

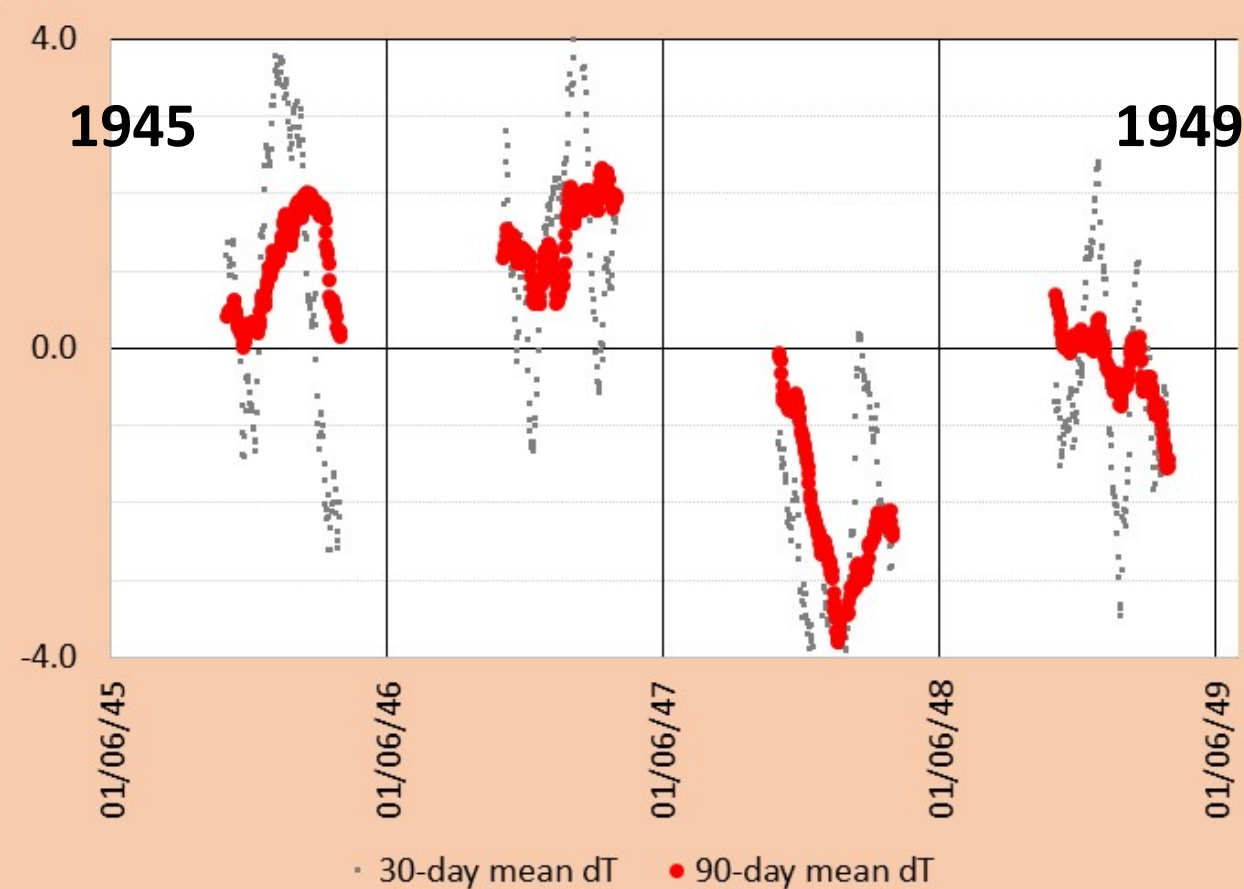
An aerial photograph showing a dry, winding riverbed cutting through a dense green forest. The riverbed is light brown and sandy, with some small pools of water remaining. The surrounding forest is thick and green, with some cleared areas visible in the distance.

EXPERIENCES WITH THE GLOBAL IMPACTS OF CLIMATE CHANGE

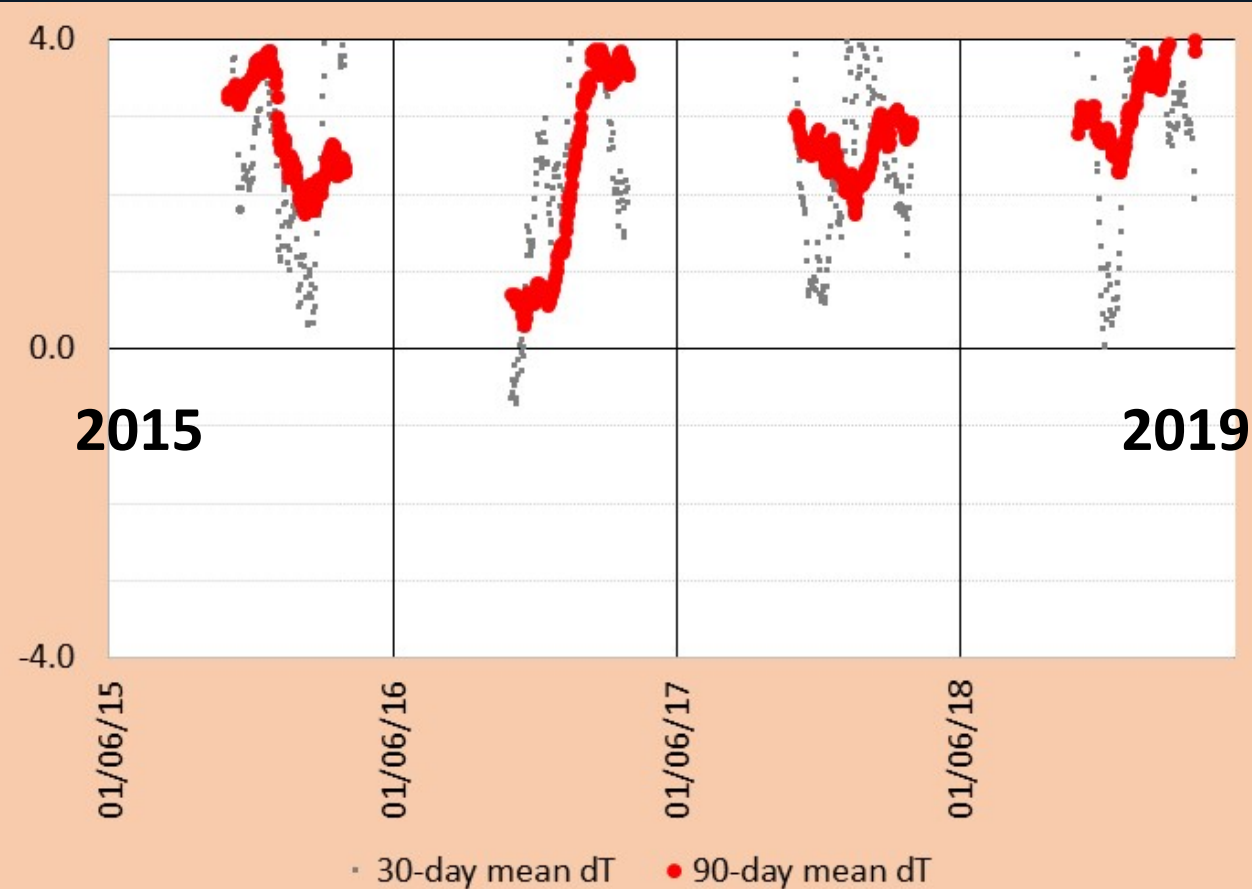
**Rick McRae,
ACT Emergency Services Agency:
Risk Analyst,
Fire Behaviour Analyst,
Research Scientist.**



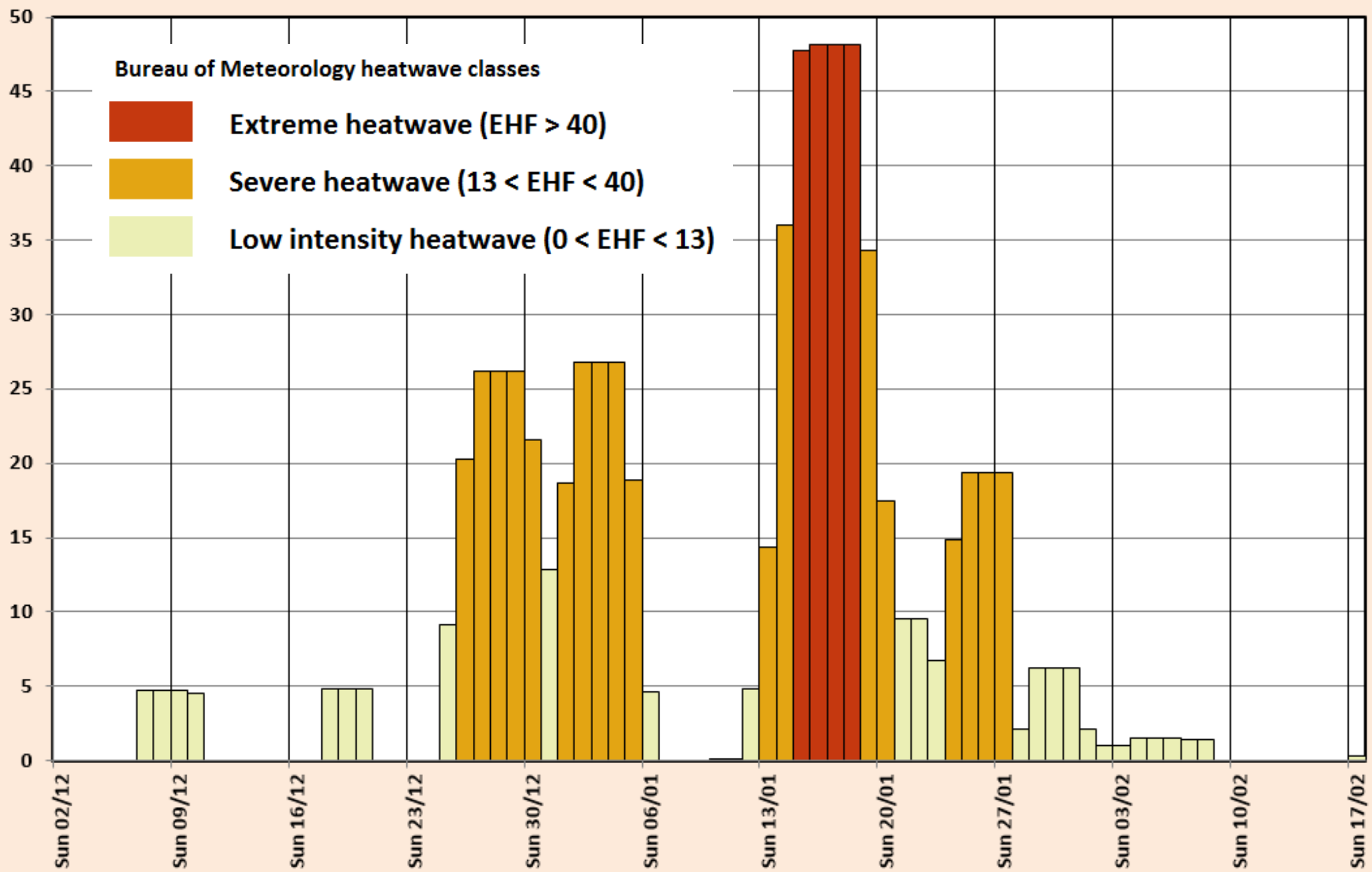
Blow-up event underway, Elephant Hill Fire, BC, 2nd September 2017. [Photo: McRae].



The past: temperature anomaly fluctuations vary around a mean of zero degrees.
Data for July 1945 to June 1949.

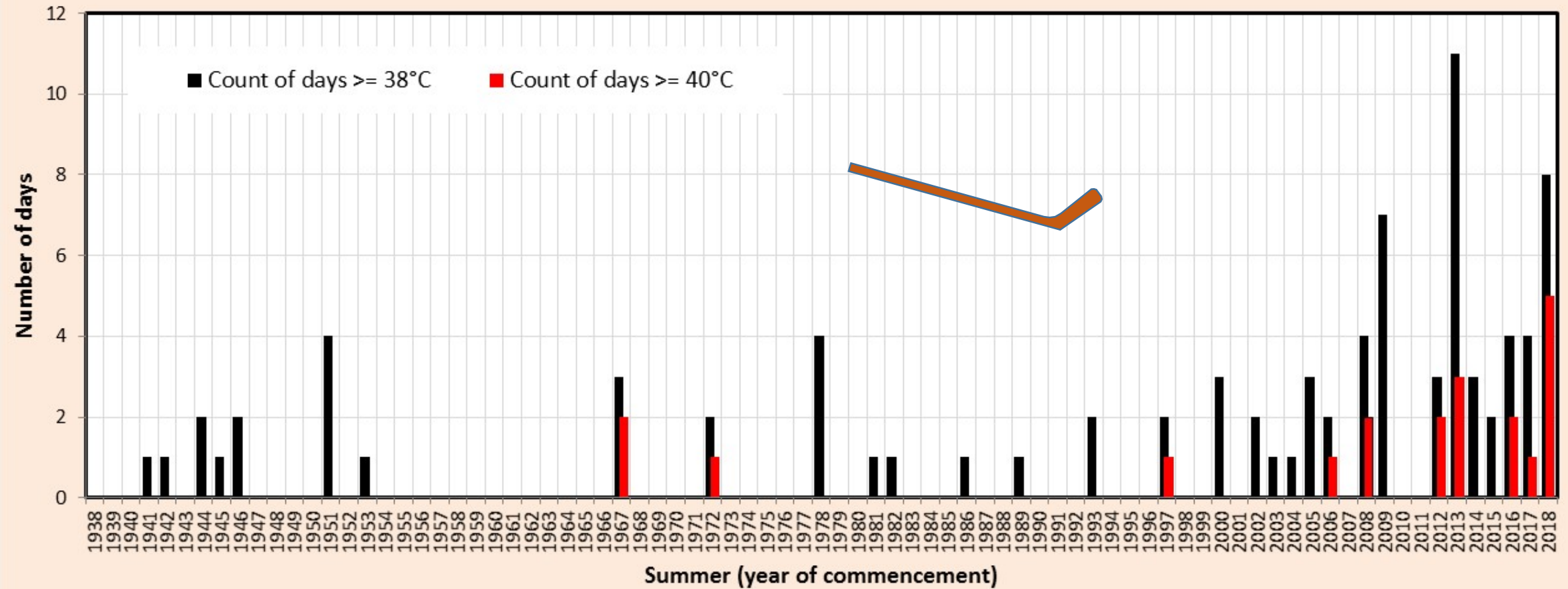


Modern reality: temperature anomaly fluctuations vary around a higher, and rising mean.
(Maxima: 30d to 7.4°C, 90d to 4.5°C)
Data for July 2015 to June 2019.

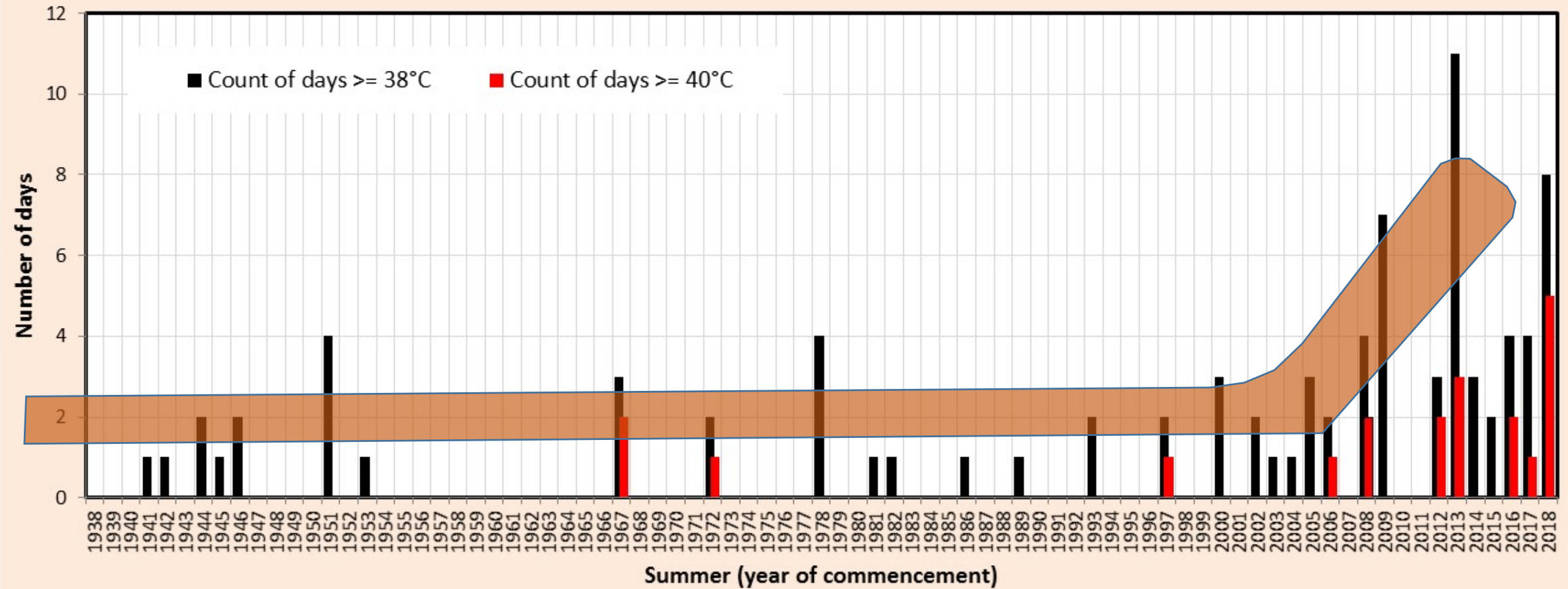


Canberra EHF plot. Summer: 54 days over 0 in 3.5 months. [Data: BoM, Plot: McRae]

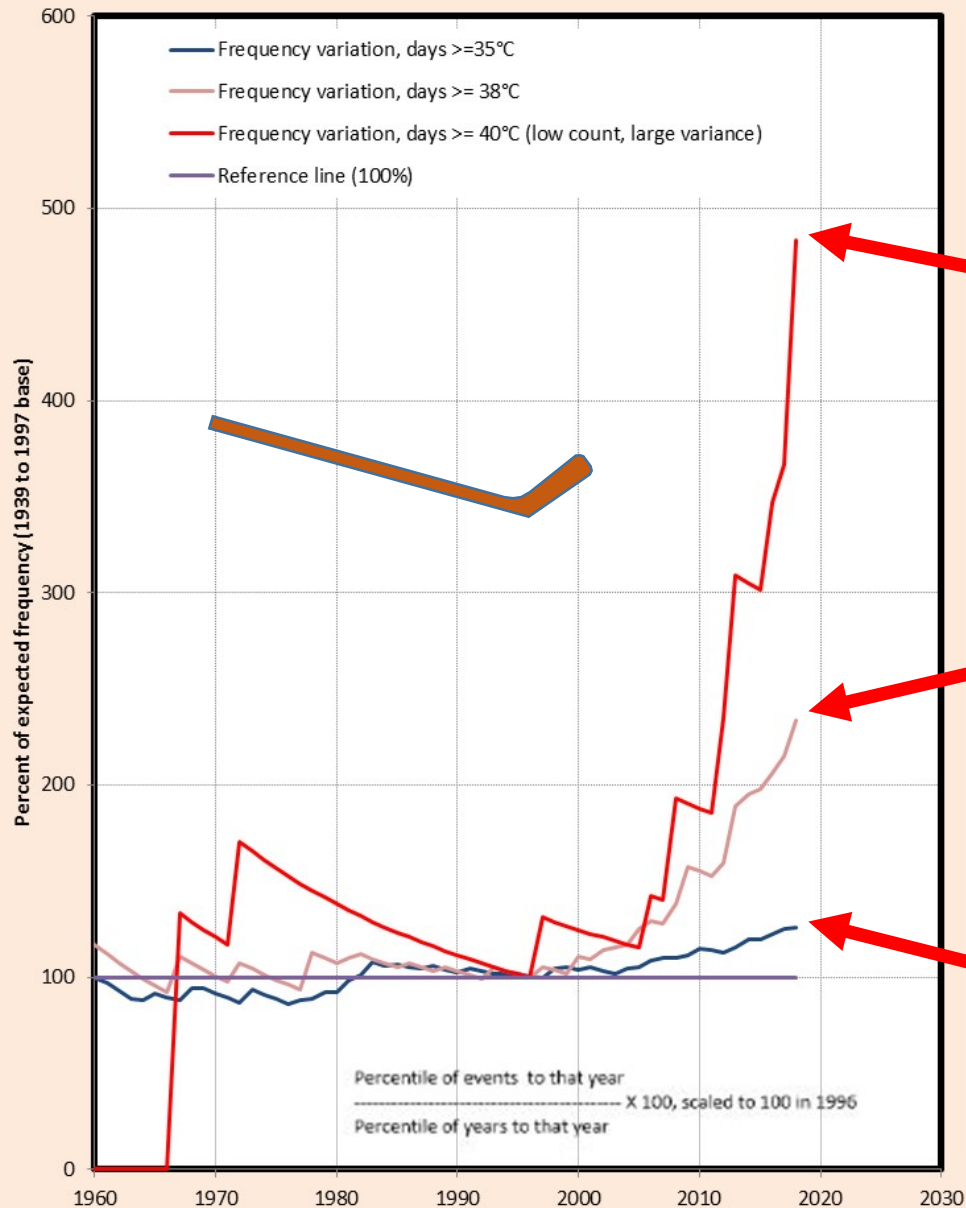
CANBERRA AIRPORT - DAYS OVER 38°C & 40°C



CANBERRA AIRPORT - DAYS OVER 38°C & 40°C



CANBERRA AIRPORT: FREQUENCY CHANGES FOR EXTREME HEAT DAYS



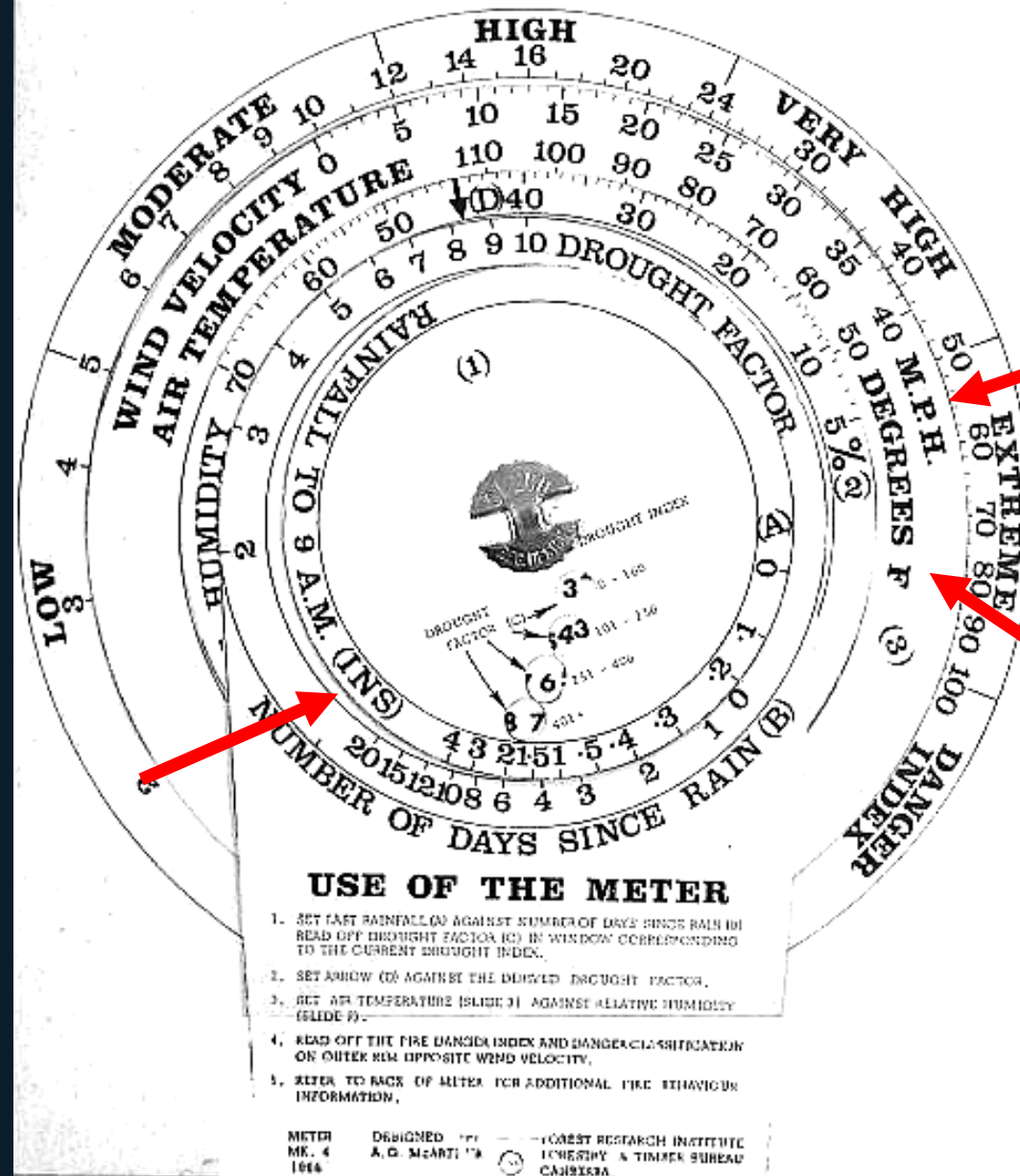
Compared to a 1997
base date:

40°C days now **383%**
more common;

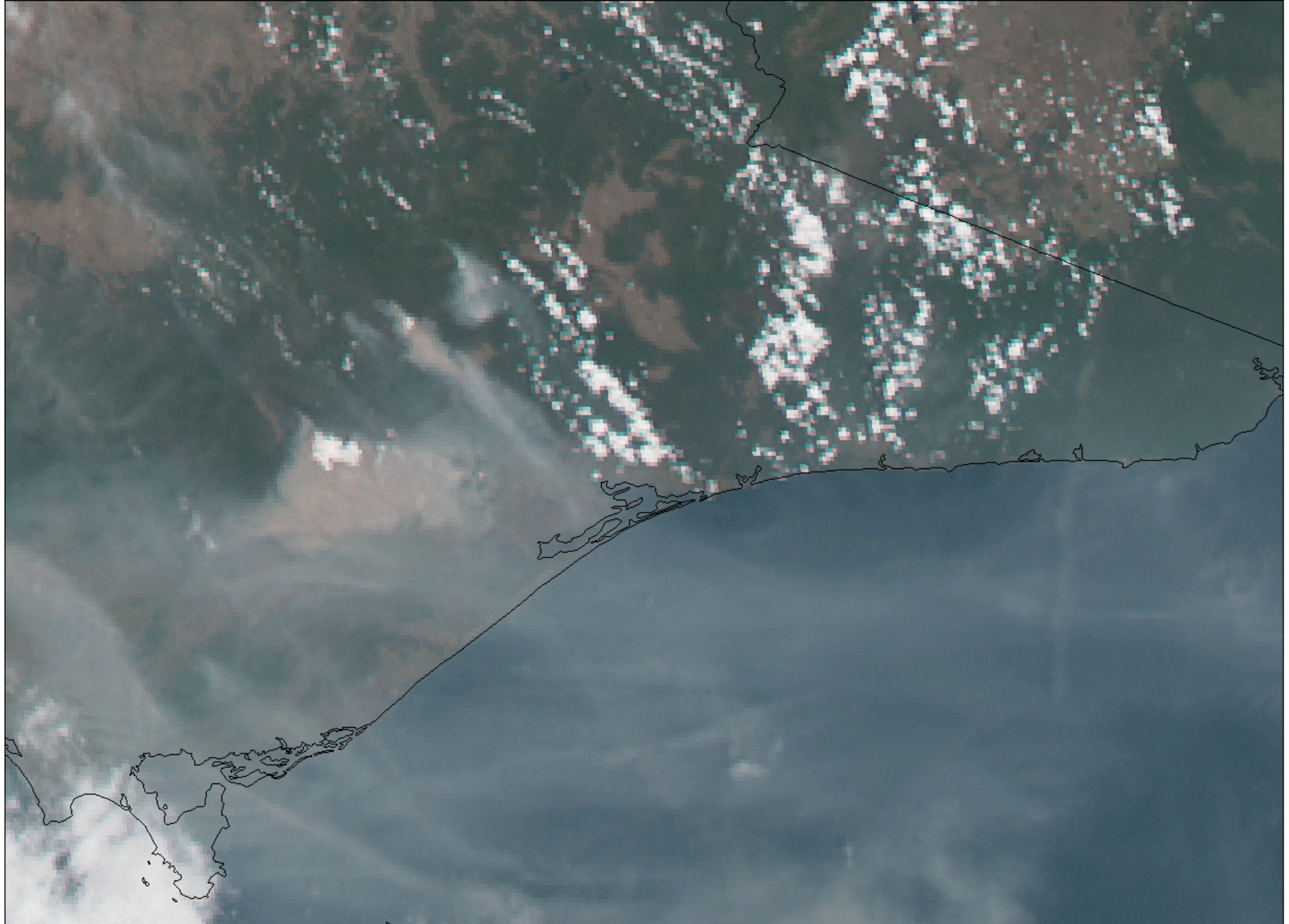
38°C days now **133%**
more common;

35°C days now **30%** more
common

FOREST FIRE DANGER METER



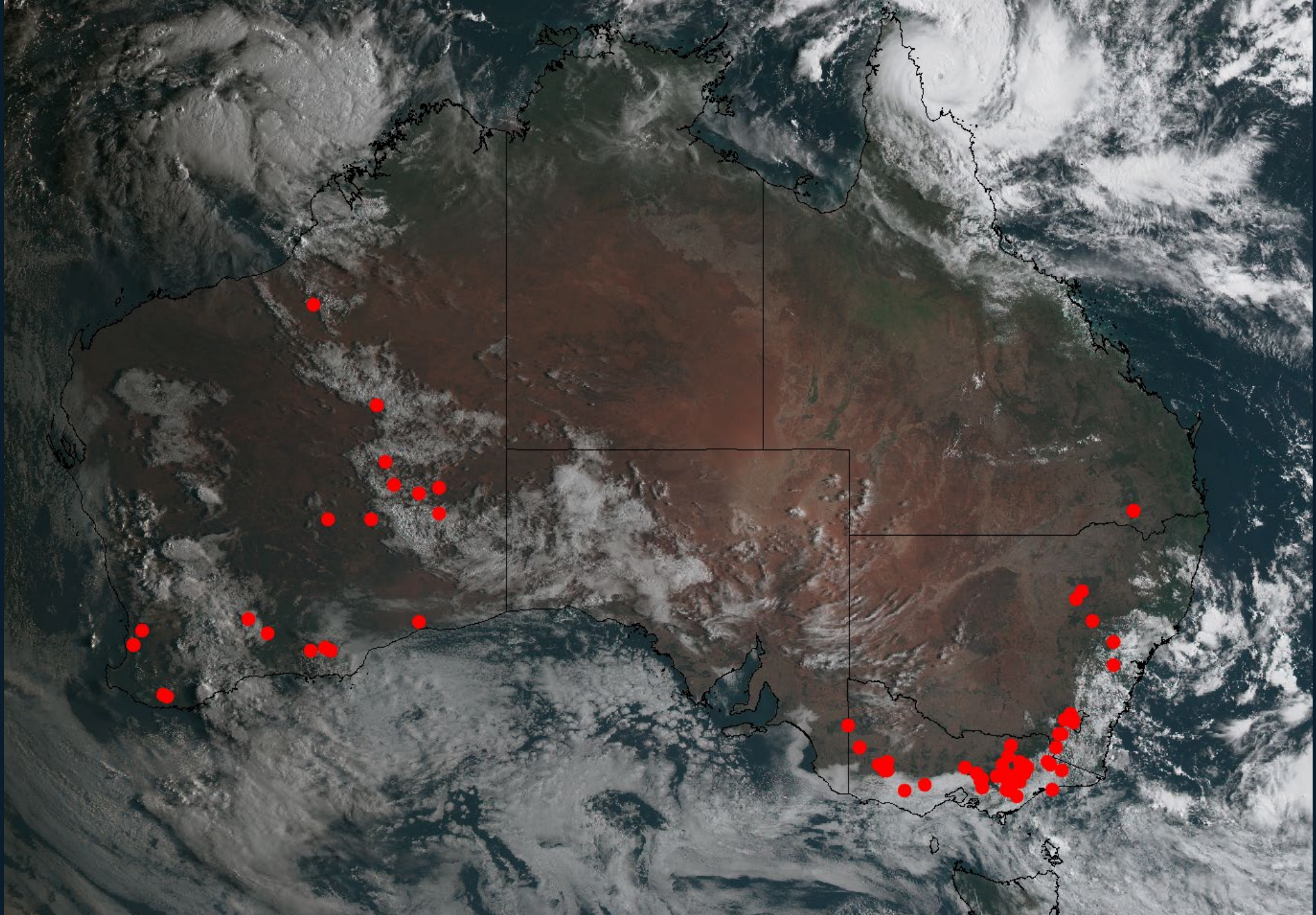
Circular slide rule: McArthur's Forest Fire Danger Index (serving us since 1966).



PyroCb near Licola, Victoria, 1:20 to 3:50, 3rd March 2019. [Himawari-8 Data: SSEC]

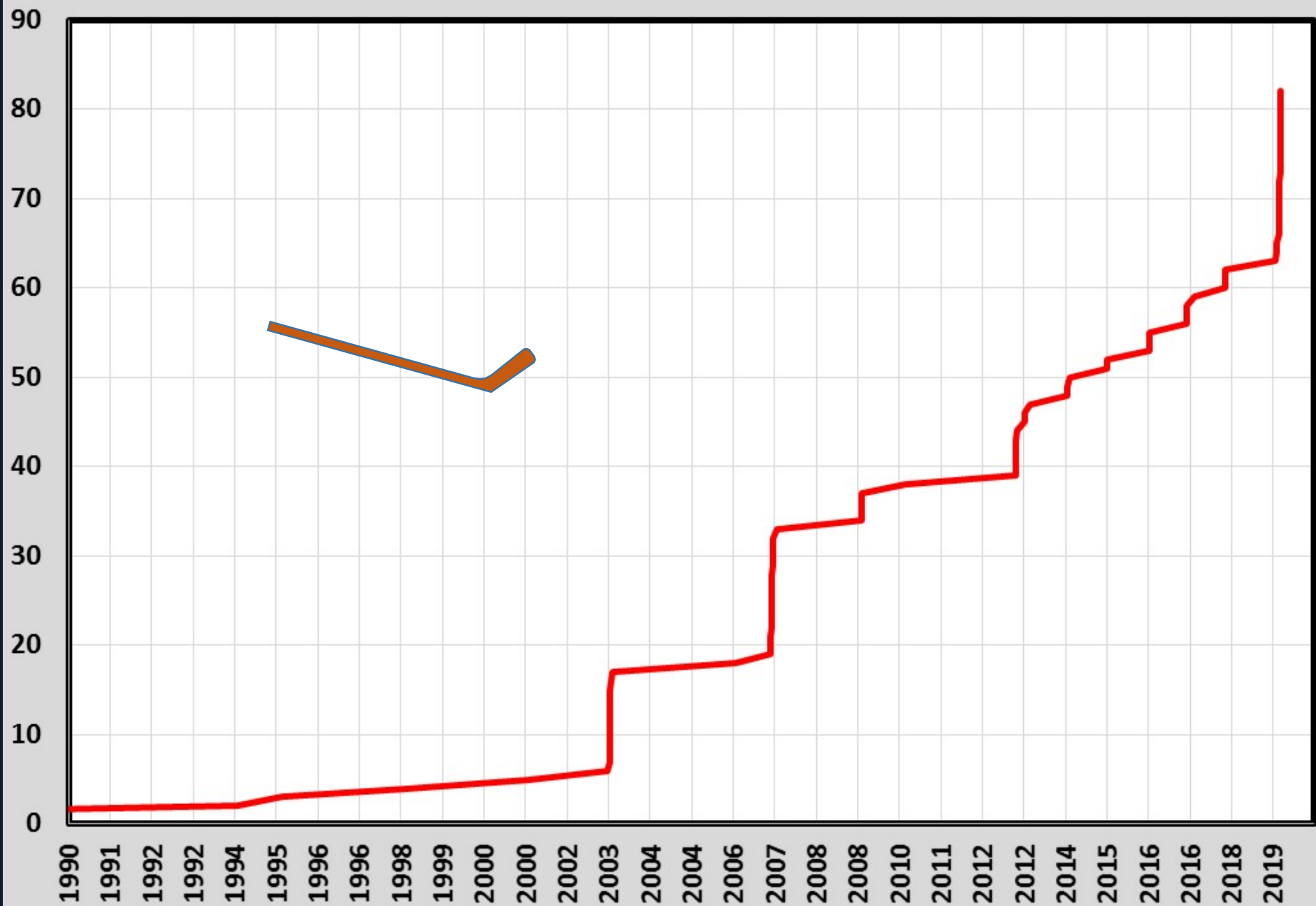


Binga Fire, Canada 27/06/2004. Photo: Noriyuki Todo, Japan Airlines



Australian pyroCb register. [Map: McRae]

REGISTER OF AUSTRALIAN PYROCB EVENTS: CUMULATIVE COUNT





Filming for ABC's *Catalyst* (S14 E7) on the science from the 2003 fires. 8th March 2013. [Photo: McRae]



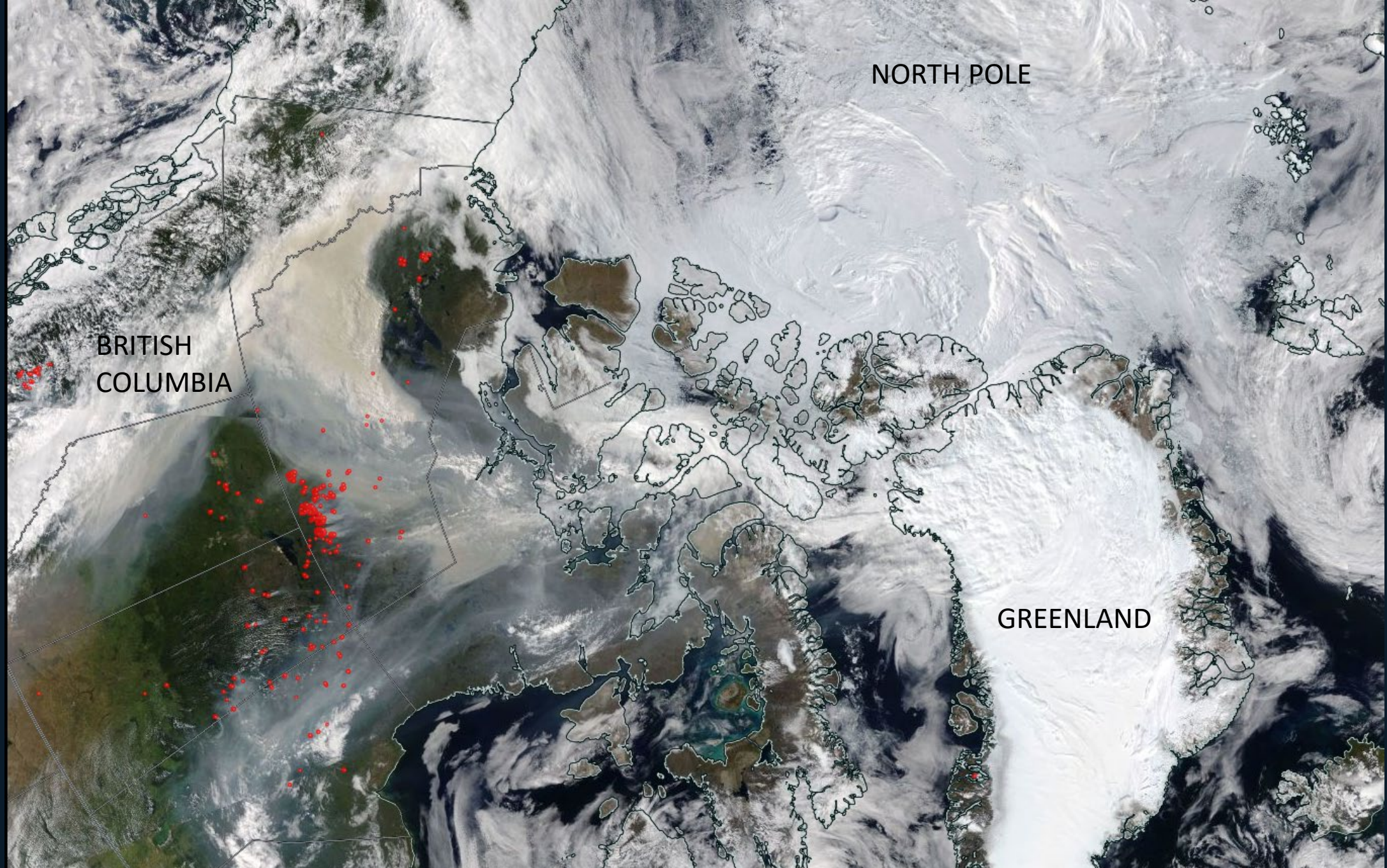
McIntyres Hut Fire, 18/01/2003. Photo: Stephen Wilkes, NSWRFs.



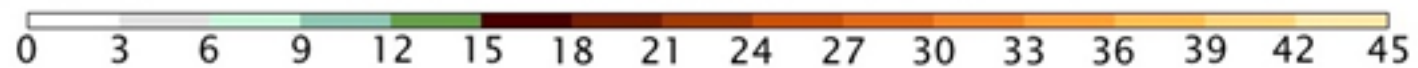
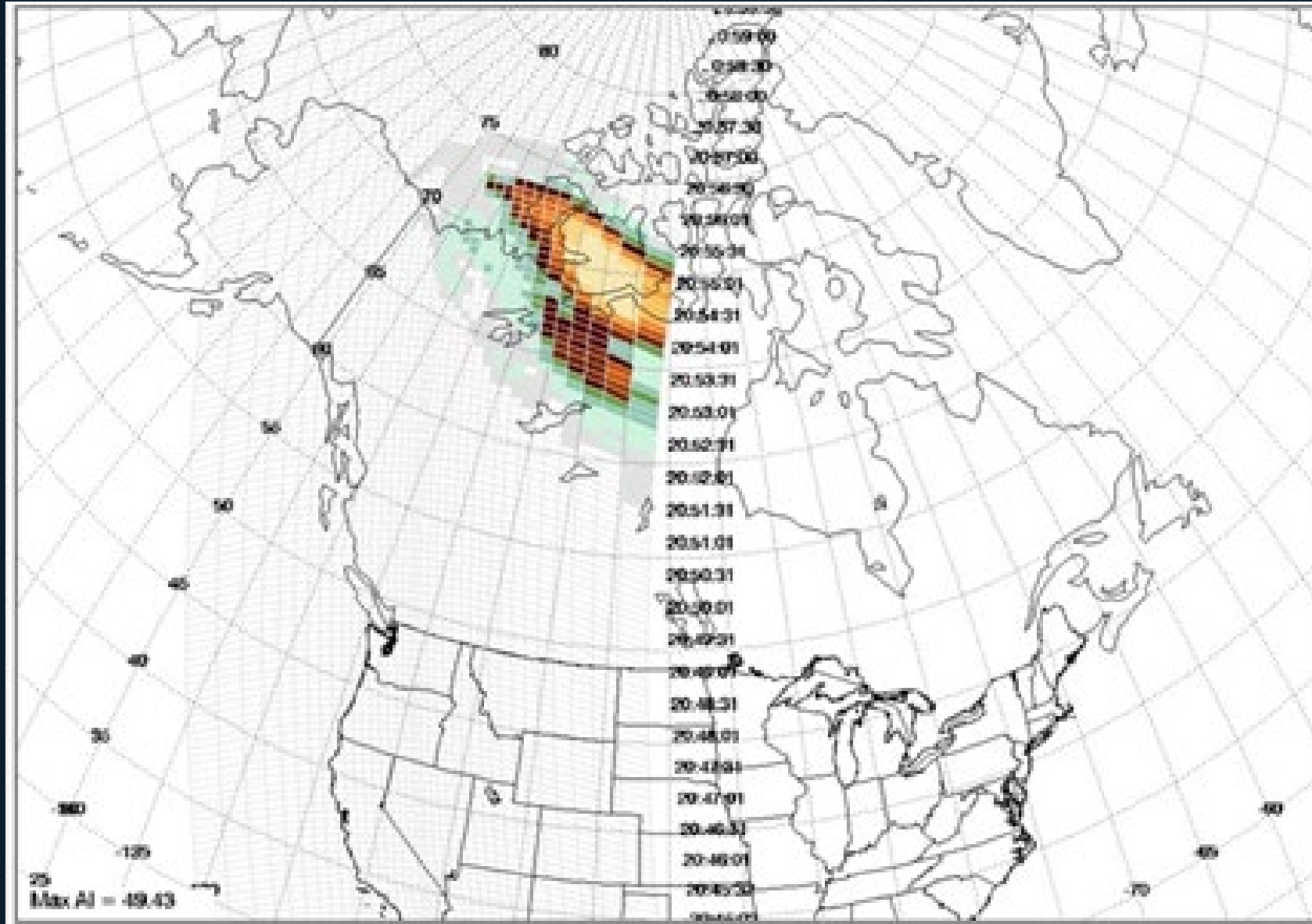
Blow-up fire event, Portugal, 18th June 2017. [MODIS Image: NASA WorldView.]



Fire on Canberra's urban edge, 13th February, 1991. [Photo: McRae]

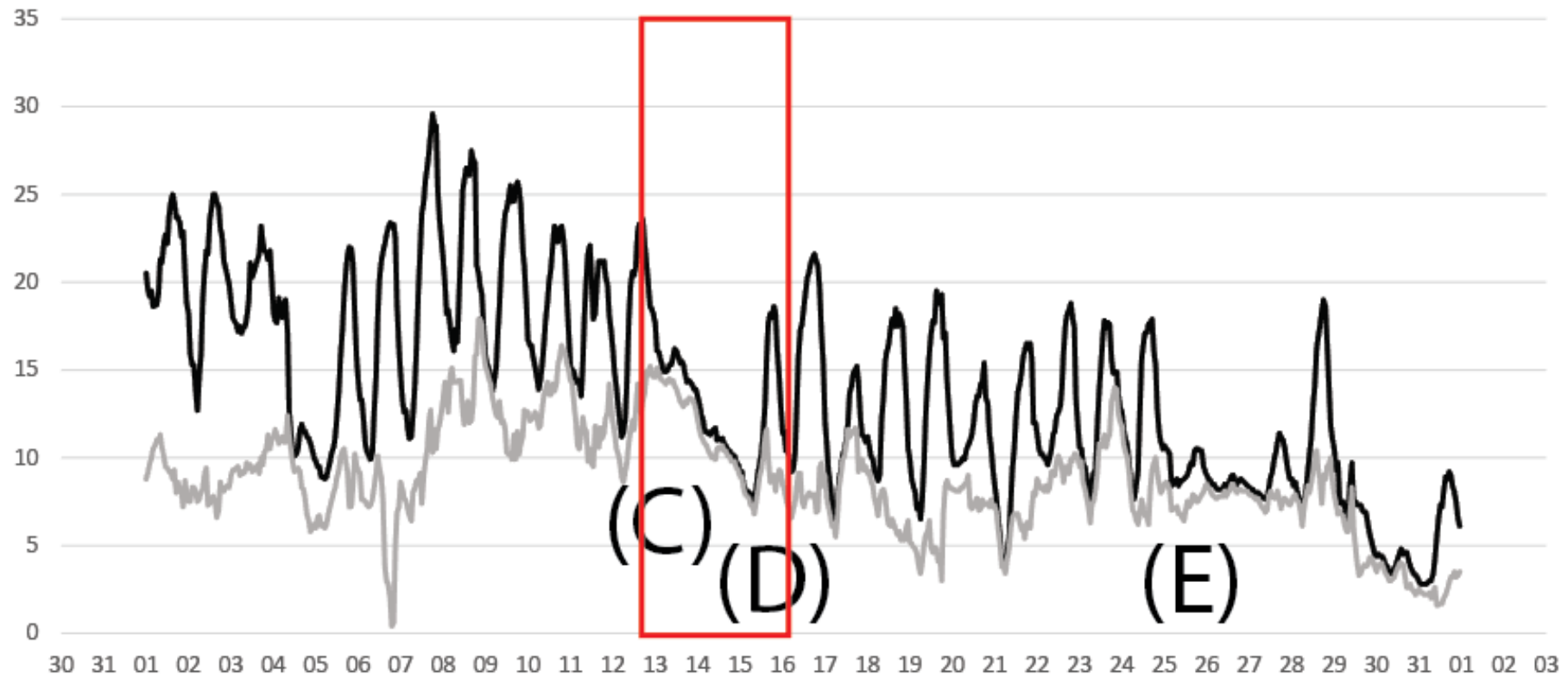


Fire hotspots and smoke, Canada, 12th August 2017. [Image & Data: NASA WorldView]

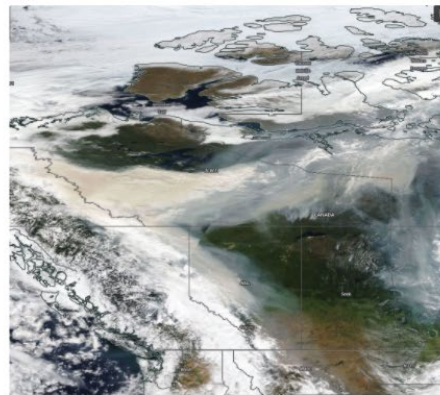


Aerosol Index 13th August 2017. [Plots: Colin Seftor, NASA]

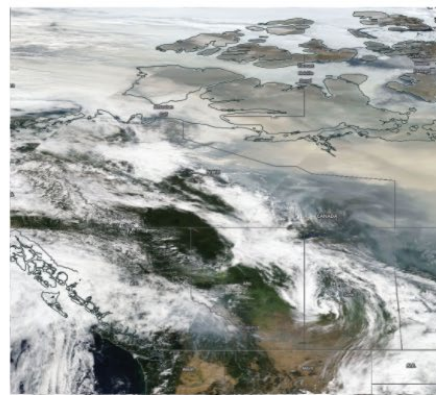
FORT MCPHERSON A



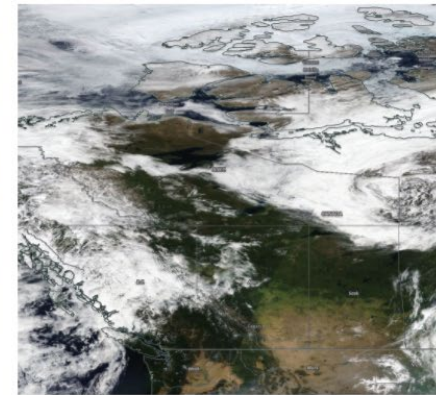
C) 13 August 2017: Blow-up fires

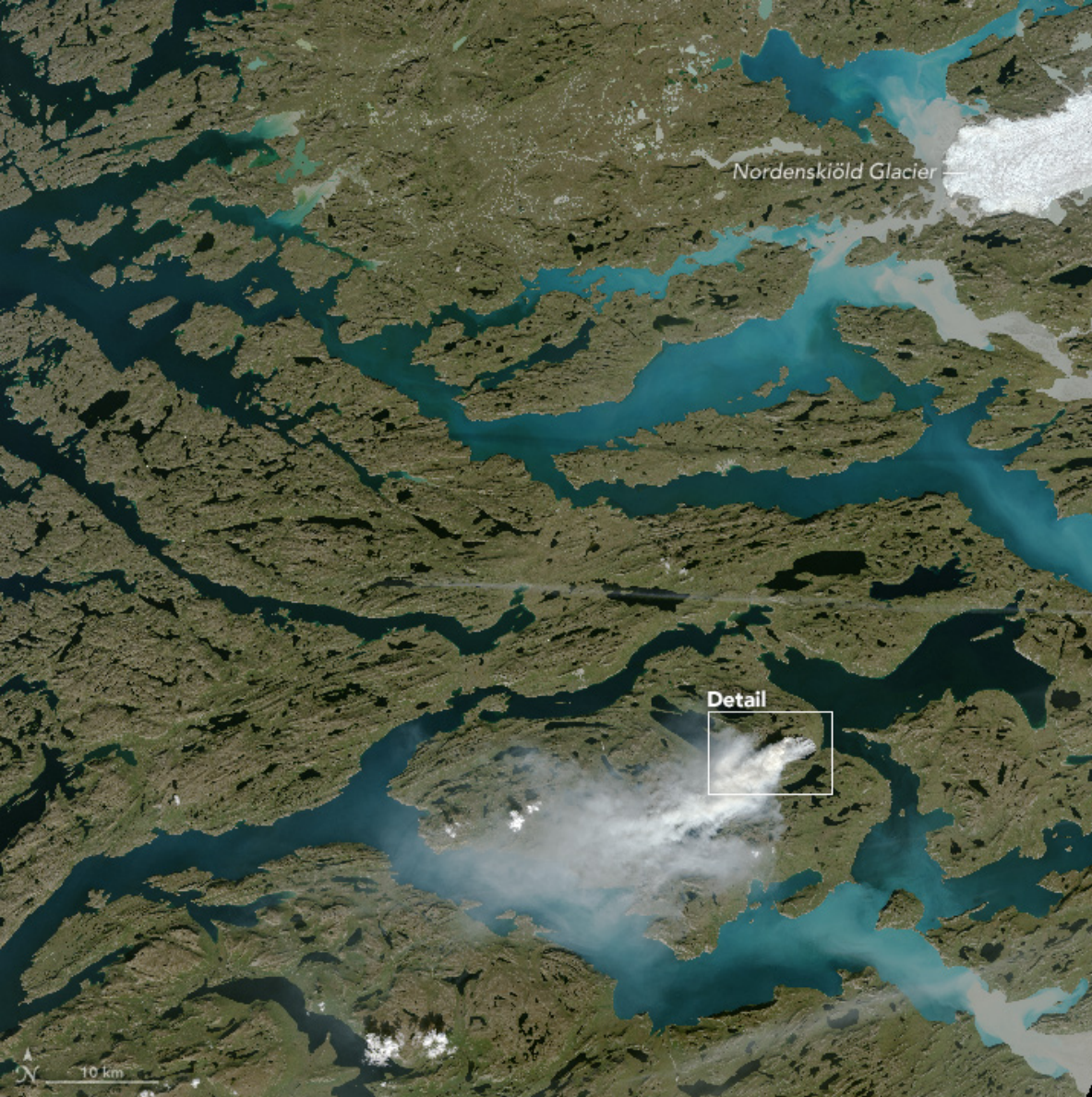


D) 15 August 2017: Blow-up fires

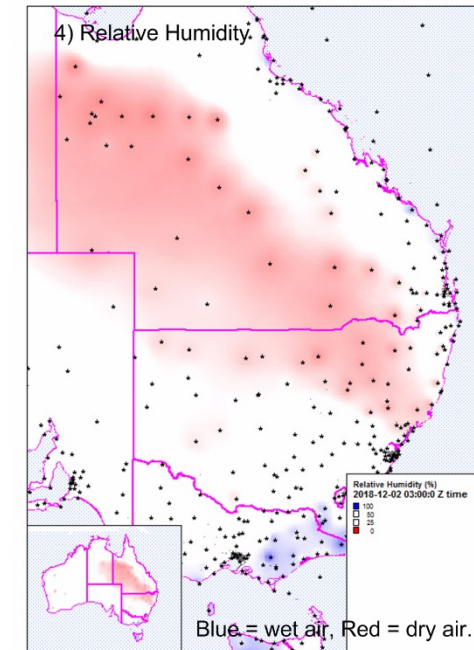
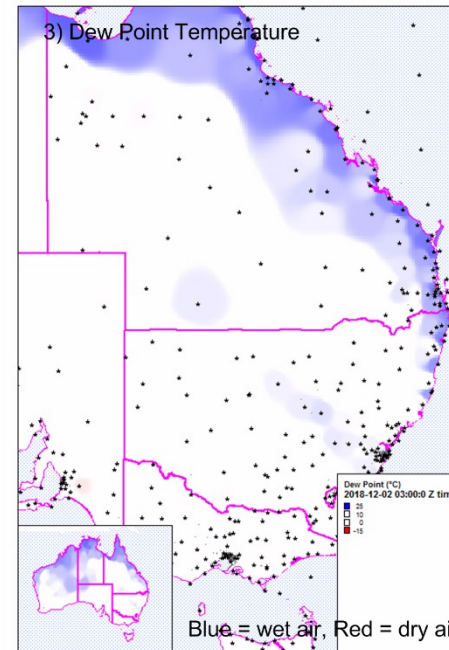
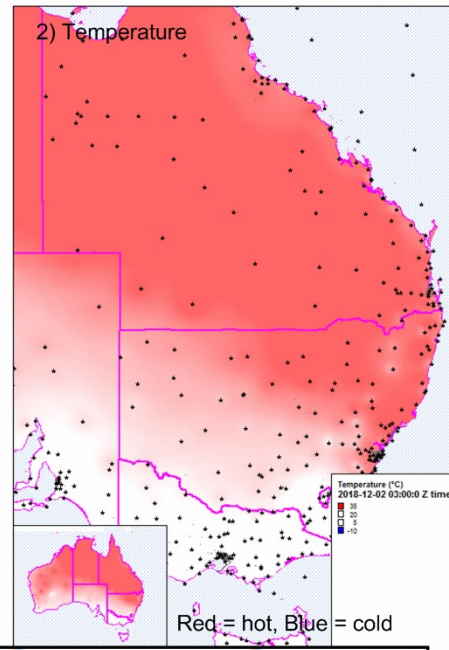
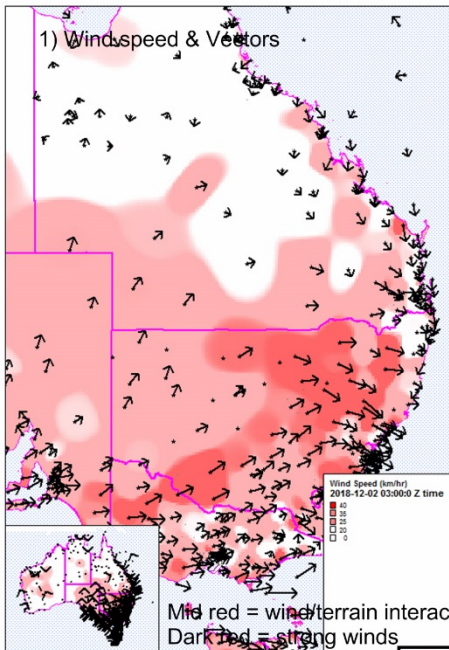


E) 26 August 2017: Synoptic





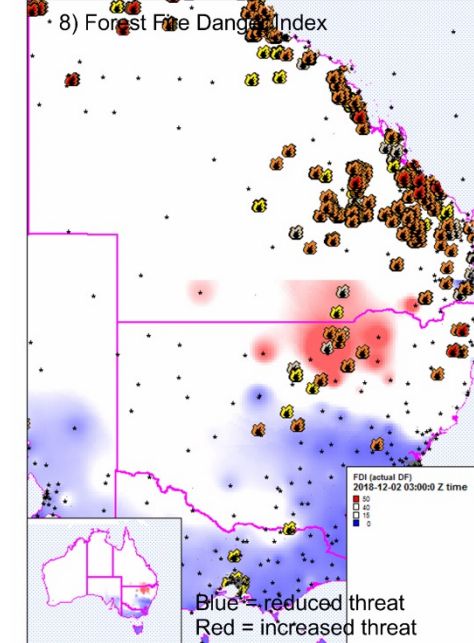
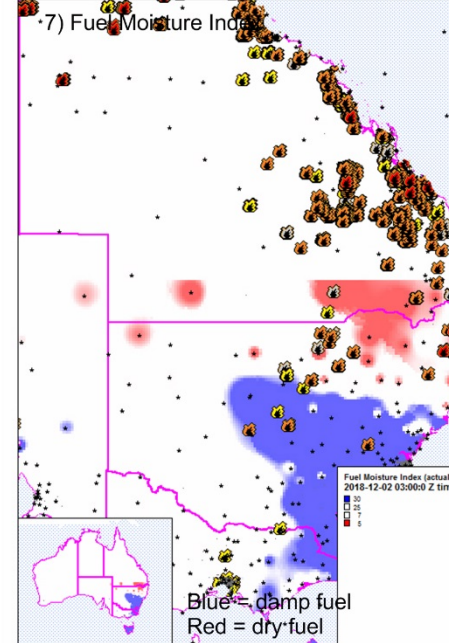
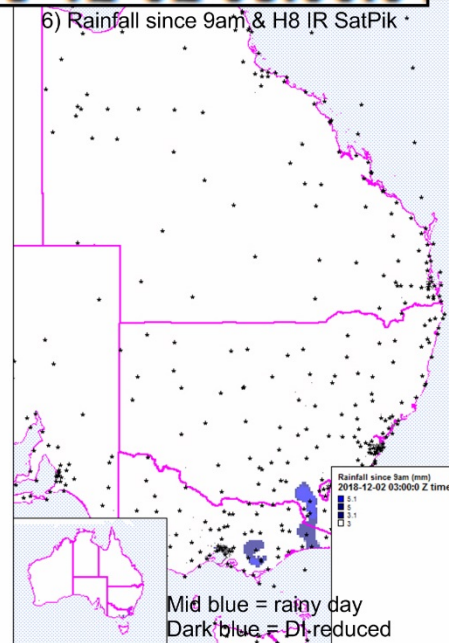
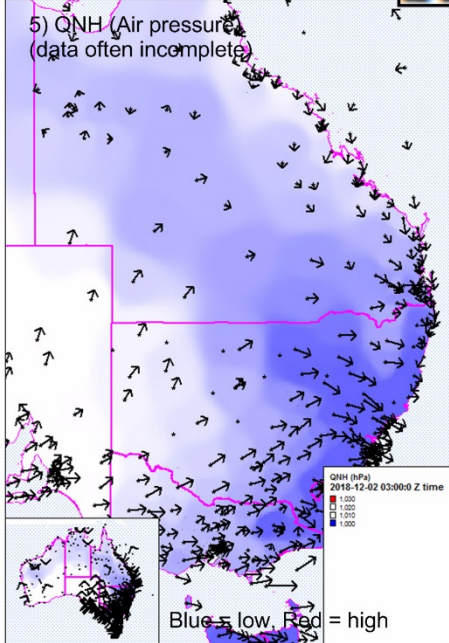
Wildfire, Greenland, July 2017. [Imagery: NASA Earth Observatory]



yyymmddhhmm format
Z=local-11(AEDST), -10(AEST)

2018-12-02 03:00:0

WEATHER INTELLIGENCE (BoM OBSERVATIONS)

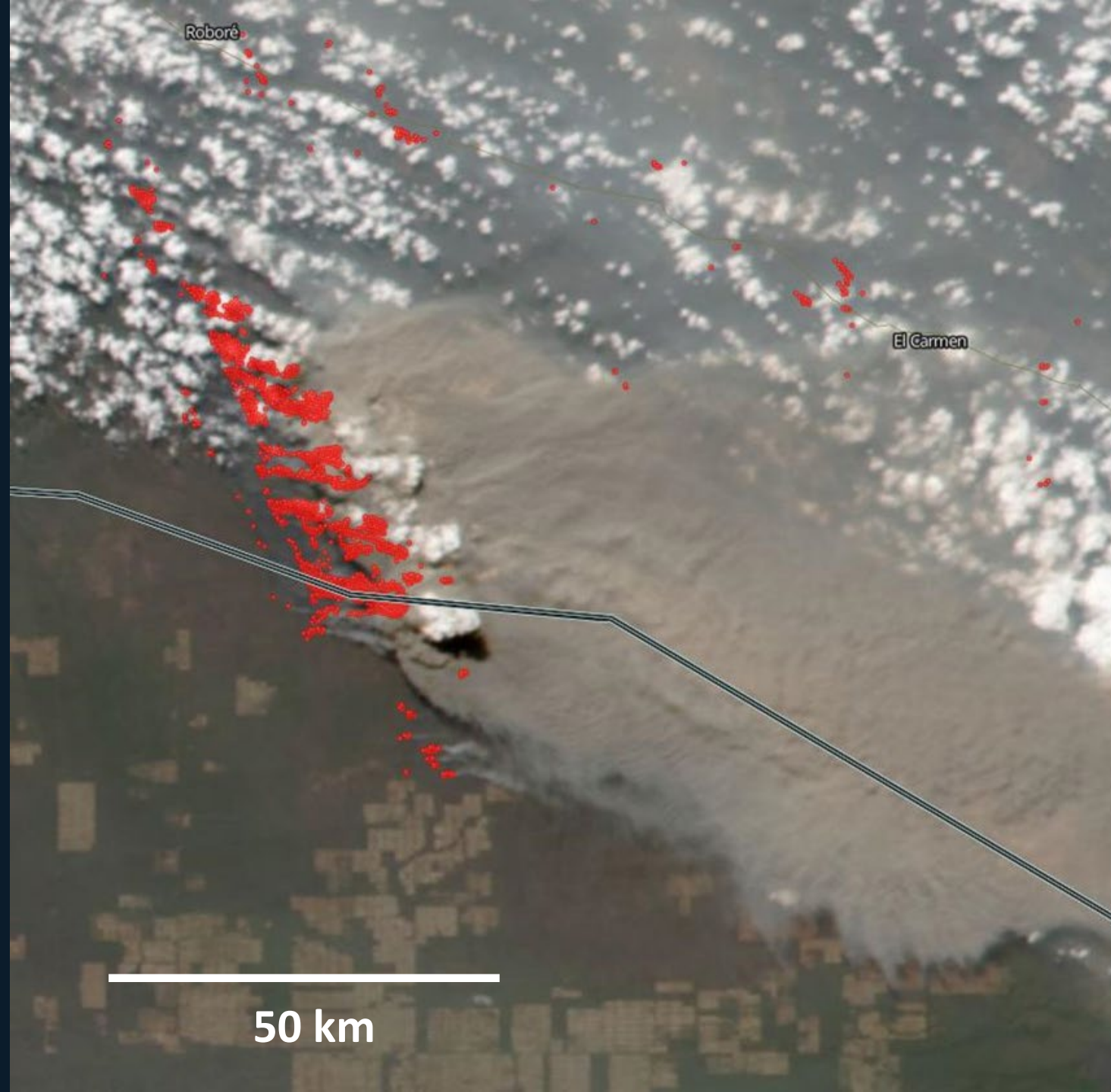




Infrared view of flames, WA, 15th November, 2018. [Himawari-8 Imagery: SSEC]

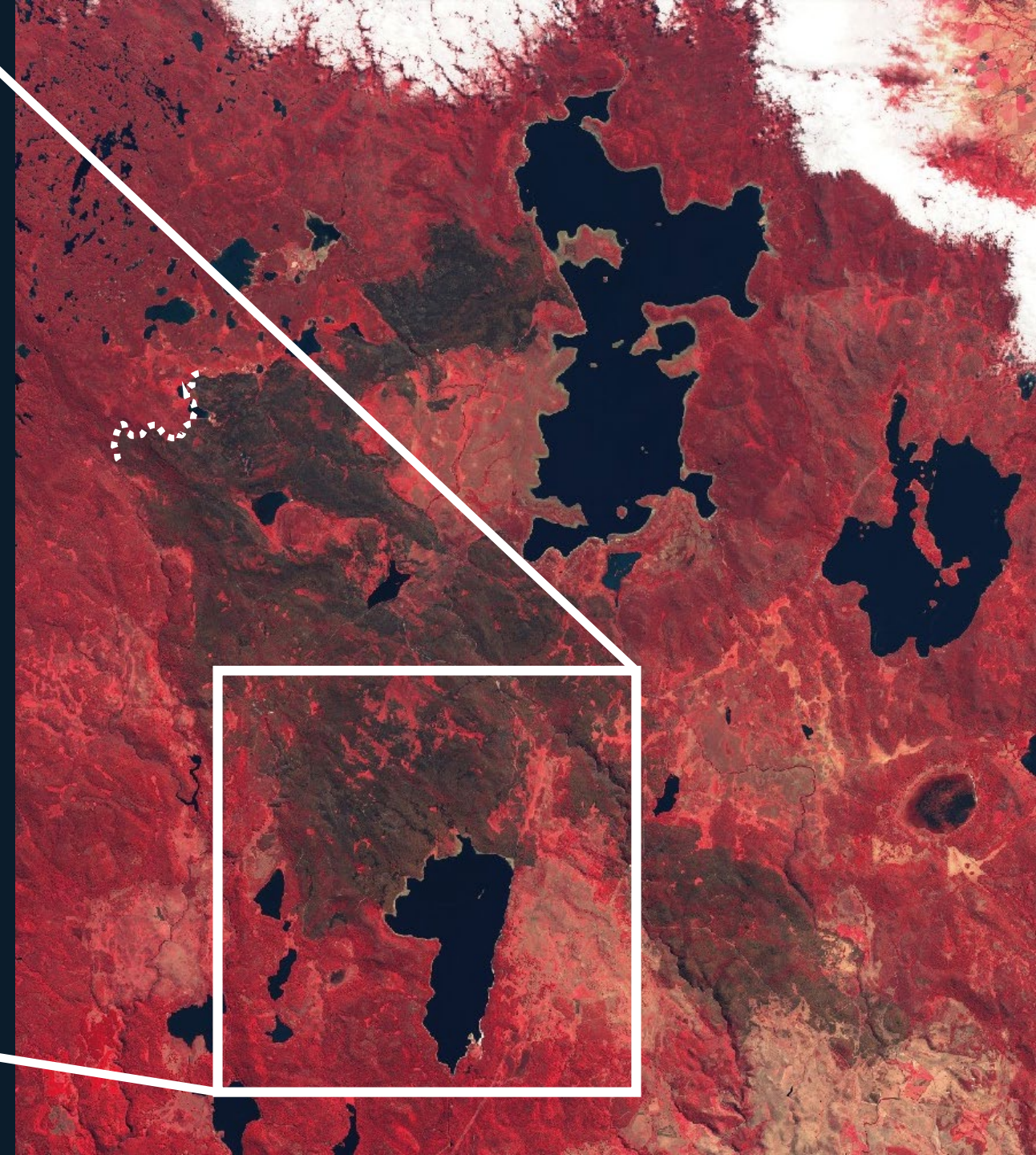
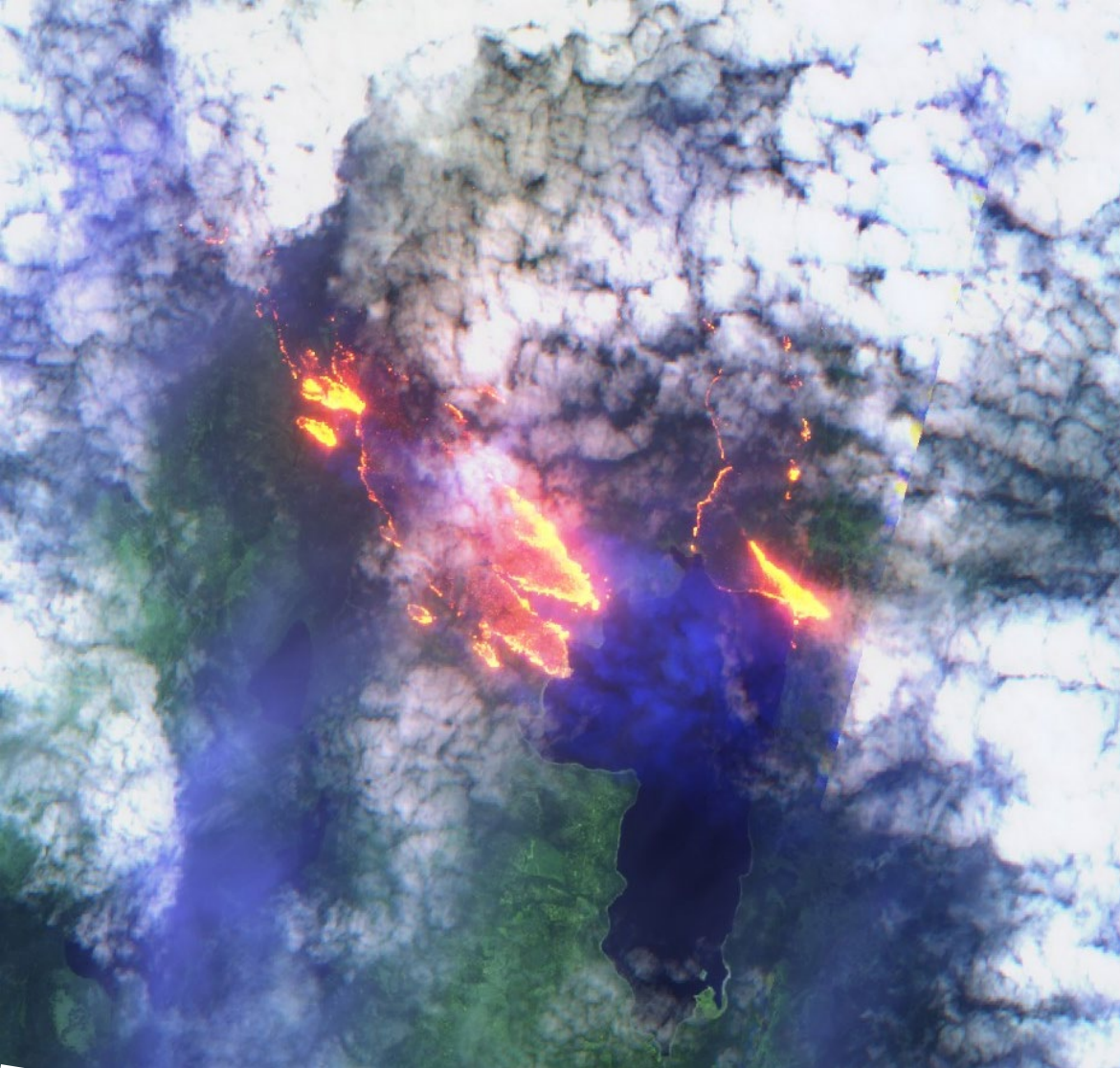
BREAKING NEWS...

- A confirmed pyroCb in Bolivia...
- ...in winter
- ...in the tropics
- Sao Paulo in darkness at noon.
- Tropical pyroCbs are now a thing. Watch this space.

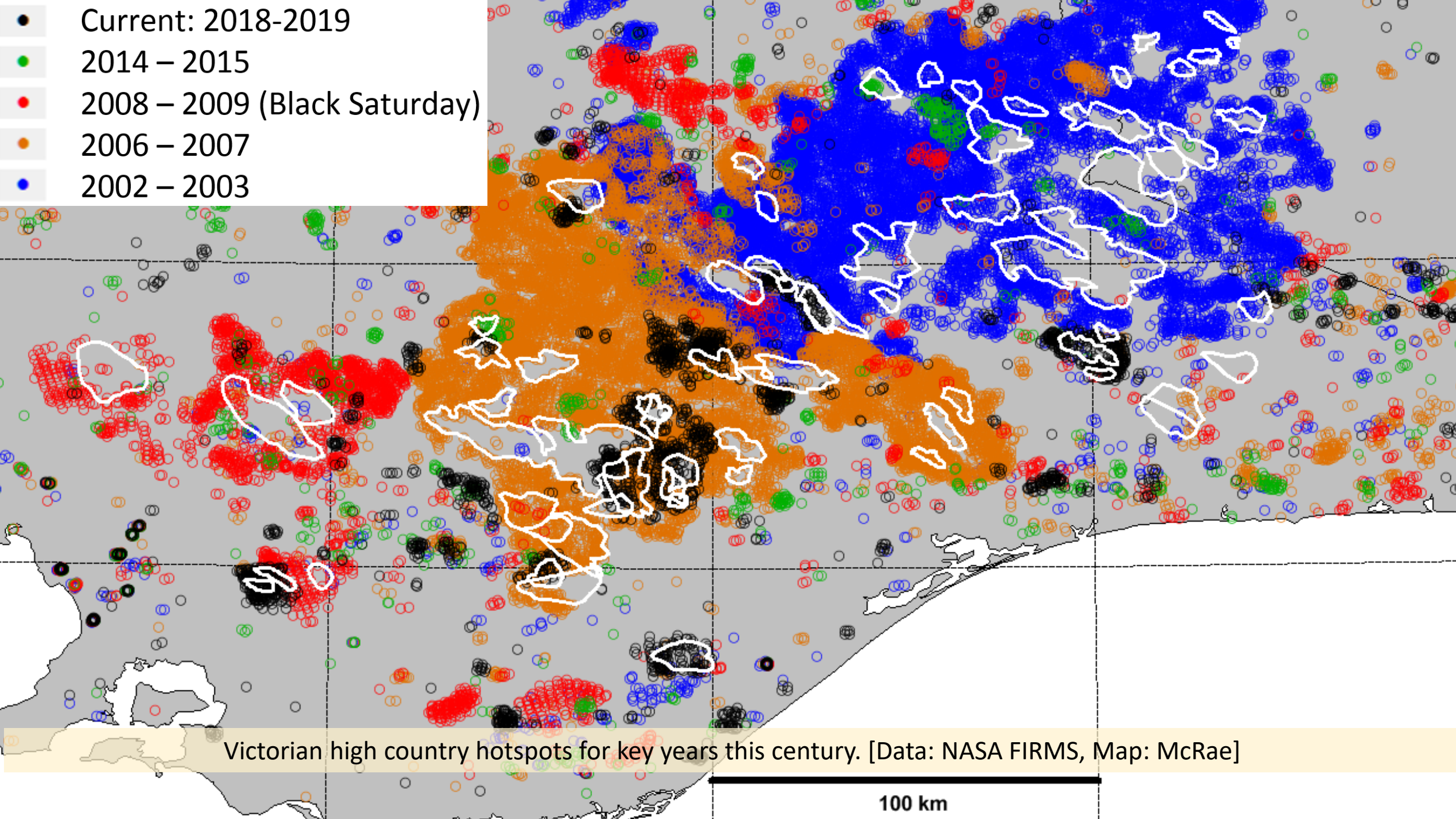




Burnt ground near Cradle Mountain, Tas., February 2016. [Photo: McRae]



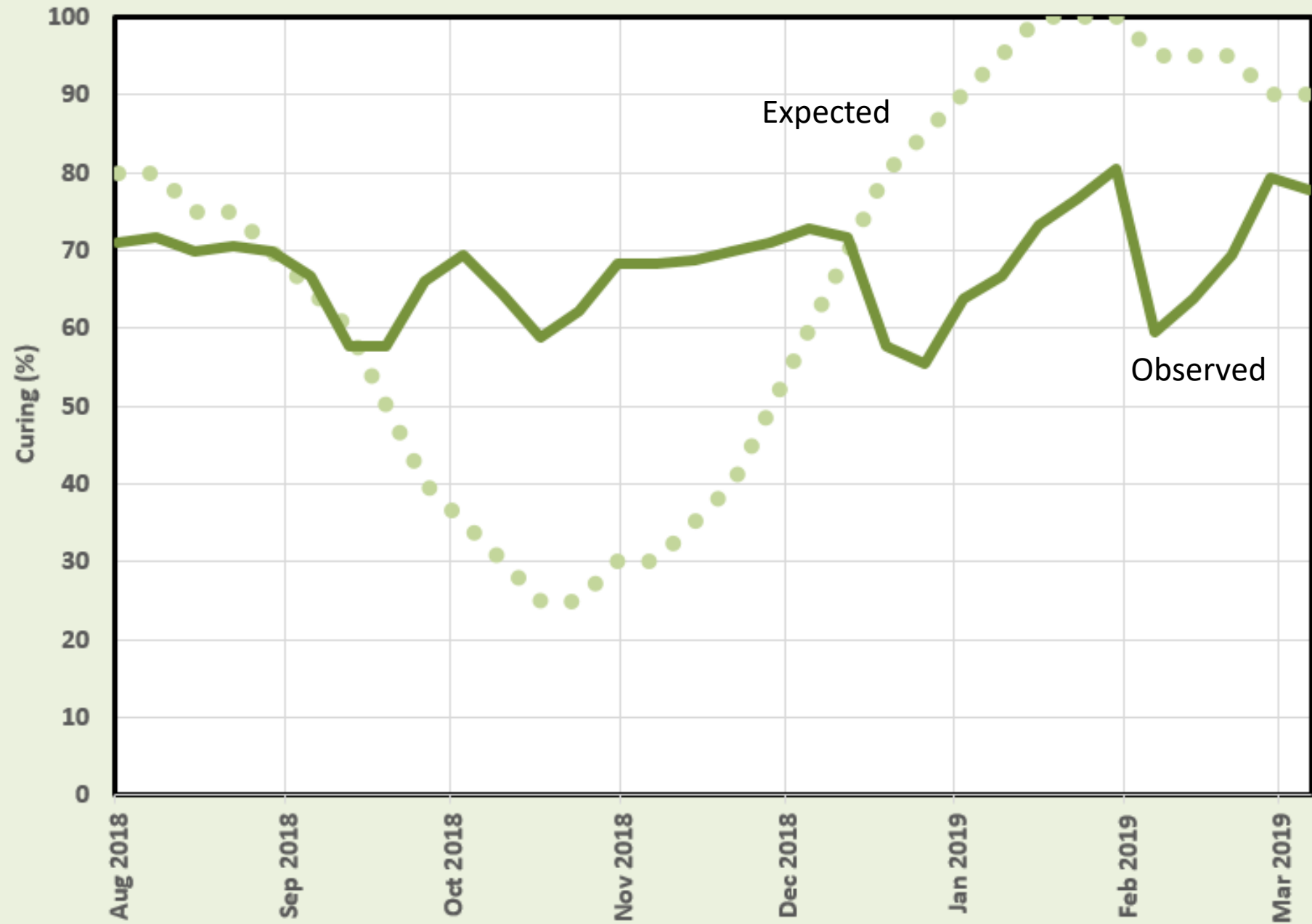
Great Lake Fire, Tasmania. (LEFT) 25th January 2019; (RIGHT) post fire. [Sentinel-2 Imagery: Sentinel Hub]





Dust storm, Canberra Airport, 12th February 2019. [Photo: McRae]

2018-2019 SEASON: MEAN CURING FOR A.C.T.



So what are my “take home messages”?

- IT IS BIG AND GETTING
BIGGER!

So what are my “take home messages”?

- WE NEED TO
WAKE UP!.

So what are my “take home messages”?

- WE CANNOT
TACKLE THIS IN
ISOLATION!

So what are my “take home messages”?

- COLLABOR-
ATE!

So what are my “take home messages”?

- LEARN
RAPIDLY!

So what are my “take home messages”?

- OBSERVE,
SHARE, PRÉPARE
AND ADAPT!

THE NEXT PAPER...

The effects
of climate
change on
beer
consum-
ption?



- Thank you.
- Questions?

I never want to see this! Holy Fire, California, August 9th 2018. Image: HPWREN.