

More fire weather data for the Global Wildfire Fire Information System

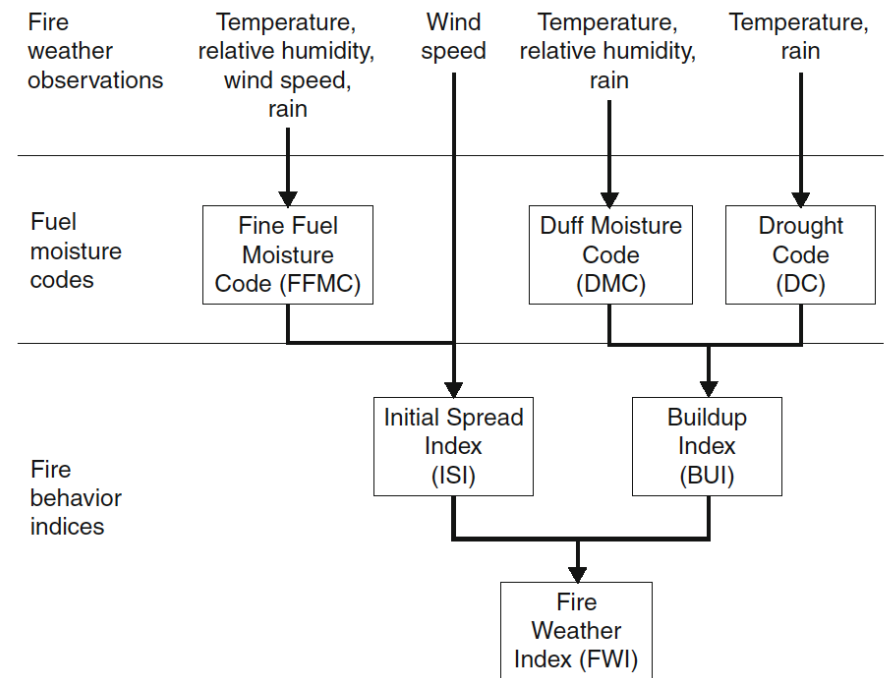
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The Fire Weather Index (FWI) System

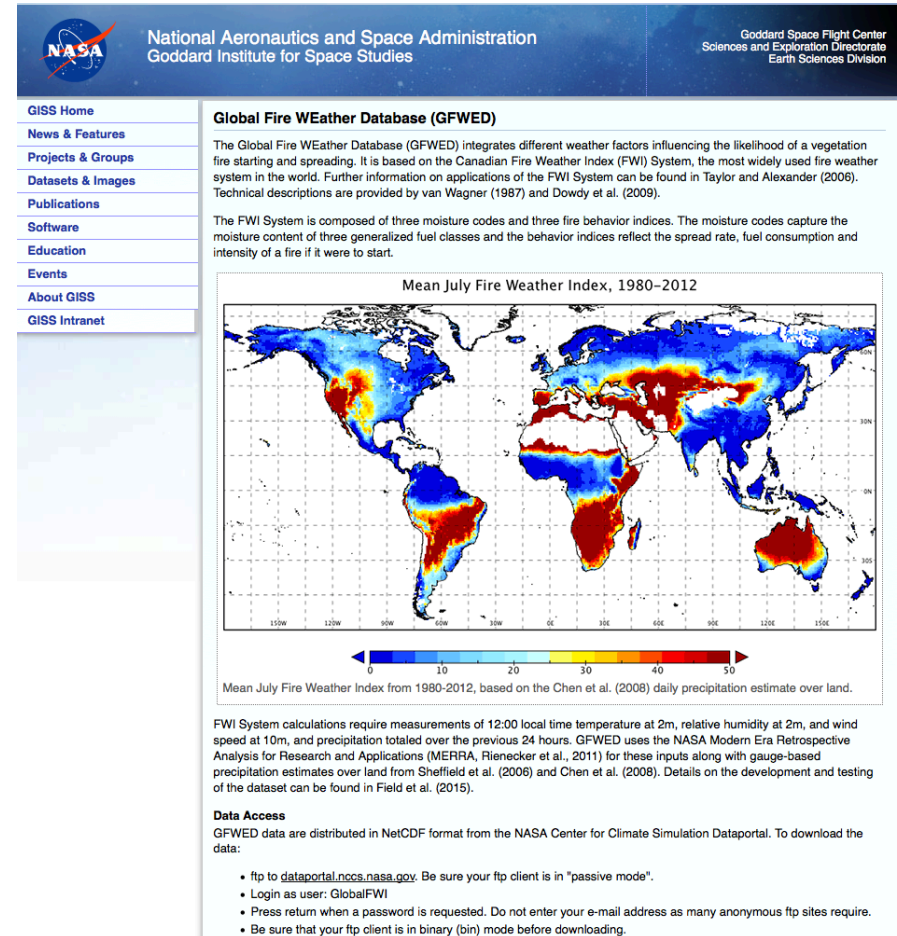
- 3 fuel moisture codes, 3 fire behavior indices.
- Minimal daily input data requirements.
- Developed in Canada, now the most widely used fire danger rating system internationally.
- Adopted for local application through lab, field and historical analyses + expert judgement.



The Global Fire Weather Database (GFWED)

Intended:

- For understanding meteorological drivers of fire activity anywhere in the world down to a daily temporal scale.
- As a baseline for operational FWI use in new regions.
- For analysis of large-scale controls of fire weather.

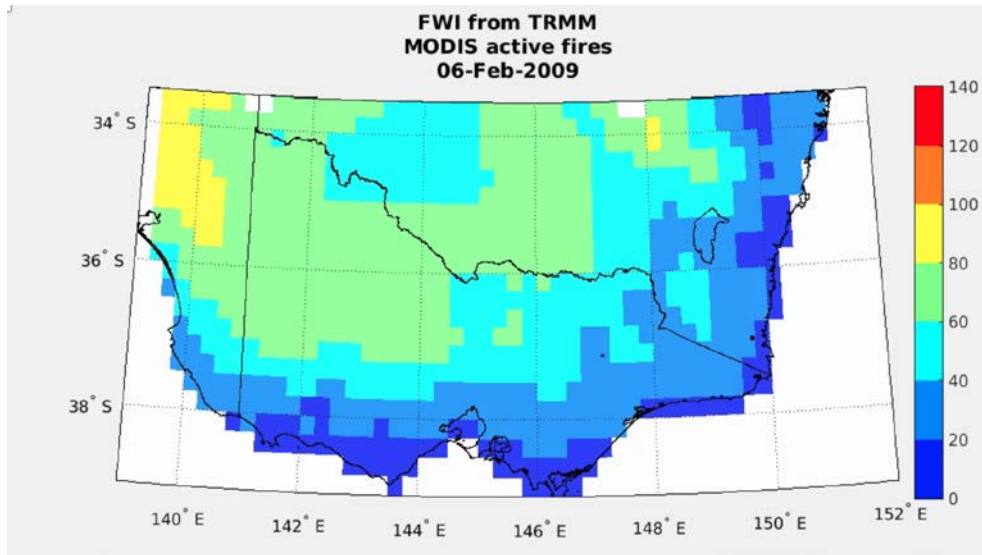


<http://data.giss.nasa.gov/impacts/gfwed>

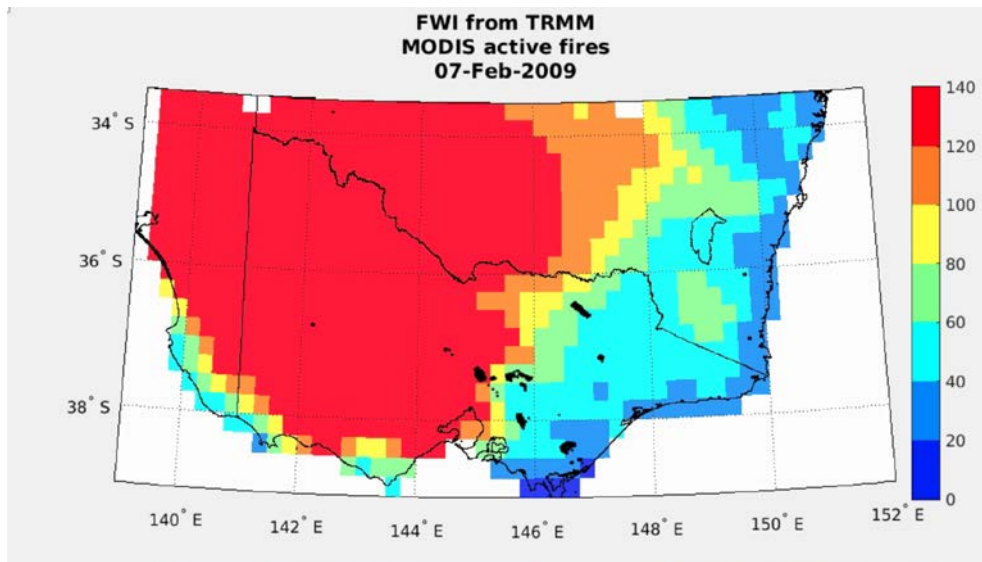
Different versions, each using different precipitation

<u>Input</u>	<u>Data source</u>	<u>Period</u>	<u>Latency</u>	<u>Coverage</u>	<u>Nominal Resolution</u>
T, RH, wind	MERRA2	1981-Present	~ 2 mo.	Global	0.5° x 2/3°
	GEOS-5 (NRT)	2014-Present	18 hrs.	Global	0.25° x 1/3°
Precipitation	1. MERRA2 raw precipitation	1981-Present	~ 2 mo.	Global	0.5° x 2/3°
	2. MERRA2 bias-corrected precipitation	1981-Present	~ 2 mo.	Global	0.5° x 2/3°
	3. Sheffield / Princeton precipitation	1981-2010	4+years	Global	0.5° x 0.5°
	4. NCEP CPC gauge-based precipitation	1981-Present	1 day	Global	0.5° x 0.5°
	5. GPCP 1-degree-daily v1.2	1997-Present	6+ mo.	Global	1.0° x 1.0°
	6. TRMM 3B42	1998-2014	N/A	50°S - 50°N	0.25° x 0.25°
	7. GPM IMERG v04 - Final	20140401-Present	5 + mo.	60°S - 60°N	0.1° x 0.1°
	8. GPM IMERG v04 - Late	20150401-Present	1 day	60°S - 60°N	0.1° x 0.1°

Example: Black Saturday 2009



FWI on Feb 6 reflects dry conditions

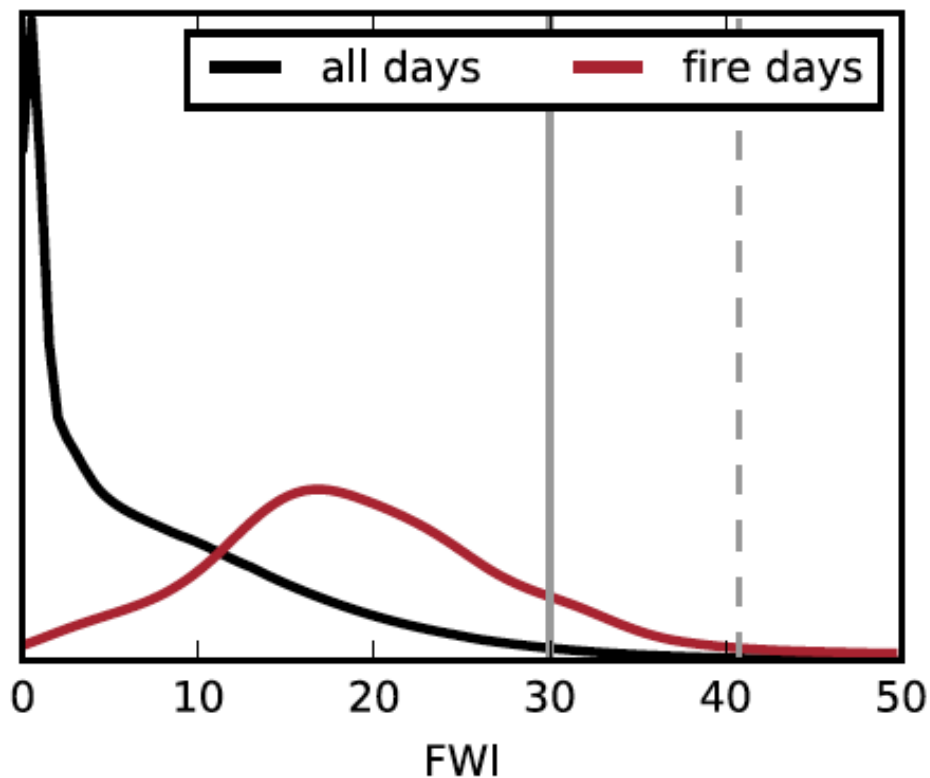
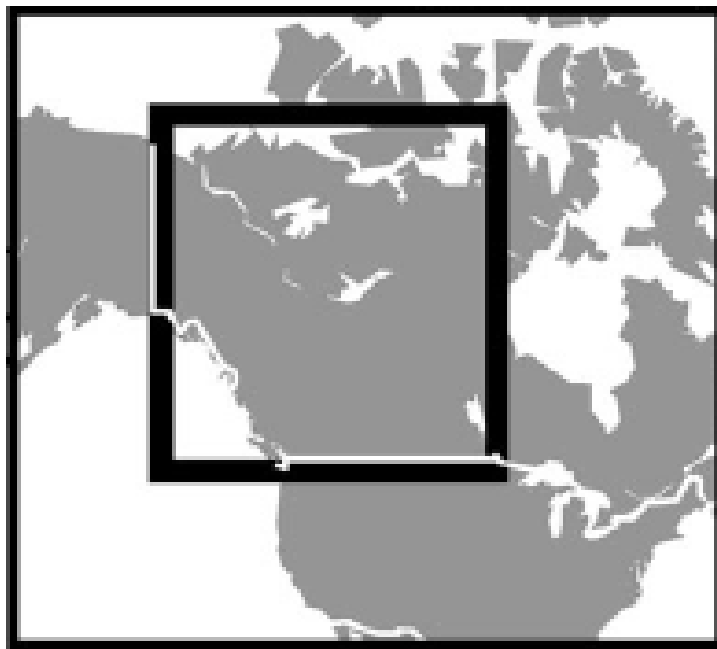


FWI on Feb 7 reflects dry conditions + high surface winds

Example: FWI-fire baselines for future fire projections over western Canada

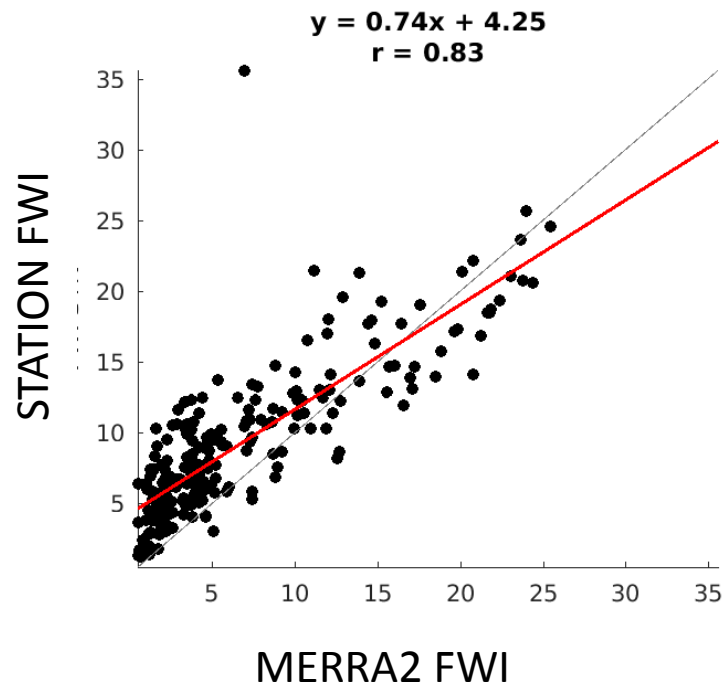
(Kirchmeier-Young et al., 2017, *Clim. Change*)

FWI distribution for all days vs. days with fire

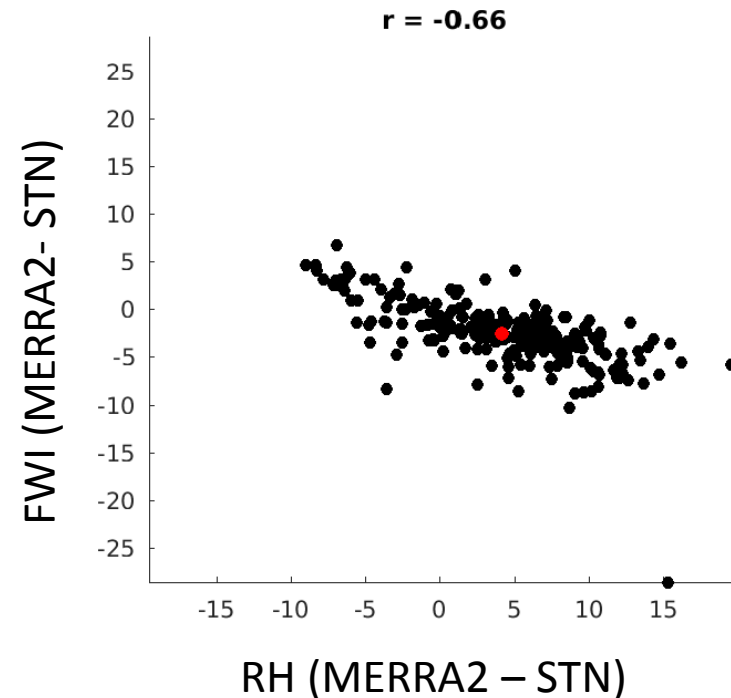


GFWED comparison with station data over Boreal North America, 2003-2015

MERRA2 has a low FWI bias compared to 182 weather stations.



This is most closely associated with a high surface RH bias.



Latest advance

The Global Precipitation Mission satellite was launched in 2014.

Data from DPR and GMI are combined with other microwave data to produce the Integrated Multi-satellite Retrievals for GPM (IMERG) product.

GFWED now includes versions using level-3 'IMERG' data.

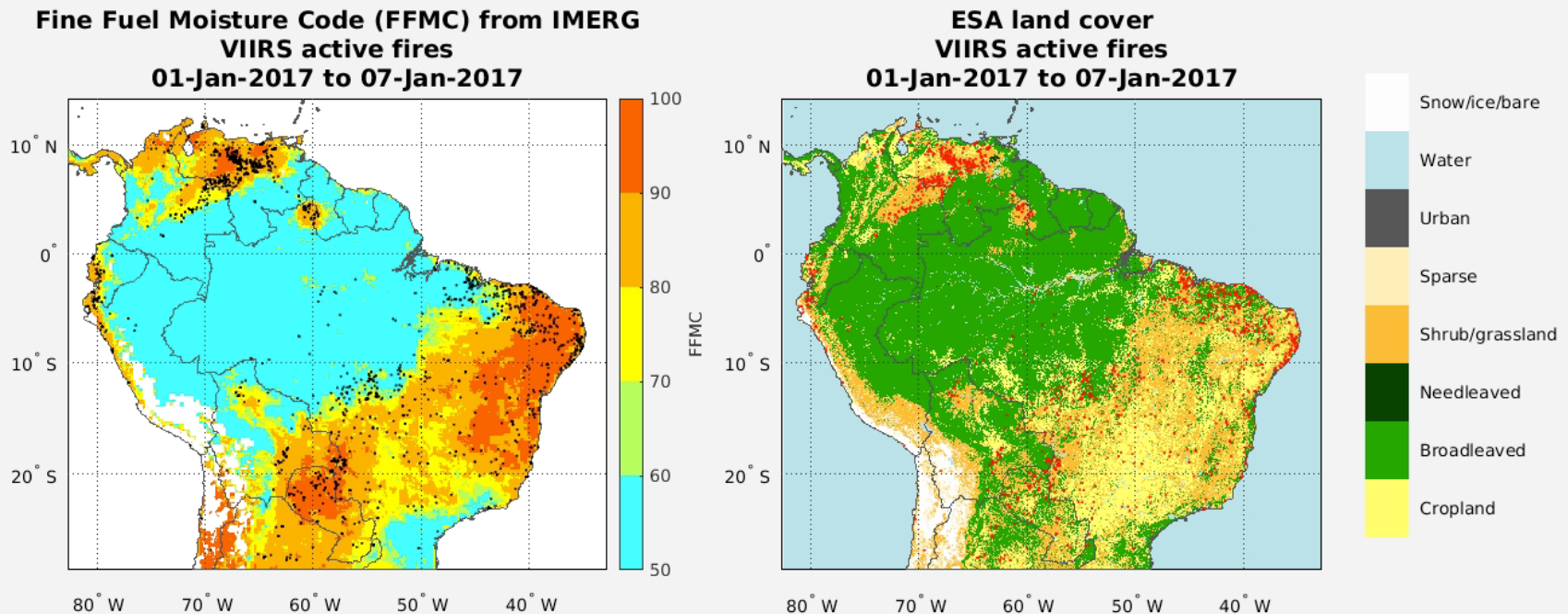


IMERG example: 2017 fire season in South America

Combined effects of weather and people

The Fine Fuel Moisture Code tracks the moisture content of fine fuels where fires can easily start.

Fire activity is associated with human activity, particularly in areas of expanded/intensified land use.



Contributions to GWIS

- Integration of selected GFWED fields into GWIS alongside existing FWI products (e.g. ECMWF)
- Development of long-term GFWED climatologies for multiple versions.
- Development of 10-day FWI forecasts based on NASA GEOS-5 forecasts.

Future development

- More fire weather indices (NFDERS, MacArthur, VPD, Haines)
- Diurnal fire weather
- Improved shutdown/startup procedures in cold regions

Further thoughts for GWIS

- Central fire weather data archive with open access
- FDIP: Fire Danger Intercomparison Project
- Inventory of fire danger interpretive guides from around the world
- On-line GWIS training and pilot workshops
- 0th-order incorporation of fuels?



Introduction to the Canadian Forest Fire Weather Index System

