

Thank you for your valuable comments.

Major comments:

1. Agreed. In the revised manuscript we will expand the introduction to place Canadian boreal fires in global context to clarify the significance of its study and relevance of our dataset.

The 2023 wildfire season was unlike anything Canada had seen in recent decades. About 15 million hectares burned, equivalent to roughly 4% of Canada's forest area and more than seven times the average of the previous four decades. The fires occurred under the warmest and driest conditions recorded for Canadian forests since at least 1980. Between May and September alone, they released an estimated 647 TgC of carbon, compared with 29–121 TgC per year during 2010–2022. That amount was more than four times Canada's annual fossil-fuel emissions (149 TgC) and comparable to India's annual total (Byrne et al., Carbon emissions from the 2023 Canadian wildfires, *Nature*, 2024, doi:10.1038/s41586-024-07878-z).

The impact extended far beyond Canada. Smoke from the fires travelled across North America and reached Europe, and exposure to wildfire-related PM_{2.5} has been associated with an estimated 5,400 acute deaths in North America and about 64,300 chronic deaths across North America and Europe (Zhang et al., Long-range PM_{2.5} pollution and health impacts from the 2023 Canadian wildfires, *Nature*, 2025, doi:10.1038/s41586-025-09482-1).

Despite the scale of these events, most machine-learning-ready wildfire datasets are built around US fires. For example, Next Day Wildfire Spread (Huot et al., 2022) covers the United States at 1 km resolution, while WildfireSpreadTS is also US based. Canada's counterpart, the Canadian Fire Spread Dataset (version 1.1, July 2025), focuses on fires of 500 ha and above. 66.8% of WSDS-CAN events fall below that threshold. Therefore, the problem is not that Canada lacks wildfire events. Rather, it lacks the training data particularly for the small-fire regime.

2. in the second version, the dataset is expanded to 2001 – 2025. MCD12Q1 landcover is released with a lag, so the most recent fire season (2025) has all other covariates but no landcover data from the same year. We retained these events in the dataset and flag the missing landcover. We do not use the previous year's land cover as a substitute because it could misrepresent the actual conditions in the years of interest.

3. we will apply the suggested structure to the revised manuscript.

4. the complete pipeline will be released on Zenodo under the existing DOI as a versioned deposit. It will include the acquisition scripts for all data sources, the event-table builder, the covariate generator and the QC suite.

On transferability: the framework has two main components – Canada specific and portable.

Portable components include event-table construction from any burned area polygon dataset, adaptive tiling, hotspot-derived day-of-burning, the ERA5-Land meteorological pipeline, and FWI calculation. These components can be applied anywhere that fire perimeter data and ERA5 data are available.

Canadian specific components are the utilization of NBAC and NFDB as sources of data, and any use of the Canadian FBP fuel type classification which has no direct global equivalent.

Minor comments

1. in the revised manuscript this issue will be clarified. Landcover will appear once under fuel.
2. in the revised manuscript we will consider this adjustment.
3. this duration limit was set initially to handle model complexity for prediction tasks which was not a solid justification. It is now removed in the second version. We apply 1 ha minimum size and no duration limit. Six events exceed 365 days because detections resumed in the following season, which is the signature of an overwintering fire; these are retained and flagged.
4. by aggregating features at the provincial and territorial levels we meant integrating data per province/territory and it did not reduce the spatial resolution of the data. In fact, tiles are adapted to each fire event. Each tile is 128×128 pixels covering a square that is 1.3 times the fire perimeter extent, with a minimum size of 4 km. This gives a median spatial resolution of about 31 m per pixel. The agency is included only as a metadata field in the dataset.
5. we meant the features (slope and aspect) that could be derived from DEM. This term will be dropped in the revised manuscript to avoid confusions.
6. agreed. We will replace proxy term with “fuel amount” in the revised manuscript.
7. Each meteorological variable is now justified by its role in fire behaviour and, where applicable, its status as a defined FWI input (please check our response to referee 1, General comment 5).
8. in the revised manuscript Table 2 will gain a categorical grouping column and the fire variables.
9. The ignition points are drawn from the National Fire Database (NFDB) point records. In the revised manuscript we will introduce it at first mention alongside the perimeter sources. Each point is matched to its perimeter spatially. For 13,783 events the record falls inside the perimeter and is used directly. For a further 4,710 the nearest record of the same year lies within 2 km, and we snap it to the perimeter. Where no point record exists, we take the first hotspot detection instead, which covers 902 events, and for the remaining 73 we fall back to a representative point inside the perimeter. Every event carries the source of its ignition point and a confidence level, so a user can see how each one was obtained and filter on it. Our reply to Referee 1, Specific comment 2 gives the full account of how the ignition points were matched, the defects we found in the first version, and the confidence tiers.
10. in the revised manuscript this figure will be updated to reflect the new changes in v2 and the suggestions will be applied either in the figure or in the caption.
- 11 – 13: will be corrected in the revised manuscript.