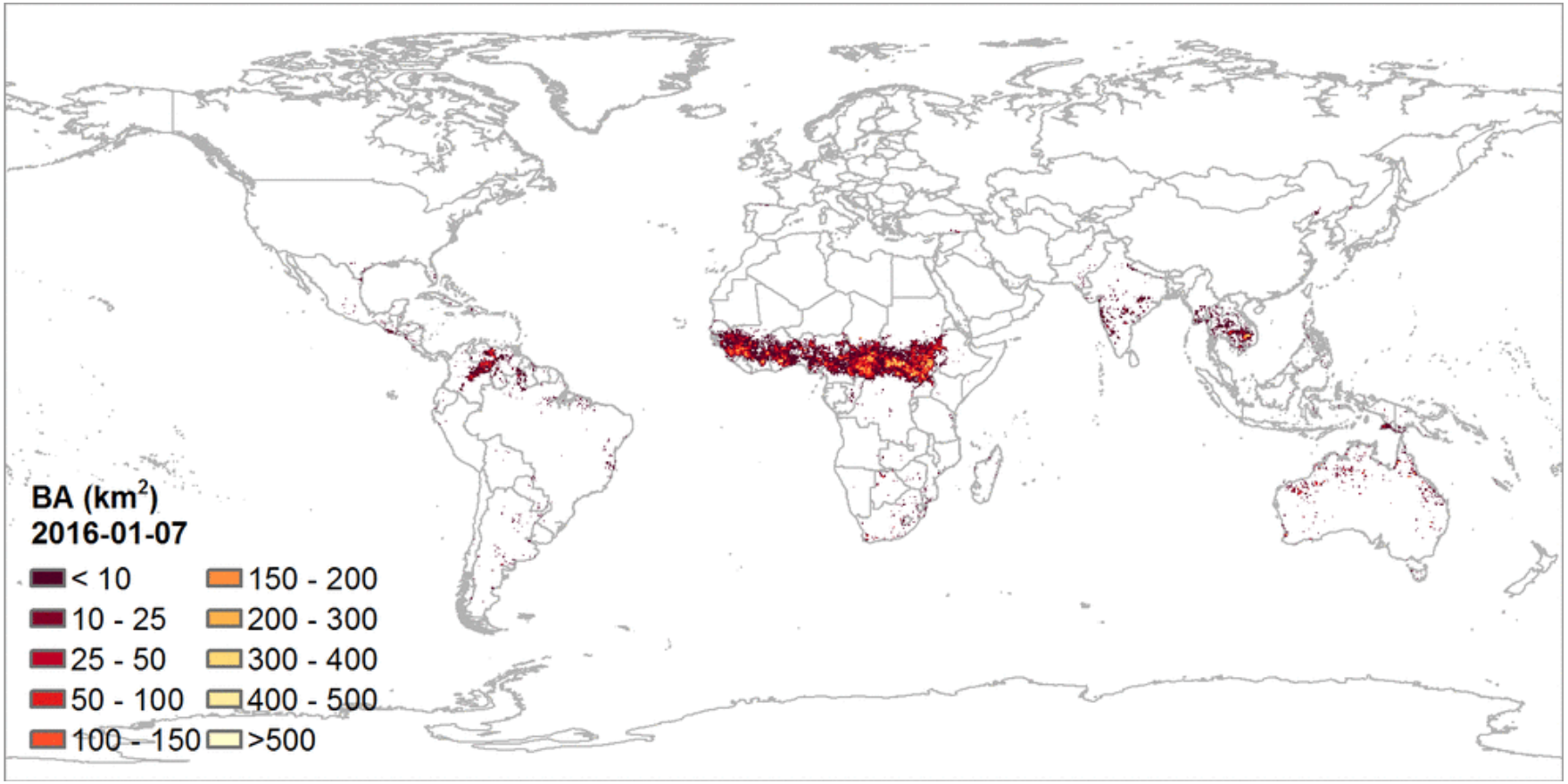
15 day periods



Fire_cci BA product v5.0: Total BA

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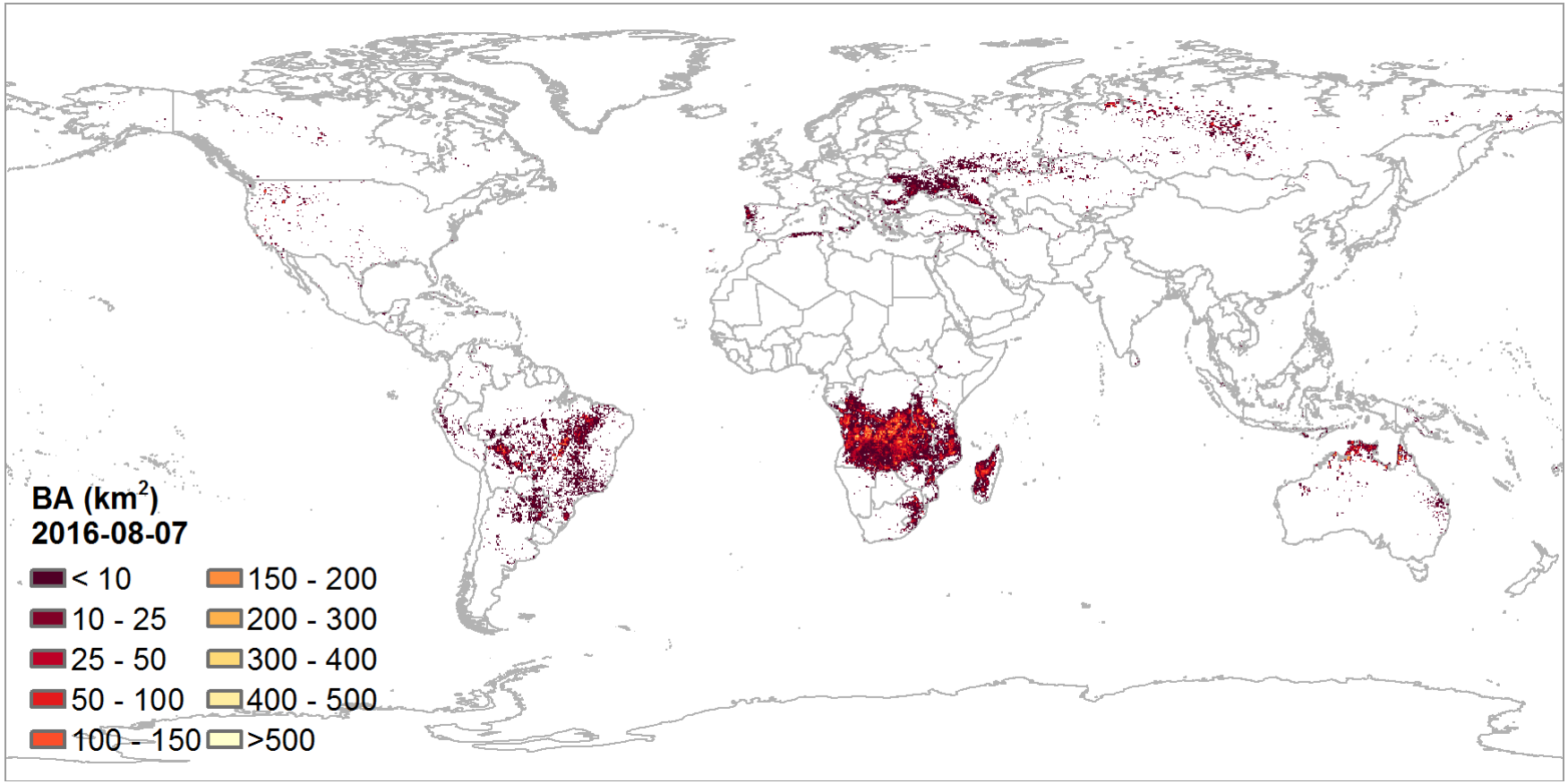
(01-15/07/2016)



Fire_cci BA product v5.0: Standard error

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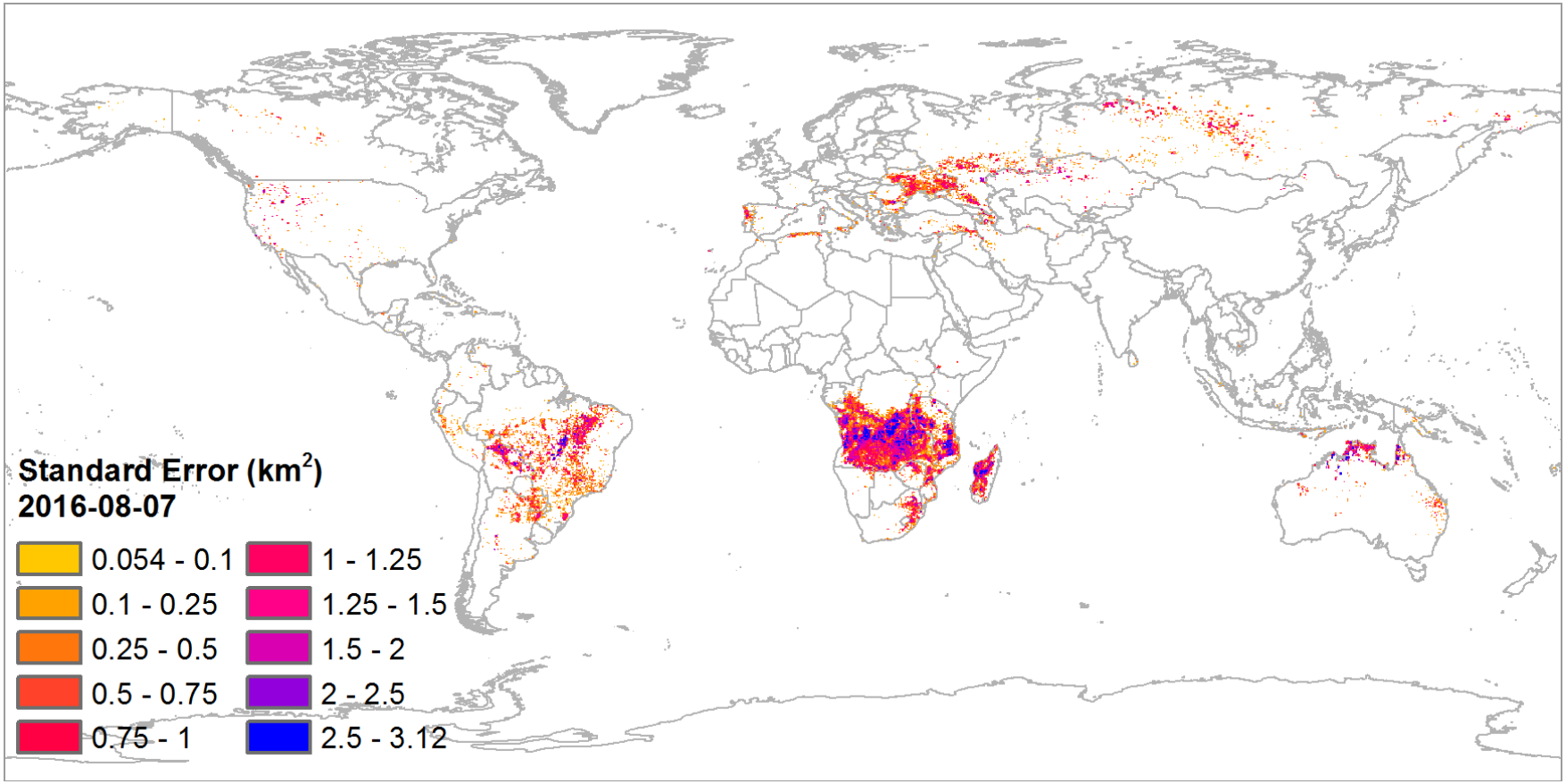
(01-15/07/2016)



Fire_cci BA product v5.0: Number of burned patches

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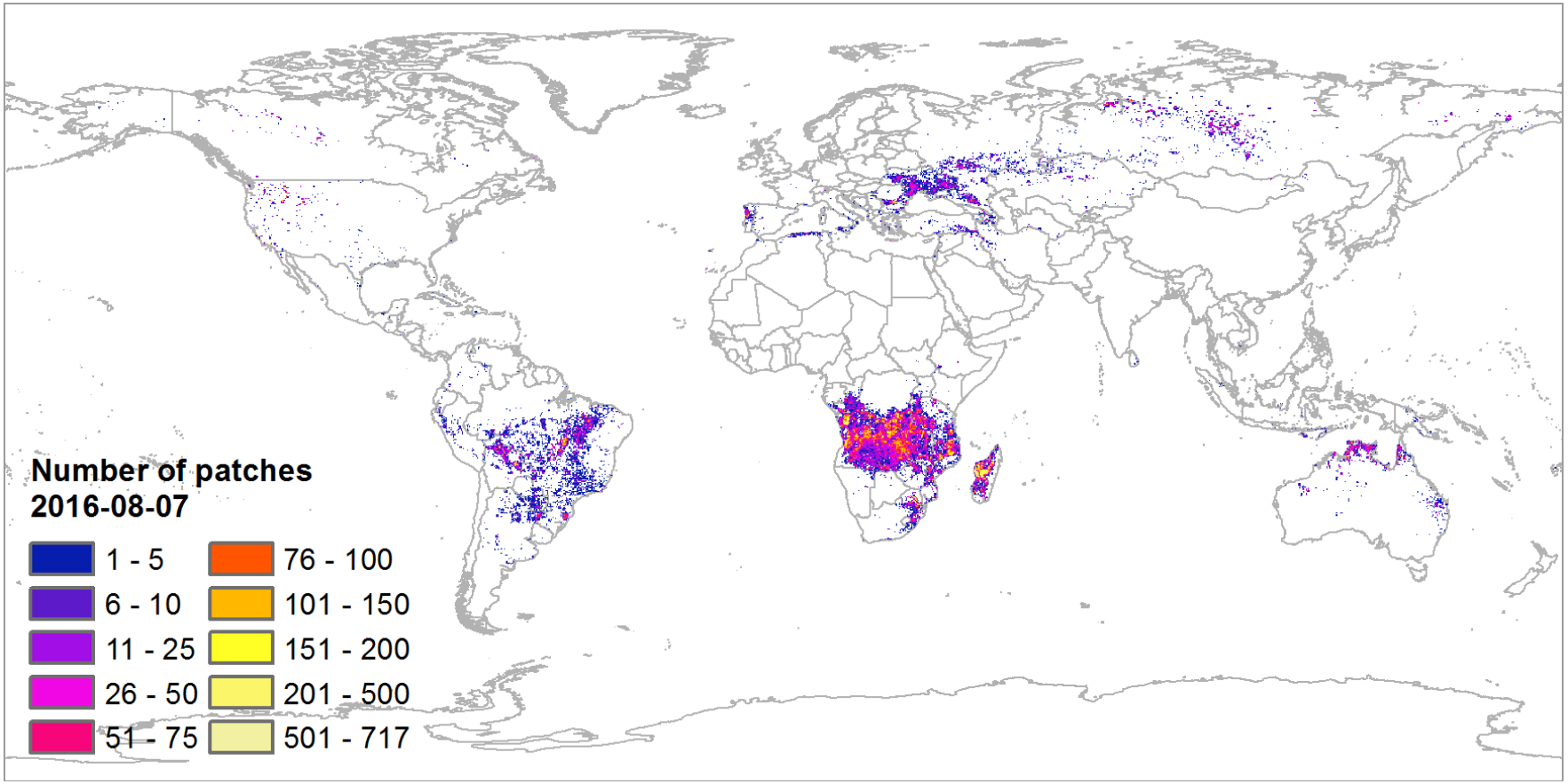
(01-15/07/2016)



Fire_cci BA product v5.0: Fraction of observed area

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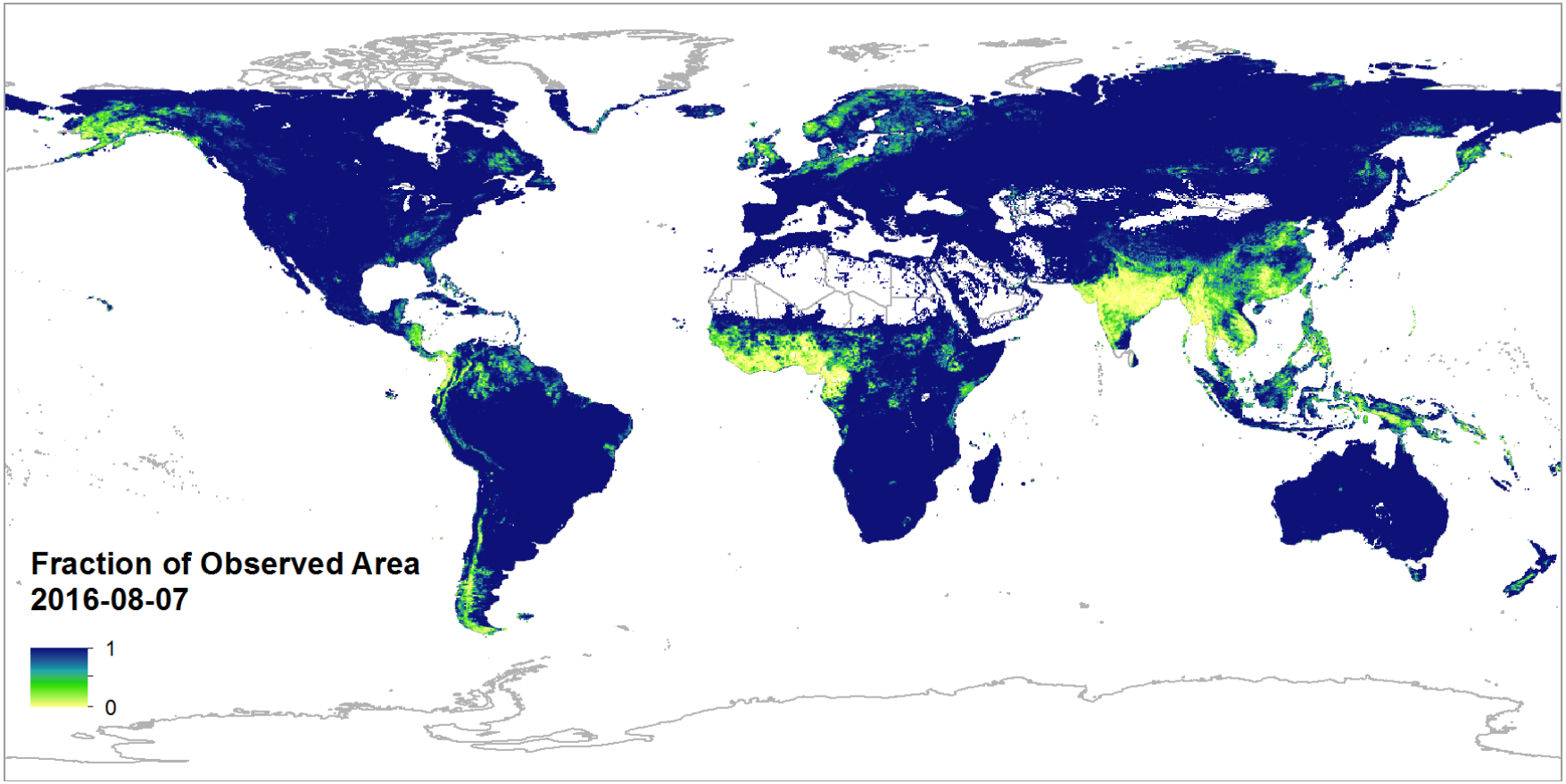
(01-15/07/2016)



Fire_cci BA product v5.0: Fraction of burnable area

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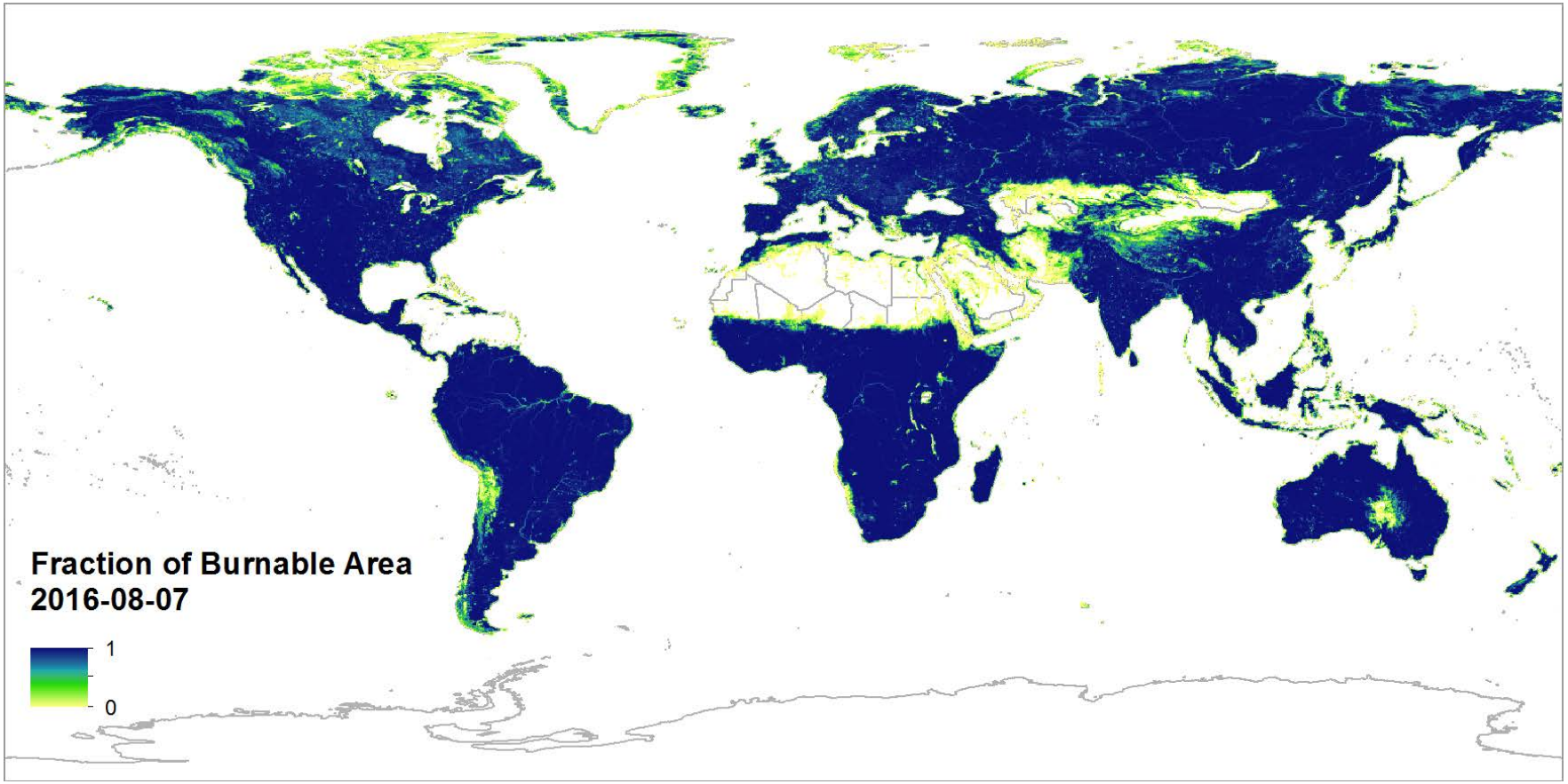
(01-15/07/2016)



Fire_cci BA product v5.0: BA in Tree cover

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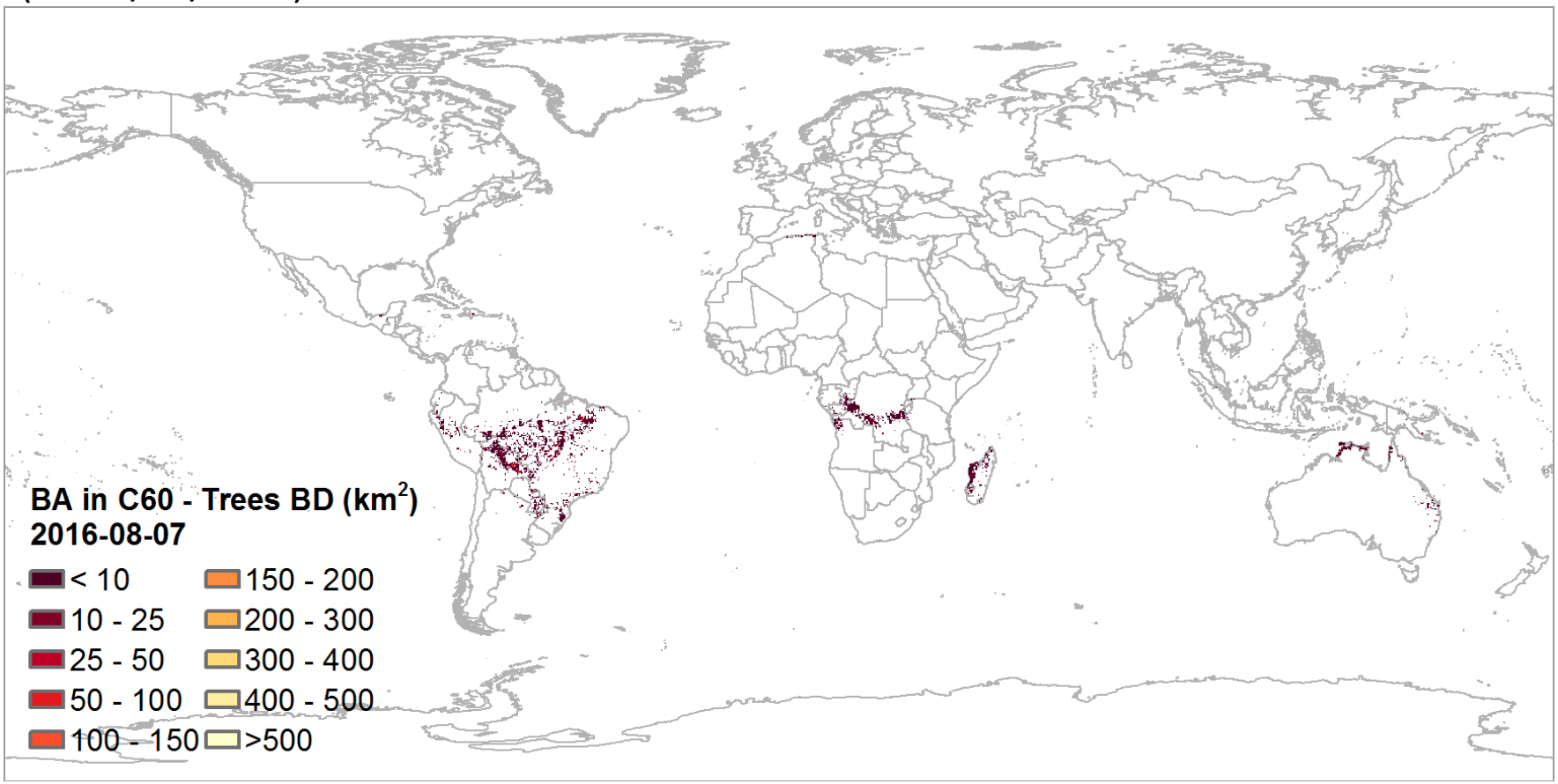
(01-15/07/2016)



Fire_cci BA product v5.0: BA in Grasslands

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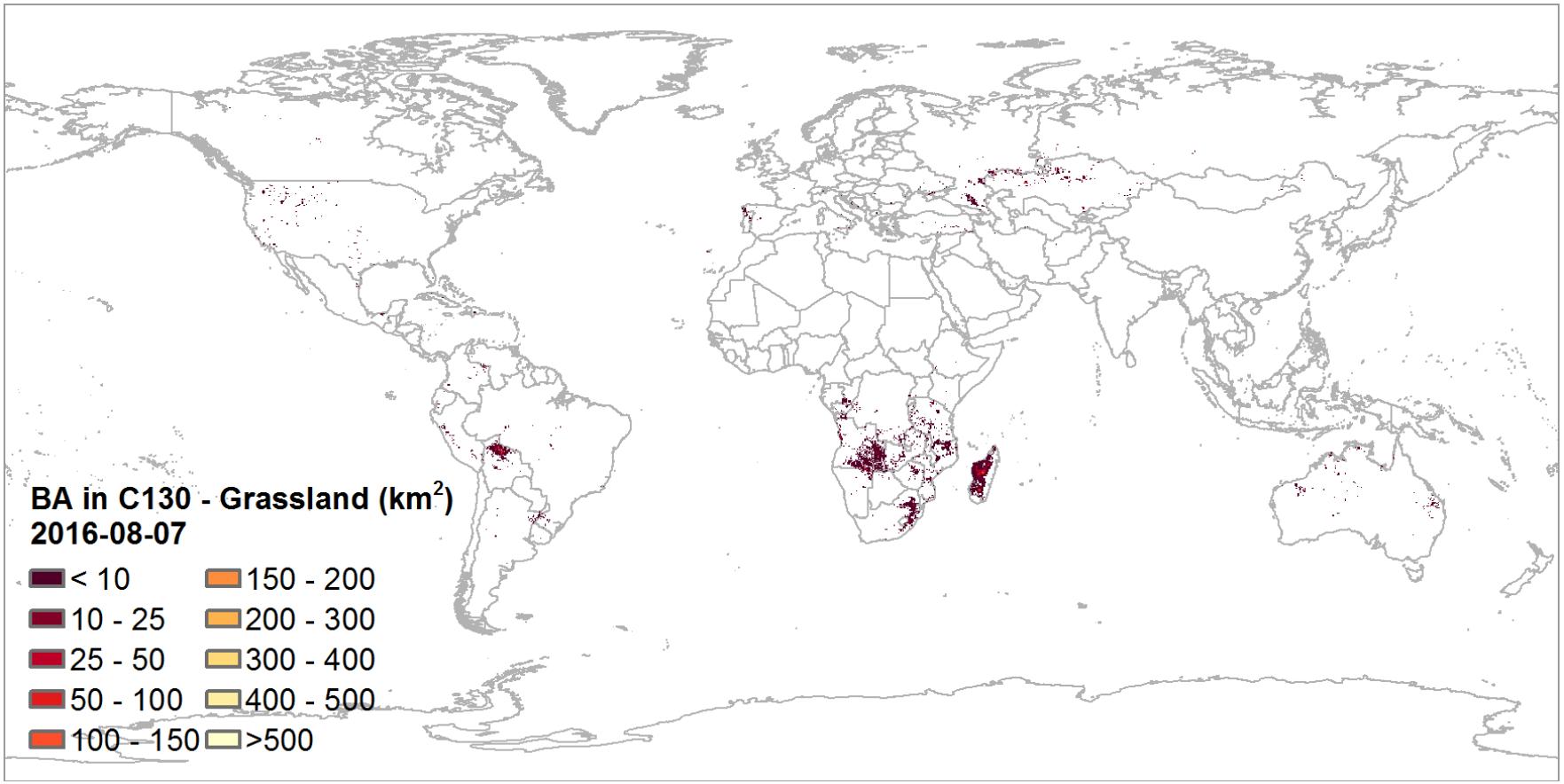
(01-15/07/2016)



Fire_cci BA product v5.0
Annual composite 2016

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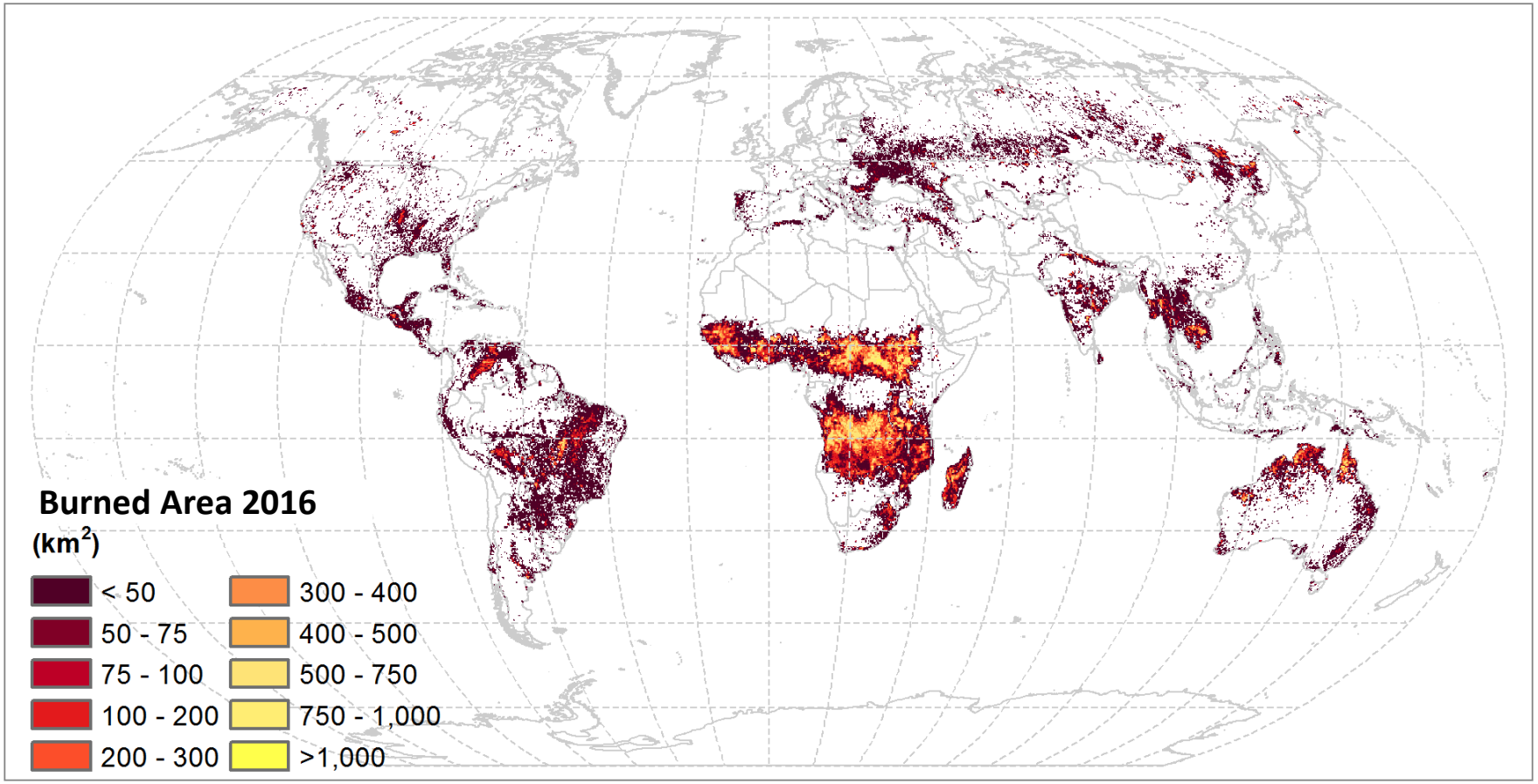

Time trends

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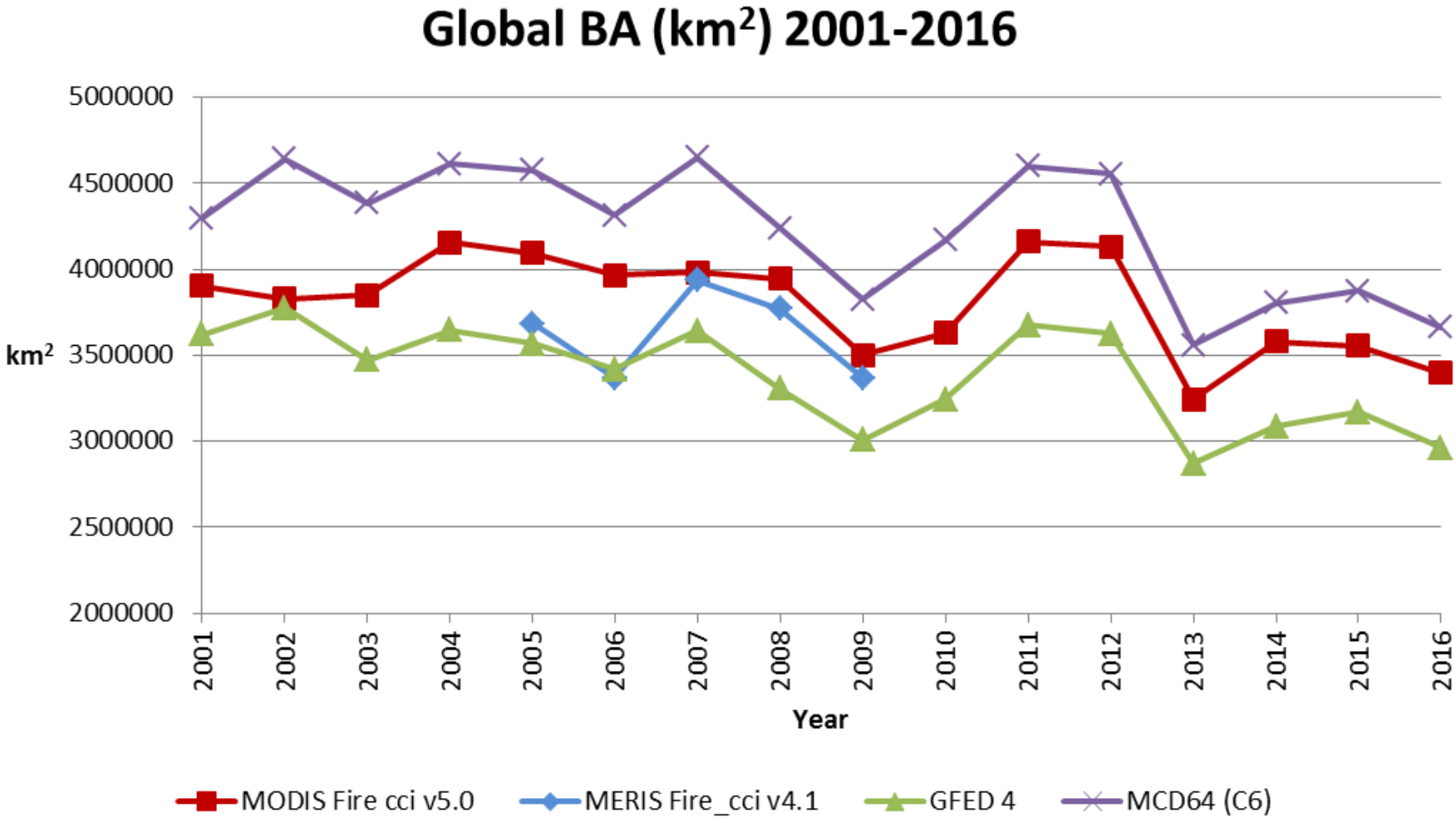

Seasonal trends

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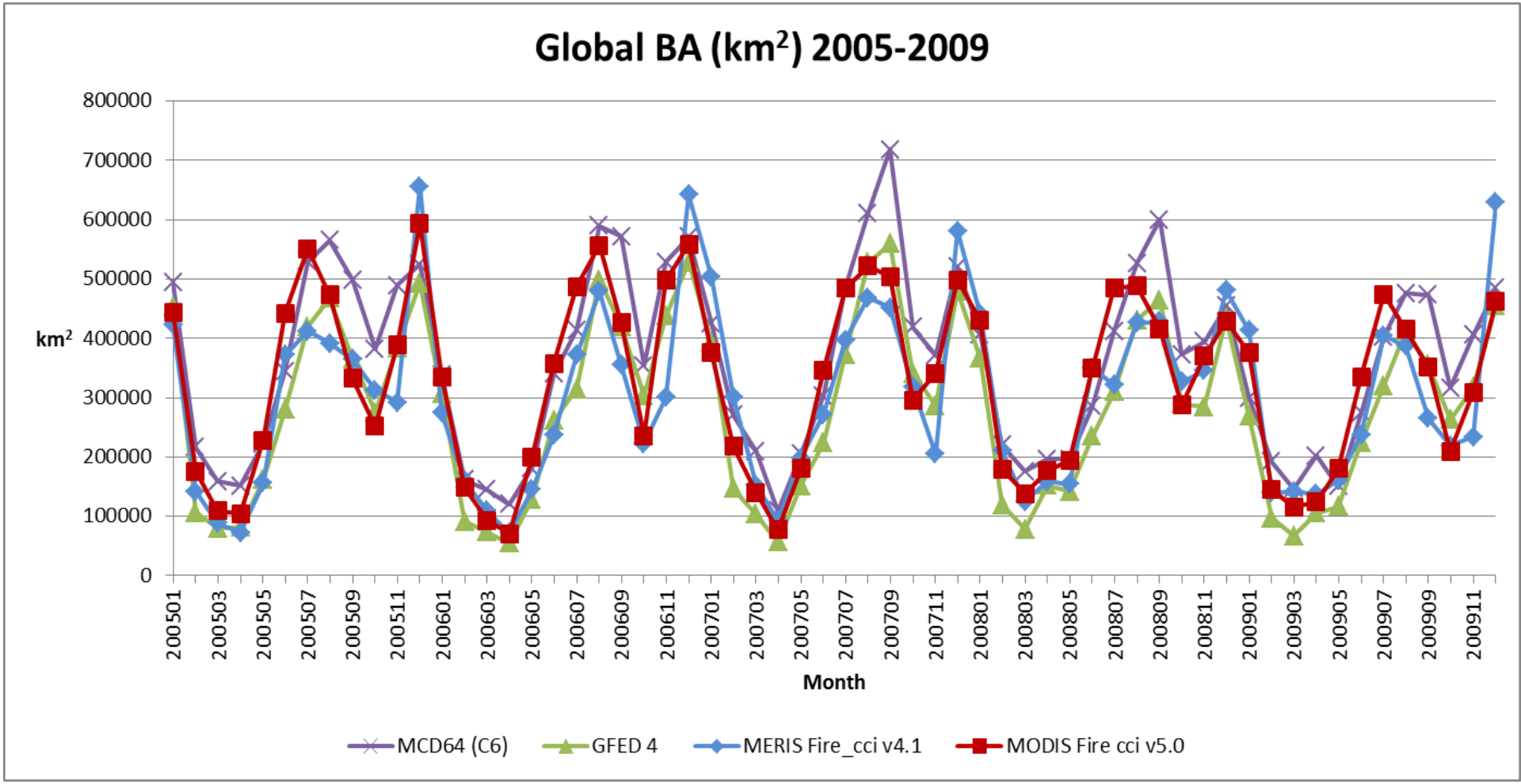
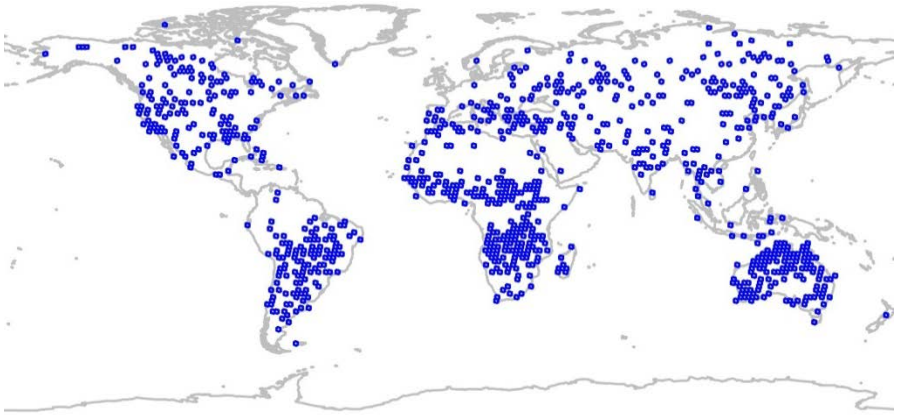


Validation sample

- 1200 sampling units, 100 each year over 2003-2014
- Sampling intensity in each stratum proportional to BA extent
- Minimum 2 units in each stratum



n_h

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Others	2+2	4+2	2+2	6+2	4+2	2+2	2+2	3+2	13+2	9+2	2+2	4+2
Tropical Forest	5+2	5+2	5+2	4+2	5+2	3+2	4+2	6+2	3+2	4+2	4+2	4+2
Temperate Forest	2+2	2+2	2+2	2+2	2+2	2+2	2+2	2+2	2+2	2+2	2+2	2+2
Boreal Forest	2+2	2+2	2+2	2+2	2+2	2+2	2+2	2+2	2+2	2+2	2+2	2+2
Tropical and Subtropical savanna	60+10	60+10	59+12	58+10	58+11	58+13	60+11	59+11	52+11	54+11	63+10	59+10
Temperate grassland and savanna	5+2	3+2	4+2	4+2	4+2	6+2	5+2	3+2	3+2	4+2	3+2	5+2
Mediterranean Forest	2+2	2+2	2+2	2+2	2+2	2+2	2+2	2+2	2+2	2+2	2+2	2+2

Padilla et al., 2017

Climate assessment: patch shape analysis (Fire_cci v4.1)

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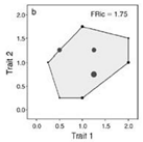
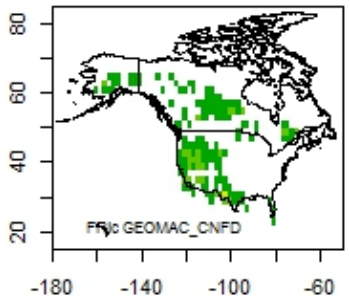
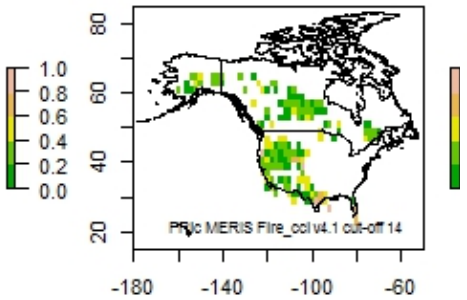
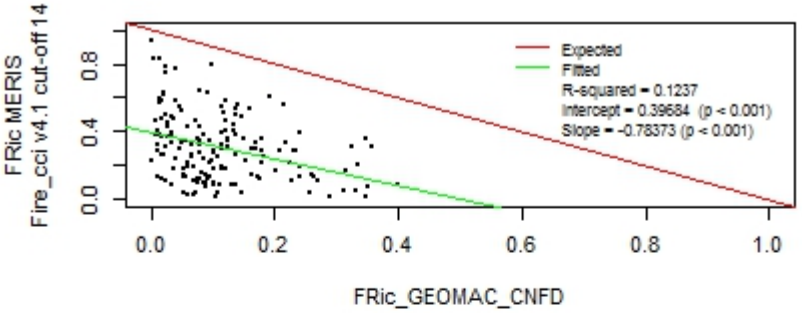
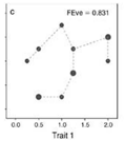


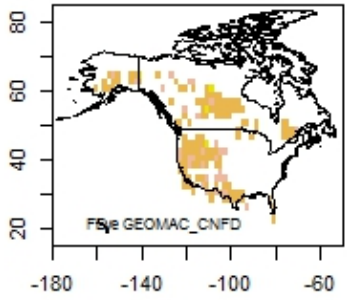


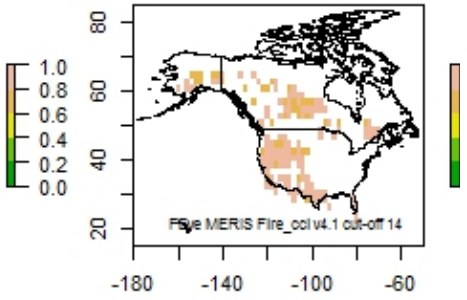


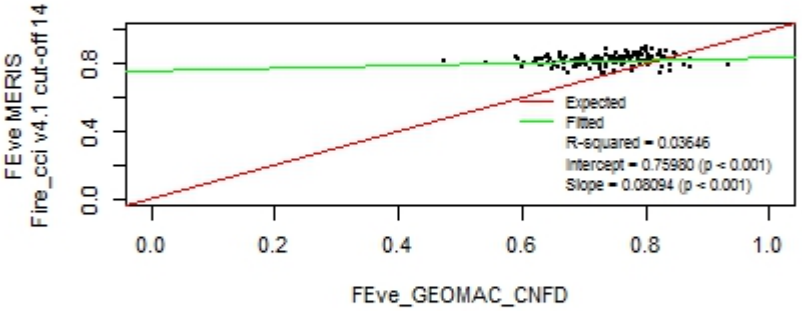


Richness

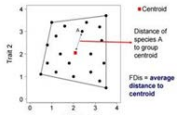


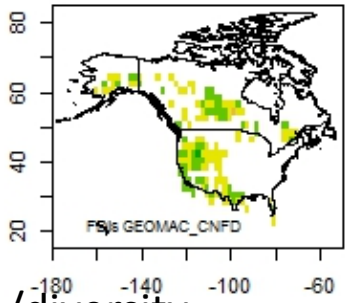


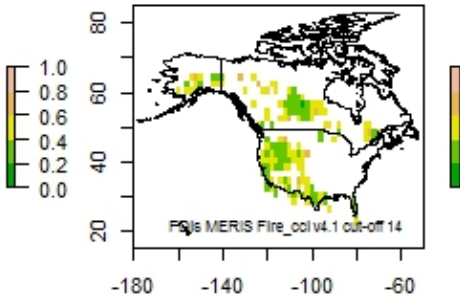


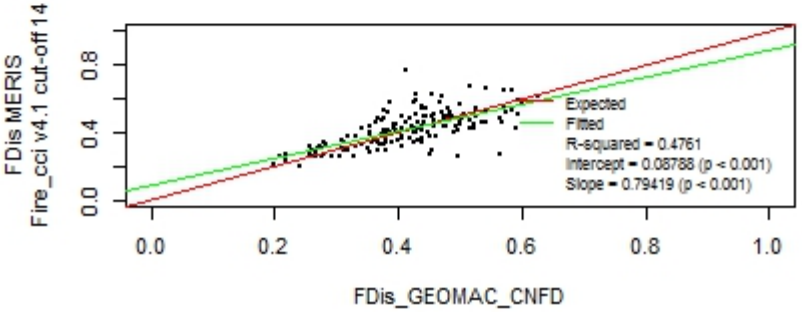


Evenness









Dispersion/diversity

LTDR BA product

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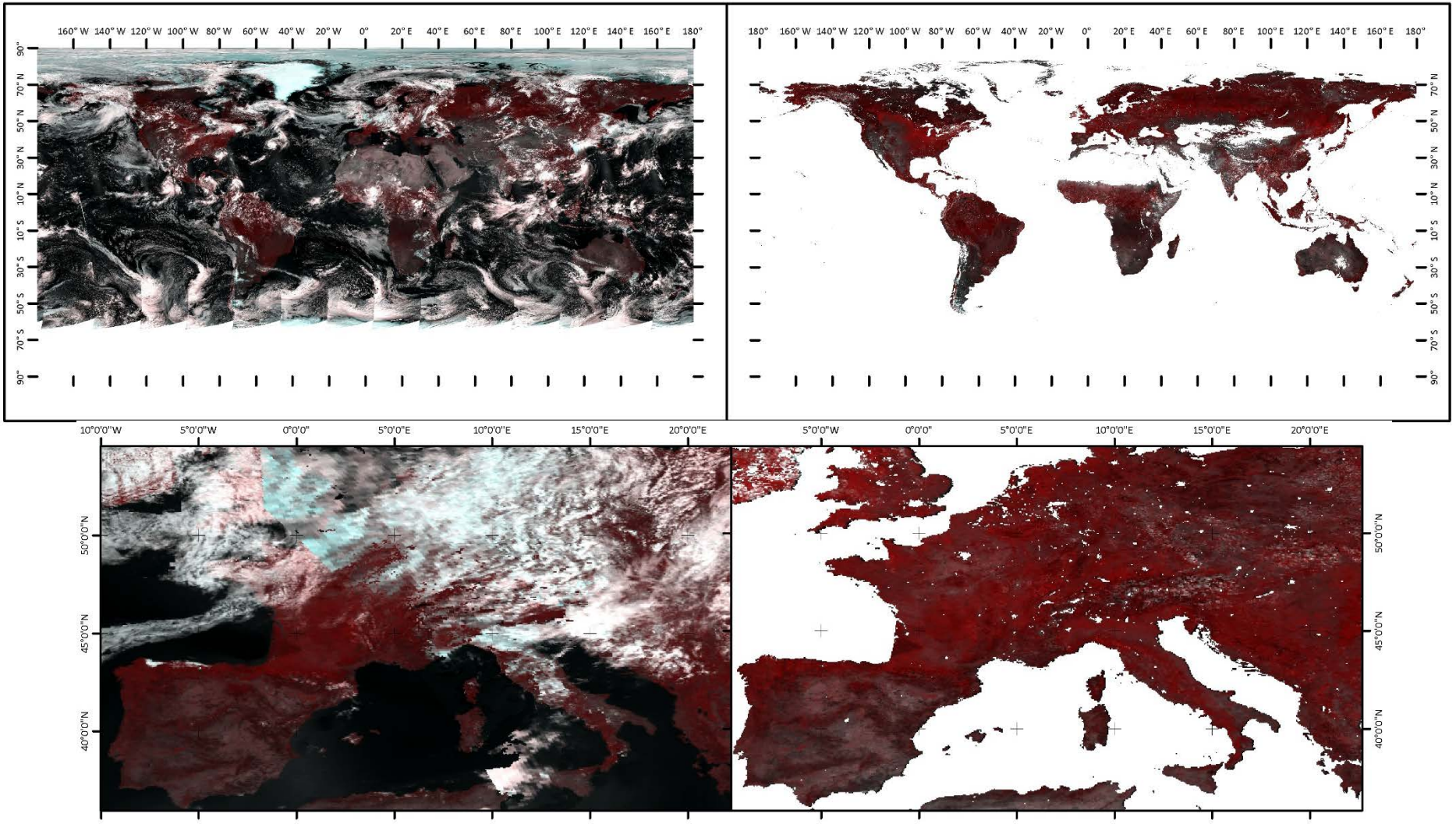
AVH09C1 Year: 2008 Day: 200

Compositing AVH09C1 + Land Cover, Year: 2008, Day: 198 - 213



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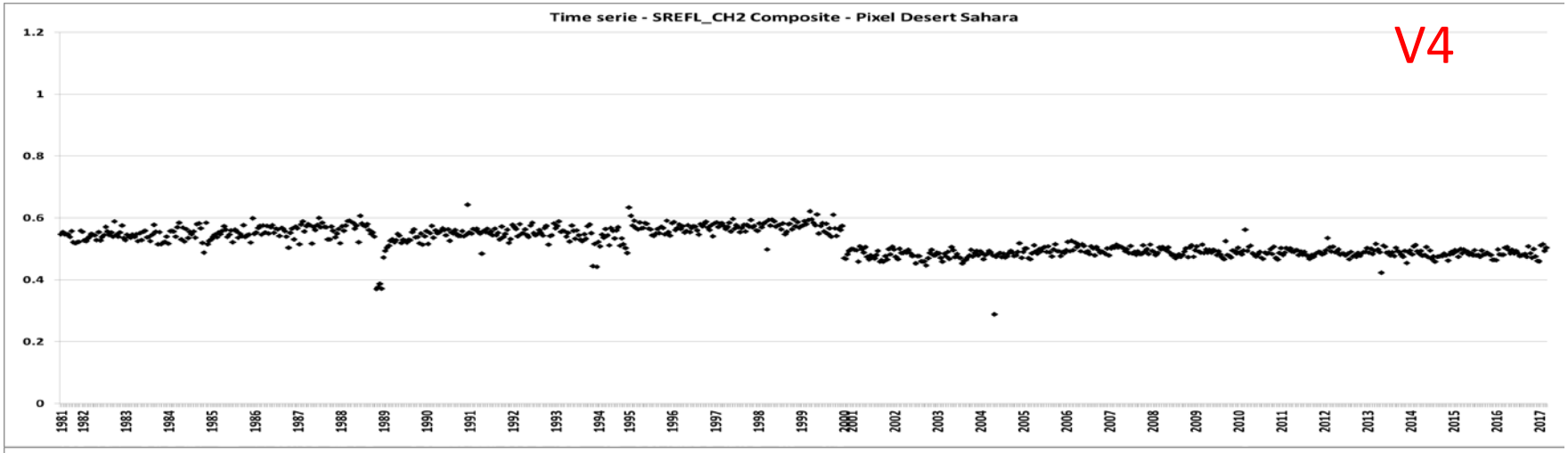
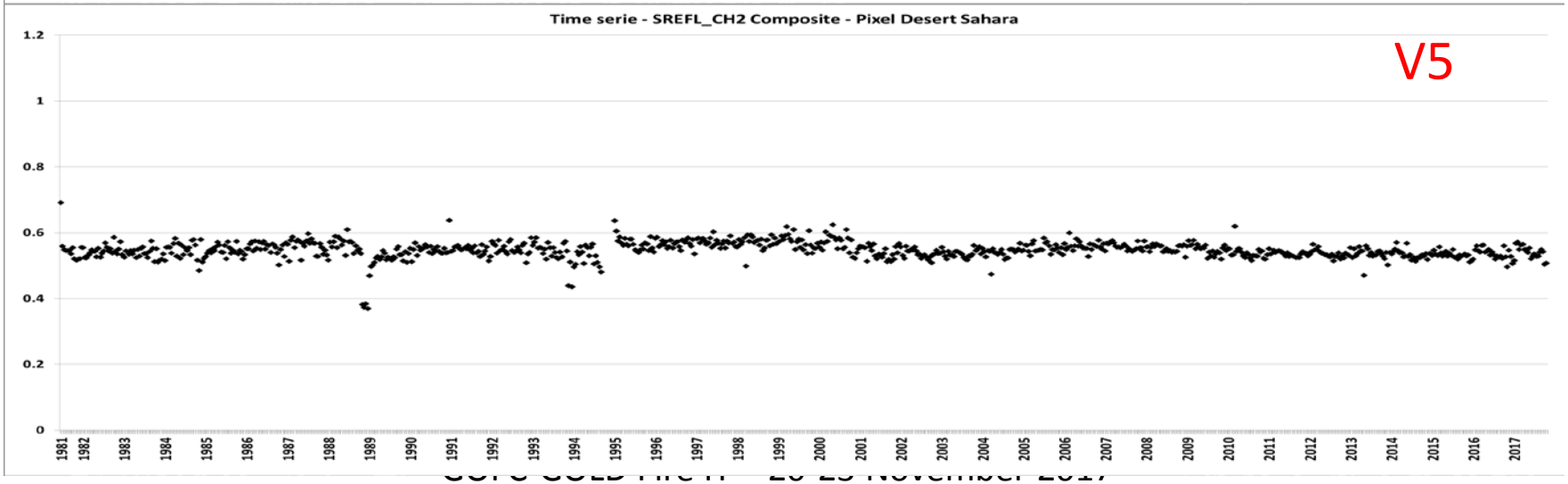
LTDR product – Time series

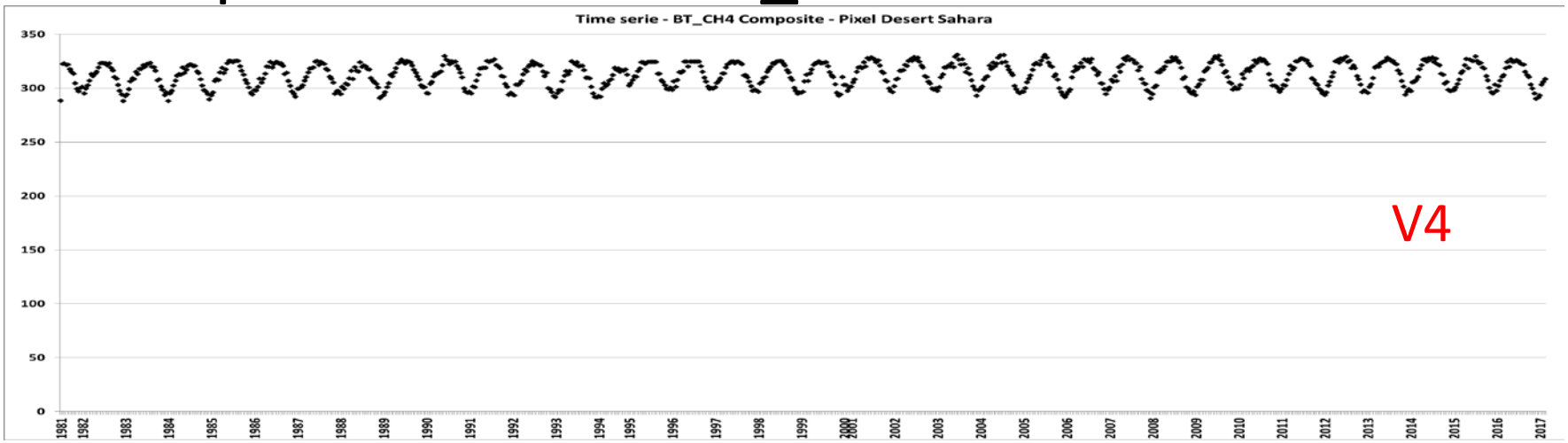
- Temporal inconsistency of the NIR reflectance

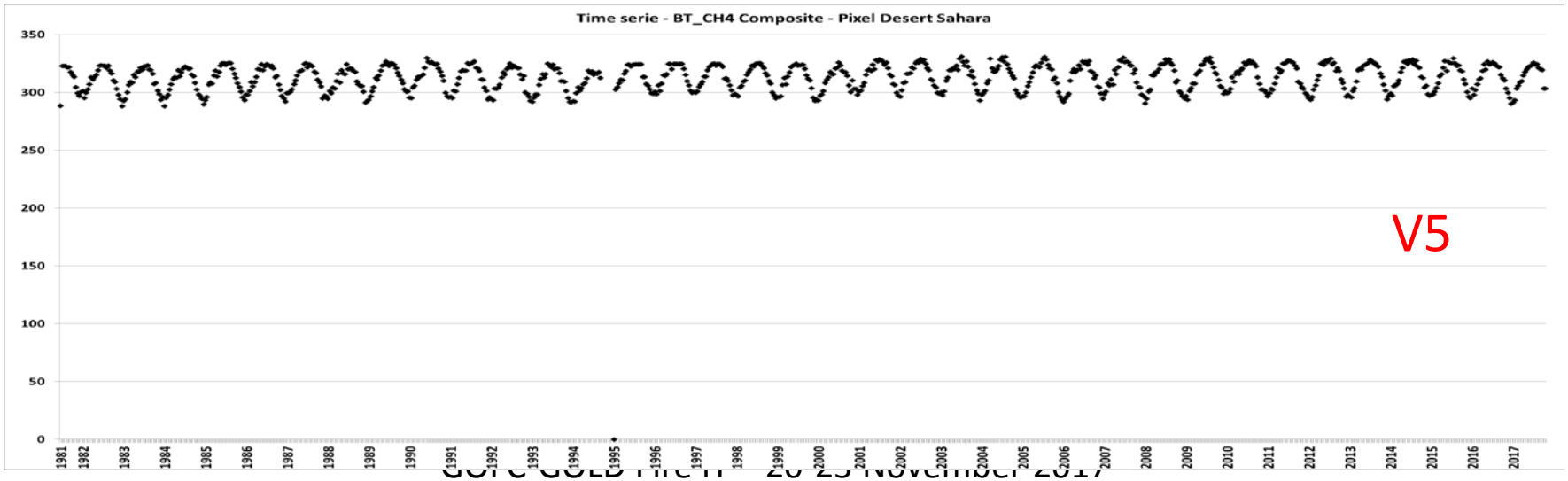




LTDR product – Time series

- Temporal trends of BT_CH4





LTDR algorithm

- Based on Random Forest.
- Trained with global datasets:
  - Landsat validation sample at 0.05 d.
  - MCD64 C6 at 0.05 d.
- Classification:
  - Discrete and regression trees.

Preliminary results: RF 3 classes (2008)

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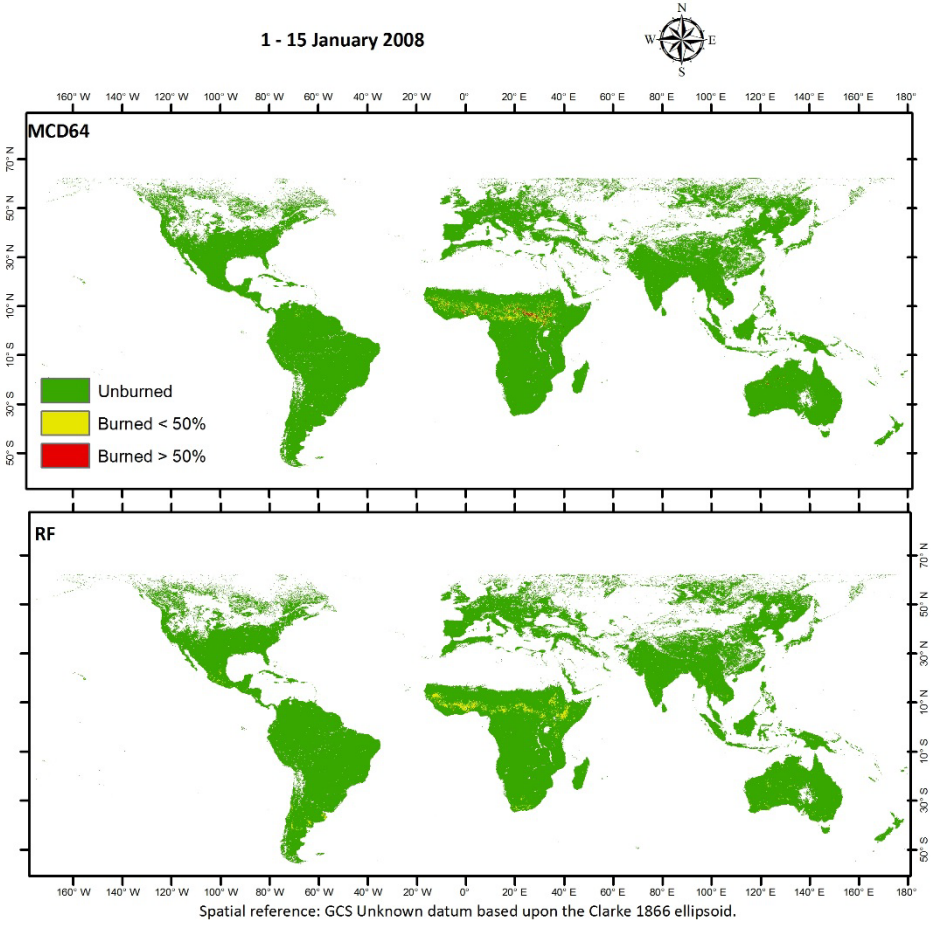

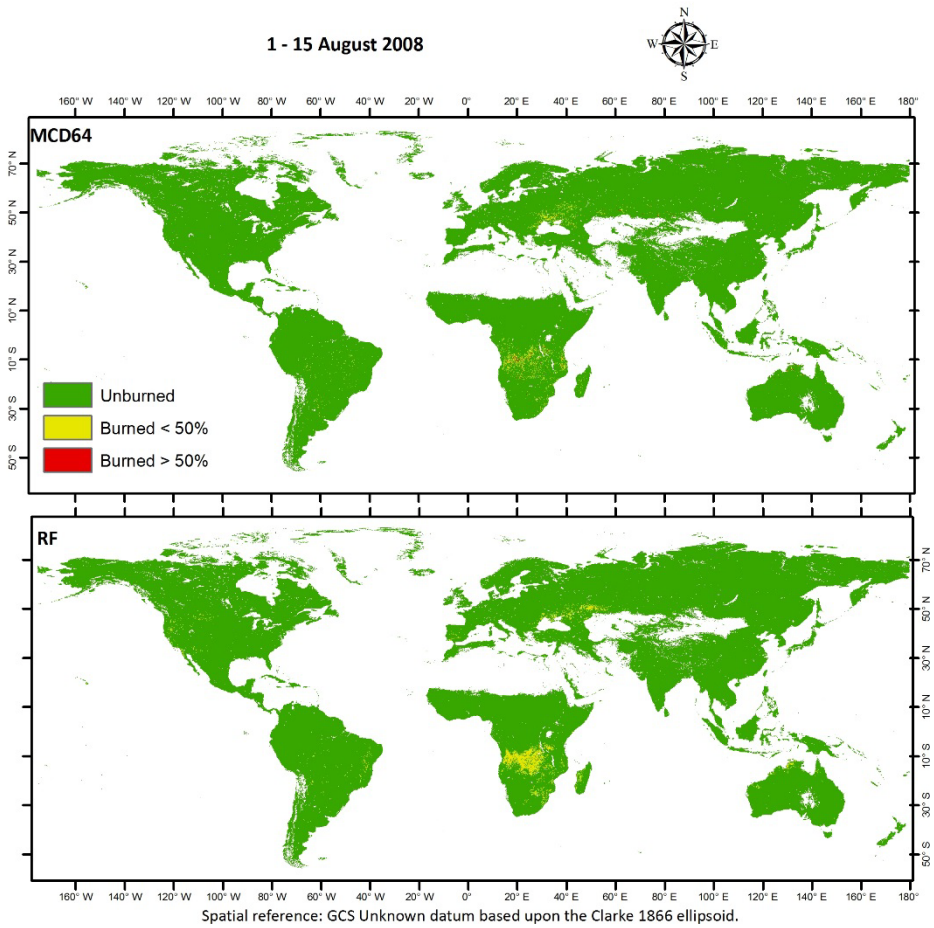

Small Fire Database (2016)

- Inputs:
  - S2 MSI + MCD14DL C6 HS
  - S1: BA Interpherometry. Potential merging for persistent cloudy areas.
- Algorithm approach:
  - Multitemporal analysis of NIR, MIRBI and NBR2
  - Two phase: seed + growing

S2 Results

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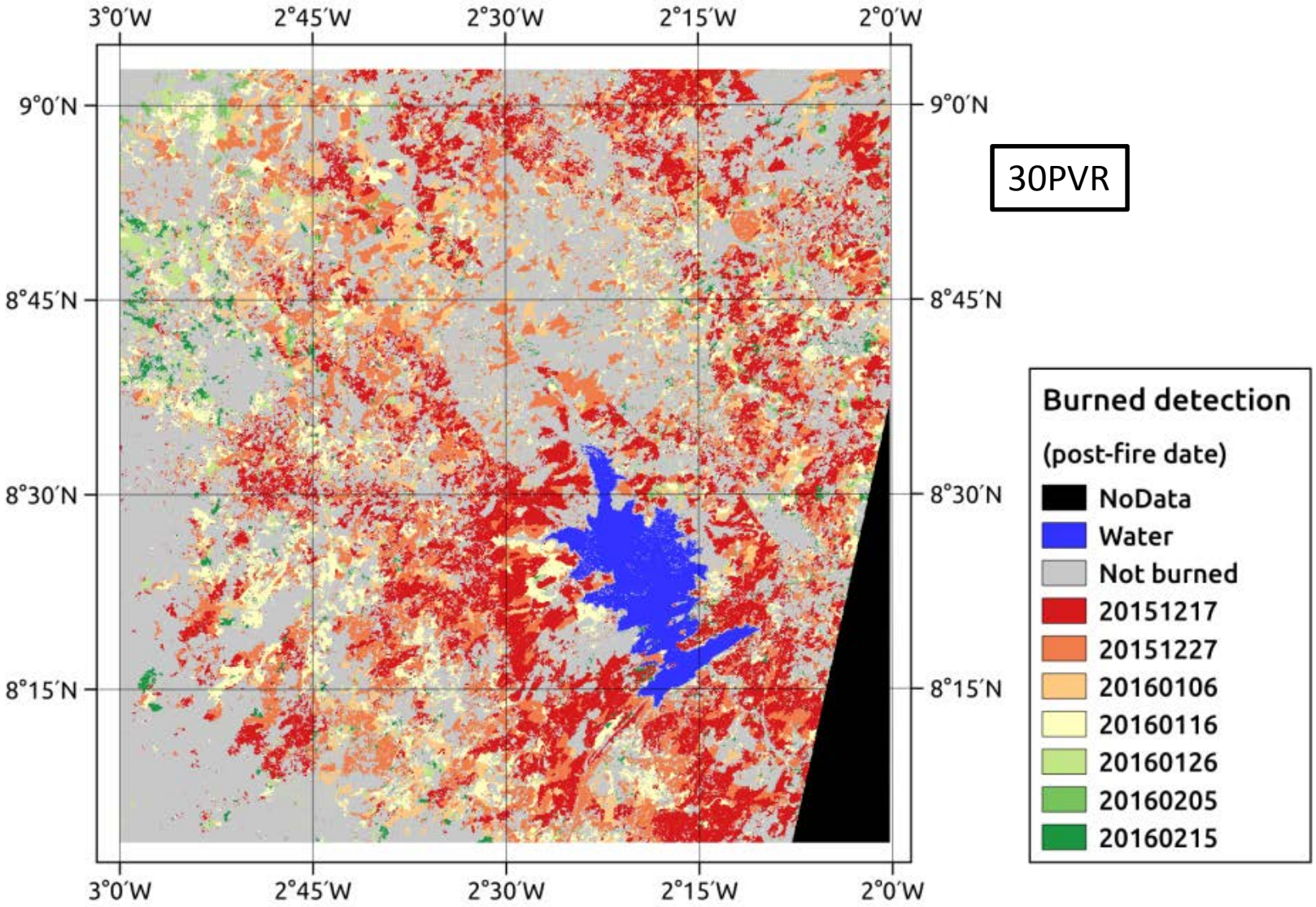
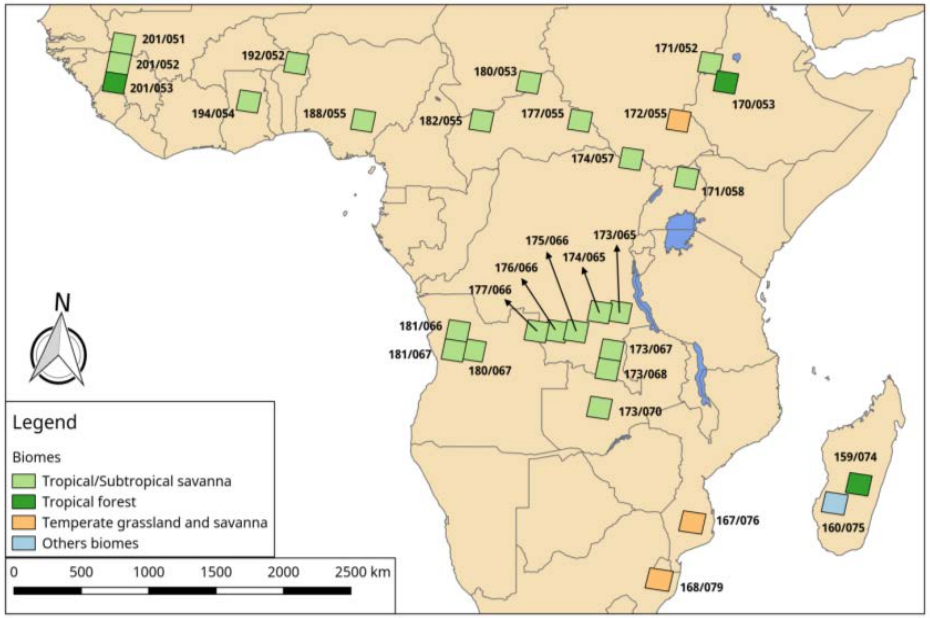


Roteta and Bastarrika, 2016

S-2 assessment

- Landsat-8
  - 29 study areas
  - OE: 8.3%
  - CE: 8.0%
  - Kappa: 0.914



Roteta and Bastarrika, 2016

SFD: Intercomparison with global products

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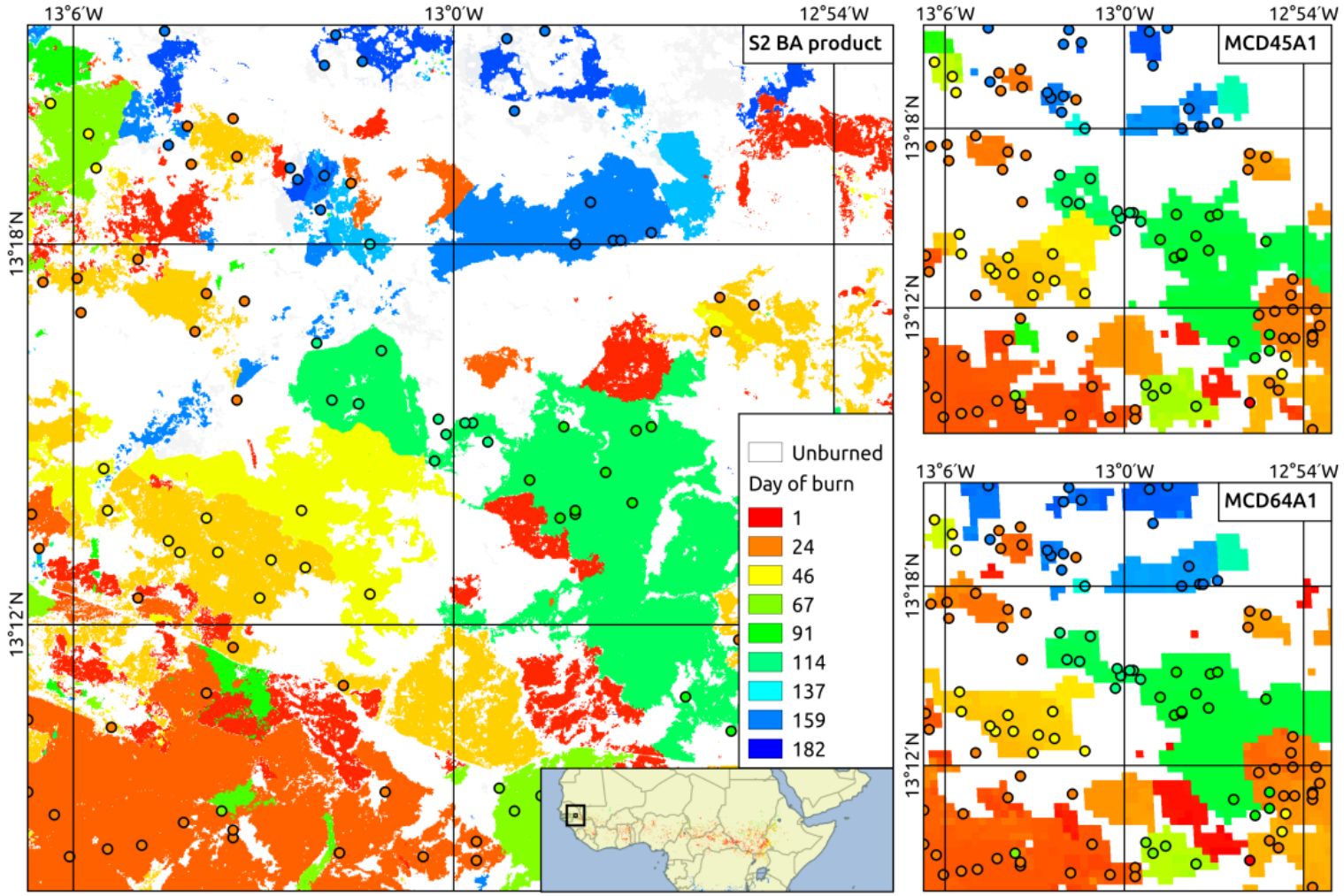

SFD: Intercomparison with global products

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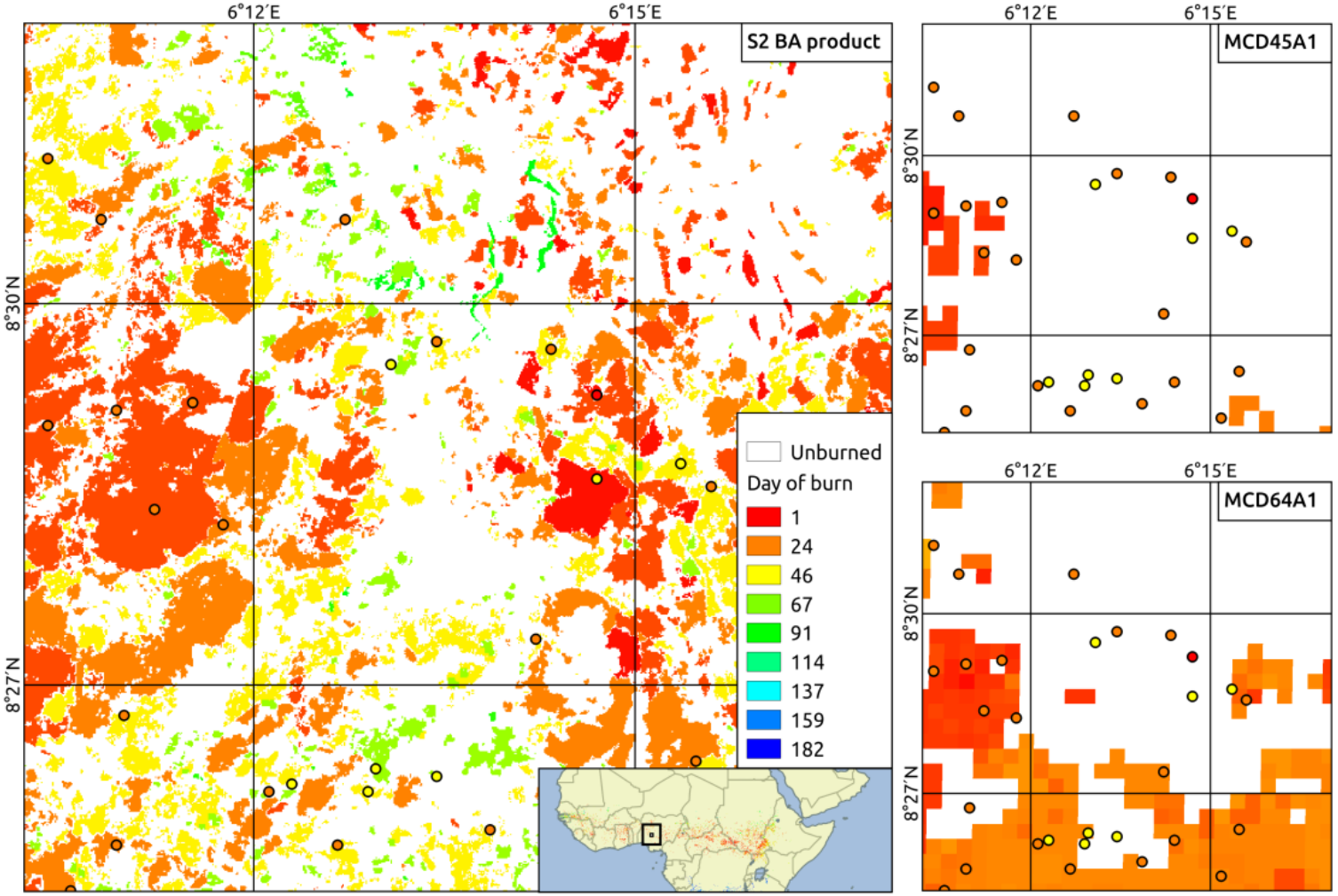

SFD: Intercomparison with global products

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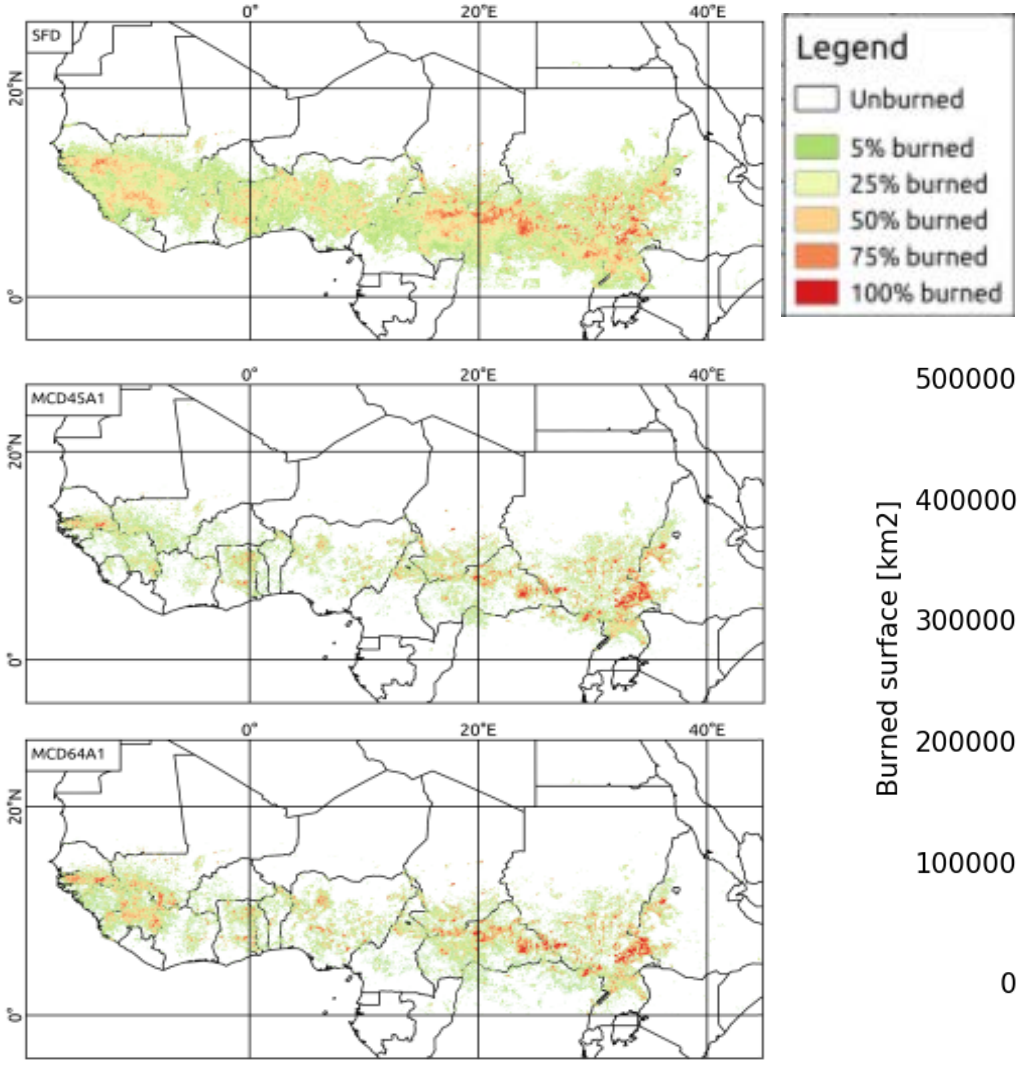

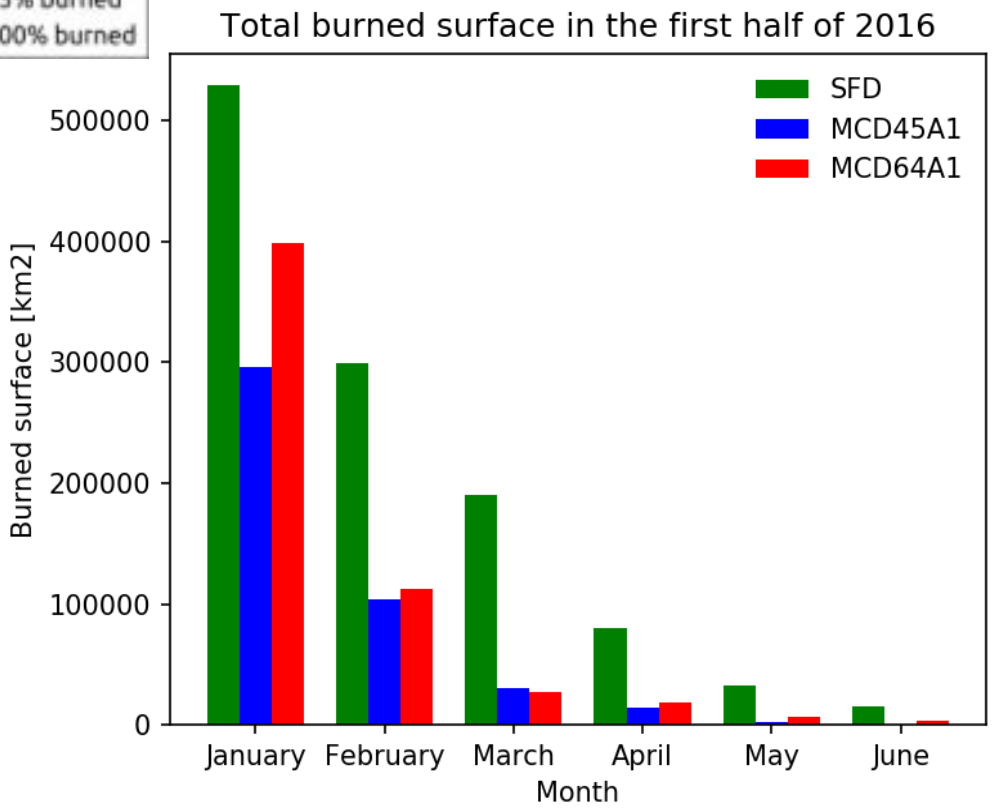

SFD: Comparison of emissions with global products

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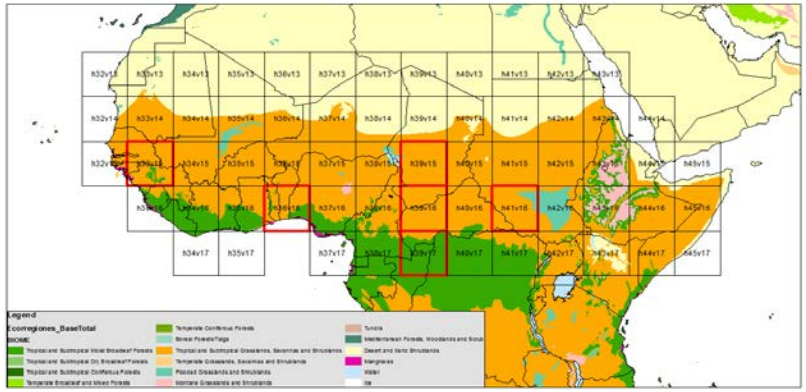
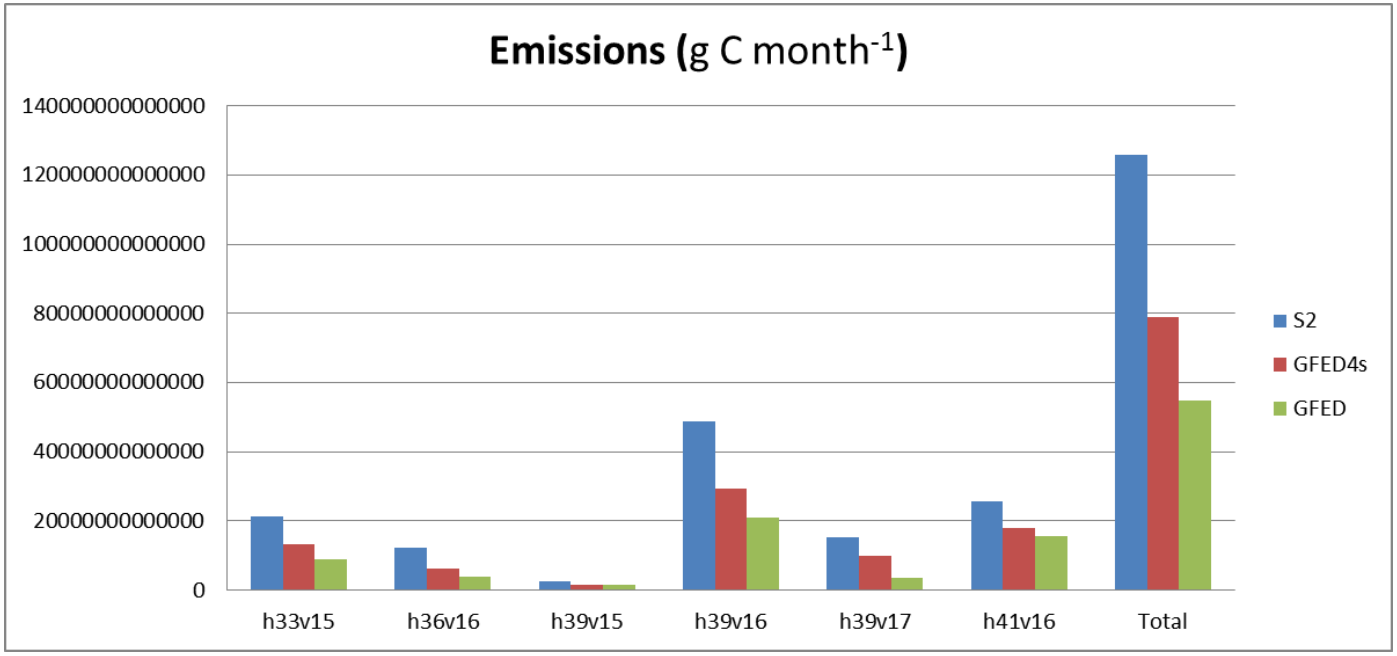


- S2 shows 37% more emissions than GFED4s and 56% more than GFED4.



SFD: Preliminary results from S-1 data

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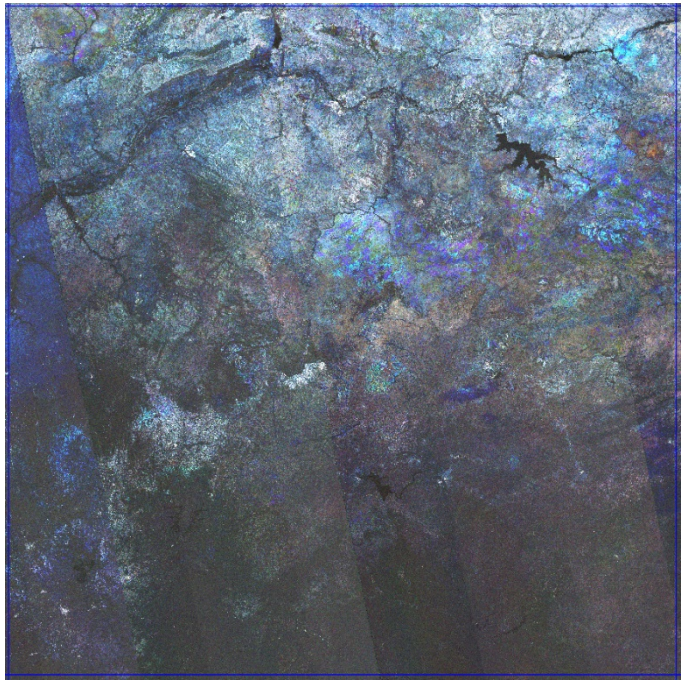
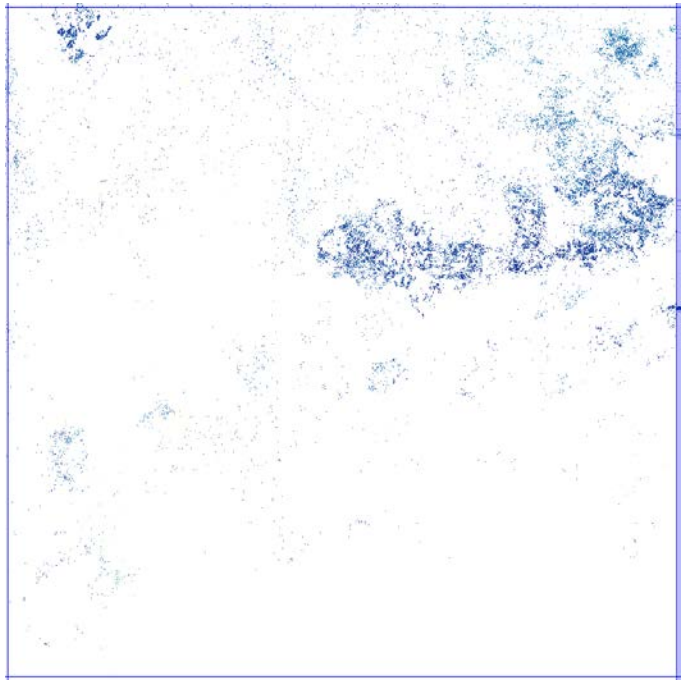
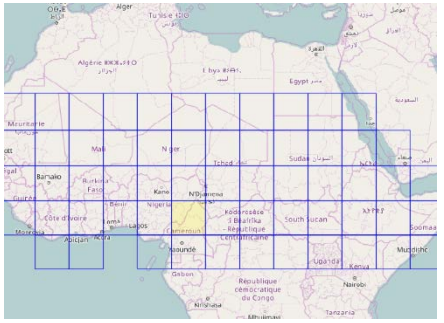


Coherence RGB (Nov-Dec)



BA Classification – 2nd Half 2016



Month of Burn

- Jan
- Feb
- Mar
- Apr
- May
- Jun
- Jul
- Aug
- Sep
- Oct
- Nov
- Dec

Wheeler and Tansey, 2017

www.esa-fire-cci.org

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ESA | aerosol | CCI | cloud | cmug | ghg | glaciers | ice sheets greenland | ice sheets antarctica | land cover | ocean colour | ozone | sea ice | sea level | soil moisture | sst

Fire

Navigation

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- Support

Questionnaire for users

Users of the BA Products are kindly requested to fill this questionnaire.

Participation of the Fire_cci project in the 11th EARSeL Forest Fires SIG Workshop

The 11th EARSeL Forest Fires SIG Workshop, was held at Chania, Crete (Greece), on 25-27 September 2017, at the Mediterranean Agronomic Institute of Chania (CIHEAM-MAICh). The head of ESA's Climate Office and CCI Programme Manager, Pascal Lecomte, presented in a keynote session the Climate Change Initiative Programme. The meeting also included a wide representation of the Fire_cci team.

The...

Submmited by: MLP
Post date: 26 Sep 17

Upcoming Fire_cci User Workshop

The Fire_cci Climate Research Group is organizing a half-day user workshop as part of the 4th FireMIP workshop that will take place on 17-19 October at IMK-IFU, Garmish-Partenkirchen, Germany.

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Submmited by: MLP
Post date: 18 Sep 17

Spatial evaluation of Indonesia's 2015 fire-affected area and estimated carbon emissions using Sentinel-1

A new article by the Fire_cci team has been published in Global Change Biology (DOI 10.1111/gcb.13841)

Fires raged once again across Indonesia in the latter half of 2015, creating a state of emergency due to poisonous smoke and haze across Southeast Asia as well as incurring great financial costs to the...

Submmited by: MLP
Post date: 31 Aug 17

Stratification and sample allocation for reference burned area data

The Fire_cci team has published a new article in Remote Sensing of Environment (DOI 10.1016/j.rse.2017.06.041).

Statistical estimation protocols are one of the key means to ensure that independent and objective information on product accuracy is communicated to end-users. Methods for...

Submmited by: MLP
Post date: 07 Jul 17

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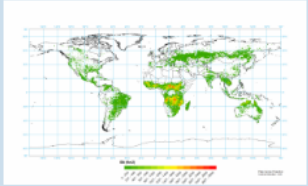

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