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RIEL

Research Institute for the Environment and Livelihoods

Burnt Area Mapping for Strategic Fire Management

Utilizing fine-scale satellite data to support planning, prescription, suppression and evaluation.

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Earth observation satellites repeatedly measure the reflectance of the earths surface.

This data can be processed to reveal incremental changes in ground cover, for example burnt area.

Timely and accurate spatial representation of burnt area (at appropriate scales) forms the basis of tools that can greatly assist the fire management process.

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- *Moderate resolution* satellite derived burnt area mapping has been integral to the development of opportunities to advance northern fire management, and still is a necessary resource (i.e. for emissions accounting), however...
- the ongoing availability of *higher resolution* satellite data sources is helping management to be progressively strategic and effective.

Planning	Prescription	Suppression	Evaluation
• Habitat scale mapping	• Re-assess prescribed burn effectiveness	• Knowledge of fire breaks /hazards	• Detailed fire history
• Spatially explicit time-since-burnt maps	• Close gaps		

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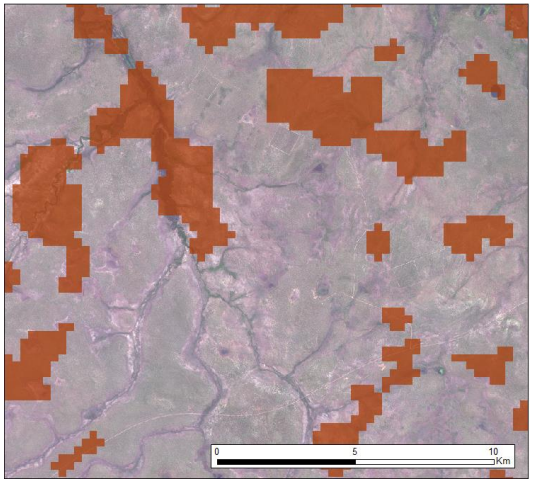
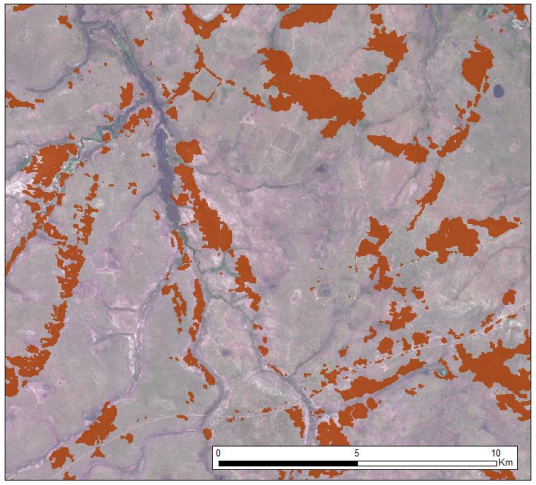
Differences in spatial resolution.

Moderate resolution



Local/habitat scale use ???

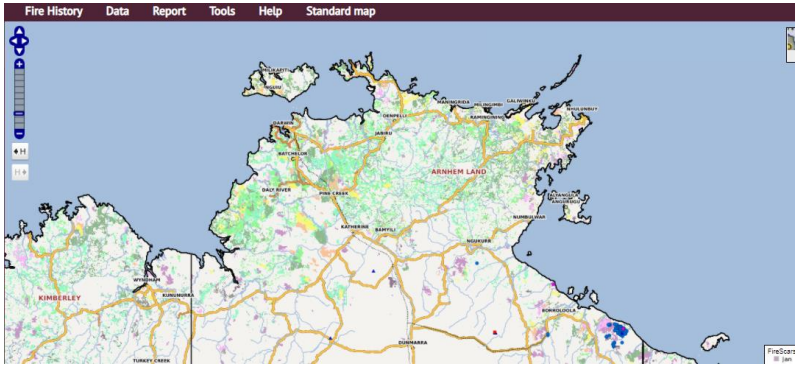
Good for global/continental scale use



Higher resolution

Appropriate for local/habitat scale use

Bad for global/continental scale use



... well, not 'bad' but difficult to do timely and accurately.
e.g. processing, editing KNP/Arnhem = 3-5 times NAFI extent.

note: there are automatic options but they questionable accuracy,
this is important i.e. could

- mislead planning, waste resources
- create hazard during fire suppression
- confound ecological modelling

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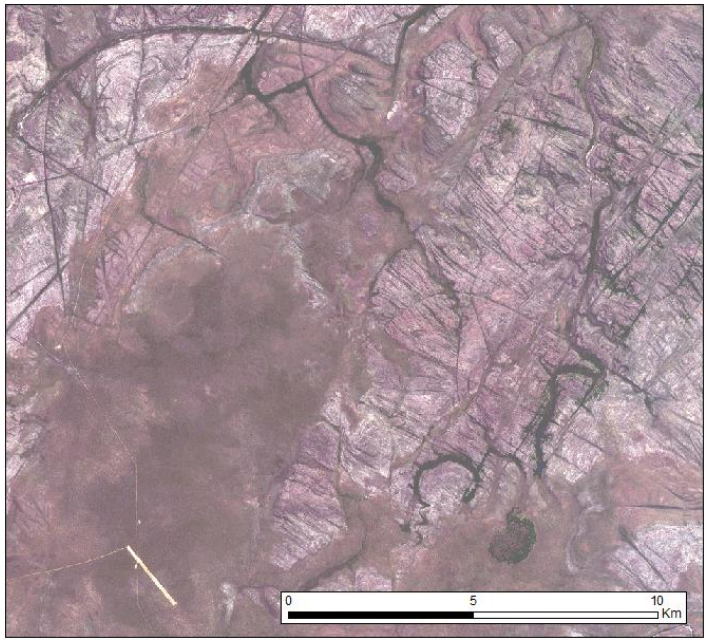
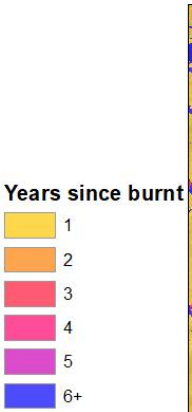
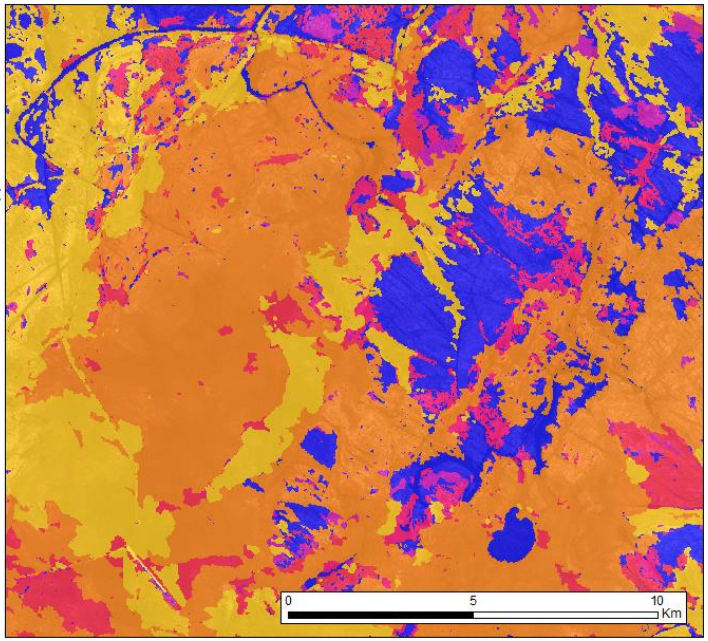
Planning

Direct strategic burning with regard to sensitive habitats, fuel load risk. (WALFA)







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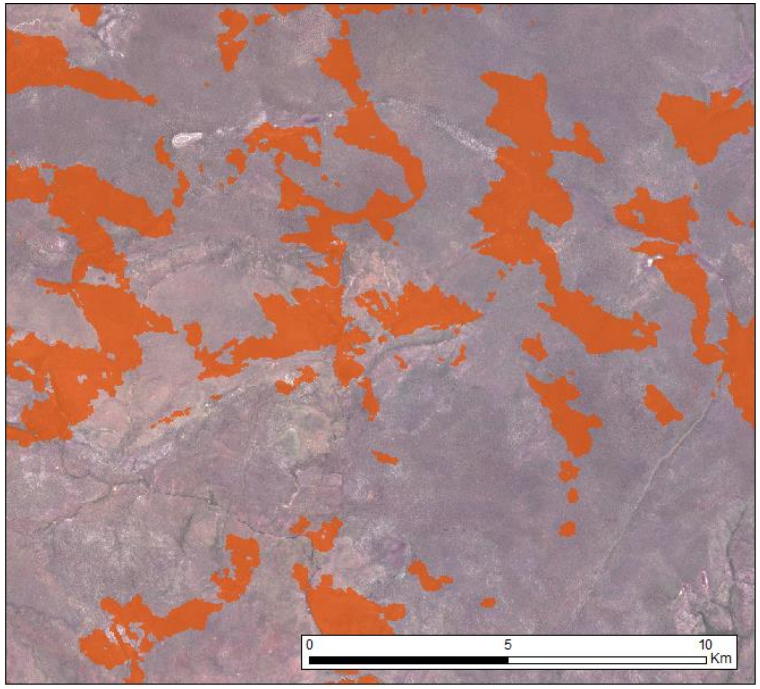
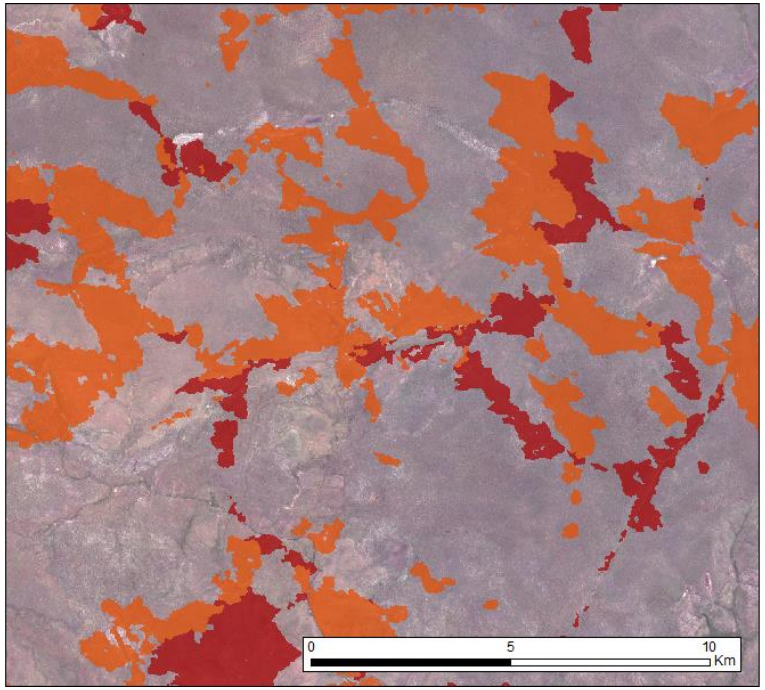
Prescription

Re-assess burns to close gaps in fire breaks. (Central Arnhem)





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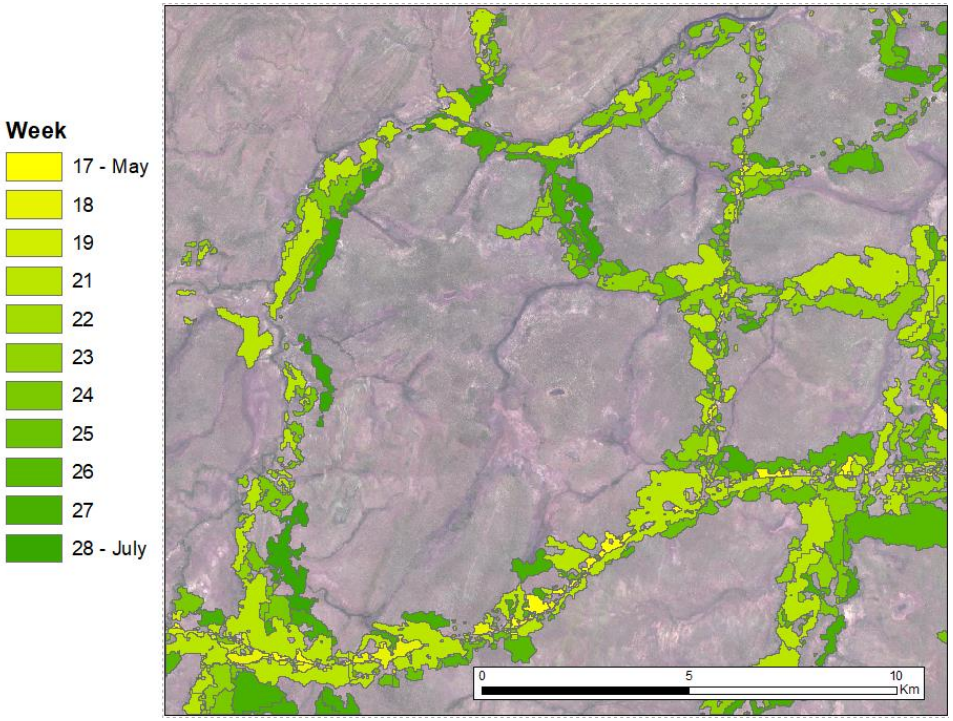
Prescription

Iteratively build up fire breaks with small low severity fires. (Kakadu)



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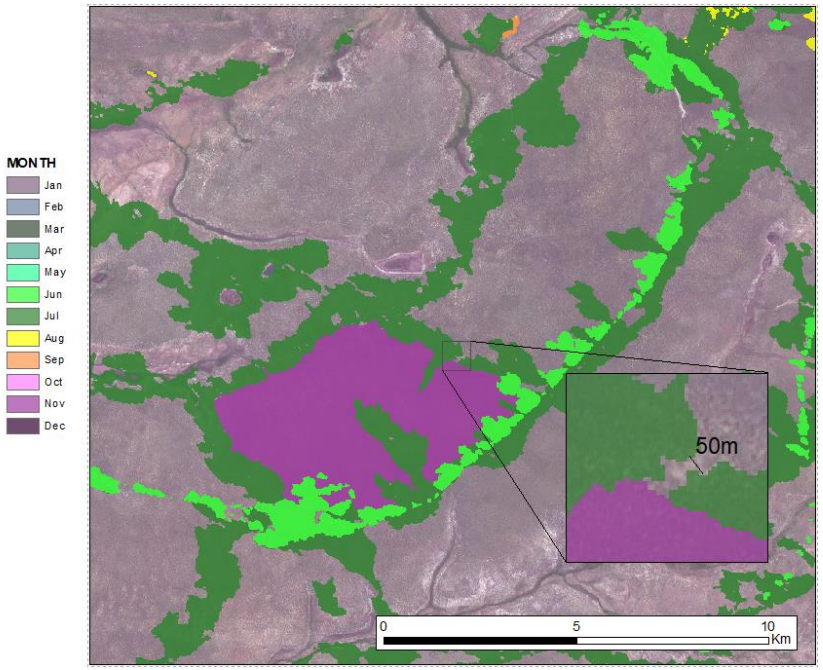
Suppression

Knowledge of burnt (or rather unburnt) areas saves resources. (Central Arnhem)



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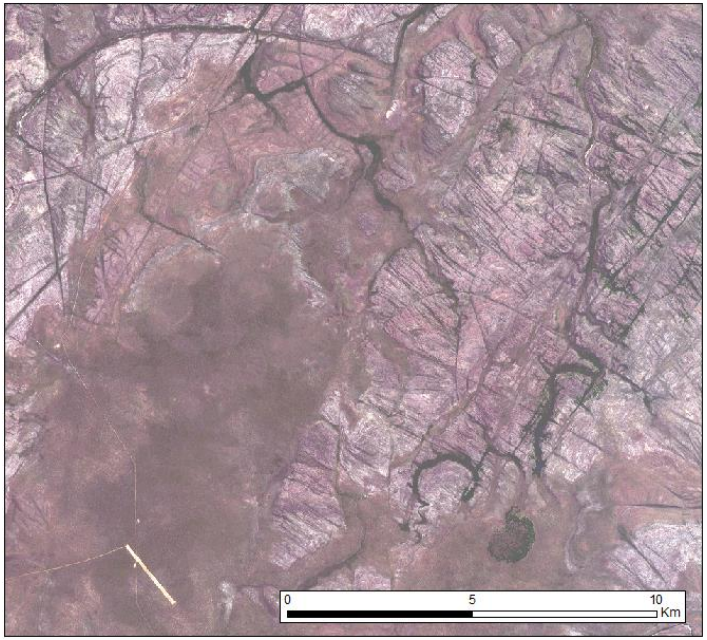
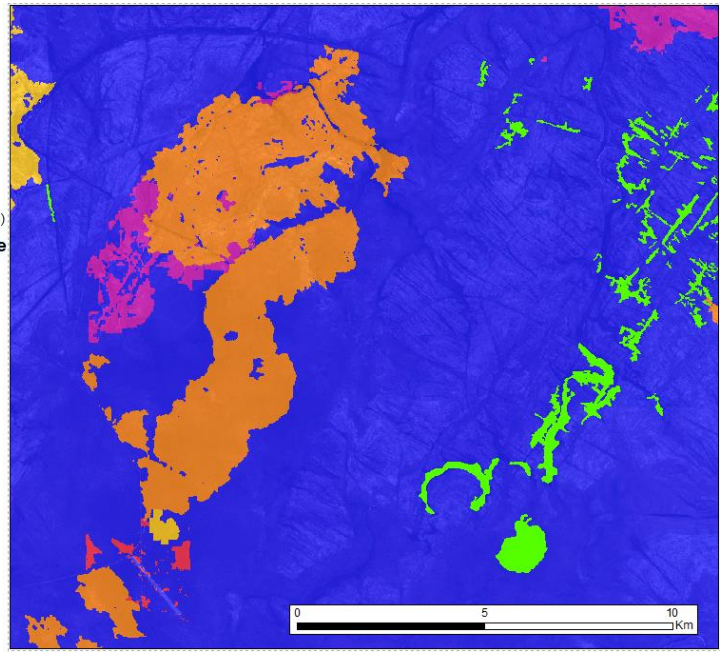
Evaluation

Fire mapping at sub-hectare scales combined with habitat mapping = appropriately scaled inputs for ecological modelling and assessment (WLML)





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Fire mapping.

Satellite data

- Overpass frequency
- Spatial resolution
- Availability

Products

- Burn indices
- Colour composites
- Burnt area classification

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Fire mapping.

- Overpass frequency
  - time for orbit to return to same place
  - faster orbit = higher overpass freq.
- Spatial resolution
  - size of sensor pixel
  - pixel must be large enough to detect enough energy per orbit speed
  - Generally, greater overpass frequency = lower spatial resolution, however
    - polar opposite orbits
    - swarms

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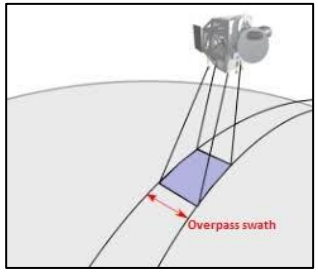

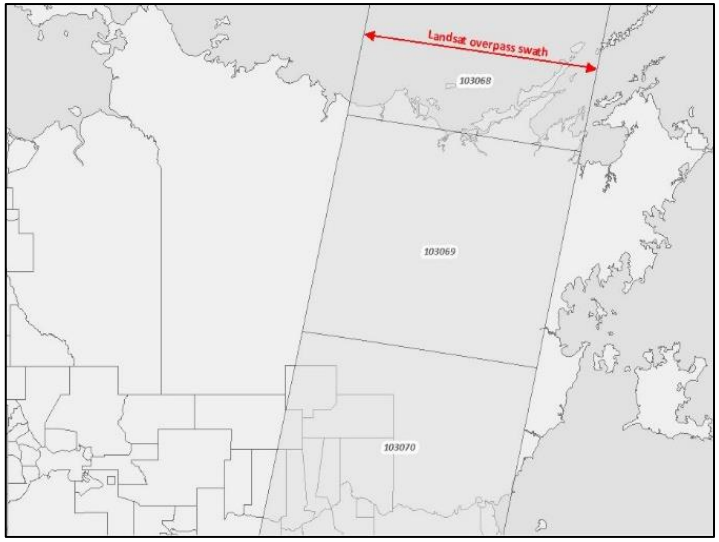

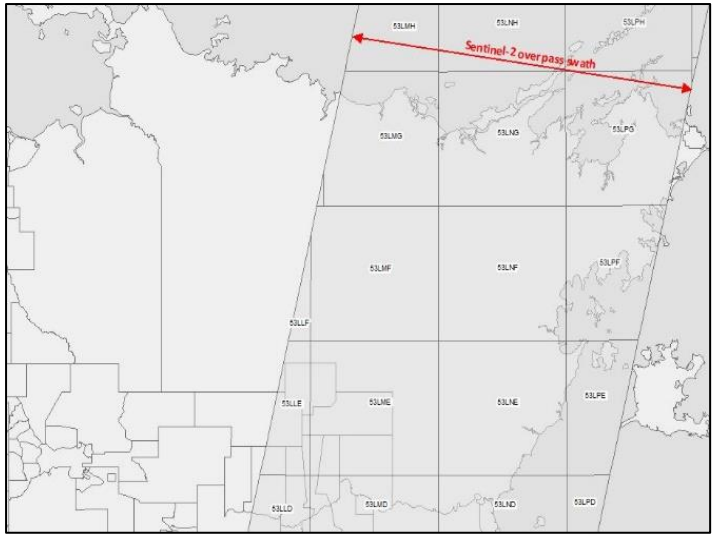

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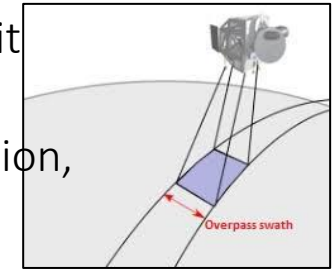
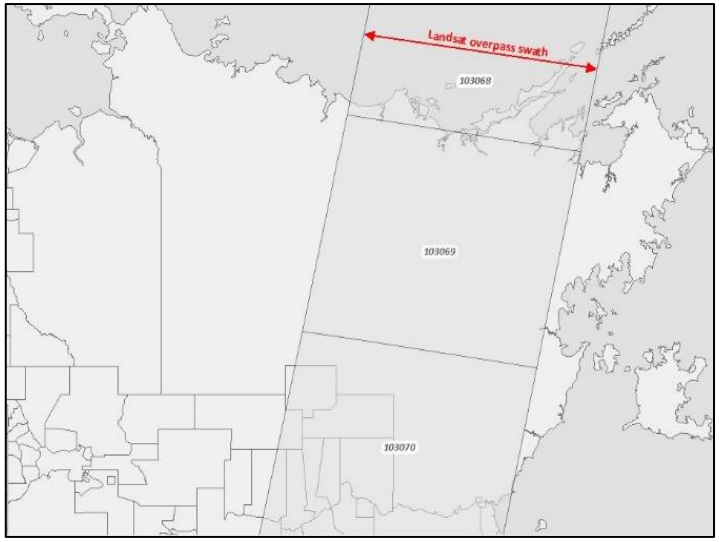
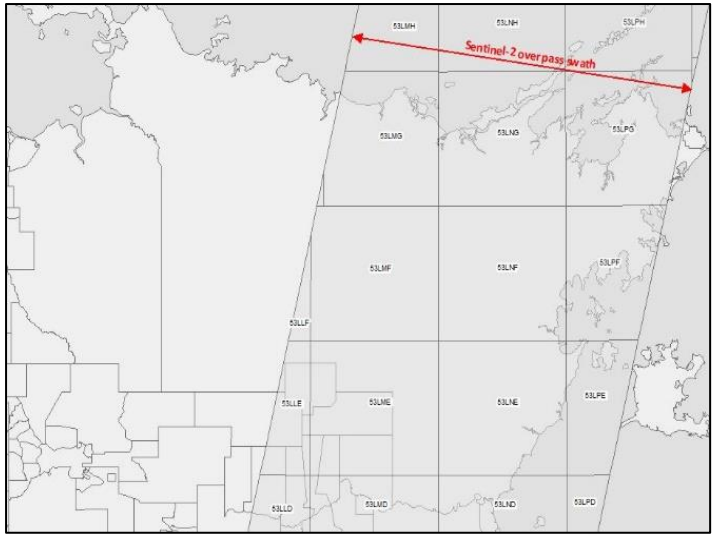




Landsat 8 = 16 days @ 30m



Sentinel 2 (x2) = 5 days @ 10m (SWIR 20m)

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Fire mapping.

- Availability
  - raw data direct from source
    - same/next day
    - manual download ind. tiles or automatic continually
  - 3rd party distributors (EO Browser, Amazon, Google)
    - easy access online portal
    - raw data or pre-processed into b&w indices or colour composites
    - merged into swaths
    - some days after overpass

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Fire mapping.

- Products
  - Indices
    - Algebraic combo of various bands
    - displayed as b&w continuous data
    - visualisation
  - Composite
    - true/false colour
    - visualisation
  - Classification
    - usually vector GIS layer /shapefile
    - analysis
    - build fire history

example burn index

example colour composite

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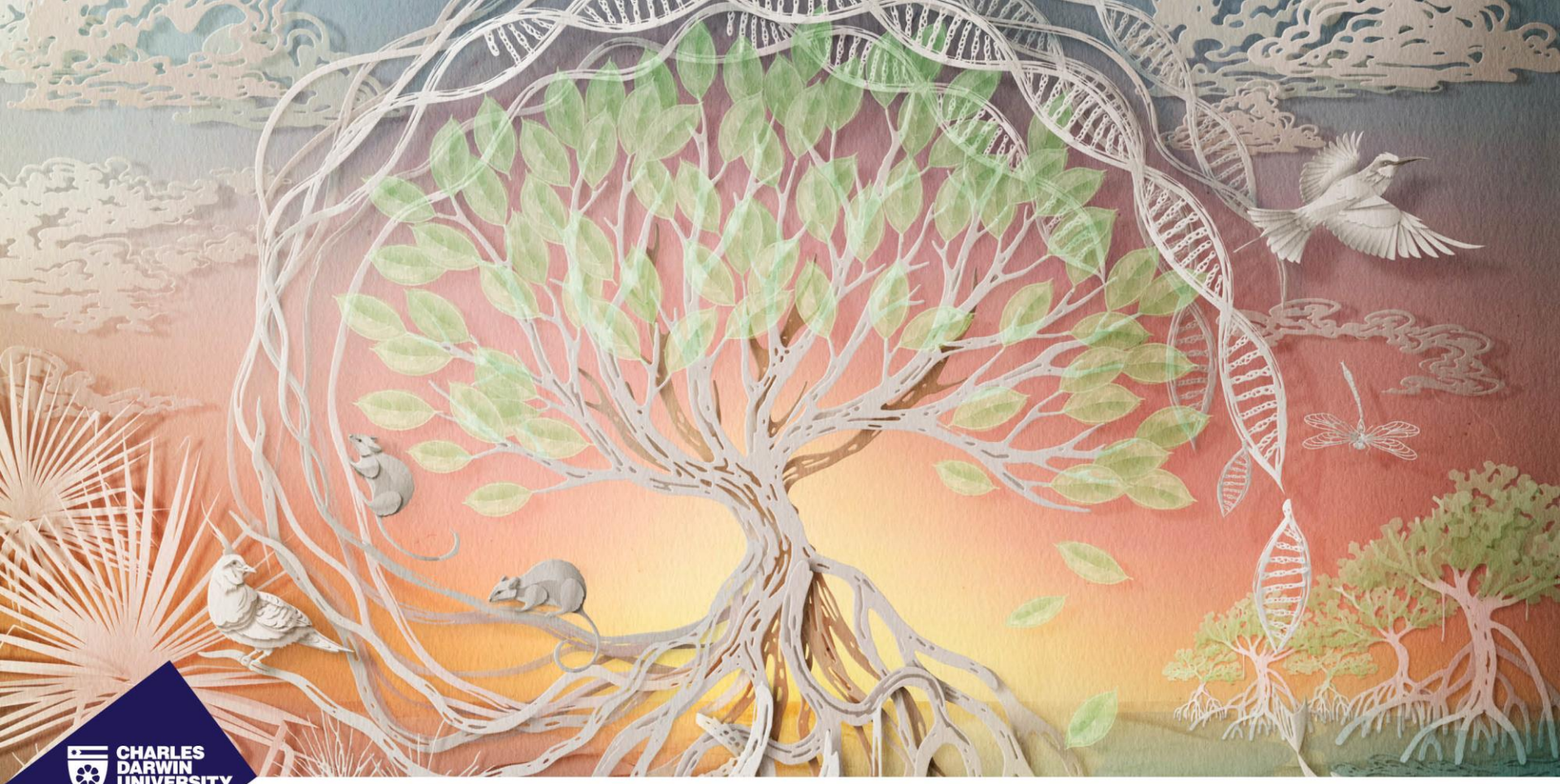

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Good Luck!

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