Validating Fire Radiative Power

FRM4Fire: Early recommendations for the characteristics and quality of airborne reference data used for satellite fire product evaluation

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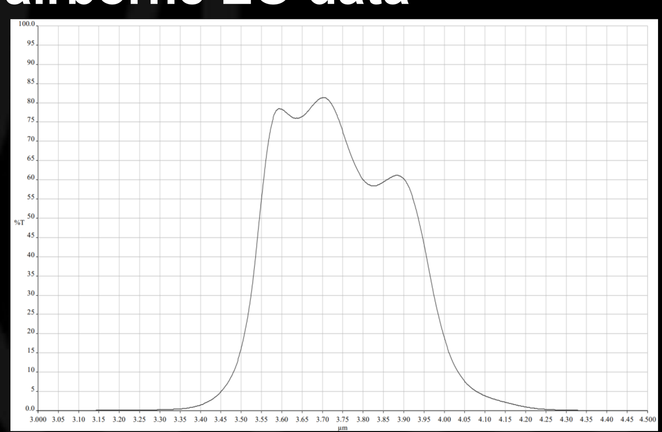
1. Airborne Platform

Enables large-scale data collection
Fixed-wing aircraft, such as the BAS De Havilland Twin Otter deployed in Canada (above), and rotorcraft, such as the Robinson R66 helicopter used in Kruger National Park, South Africa (left).

2. Instrumentation

Thermal sensor deployed should
- **match spectral channel of the satellite sensor being validated**
- **have sufficient dynamic range**

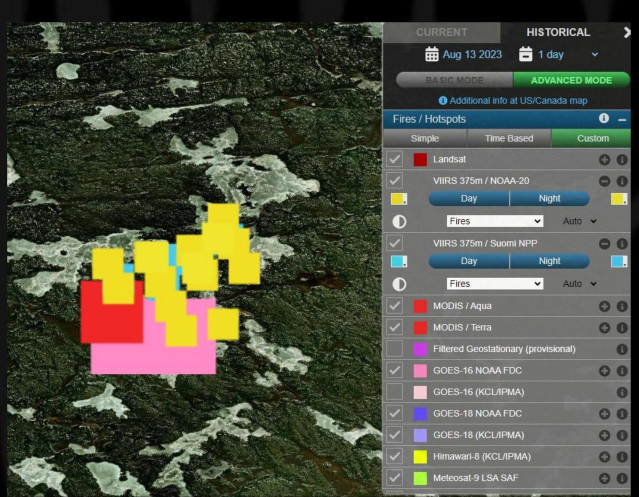
Navigation data required to georeference airborne EO data



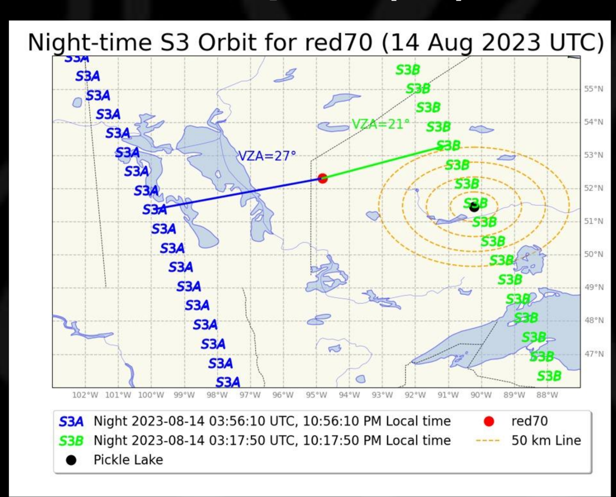
Spectral filter allows MIR thermal camera to replicate SLSTR S7/F1 channel (left); EO sensors installed on Twin Otter (right)

3. Planning Data Collection

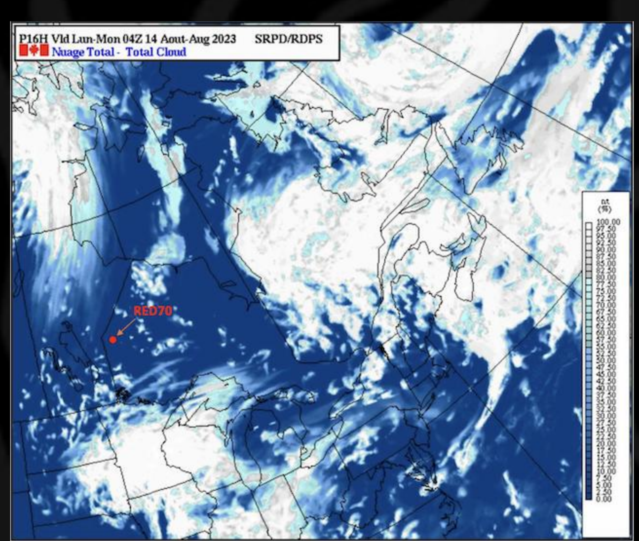
Identify suitable fire



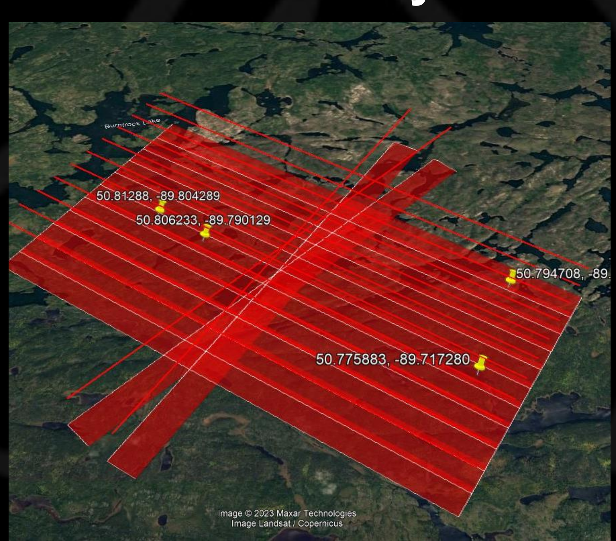
Determine satellite overpass(es)



Ensure cloud-free



Plan survey



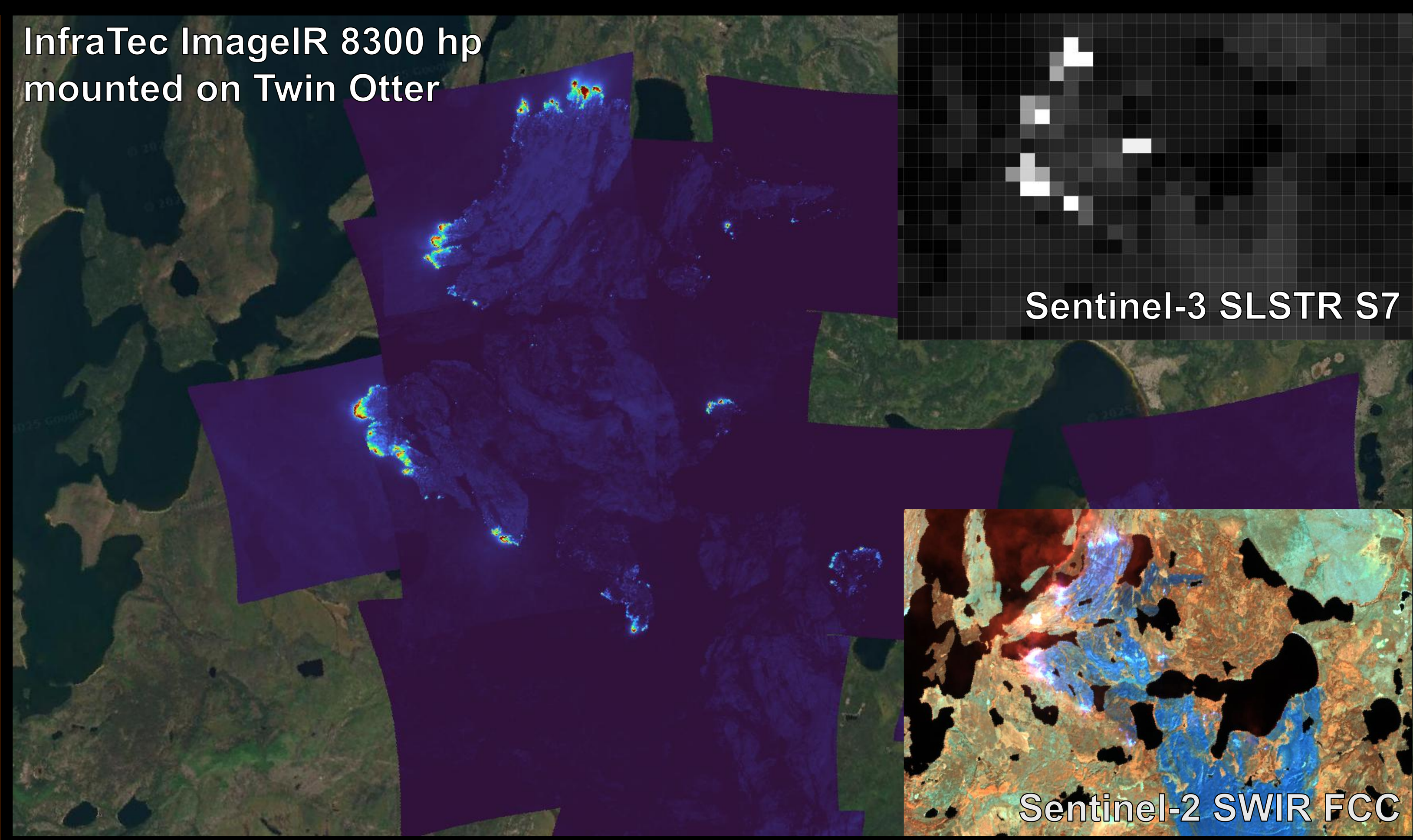
4. Fly over a fire

Collect near-simultaneous measurements with satellite

Wildfire surveyed during two Sentinel-3 nighttime overpasses in Ontario (above) and two Sentinel-3 daytime overpasses in Saskatchewan (right).

5. Airborne Data Processing

Georeference using navigation data and per pixel view vectors (from geometric calibration of optics)
Apply atmospheric correction

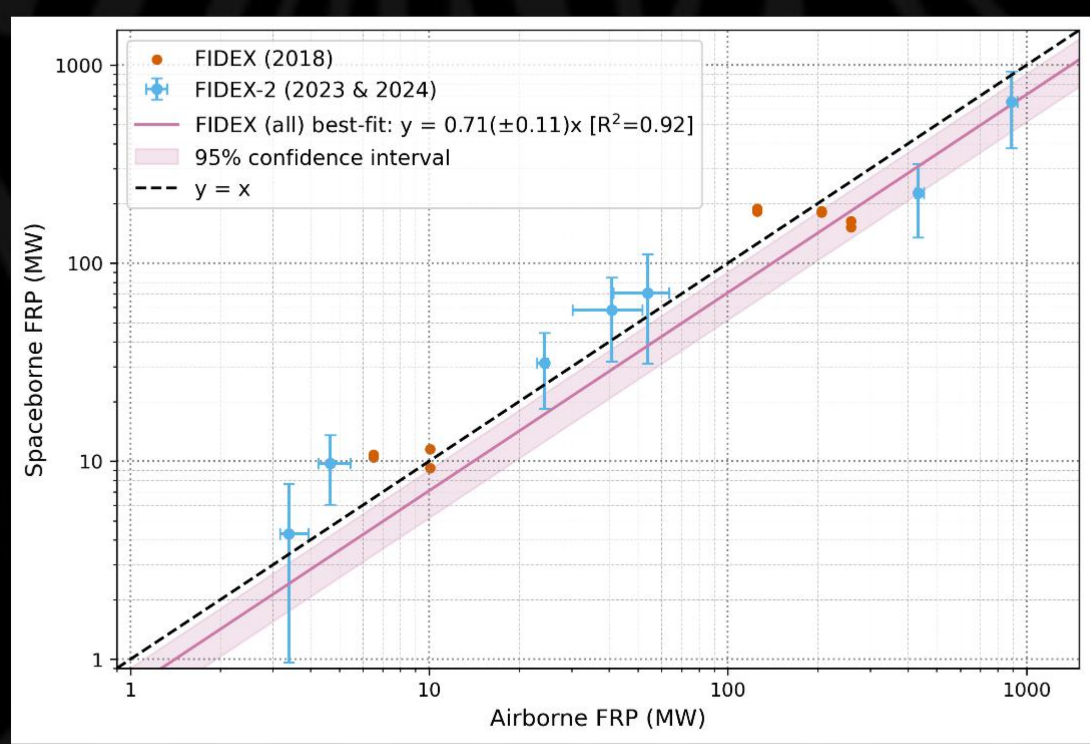


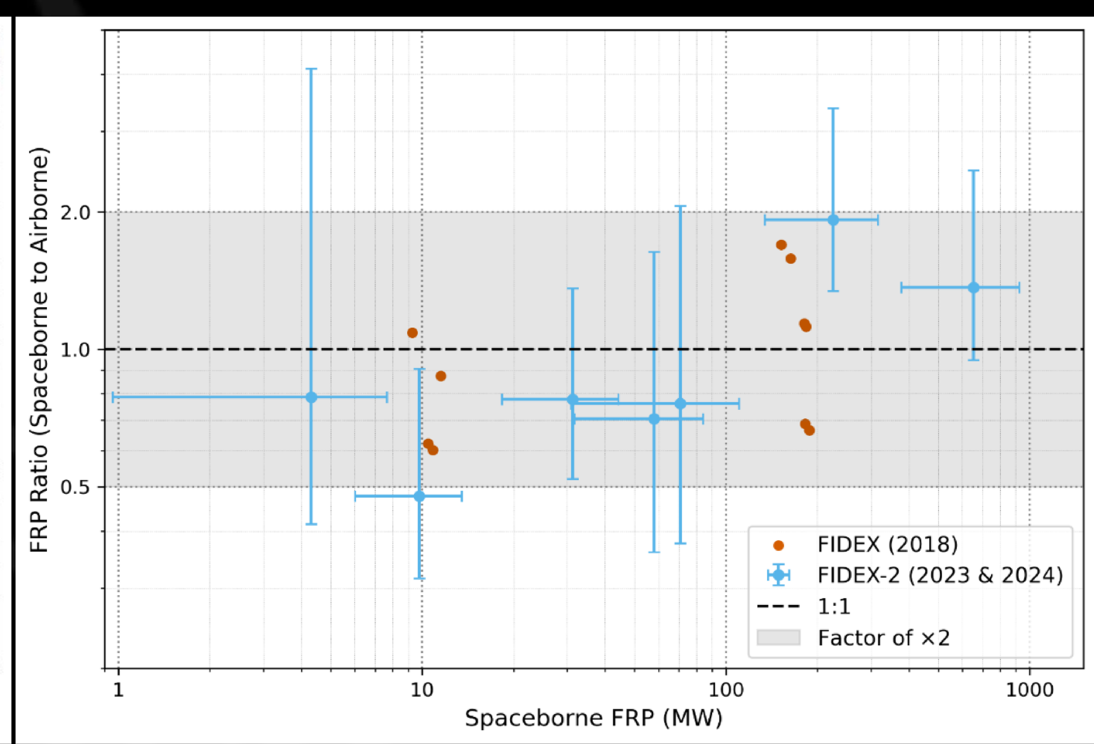
6. Comparison with Satellite FRP

Find out more about the FIDEX campaigns here

Total FRP should be measured for entire fire clusters, rather than per pixel, to reduce the impact of georeferencing inaccuracies in the satellite data.

As part of the FIDEX project, 19 fires were measured during S3 overpasses.
A strong linear correlation was observed between airborne and satellite-derived FRP. Most data points fall within expected uncertainty, though the airborne-derived FRP tended to be larger than the satellite-derived for more intense fires (>150 MW). This suggests future efforts should prioritise larger fires and, therefore, consider higher-altitude flights.





fiducial reference measurements for fire

Find out more about FRM4Fire here