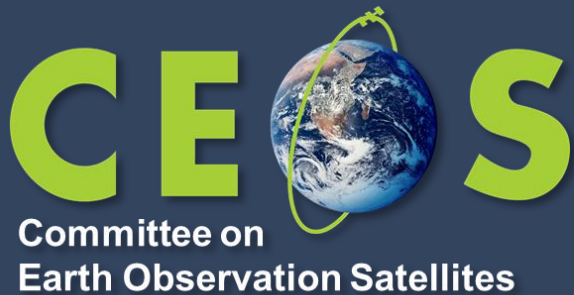


CEOS Wildfire Preparedness Pilot – Pre-fire fuel dryness (2026-2029)

Pilot overview and progress update

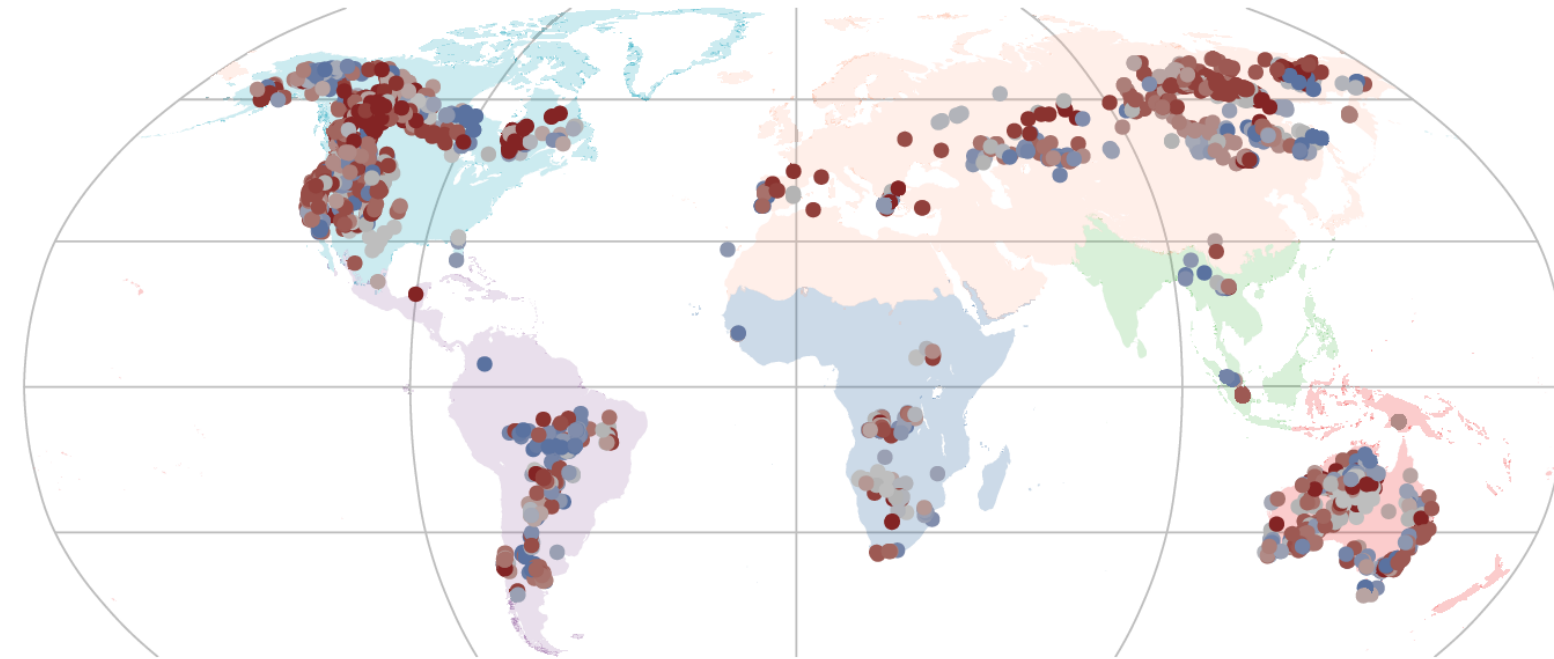


Marta Yebra (ANU) & Arijit Roy (ISRO)
ASI – CEOS WGD International Workshop on
“Earth Observation for Disaster Risk Management”

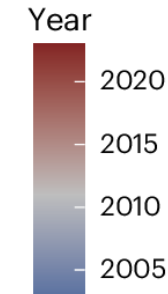
Increasing Megafires Globally



Frequency

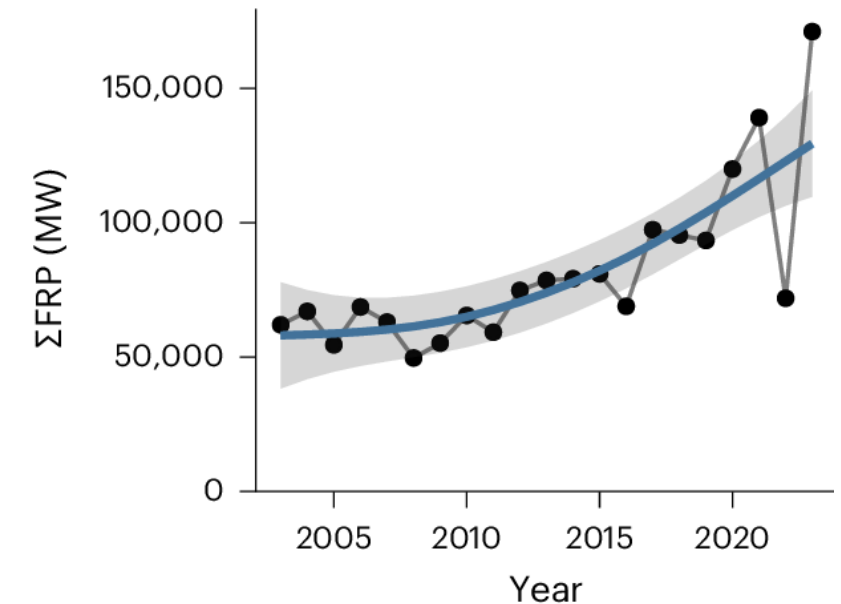


Energetically extreme fires
defined as the top 0.01% for fire radiative power (FRP)
from 2003 to 2023



Intensity

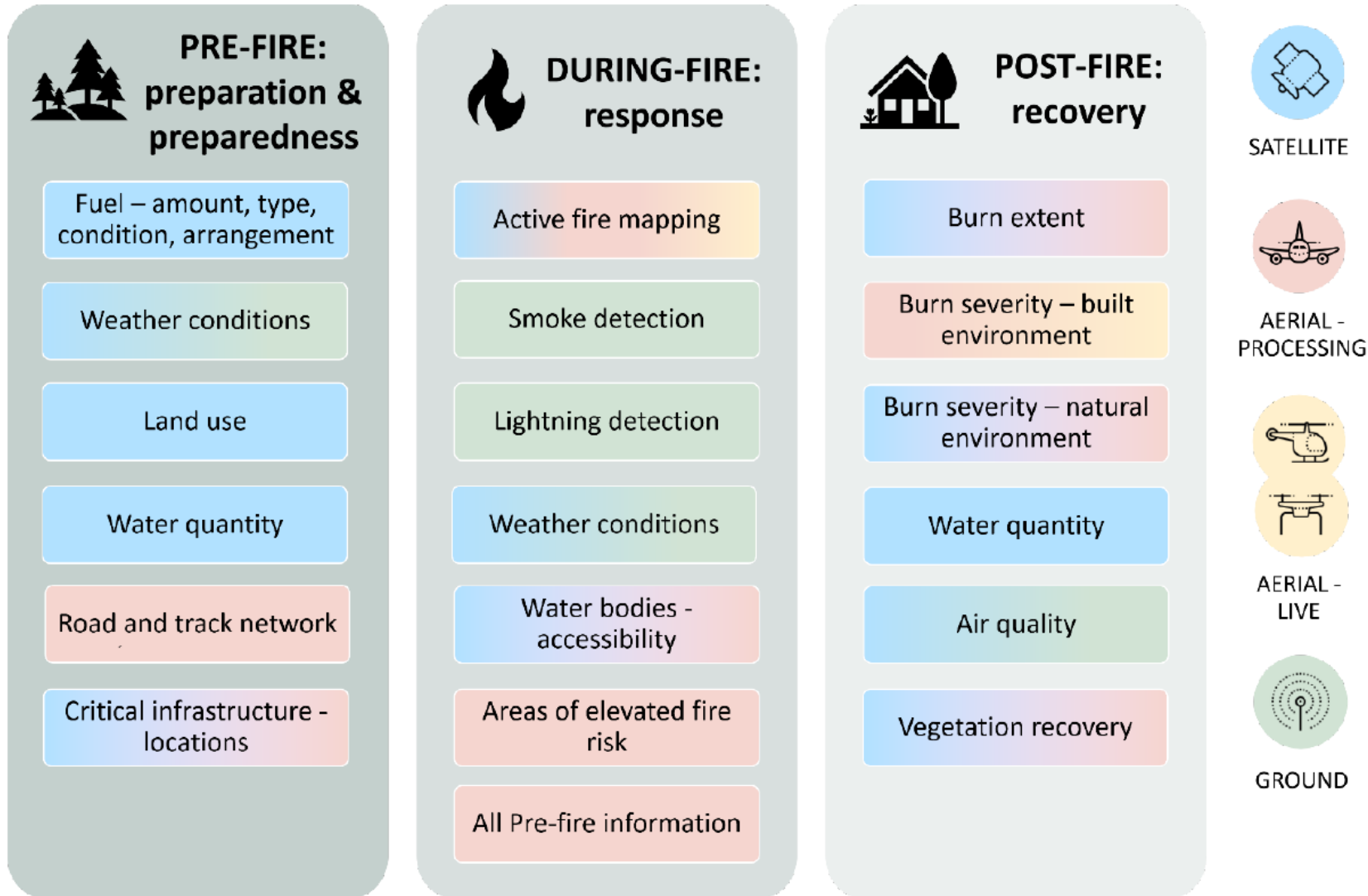
Mean of top 20
 Σ FRP events per year

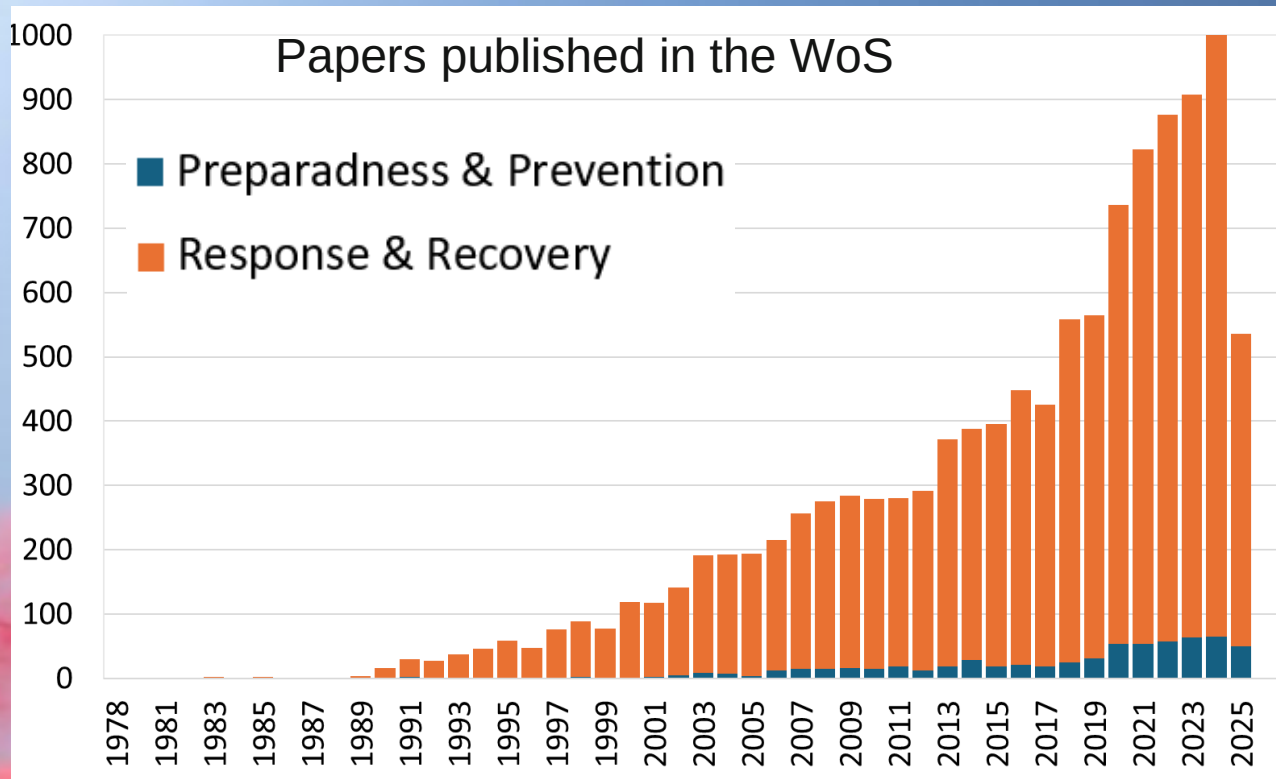


Remote sensing capabilities for bushfire decision making



PPRR
Framework





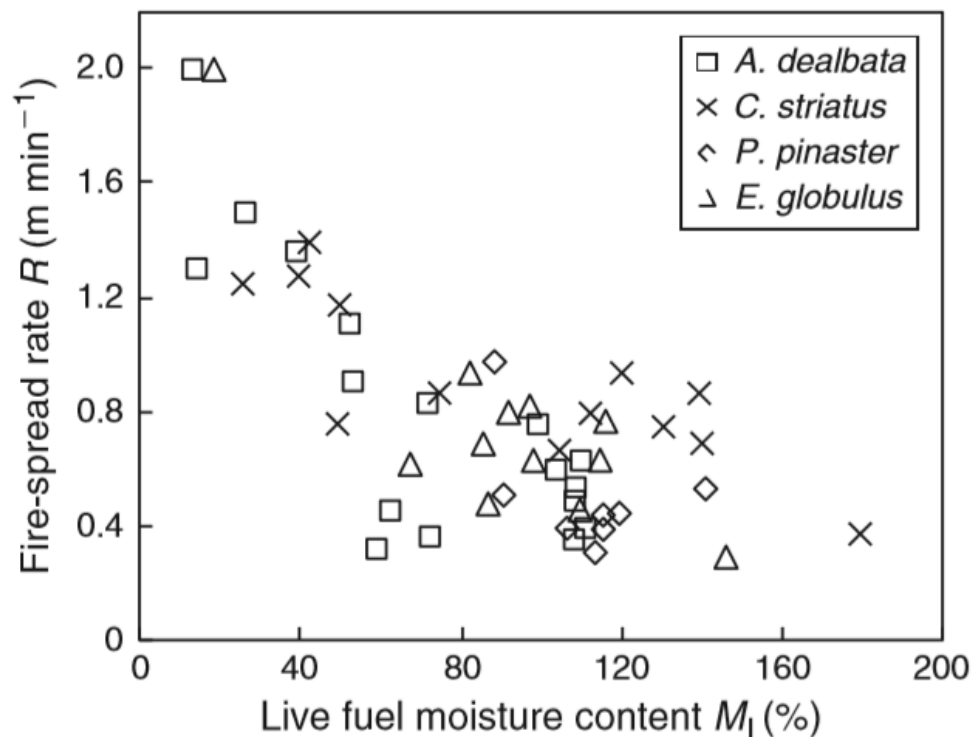


shifts the focus from
reactive response to
anticipatory preparedness
saving resources, ecosystems and lives

Fuel Moisture Content important driver of fire danger and fire behaviour

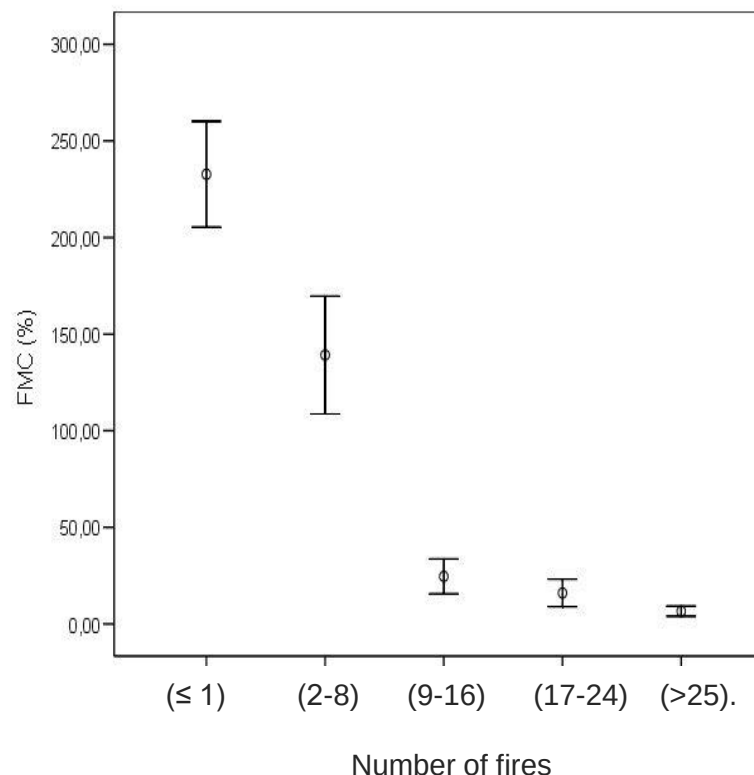


Forest



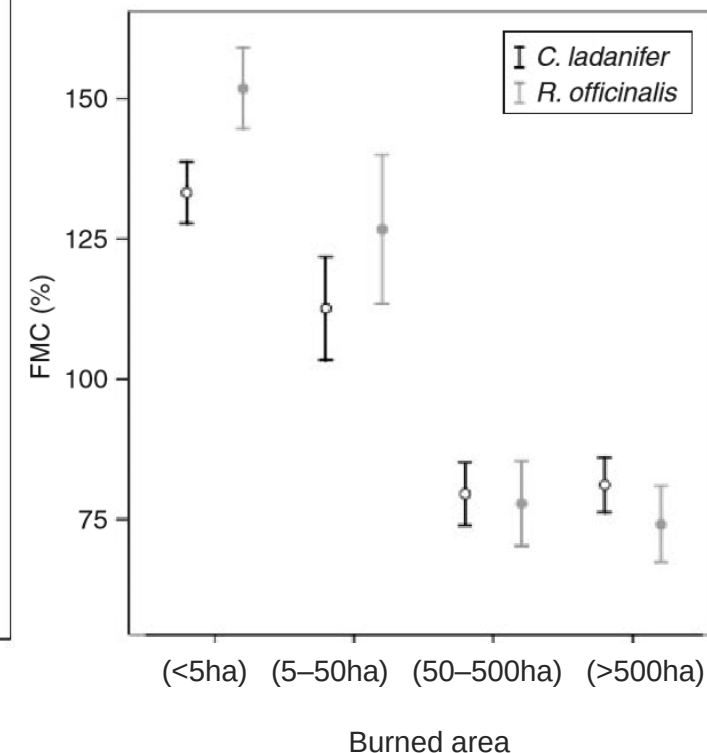
Rossa et al., 2016, IJWF

Grass



Chuvieco et al. 2009, IJWF

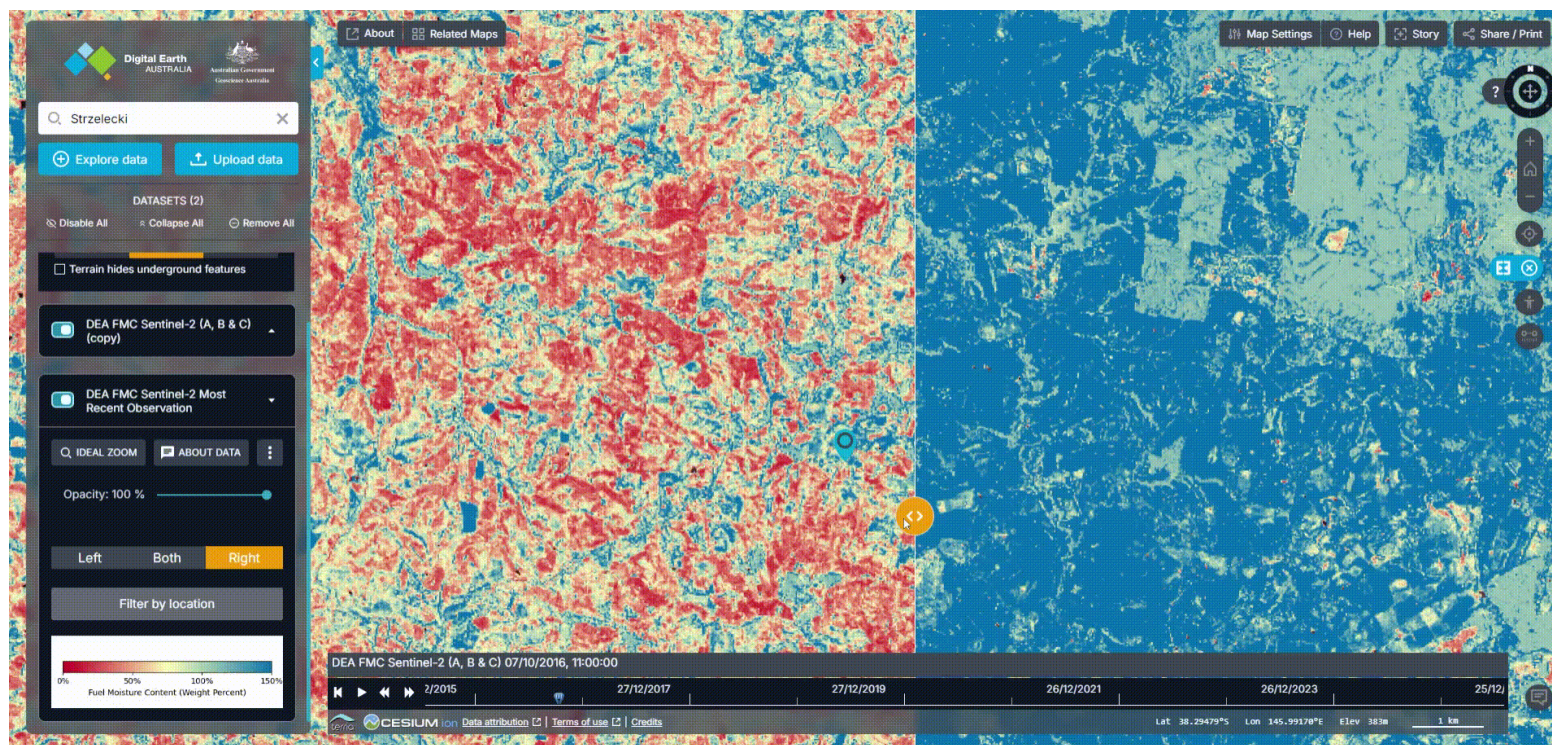
Mediterranean Shrub



Overarching Objectives



Benchmark and advance globally consistent fuel dryness indicators to support anticipatory fire management and inform future Earth observation capabilities.



Workplan/Phases (2026-2029)



Phase 1 – Literature Review (2026)

- Review EO-based LFMC estimation methods
- Assess integration of LFMC indicators in operational fire danger and fire management systems



Phase 2 – Algorithm Benchmarking (2027)

- Develop standard protocols for LFMC field data collection
- Benchmark EO-based LFMC algorithms using Globe-LFMC
- Expand validation through additional ground observations and regional datasets



Phase 3 - Sensor Evaluation (2028)

- Assess capability of current and future EO missions to detect flammability traits
- Provide recommendations for future EO mission capabilities



Phase 4- Operational Integration & Uptake (2028-2029)

- Recommend globally (regional) consistent dryness algorithms
- Recommendations of products to be delivered via operational platforms (GWIS, Digital Earth platforms, GEE)
- Demonstrate integration in fire management use cases with operational agencies

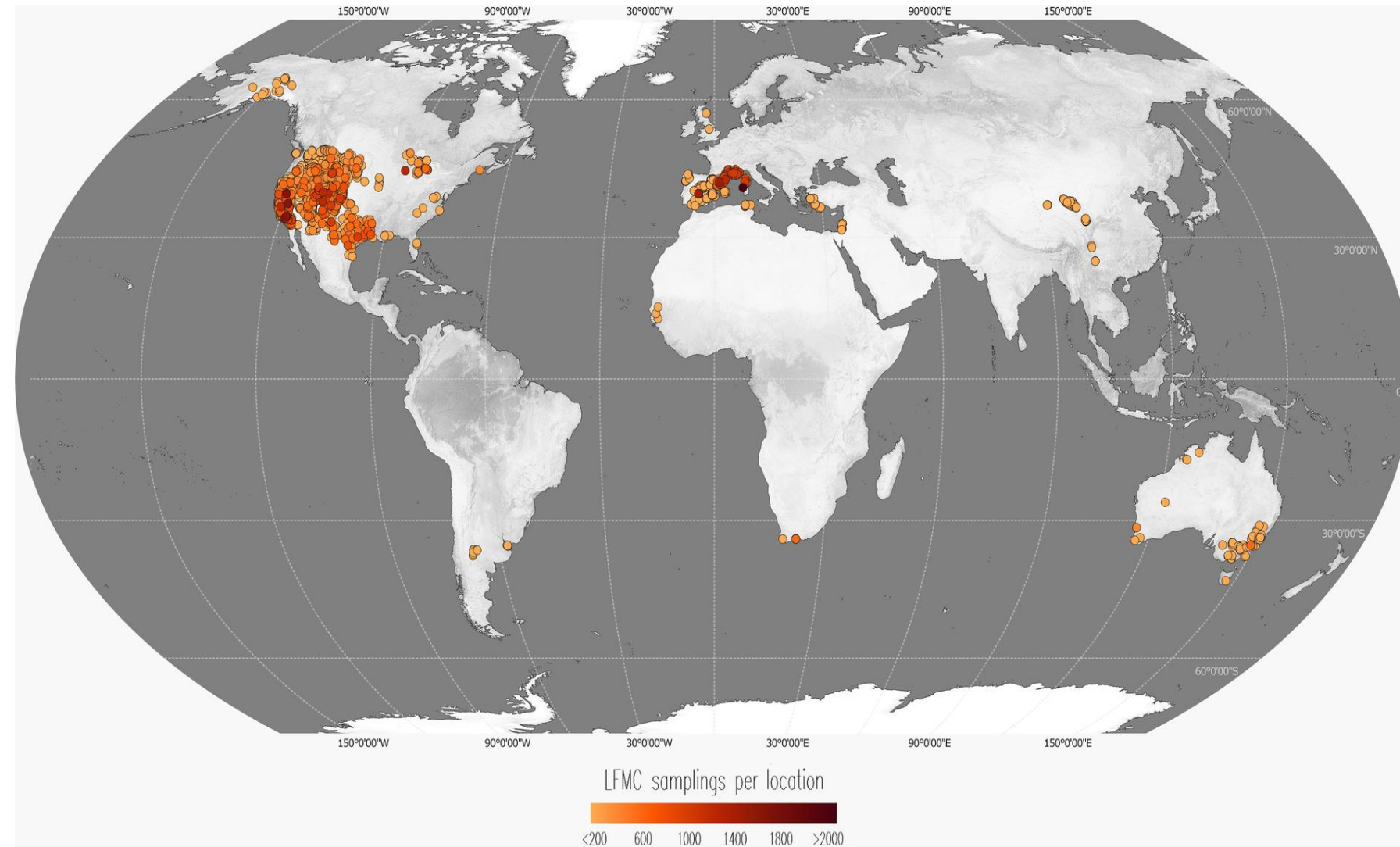
Existing EO FMC Products



Many methods exist → Not many operationalised → Not benchmarked

Product	Region	Sensors
Quan et al., 2021	Global	Optical
Forkel et al., 2023	Global	Optical + Pas. MW
Miller et al., 2023	CONUS	Optical
McCandless et al., 2020	CONUS	Optical
Rao et al., 2020	West US	Optical + Act. MW
Chaparro et al., 2024	West US	Optical + LIDAR + Pas. MW + Act. MW
Yebra et al., 2018	Australia	Optical
Cunill et al., 2021 Chaparro et al., Under Review	Mediterranean Basin	Optical

Uneven Field Data Foundation

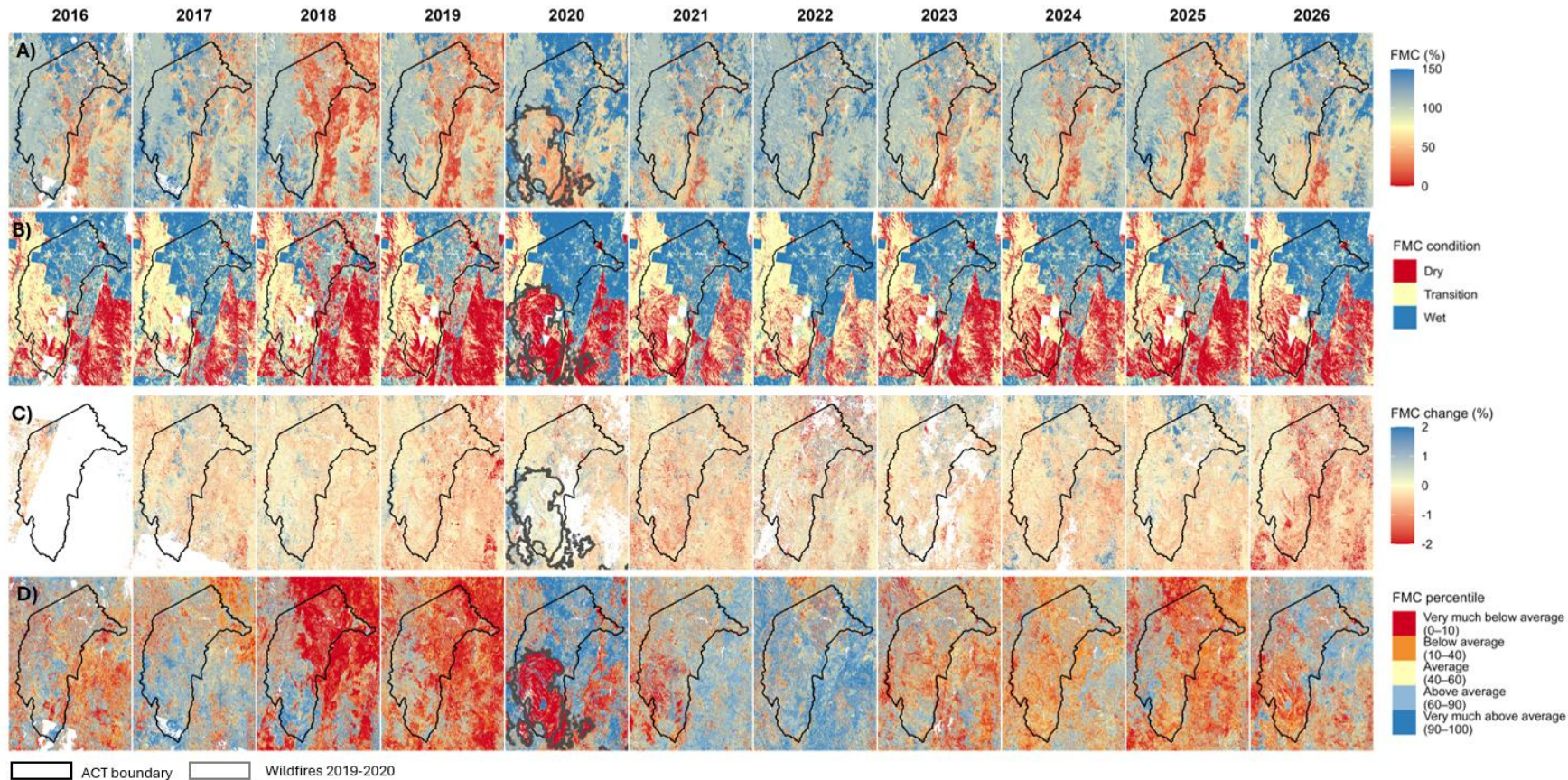


Globe-LFMC: Extensive but Regionally Concentrated
Yebra et al. 2024 – Scientific Data

Use case and End-User Applications: Monthly Outlook:



AUGUST CONDITIONS, 2016–2026



WHAT THE DATA SHOW

55%

average or above-average FMC
45% below or very much below average

Rapid drying

The July–August decline was faster than in most years since 2016.

Southern ACT

Drier than the north, with local areas anomalously dry for August.

2026 is generally not as dry as August 2018 or 2019.

MONITORING PRIORITY

Watch transition areas where rapid drying overlaps with anomalously dry conditions, particularly in southern ACT.

From fragmented capability to coordinated pre-fire monitoring

Building a global and operationally relevant understanding of fuel conditions from space

Today: fragmented capability

-  Many EO products and methods
-  Uneven validation data across regions
-  Limited operational uptake
-  Lack of global consistency

Valuable progress, but regionally concentrated and not yet comparable globally.

Through the Wildfire Preparedness Pilot (2026–2029)

-  Benchmark existing EO fuel-condition indicators
-  Improve field/validation protocols
-  Evaluate current and future EO capabilities
-  Demonstrate operational use and integration

International collaboration
for globally consistent and operationally relevant fuel-condition indicators

From data and research to global impact

Towards coordinated pre-fire monitoring



By the end of the Pilot

- Consistent benchmarking approaches
- Improved field/validation protocols
- Recommended EO fuel-condition indicators
- Regional operational demonstrations



For CEOS

- Clearer observation requirements
- Evidence for future missions
- Stronger link between preparedness and active-fire capabilities



Ultimate goal

A coordinated pathway for globally useful pre-fire fuel-condition monitoring, supporting anticipatory fire management and a more resilient world.

Thank you



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