



WildFireSat

La mission GardeFeu



Overview

WildFireSat: The world's first purpose-built operational satellite system for monitoring wildfires

An initiative of Natural Resources Canada (NRCan), the Canadian Space Agency (CSA) and Environment and Climate Change Canada (ECCC)

WildFireSat will support those responsible for:

- wildfire management
- smoke and air quality forecasting
- wildfire carbon emissions reporting

WildFireSat is targeted to be used operationally in 2029.

Wildfires in Canada and around the world are getting worse, partly due to the influences of climate change and climate variability.

Canada is a world leader in wildfire management and research. Innovative Canadian technology is now available to build a space solution that will provide wildfire managers with the tools they need.



Technical

Satellite observation

Recent Canadian technological innovations make it possible to build a space solution for fire management in Canada. The infrared sensor, based on microbolometer technology, does not need to be cooled (unlike previous larger and more resource-hungry sensors). The CSA, NRCan's Canadian Forest Service (CFS) and Canadian industry have been working together for over 10 years to develop the microbolometer infrared technologies needed to deliver a wildfire monitoring satellite mission.

- WildFireSat will be a satellite system, providing daily monitoring of Canada, with <30 min. data latency to end users

Spacecraft:

- one or more microsattellites, < 150kg (TBD)

Orbit:

- Sun-synchronous low Earth orbit

Fire Management Integration: WildFireSat is unique in that, through engagement with the provincial and territorial fire management agencies, we will tailor a complete information system for the needs of fire management across the country.

WildFireSat will provide unprecedented, daily, near real-time strategic intelligence on all active wildfires, at a scale and scope previously not possible, when agencies need to make critical decisions on strategic preparedness and priorities. Air quality, smoke, and carbon emissions from wildfires will also be better forecasted and monitored in near real time.

- WildFireSat is the only public satellite monitoring system ever created to respond directly to the needs of, and in conjunction with, front line fire managers in Canada.
- This work will include initiatives to increase capacity within provincial and territorial fire management agencies to integrate, understand and better use WildFireSat products in real world decision-making.

Products: WildFireSat data products are organized under three tiers: 1) satellite-level fire products, 2) fire behaviour through data synthesis with other satellites and 3) inputs to existing fire modelling and decision support tools.

Specific operational products may include:

- Precision maps of wildfire size, shape and location, with actively burning areas identified
- The direction of travel and speed of various sections of the fires
- Estimates of fire intensity, and the likelihood that various firefighting methods will succeed (e.g., ground crews, air attacks)
- The estimated arrival time of the fire at adjacent communities, industrial installations, infrastructure and sites of cultural value
- The rate of smoke production, its composition, how high it is travelling into the atmosphere, and where and when it will impact air quality on the ground



Strategic alignment

WildFireSat aligns broadly with several national initiatives, including:

- Canadian Wildland Fire Management Strategy. A 10-year review and renewed call to action
- Blueprint for Wildland Fire Science in Canada (2019–2029)
- Emergency Management Strategy for Canada: Toward a Resilient 2030
- Canada’s Strategy for Earth Observation
- Canada’s domestic commitments under the United Nations Sendai Framework on Disaster Risk Reduction

Strategic alignment



Mission manager: Dr. Denis Dufour is the mission manager of the WildFireSat mission with the CSA. Denis is formerly a member of the Institut national d’optique (INO).

Principal investigator: Dr. Josh Johnston is the principal investigator of the WildFireSat mission. Josh is a forest fire research scientist with NRCan’s CFS and was formerly a wildland firefighter.

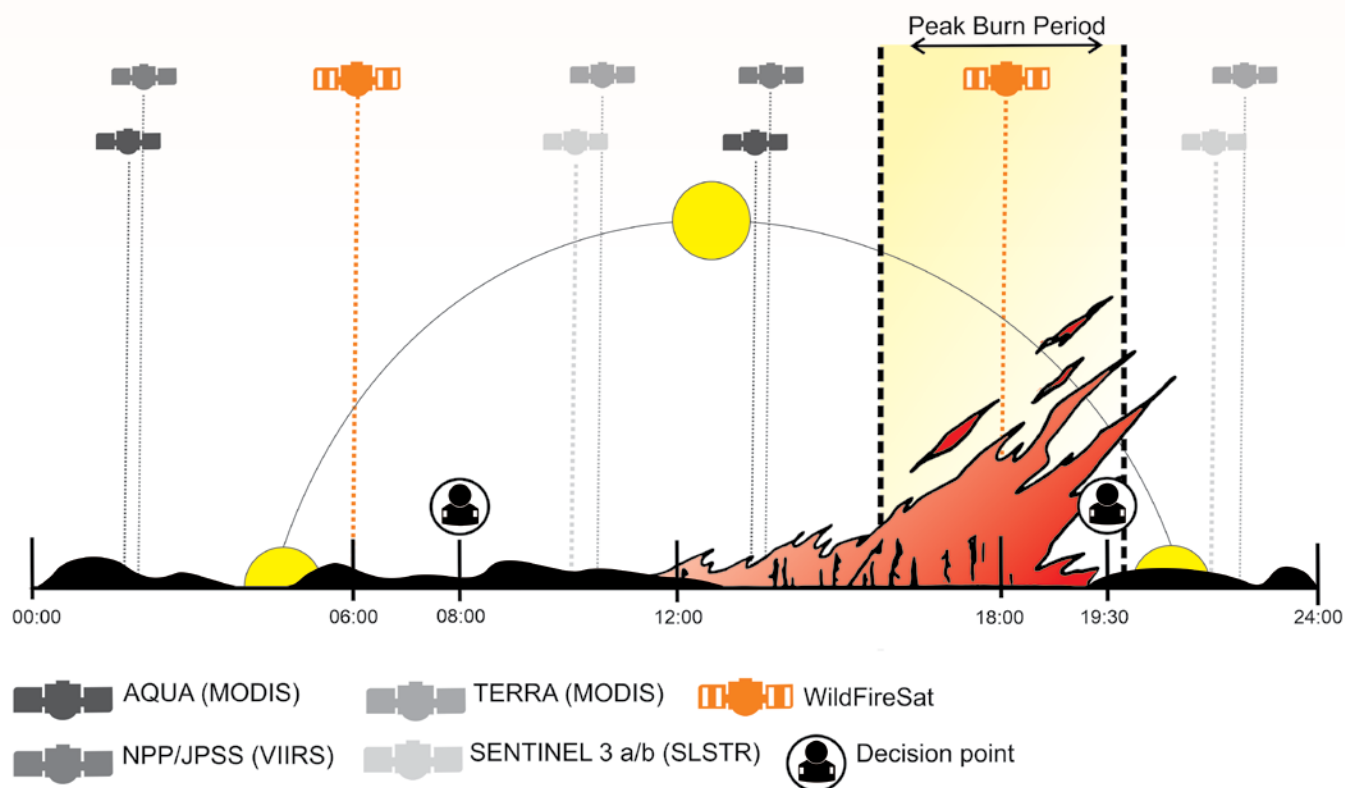
CSA: The CSA leads the space and ground segments of the mission, including the design, build, testing, launch, commissioning and operations of the satellite.

NRCan (CFS and CCMEO): The CFS provides expertise on remote sensing of wildfires and defines the overall mission requirements to support fire management. The CFS will ensure the final data products are produced, stored and delivered to the appropriate end users. The Canadian Centre for Mapping and Earth Observation (CCMEO) will support data archiving and the management and dissemination of some products.

ECCC: ECCC provides direction, development and integration of WildFireSat data into existing and future smoke and air quality forecasting algorithms.

Canadian industrial collaborators: These collaborators design and manufacture the space segment of the mission in conjunction with the government partners.

Team roles



This figure illustrates the active-fire satellite overpass times and diurnal wildfire activity. WildFireSat will address a gap in available observations during the peak burn and support critical decision points for fire managers.

Source: Johnston, J.M., Jackson, N., McFayden, C., Ngo Phong, L., Lawrence, B., Davignon, D., Wooster, M.J., van Mierlo, H., Thompson, D.K., Cantin, A.S. and Johnston, D., 2020. Development of the user requirements for the Canadian WildFireSat Satellite Mission. *Sensors*, 20(18), p.5081.

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