Earth Observation for European Sustainable Forest Management – webinar

Large scale burnt area mapping

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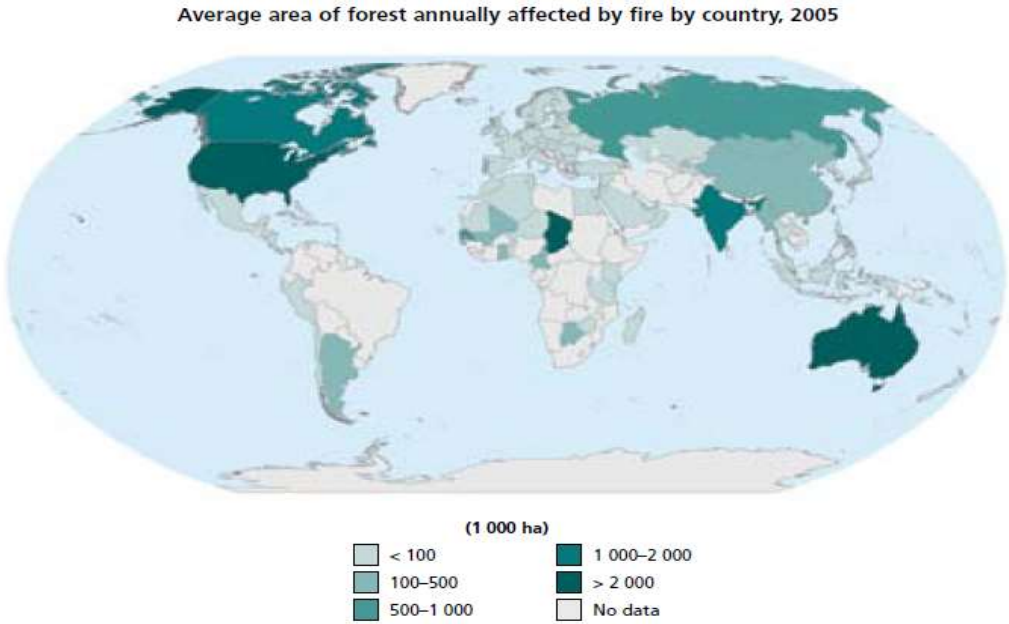
How much area is burned globally?

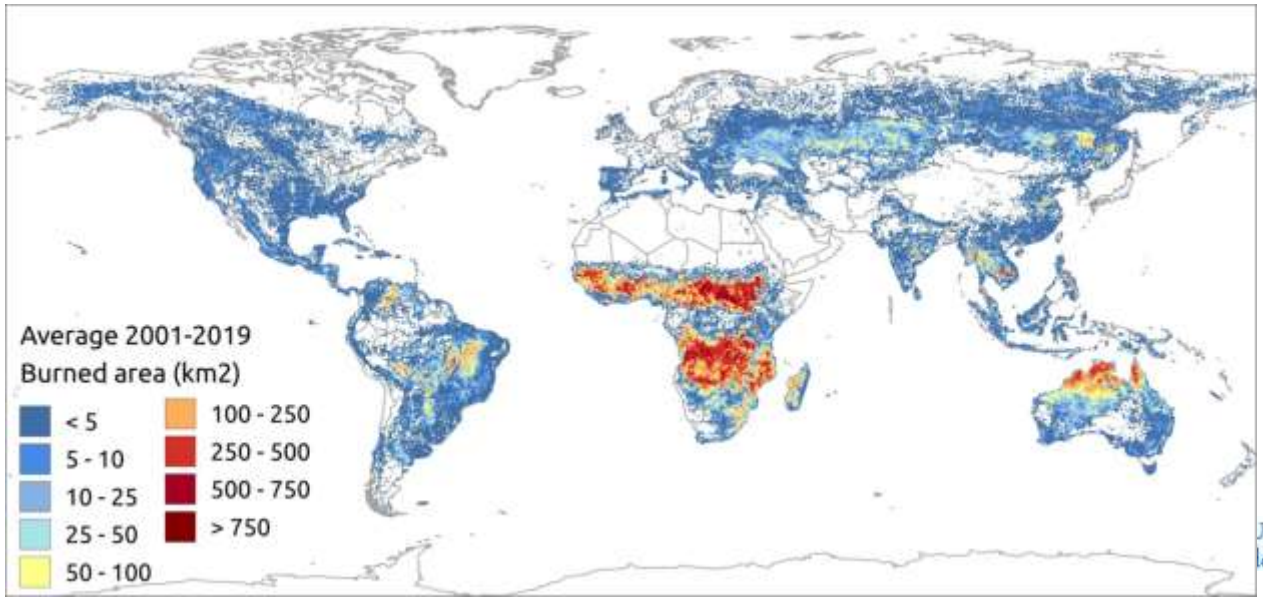
From official FAO statistics (FRA2010): 0.6 Mkm².
Based on information from 78 countries



From satellite-based products

FireCCI average BA: 4.5 Mkm²

Lizundia-Loiola et al., 2020, RSE



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Existing Global BA products

BA dataset	Time span	Sensor/Method	Spatial resolution g=grid p=pixel d=degree	Temporal compositing
GIO-GL1*	1999-present	SPOT VGT; from 04/2014 onwards: PROBA-V	p: 1 km	10-day composite
GIO-GL1 300*	04/2014-present	PROBA-V	p: 300 m	10-day composite
FireCCI51	2001-2019	MODIS VNIR + HS	p: 250 m g: 0.25 d	Monthly
GFED4s	1997-present	MCD64A1 + scaled HS	g: 0.25 d	Monthly with scalars for daily and 3-hourly estimations
GFED4	1995-present	MCD64A1+ ATSR + HS	g: 0.25 d	Monthly Daily (from Aug-2000)
MCD64A1 c6	2000-present	MODIS + HS	p: 500 m g: 0.25 d	Monthly

Chuvieco et al., 2019, RSE

Sources of BA product errors

- Input data (sensor limitations):
  - Spatial, spectral and temporal resolution.
  - Cloud coverage, artefacts.
  - Observation conditions.
- Algorithms.
  - Fire is not a binary event!
  - Global BA algorithms should take into account:
    - Severity.
    - Type of fire.
    - Time after fire

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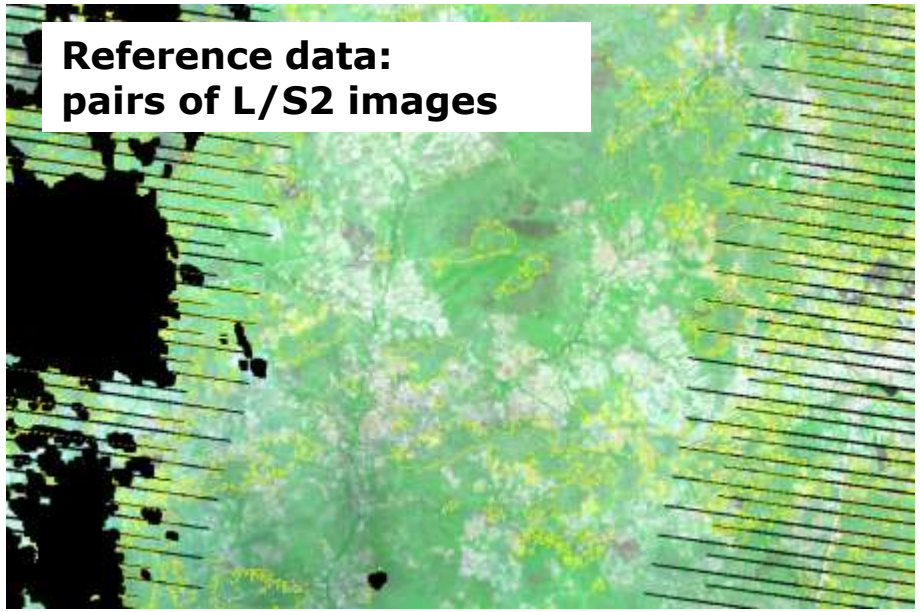
Challenges for Global BA validation



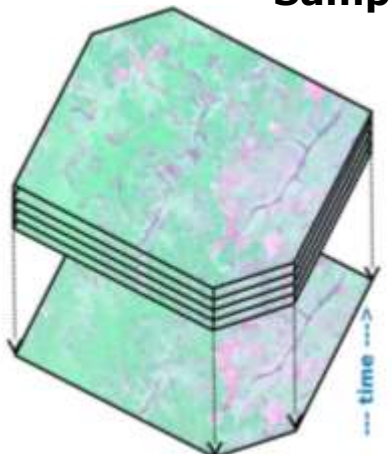
Stratified random sampling

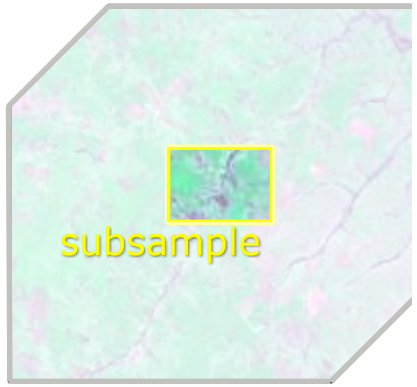
Years, 2003-2014

Biomes

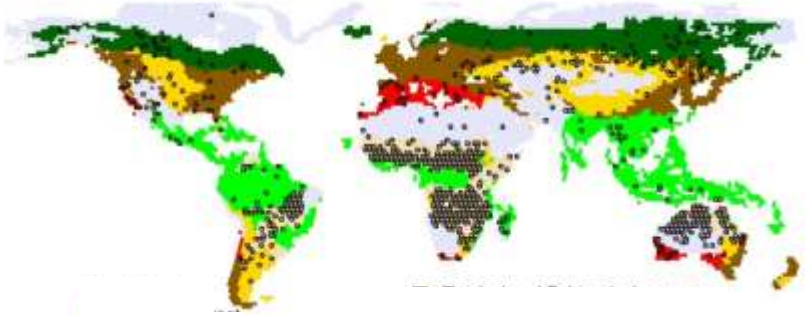
MCD64c5
BA

Sampling Unit





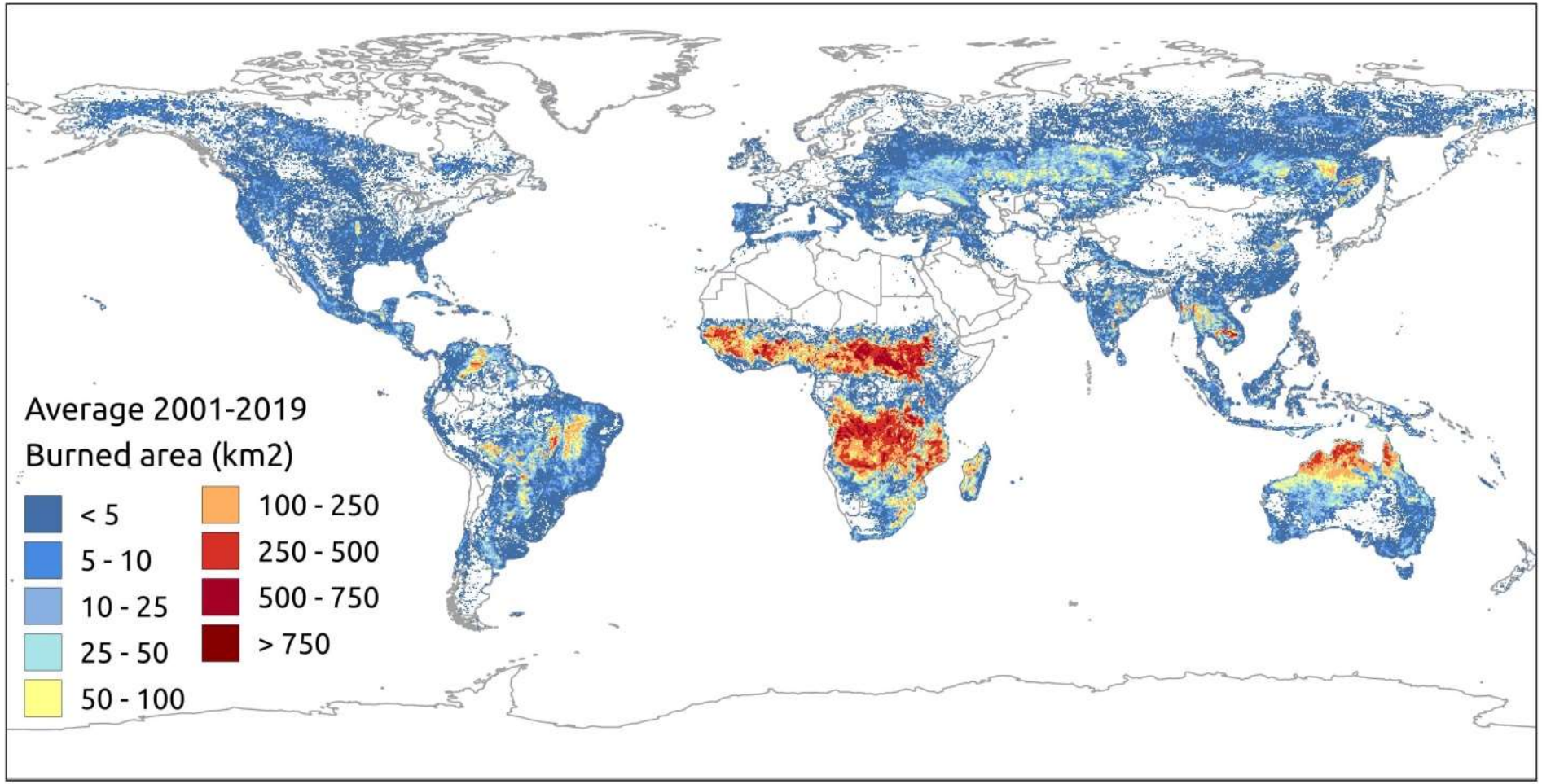
1200 sampling units, 100 each year



Padilla et al., 2018, RSE

Strengths & Limitations of EO BA products

- Spatial coverage (+)

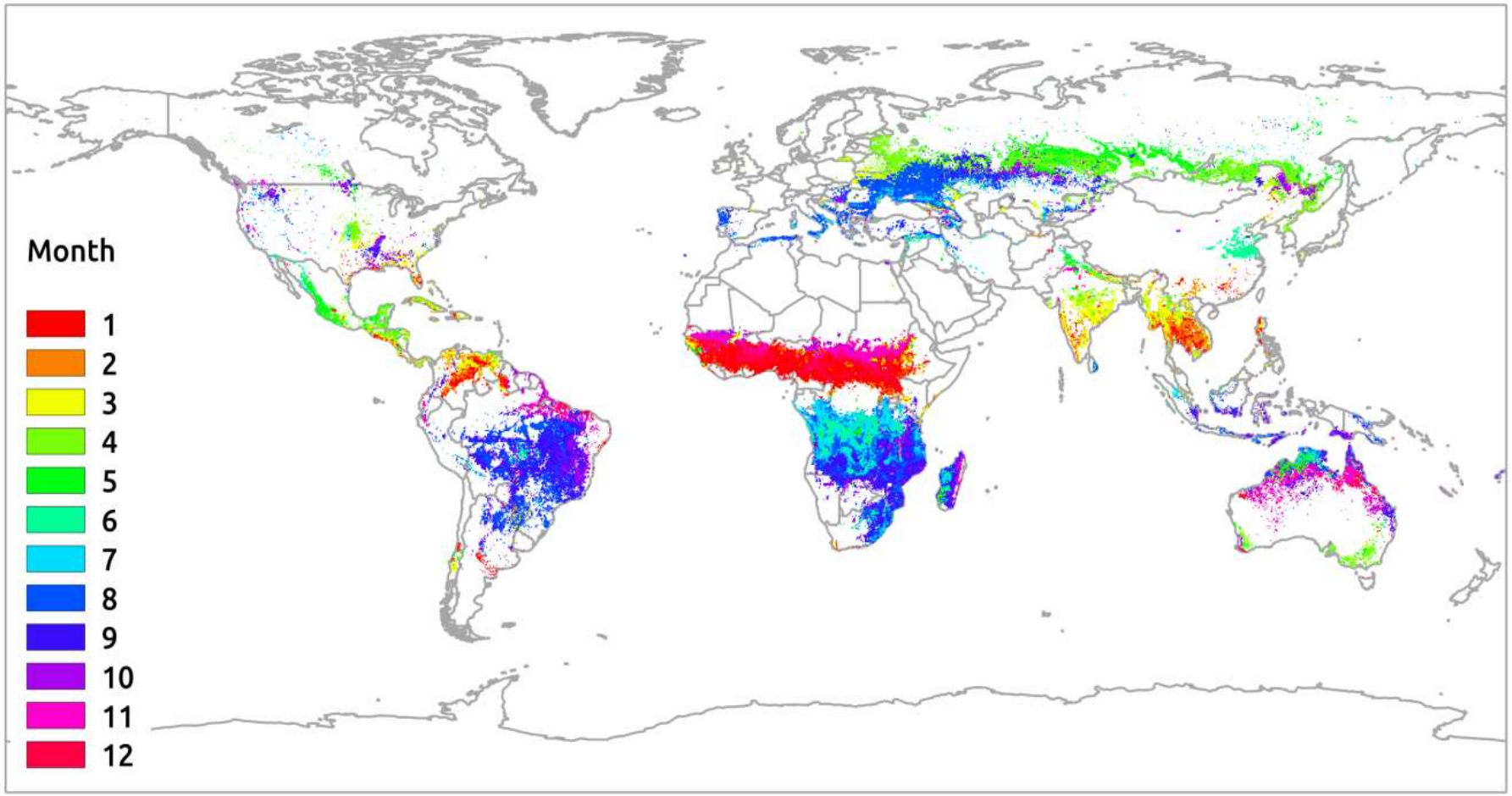


Lizundia-Loiola et al., 2020, RSE

Strengths & Limitations of EO BA products

- Spatial coverage (+).
- Seasonal coverage (+-)

Highest occurrence month



Lizundia-Loiola et al., 2020, RSE

Strengths & Limitations of EO BA products

- Spatial coverage (+)
- Seasonal coverage (+-)
- Temporal reporting (+-).

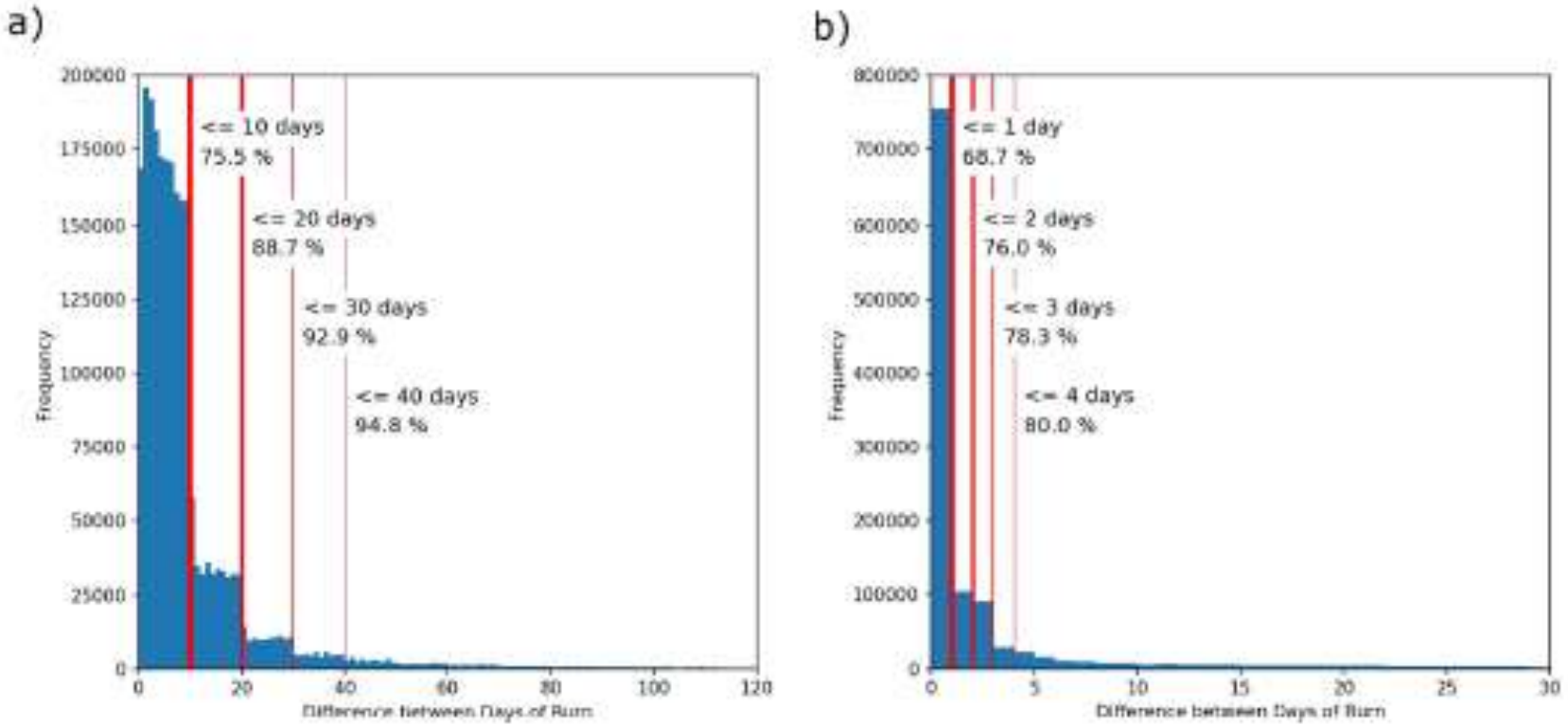
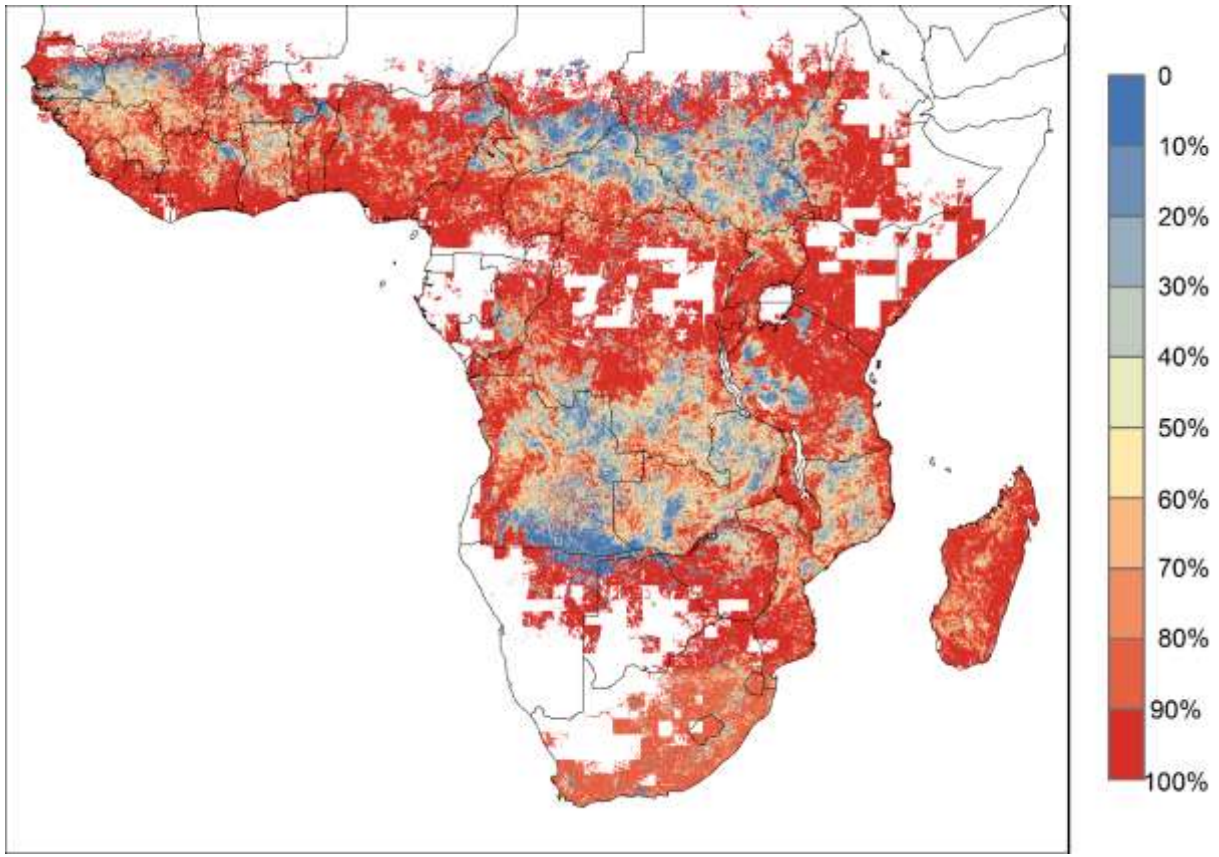


Fig. 14. Detection delay of the a) FireCCISFD11 and b) MCD64A1 comparing to MCD14ML hotspots acquisition date.

Roteta et al., 2019, RSE

Strengths & Limitations of EO BA products

- Spatial coverage (+)
- Seasonal coverage (+-)
- Temporal reporting (+-)
- Fire size distribution (-)

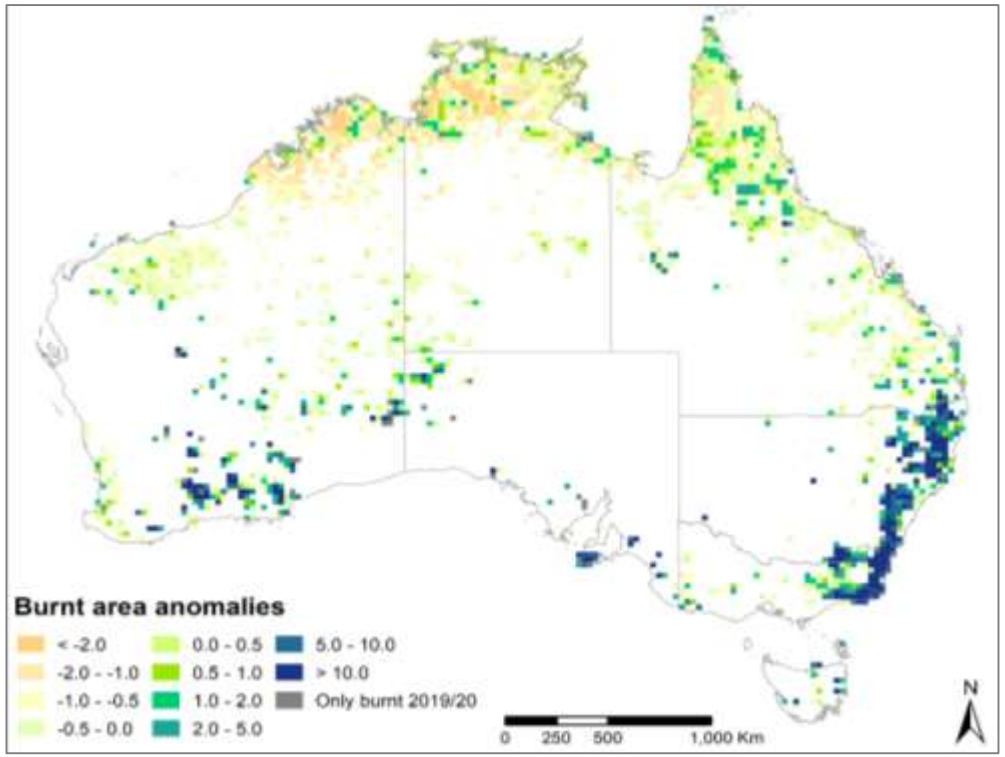


Fraction of total burned area from fires smaller than 100 ha (plotted on a 0.05° grid).

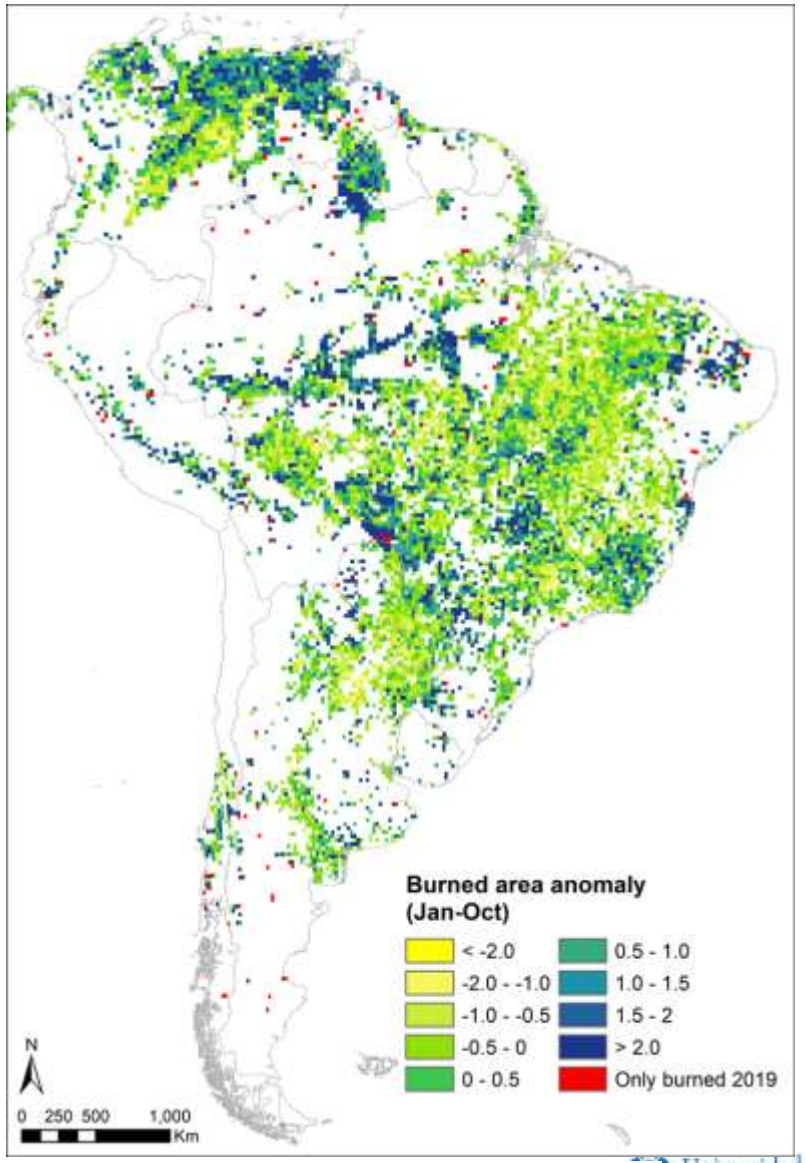
Ramo et al. 2020, in review

Strengths & Limitations of EO BA products

- Spatial coverage (+)
- Seasonal coverage (+-)
- Temporal reporting (+-)
- Fire size distribution (-)
- Interannual variability: anomalies



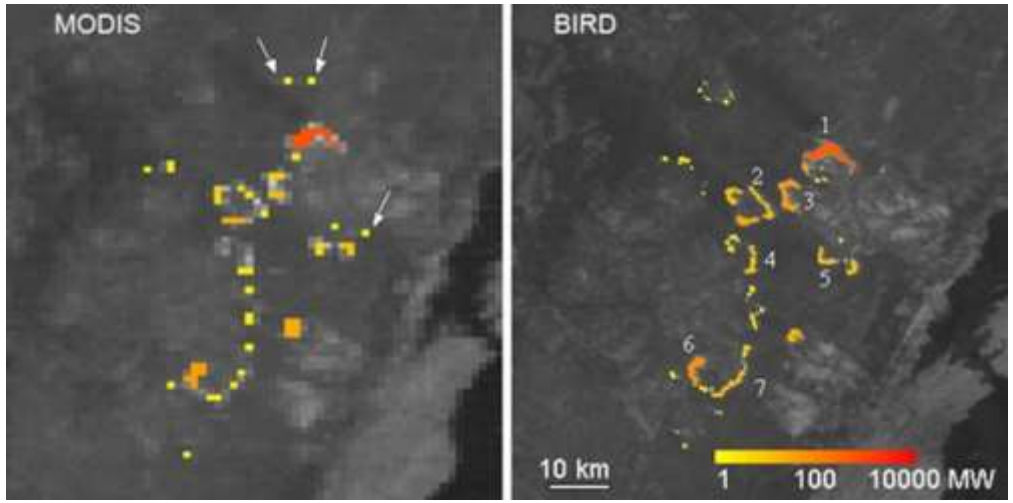
Bowman et al., 2020, Nature

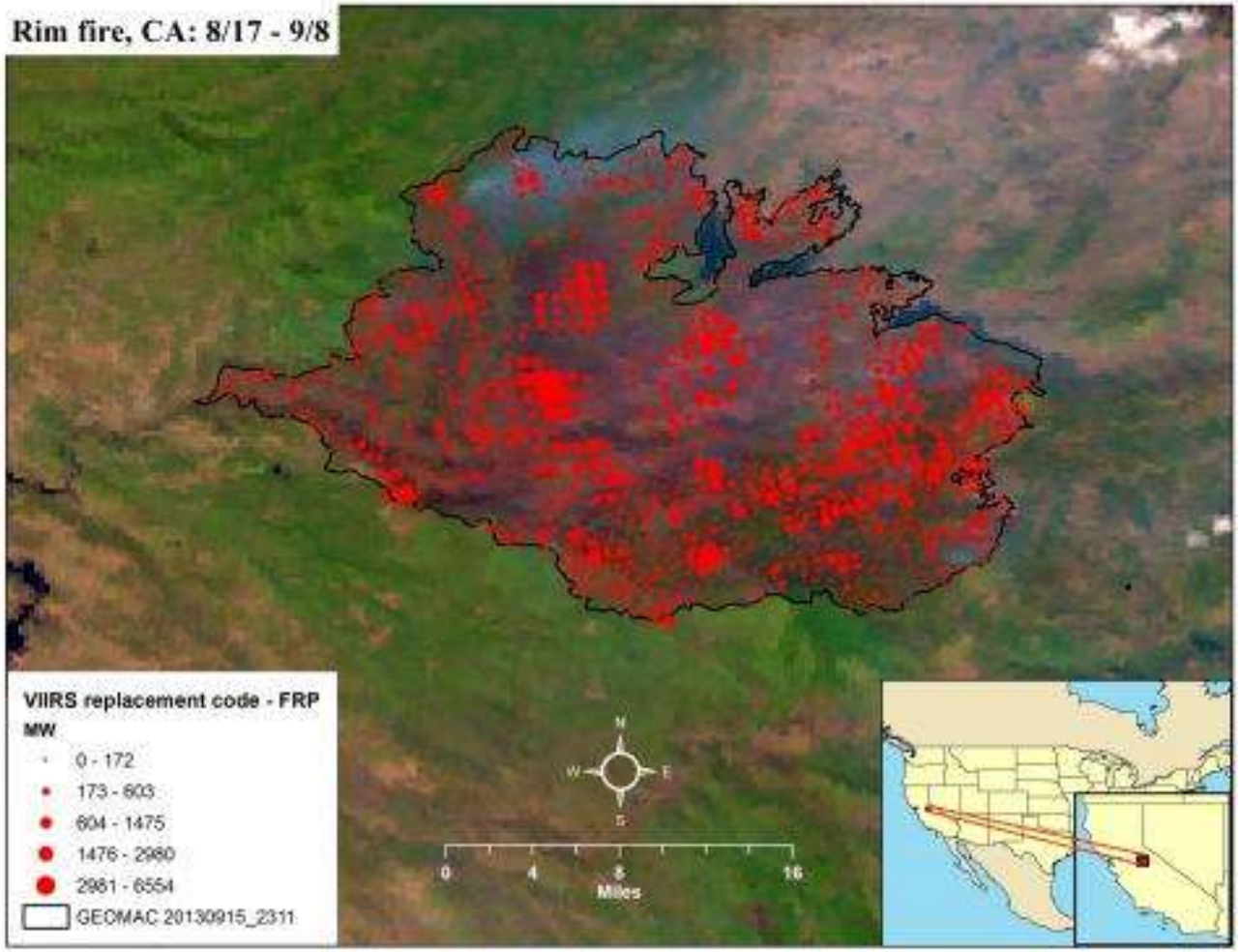


Lizundia-Loiola et al., 2020, RS

Strengths & Limitations of EO BA products

- Spatial coverage (+)
- Seasonal coverage (+-)
- Temporal reporting (+-)
- Fire size distribution (-)
- Interannual variability (Fire return ir
- Burn severity (-)





http://viirsfire.geog.umd.edu/pages/AFPE.php

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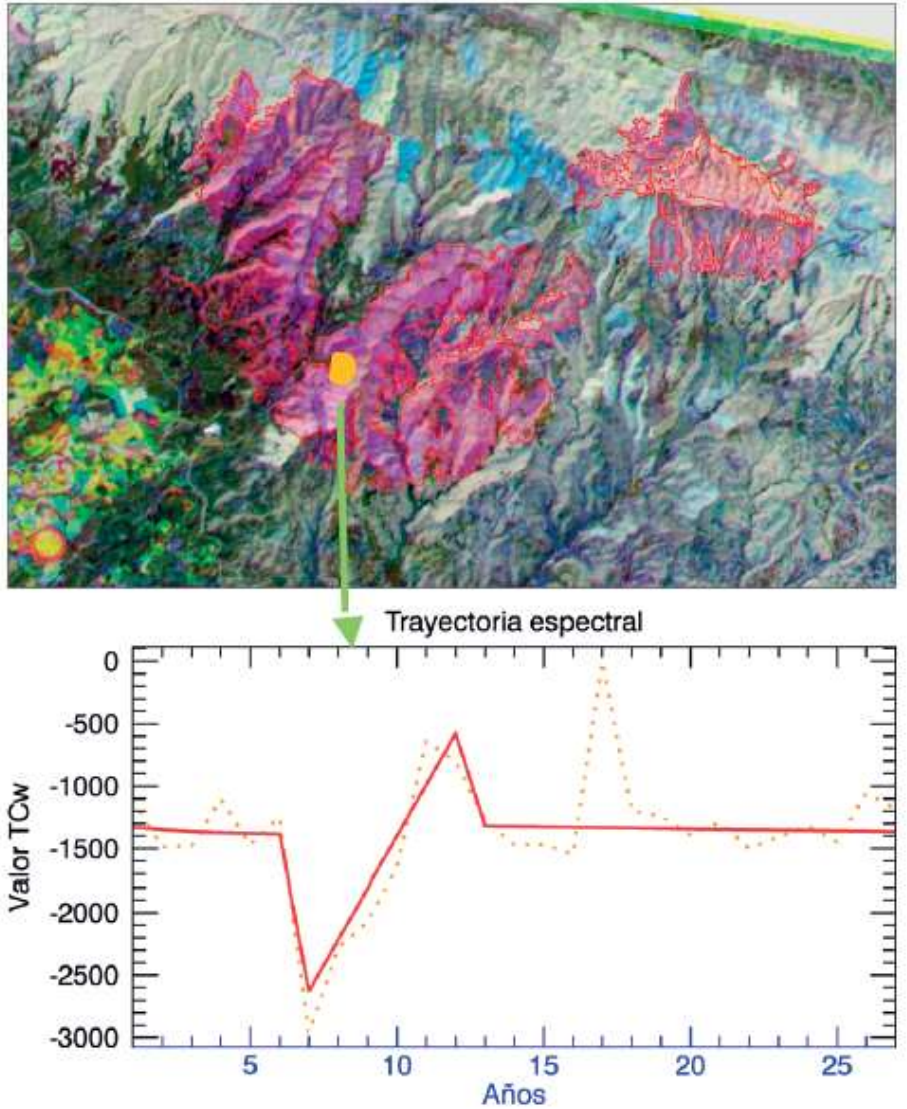
Strengths & Limitations of EO BA products

- Spatial coverage (+)
- Seasonal coverage (+-)
- Temporal reporting (+-)
- Fire size distribution (-)
- Interannual variability (Fire return interval) (-)
- Burn severity (-)
- Regeneration Potential (+).



Martínez et al., 2017, RET