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Fire_cci legacy

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On behalf of the Fire_cci consortium

7th CCI Collocation, October 2016

What was the Burned Area landscape in 2010?

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- USA:
  - Standard: MODIS-based BA product (MCD45): 500 m resolution, monthly pixel files.
  - Alternative: MODIS HS product (MCD64), to ingest the Global Fire Emissions Database (GFED), 15-day grid tiles.
- EU:
  - Different BA products (L3JRC, Globscar, Globcarbon), not consistent and not very accurate.
- Both:
  - Global BA products not statistically validated.
  - Weak connections to climate modelers.
  - Some coordination through the GOFC-GOLD Fire IT.

Performance of EU BA precursor products

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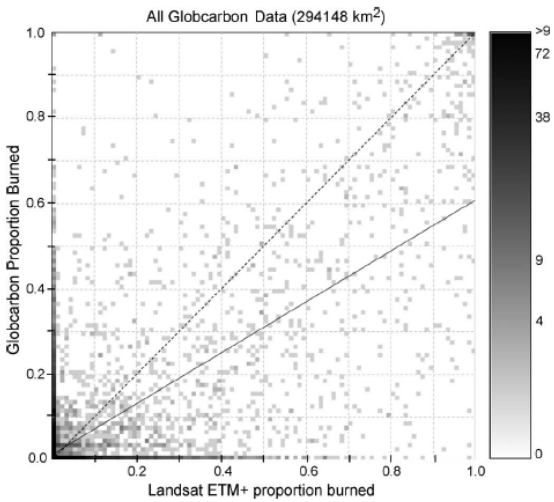
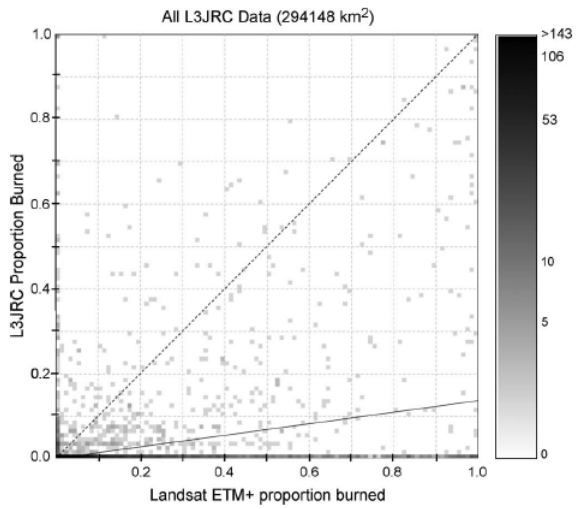
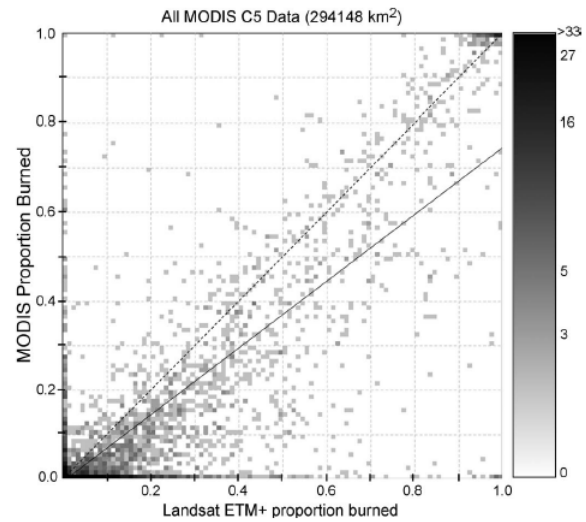


Globcarbon r^2= 0.595



L3JRC r^2=0.128



MCD45 r^2=0.746

Roy et al, 2009. South African scenes

Performance of EU BA precursor products

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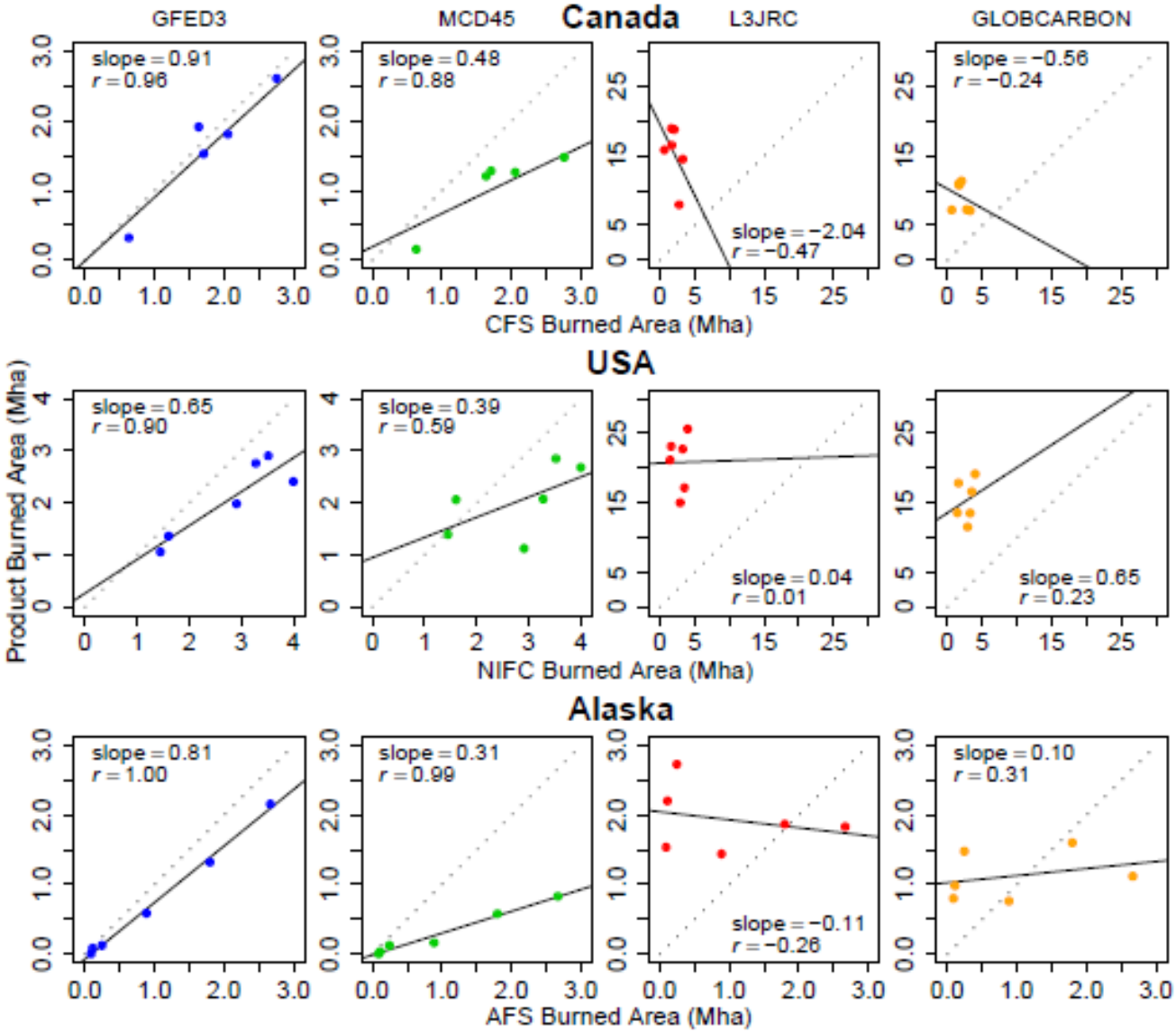
Giglio et al., 2010

Comparing to fire perimeters



What is the Burned Area landscape in 2016? (2 years left)

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- USA:
  - Future merging of both MODIS-based BA product (MCD45 and MCD64).
  - New versions of Global Fire Emissions Database (GFED4 and 4S). Small fires estimated.
  - Movement towards Landsat-based products.
  - Global validation not yet undertaken.
- EU:
  - New MERIS based BA product. Consistent trends with NASA MODIS products. MODIS VNIR (in progress).
  - Climate assessment: fire shapes and fire emissions.
  - Global BA products statistically validated (for 2008). Temporal stability of sample sites. Stage 3 (in progress).
  - Small fire database based on Sentinel-2/1 (in progress).
  - Strong connections to climate modellers: cross-ECV collaborations.

Fire_cci BA product v4.1

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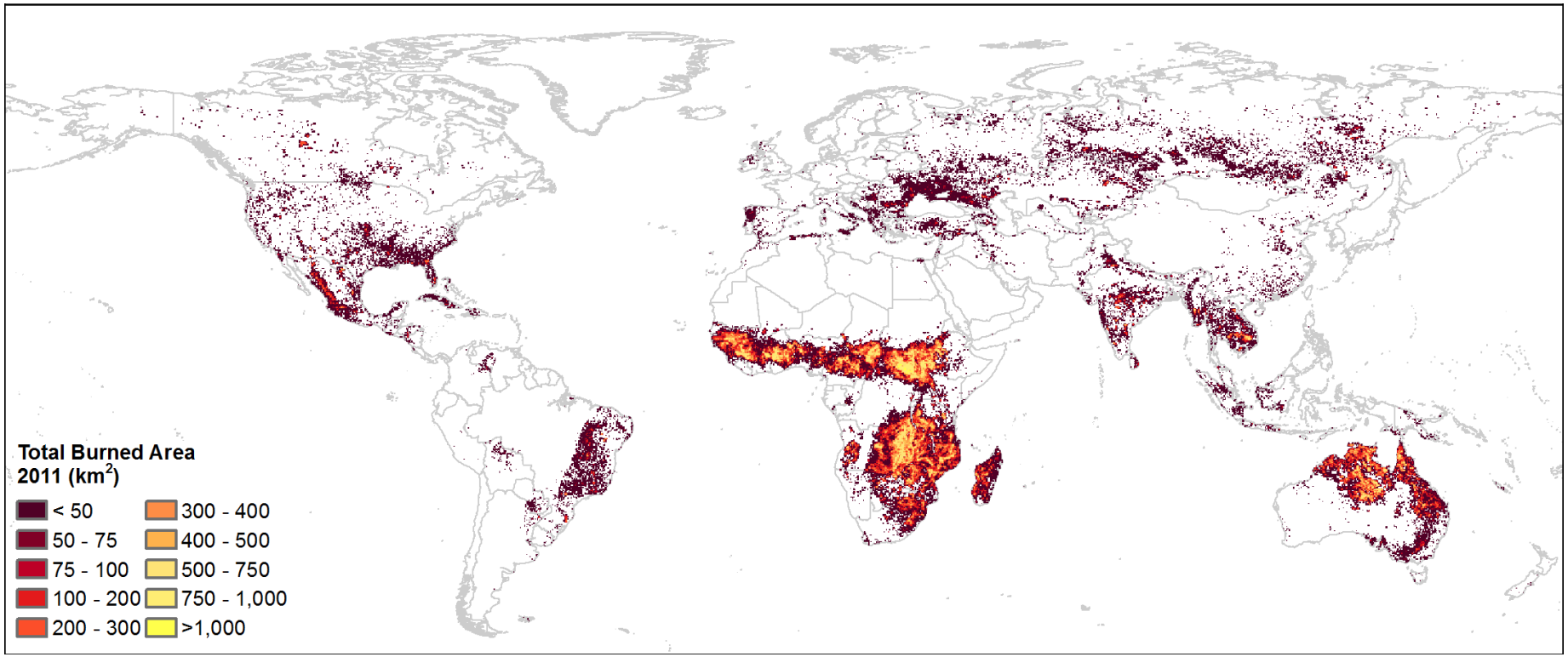

Product intercomparison

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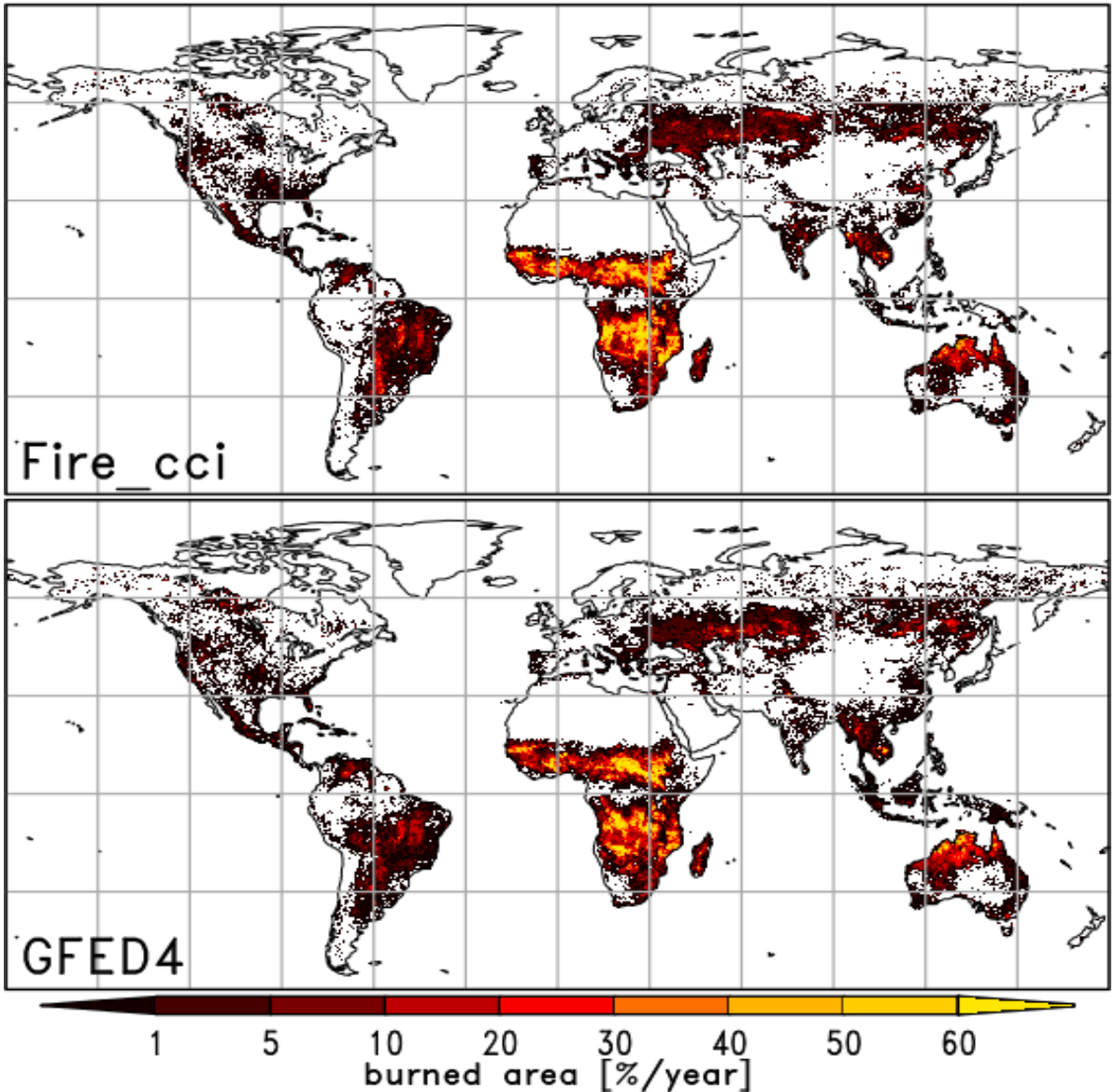
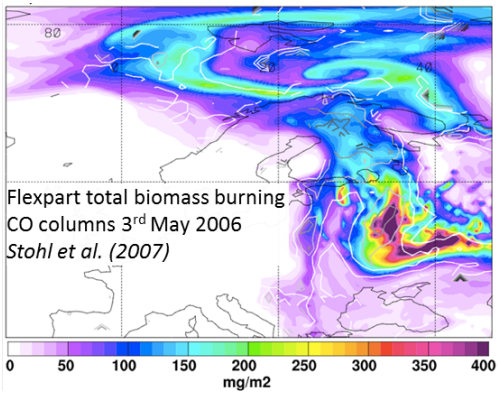
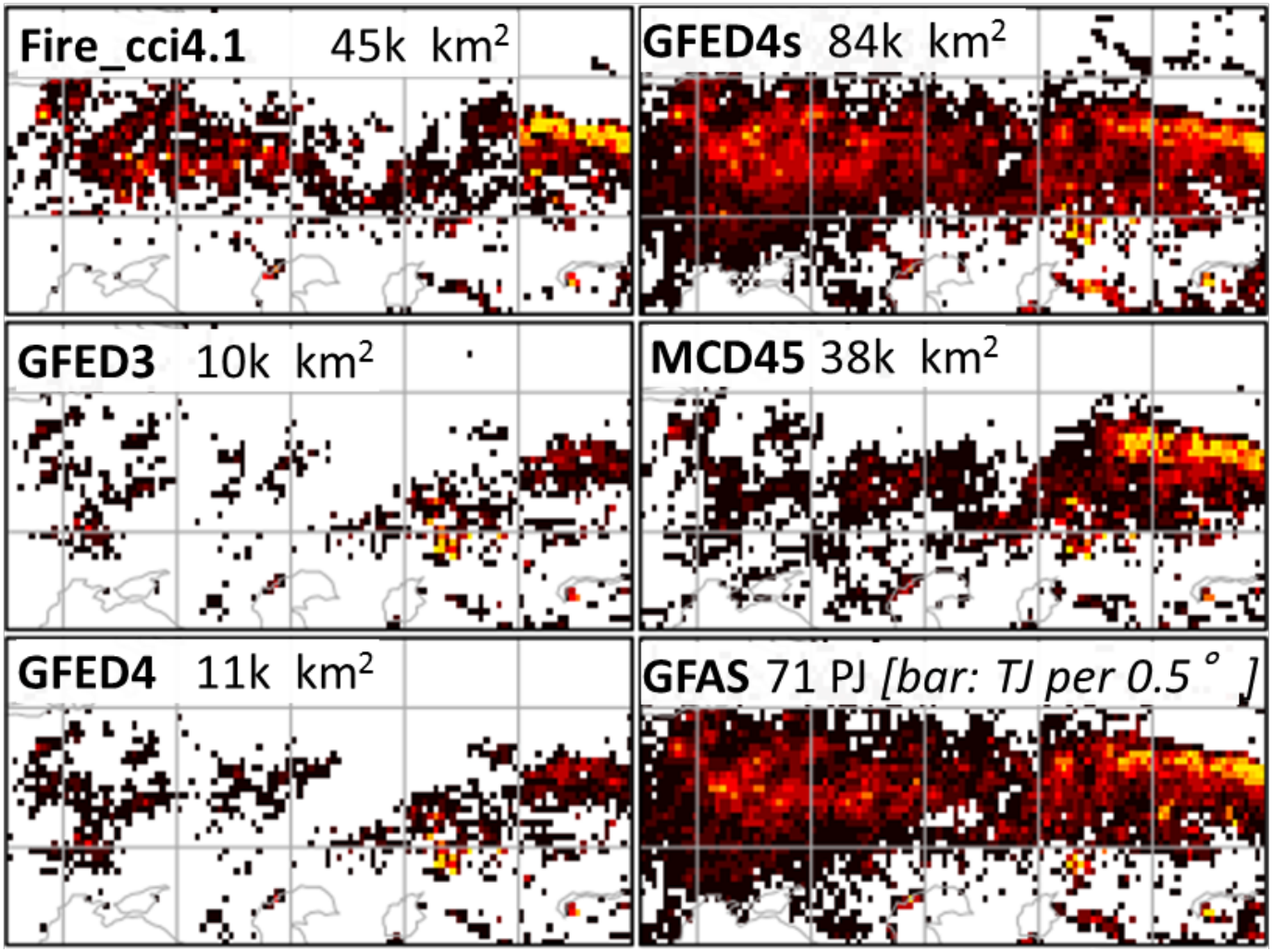


Regional differences





Temporal trends
GFED 4 – GFED4s – Fire_cci4.1

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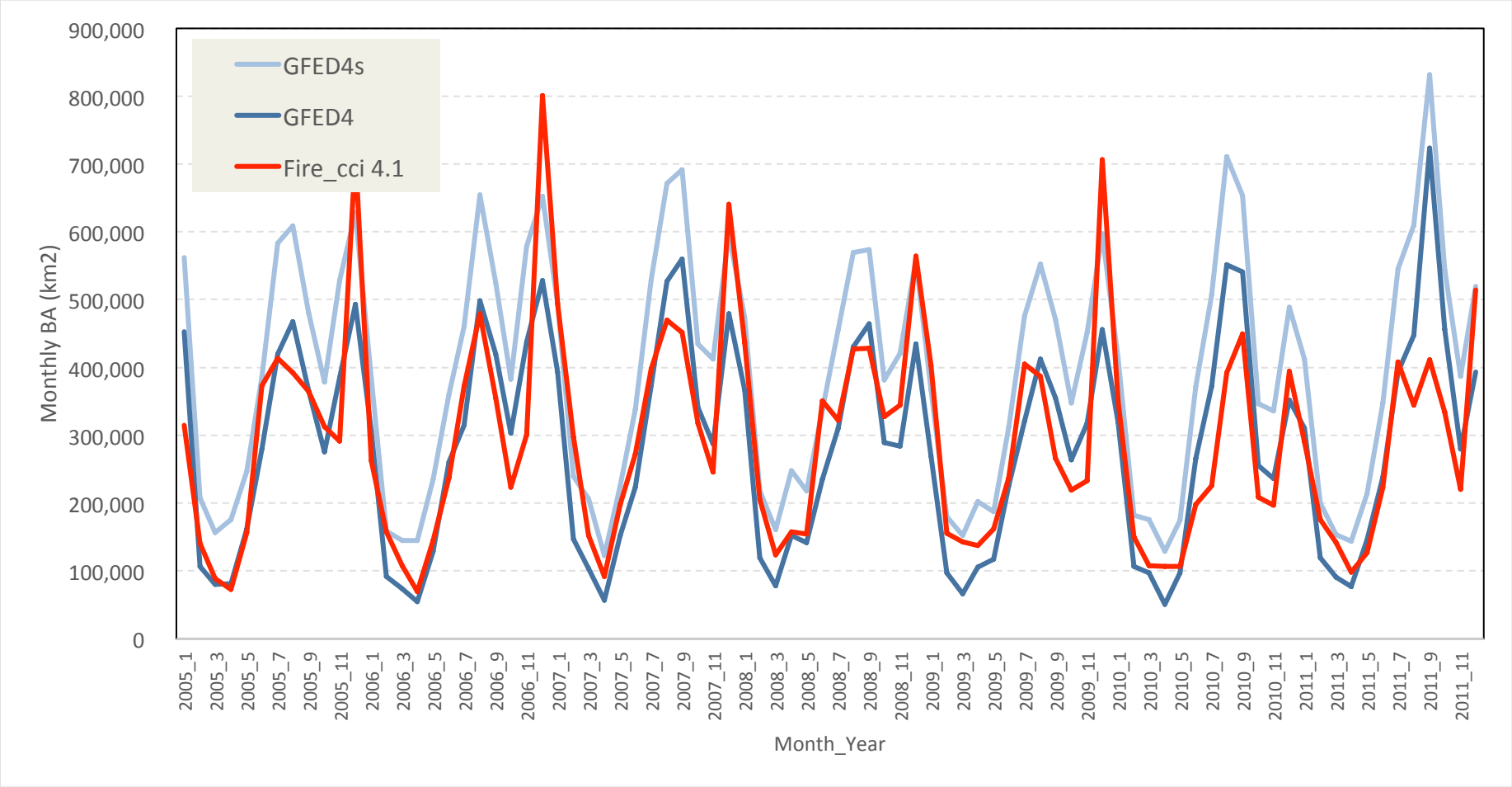
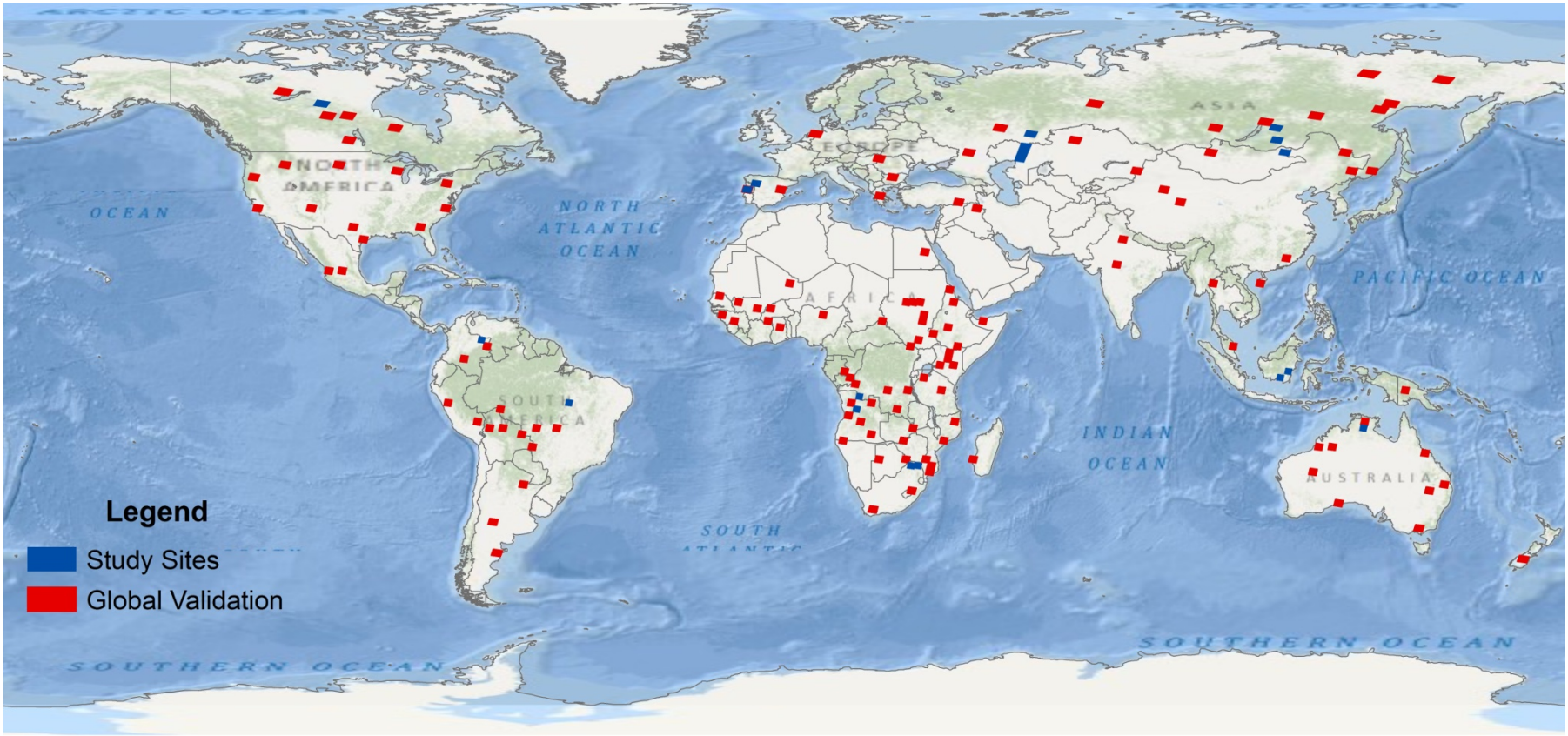


Validation



- 242 pairs of Landsat TM/ETM+ images.
- 130 sites for spatial validation from 2008 (red)
- 112 pairs for temporal validation (blue).

Temporal series for validation

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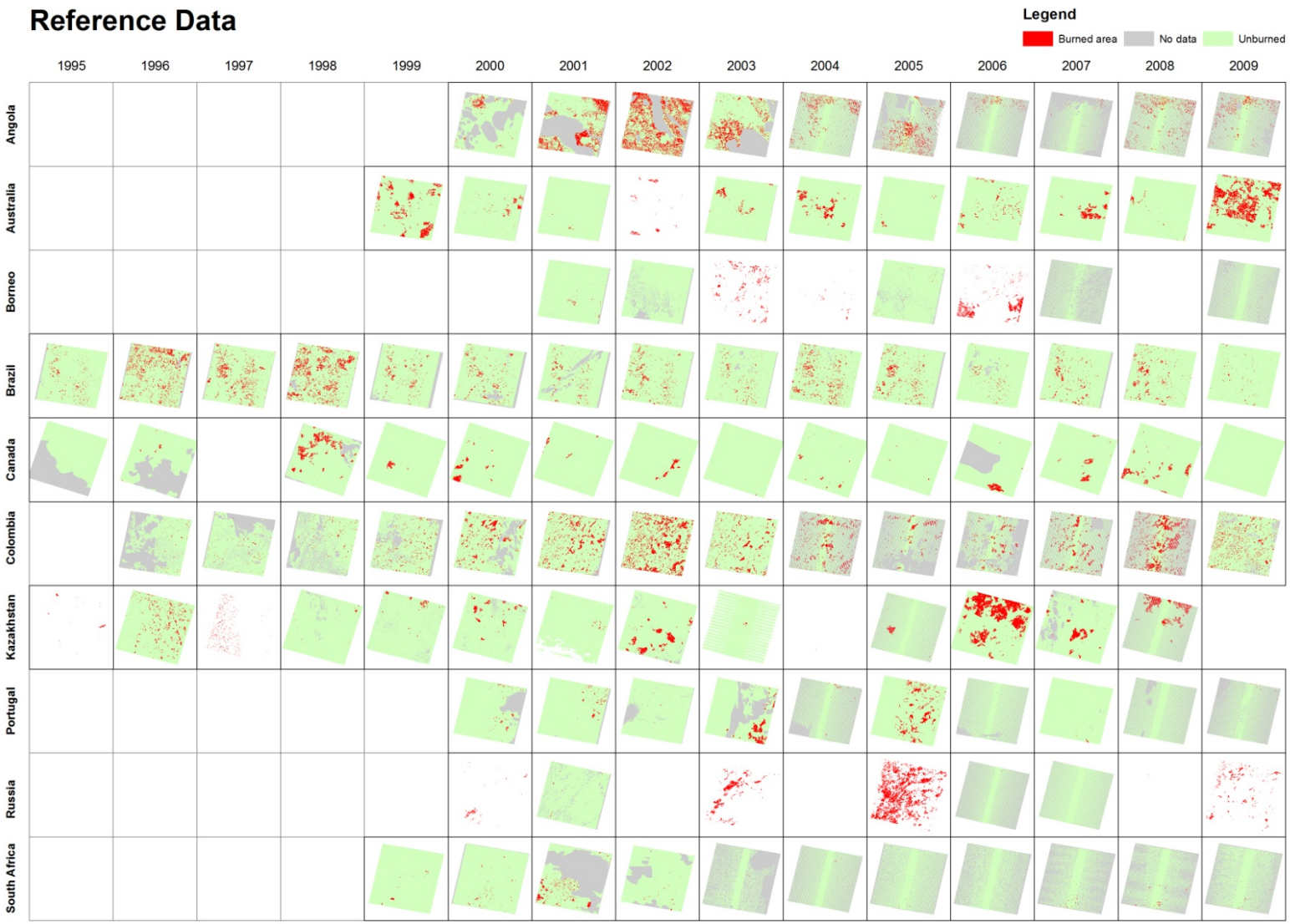


Global accuracy (2008)

Accuracy metrics (Standard error)

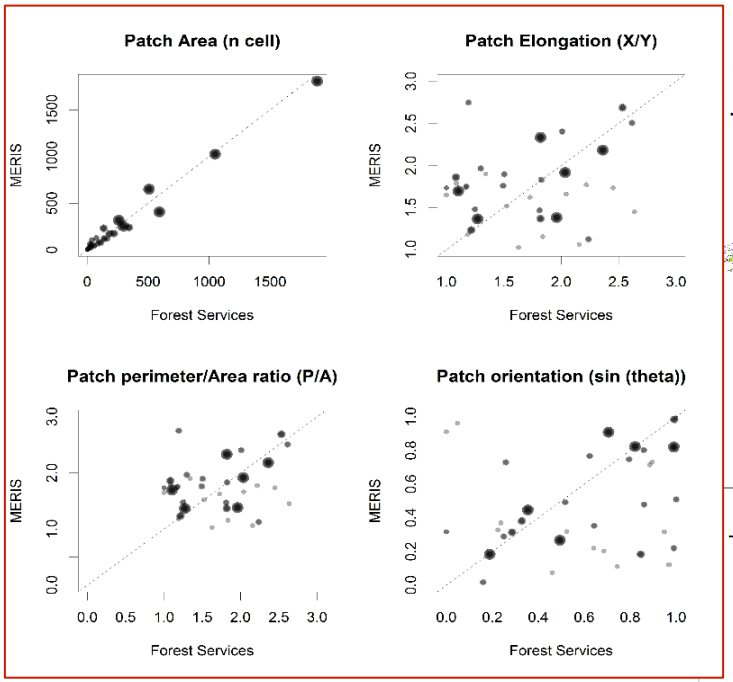
	Product	OA(%)	Ce(%)	Oe(%)	DC(%)	B (%)	relB(%)
a	MCD64	99.6 (0.1)	42 (4)	68 (4)	42 (4)	-0.17 (0.05)	-44 (7)
b	MCD45	99.7 (0.1)	46 (4)	72 (5)	37 (4)	-0.17 (0.05)	-48 (8)
c	Geoland2	99.6 (0.1)	74 (9)	91 (4)	13 (5)	-0.23 (0.07)	-68 (9)
d	Fire_cci	99.6 (0.1)	64 (6)	76 (5)	29 (5)	-0.12 (0.04)	-34 (12)

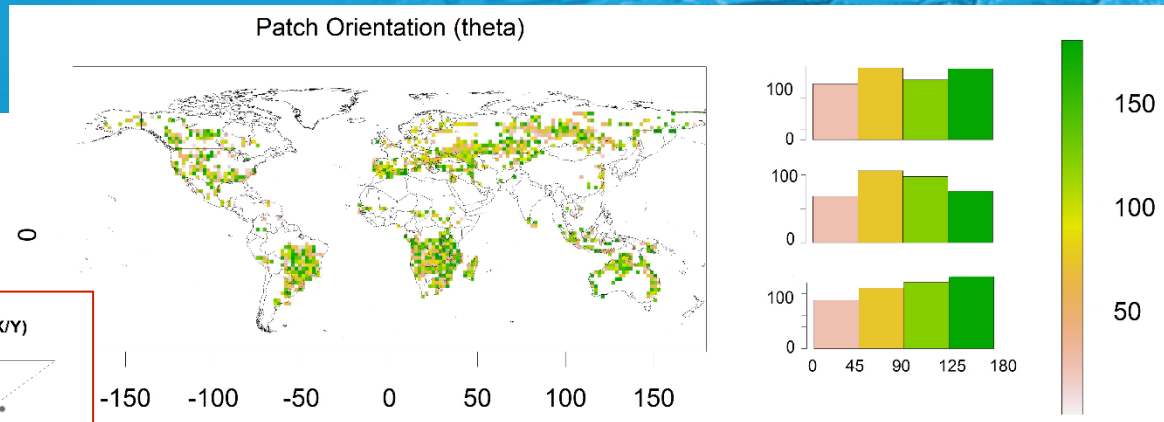
Comparison with fire perimeters for selected sites

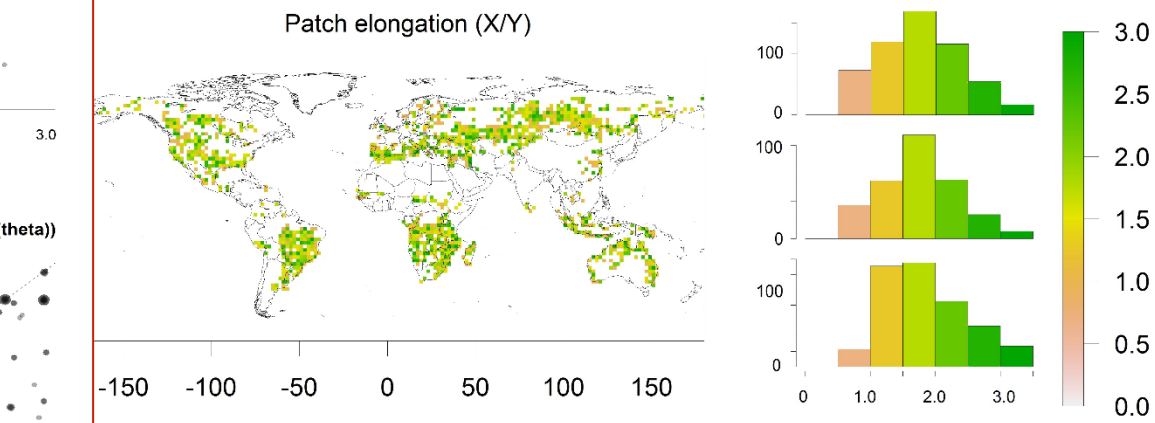
- Australia: CE = 0.22; OE = 0.38
- Canada: CE = 0.12; OE = 0.43
- California: CE = 0.22; OE = 0.28

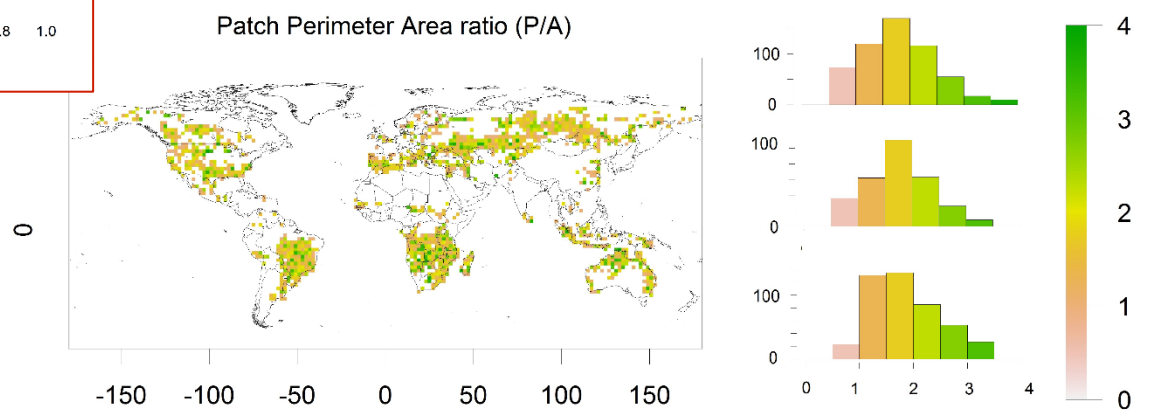
Padilla et al., 2015

Fire patch analysis v3.1









Chuvieco et al., 2016, GEB

Emission comparisons

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	Burned area (Mha yr^{-1})	CO emissions (TgCO yr^{-1})	Carbon emissions (PgC yr^{-1})
GFED4 data set	346	258	1.6
ORCHIDEE – GFED4	346	329	2.0
ORCHIDEE – Prognostic	232	346	2.0
ORCHIDEE – Fire_cci 3.1	369	351	2.1
GFED3.1 data set	346	334	1.9

Chuvieco et al., 2016, GEB

Product Downloads

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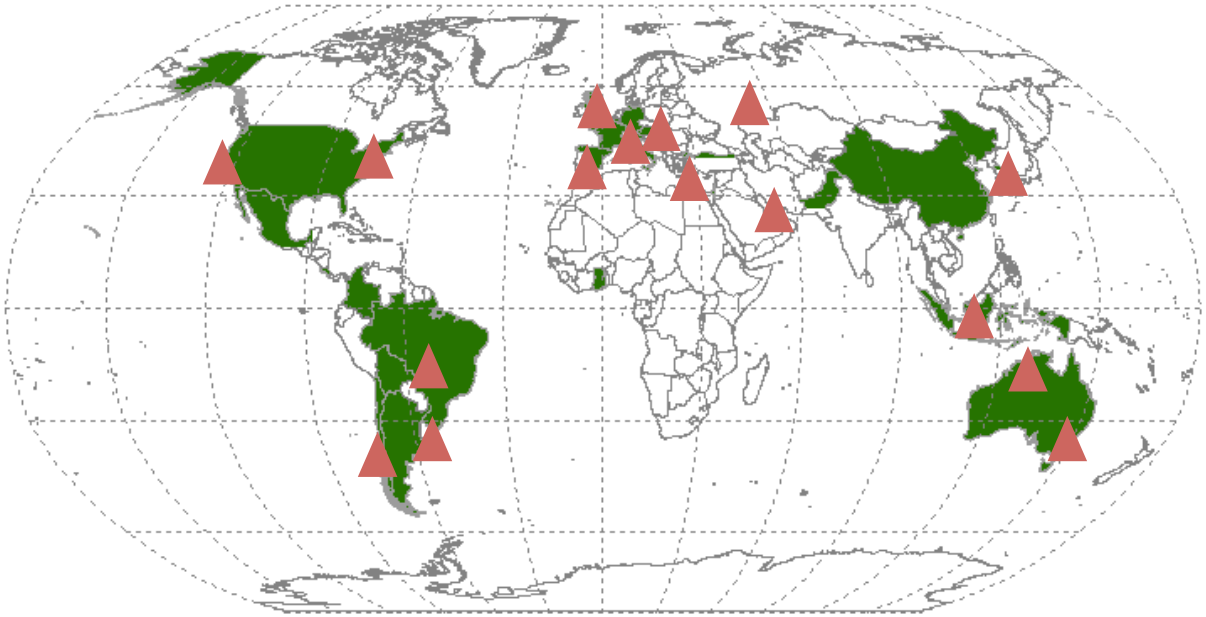
- Version 3.1:
  - 65 researchers from 28 countries (+ESA, JRC, FAO).
- Version 4.1 (available since July, 2016):
  - 35 researchers from 18 countries.



Project presentations 2010-2016

What actions have promoted the change?

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- Collaboration amongst the leading fire experts (EU and Int), both with RS and climate background.

Presentation to the international fire community

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And to regional networks (Russia, Australia and Latin America)

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What actions have promoted the change?

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- Collaboration amongst the leading fire experts (EU and Int), both with RS and climate background.
- Sensor-oriented BA algorithms. Equilibrium between ambition and pragmatism.
- Strong emphasis on validation.
- Connection between ECVs at programmatic level:
  - Difficulties in objectives and language.
  - Emphasis on data generation versus data analysis.
  - Initiatives in progress: fire emissions – GHG; fire occurrence – LC; Soil Moisture – fire occurrence.
  - Potentials: fire emissions – aerosols; SST – fire occurrence.

Lessons learned

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- Keep focus on final goals in terms of data processing.
- Burned area products require further research (less in data generation, more in data analysis).
- Invest on validation: reference sites and methods.
- Cooperation between RS experts and modellers: CRG + CMUG.
  - Cross-relation with other ECVs.