ARE BIG FIRES INEVITABLE? Perspectives from the HighFire Risk Project

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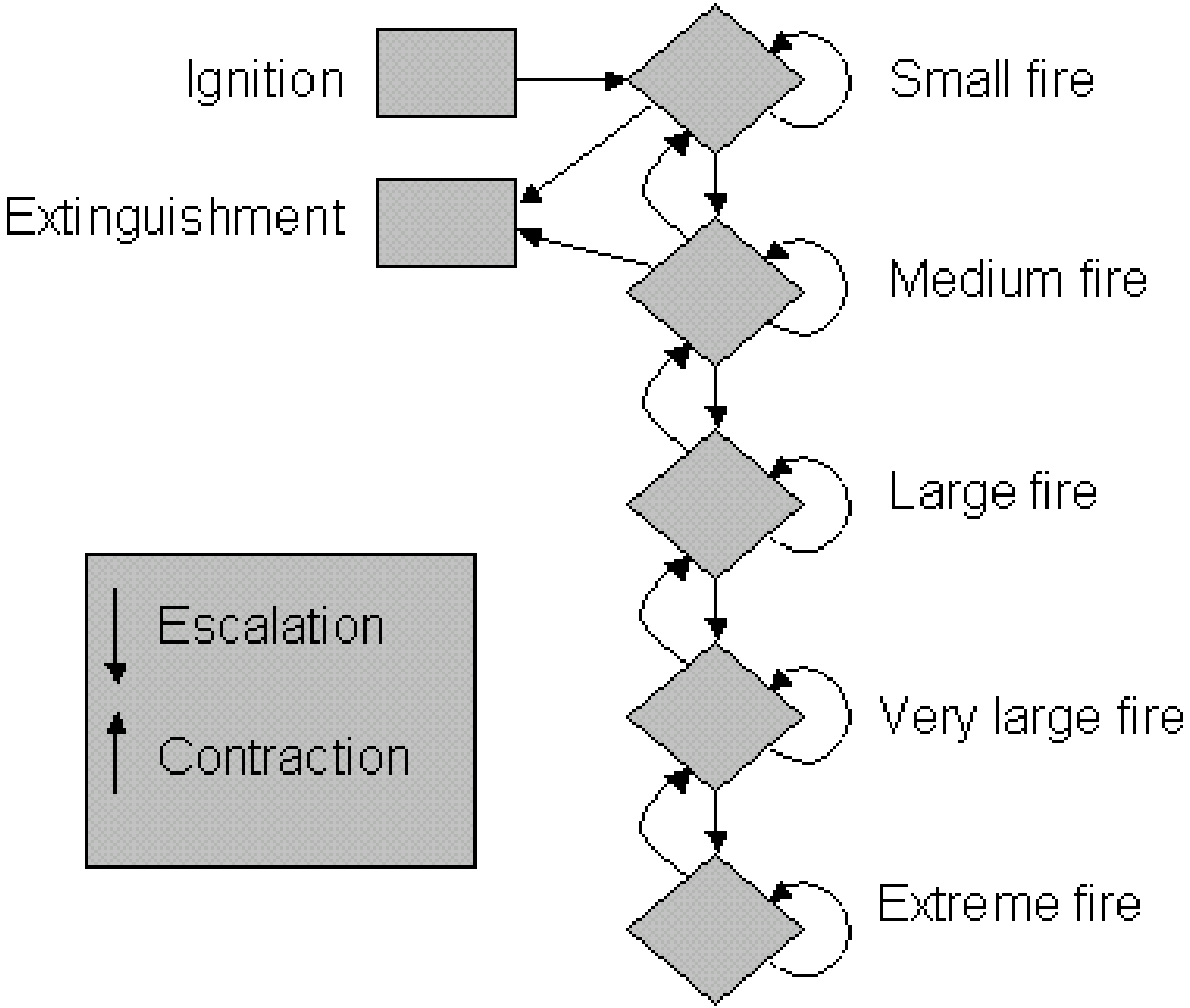
The Maelstrom (Flea Creek, Brindabella and Bendora Fires), 18 Jan 2003. Photo: T.A.S.

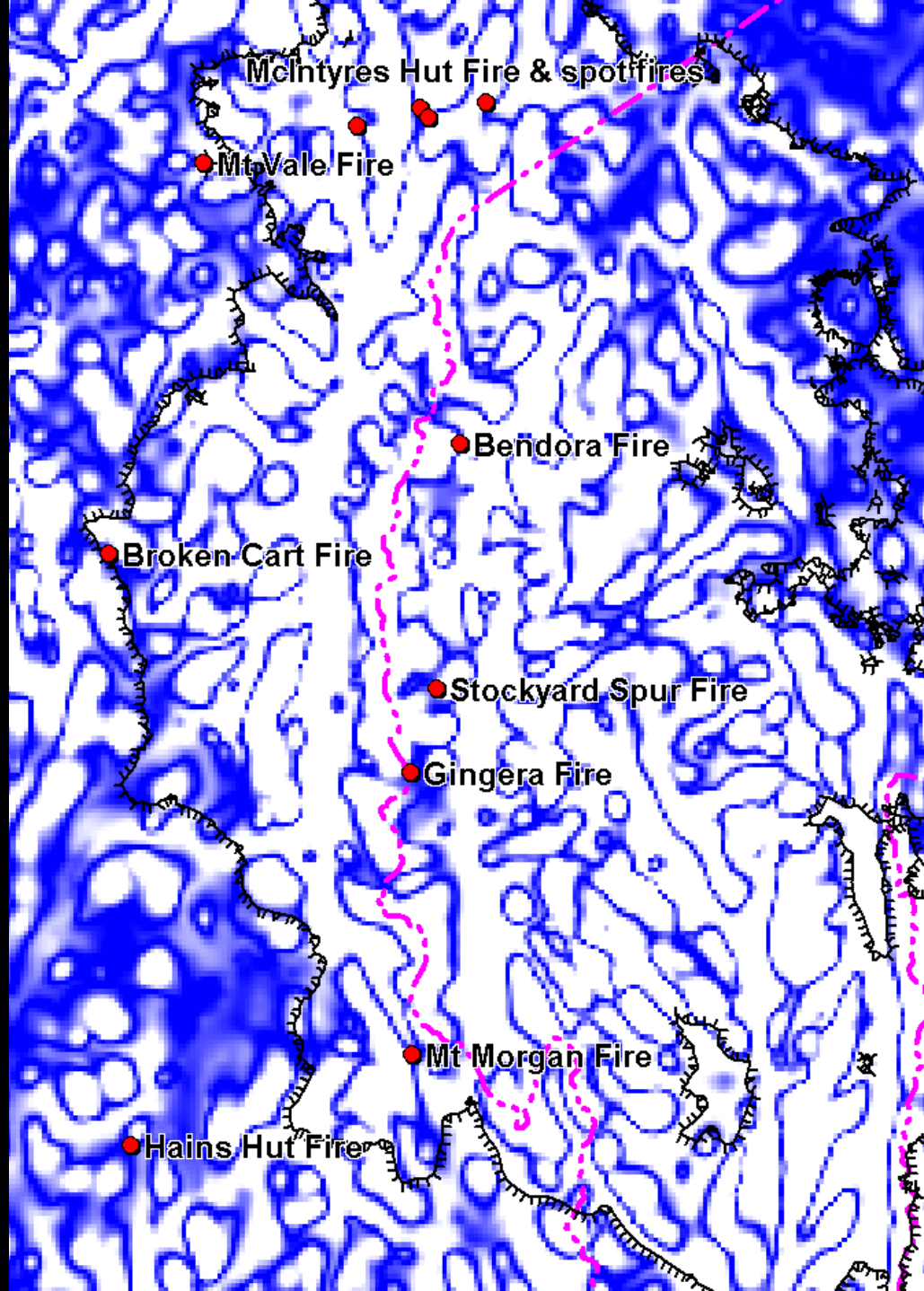
- Black Mountain Tower

Rapid escalation of a spot fire in 5 minutes. Helicopters marked. [Wilkes]

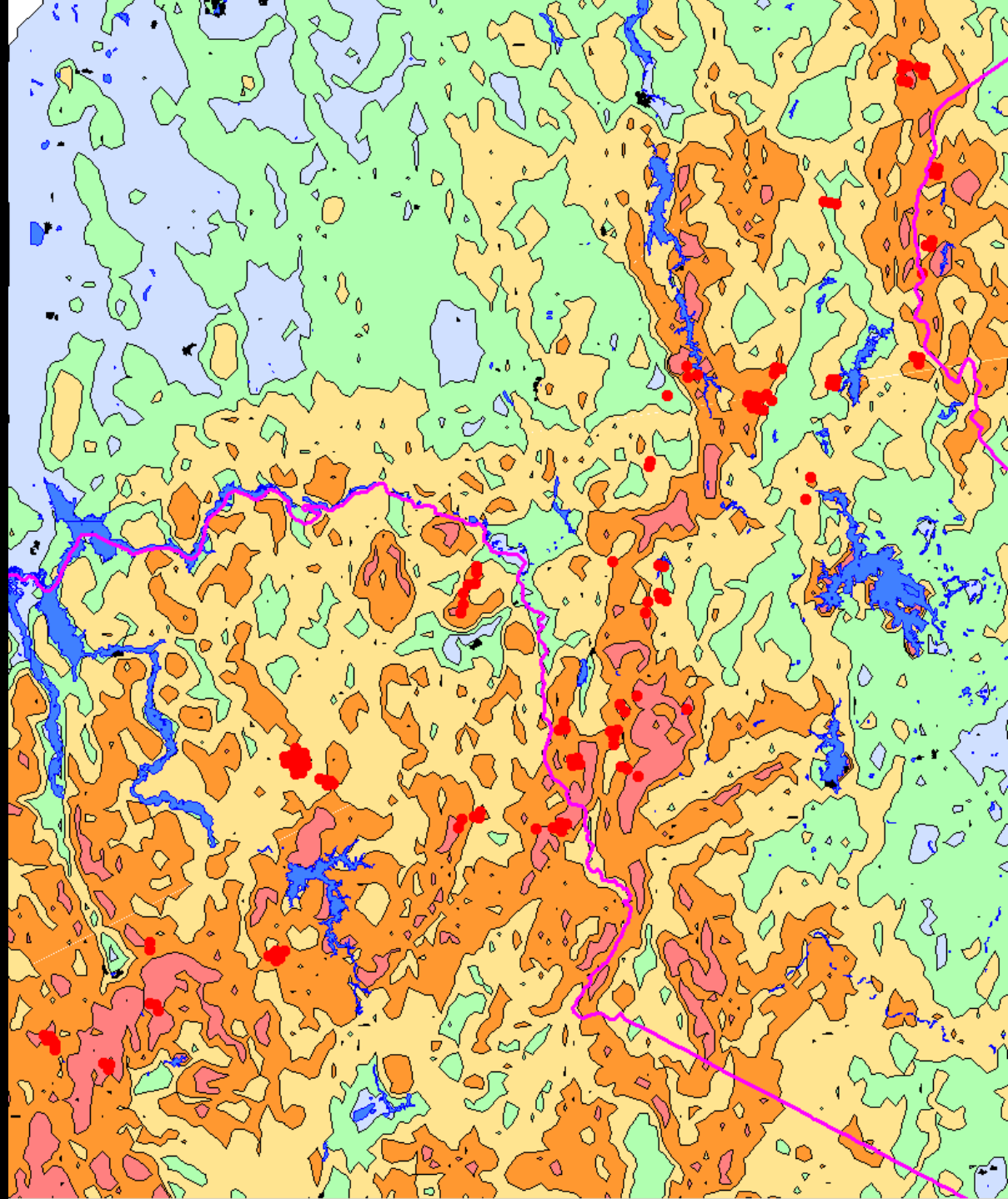

Ignition
Extinguishment
Small fire
Medium fire
Large fire
Very large fire
Extreme fire
Escalation
Contraction

PROCESSES

- Ruggedness: in ignition and as a limiter
- Nocturnal low-level jets
- Dry slots
- Unusual combustion
- Violent pyro-cumulonimbus
- Mountain wind waves
- Föehn-like winds
- Dynamic channelling
- Terrain chimneys
- Plume-driven fire

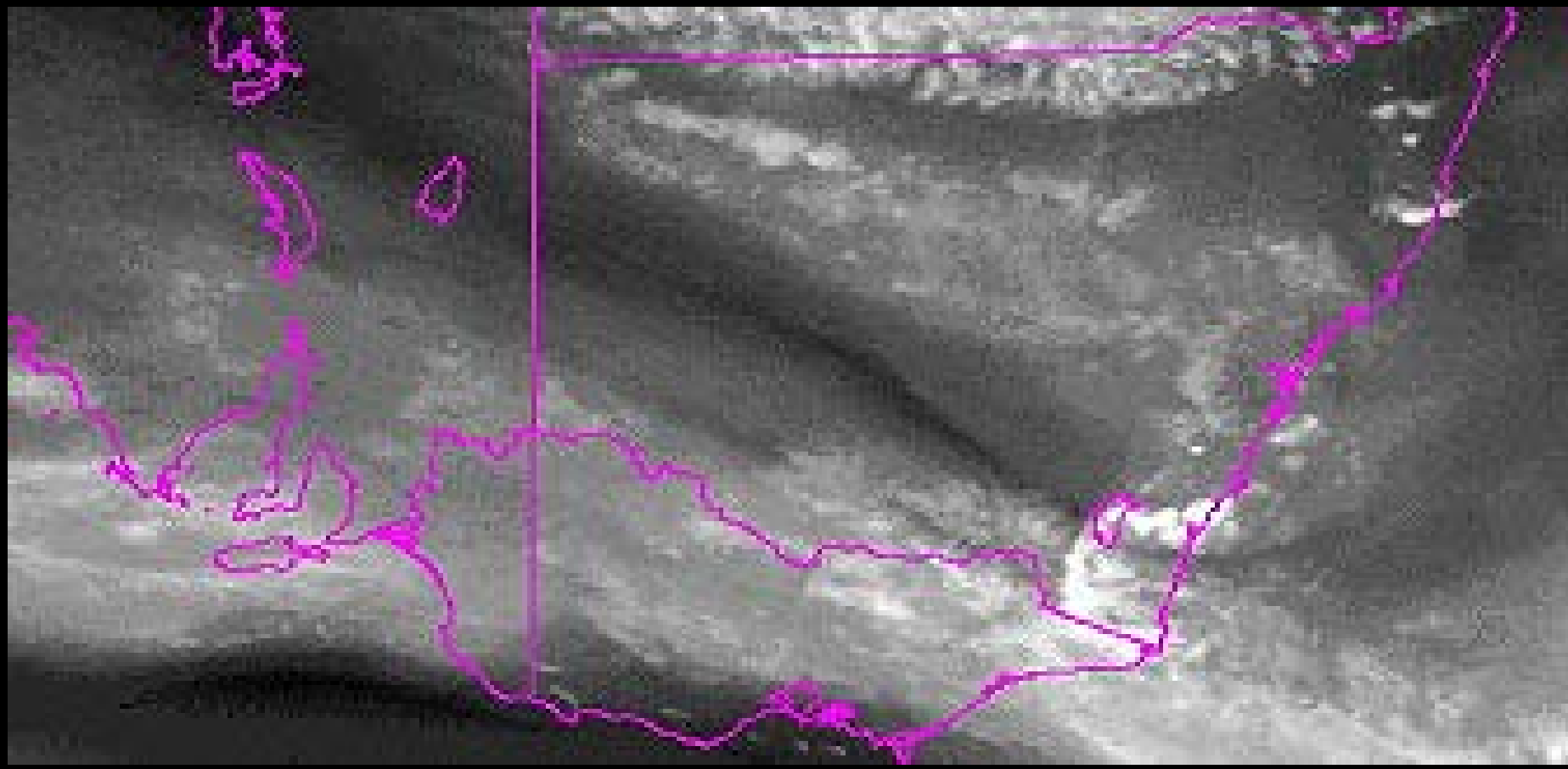


Local-scale model of lightning-ignition prone areas (blue) and fires early in Jan 03 event (red). [McRae, BCRC]



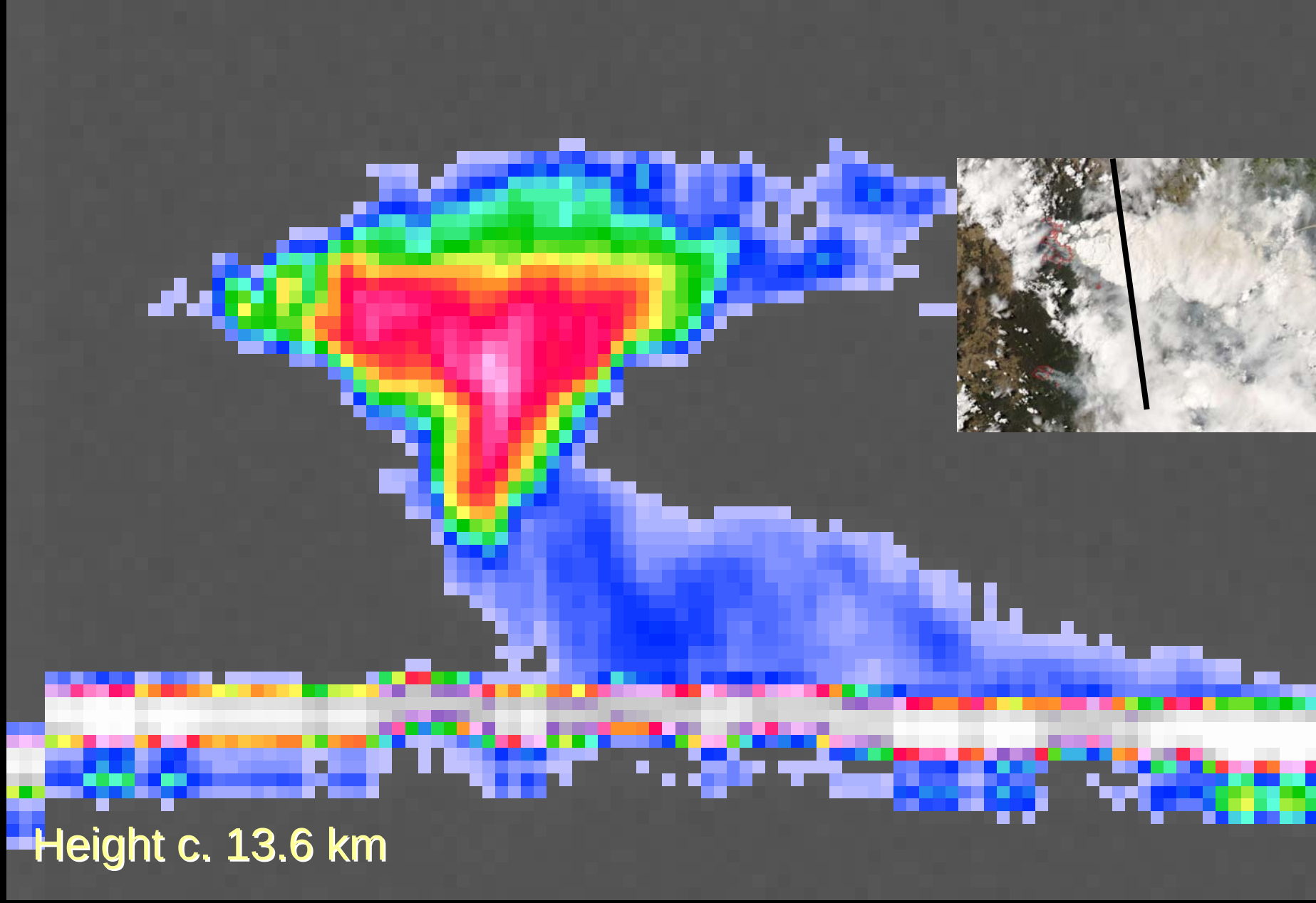
Ruggedness model of lightning-ignition prone areas (yellow, orange & red) and fires early in Jan 03 event (red dots). [McRae, BCRC]

Early stages of Gingera Fire, 10 Jan 03 [McRae]



Water vapor imagery, showing dry slot passing over Canberra Fires, 18 Jan 03, Mills, BoM]

Intense ember storm on Canberra’ s edge, 18 Jan 03 [Win TV].



Radar cross-section of pyroCb, Wollemi Fire, NSW [CloudSat]

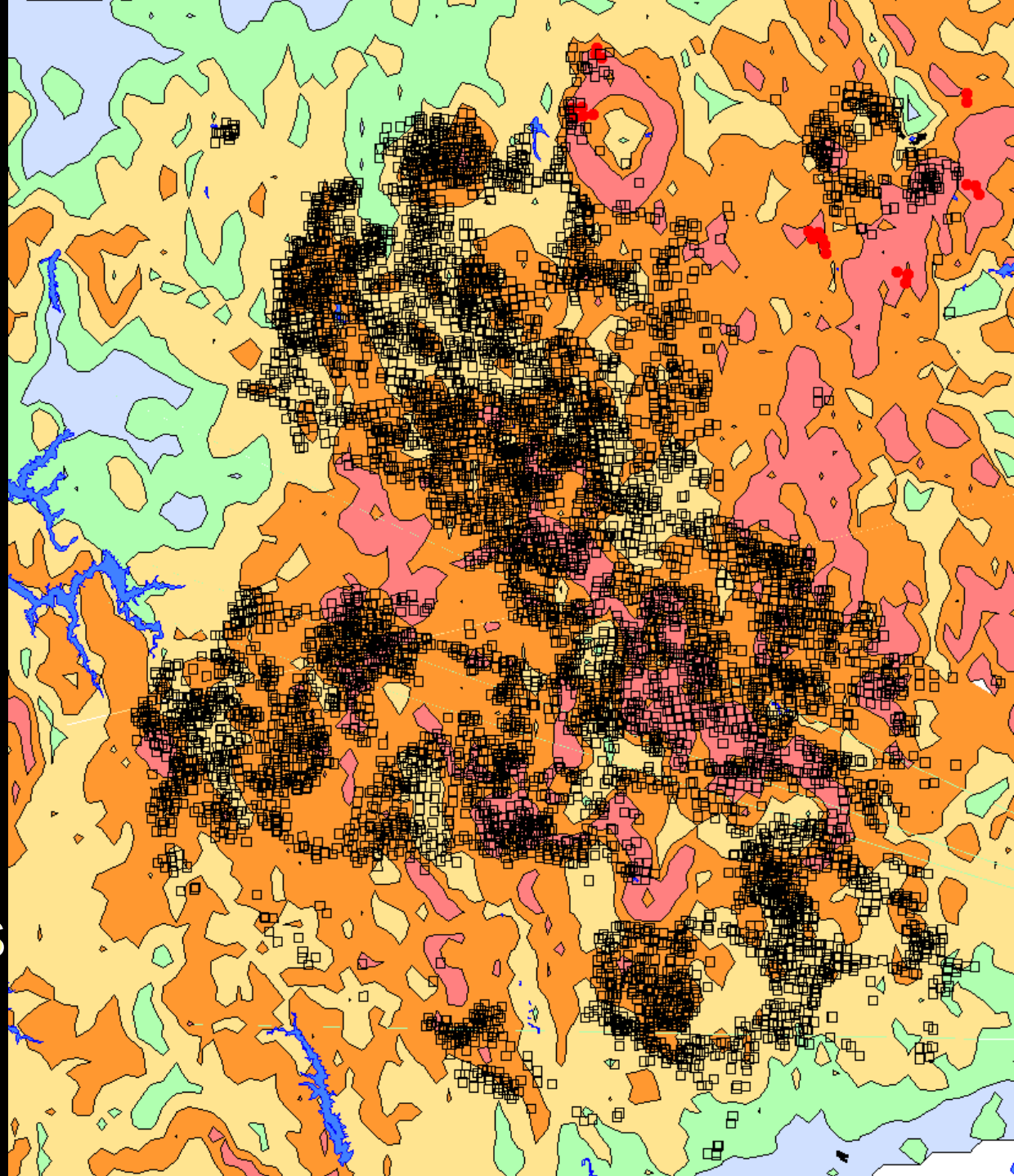
Mountain wind waves in proximity to complex fires, 17 Jan 03. [MODIS]

Alpine fire driven by
a Föehn-like Wind,
May 05. [McRae]

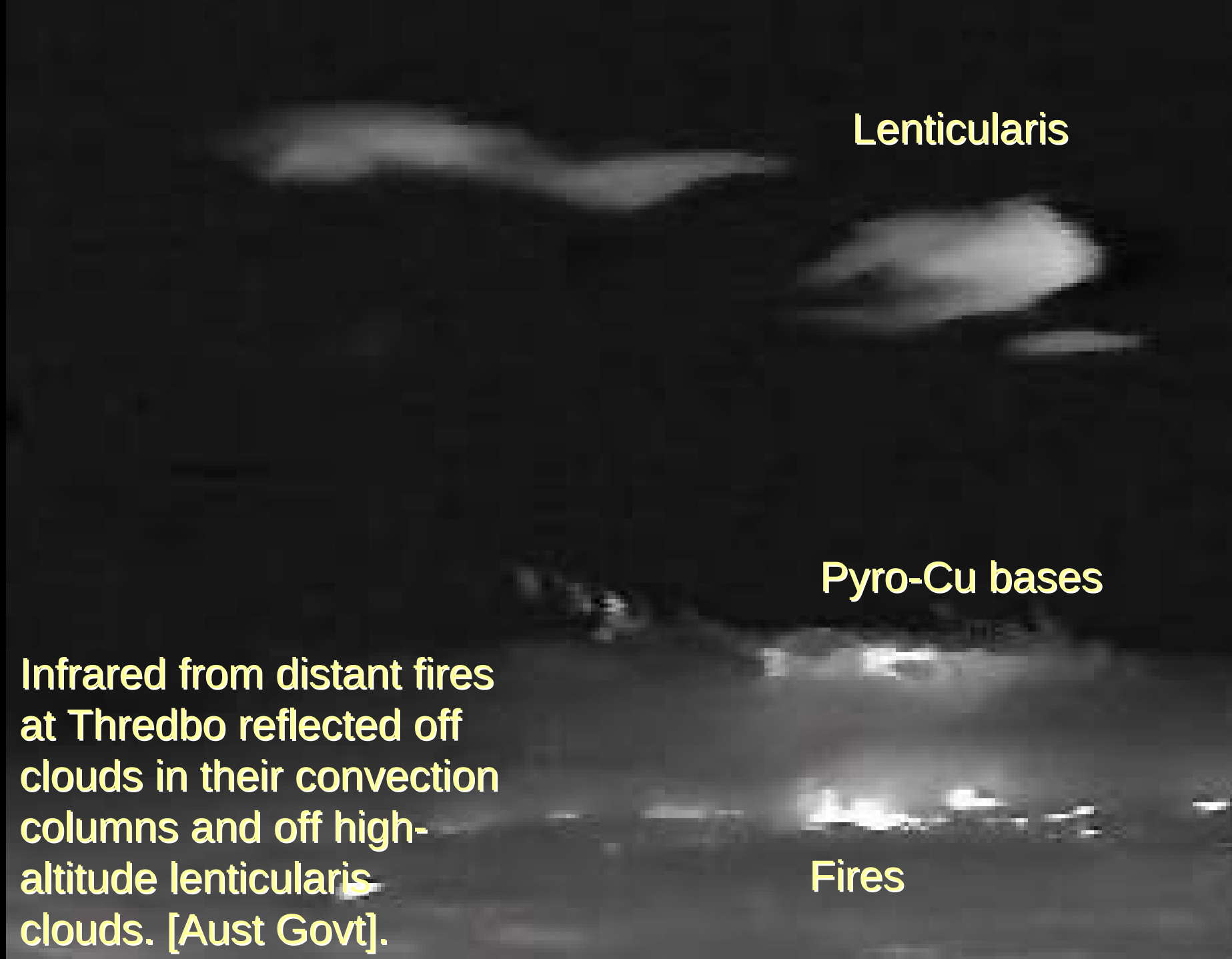
A canyon that experienced eruptive fire behaviour – 4 years of regeneration. [McRae]

Aerial view of lee-slope channelling event accelerating fire laterally, 18 Jan 03 [Wilkes]

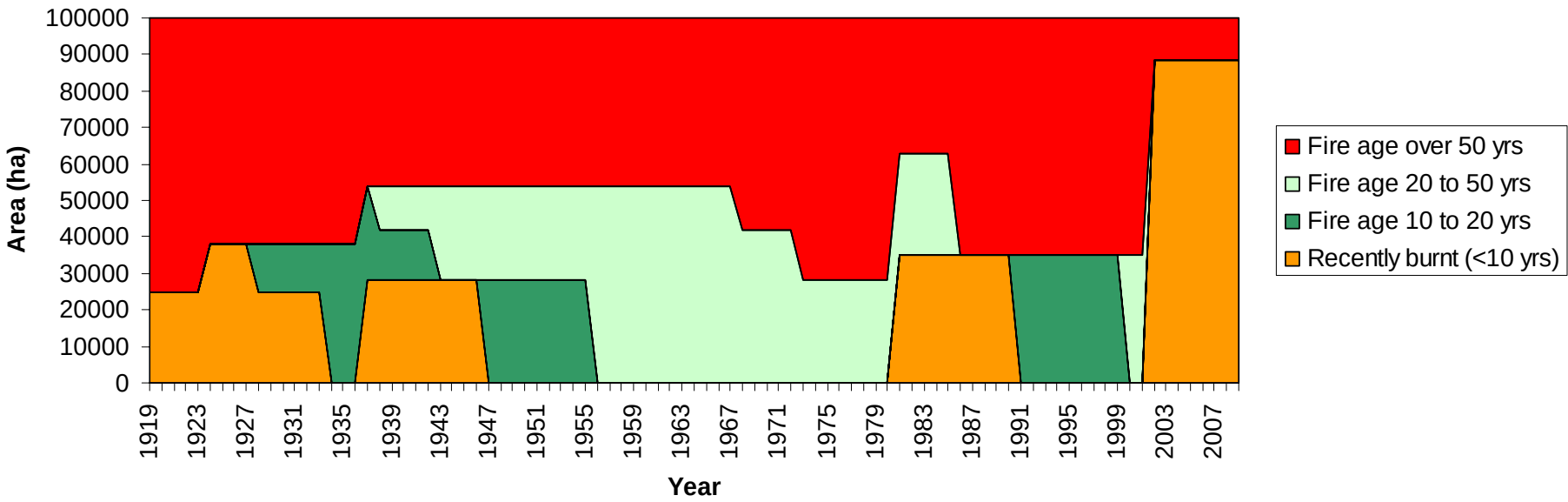
Detail of pyroCb at 20,000ft. [T.A.S.]

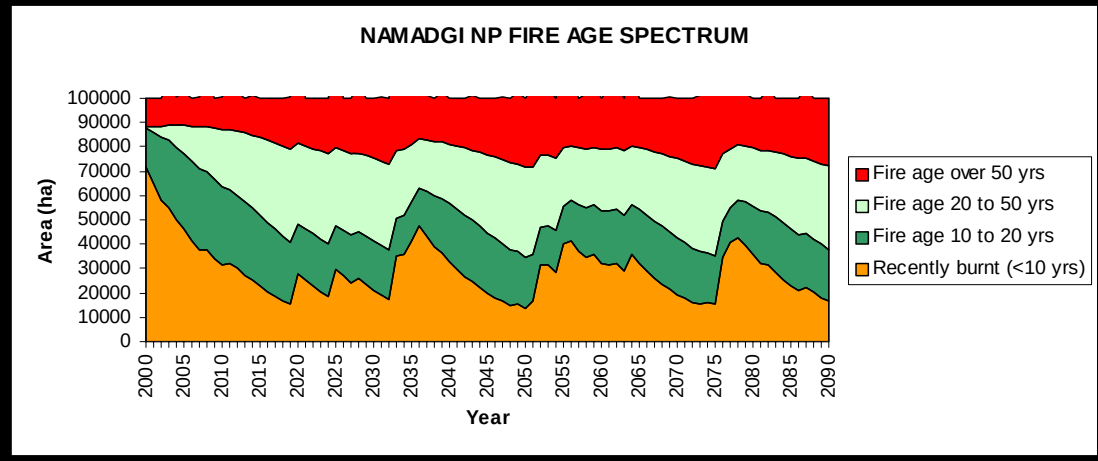


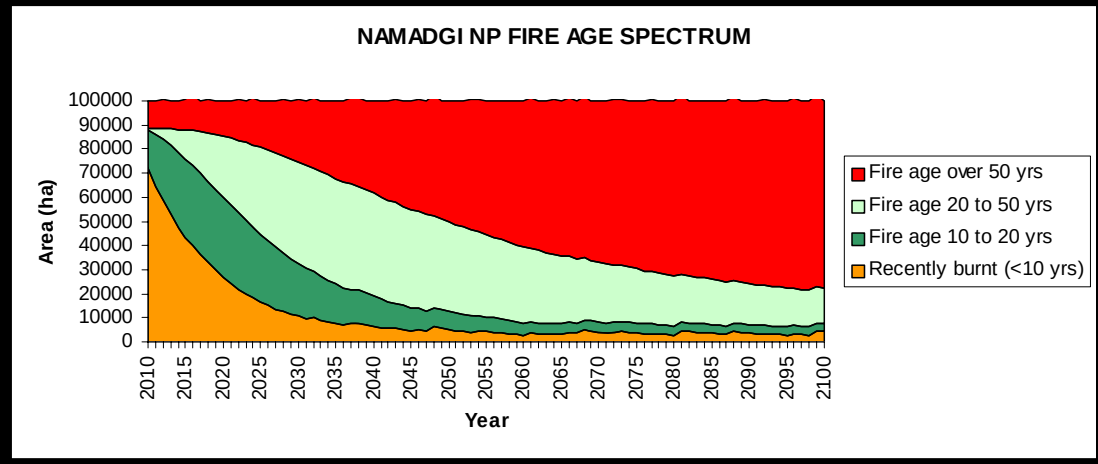
Comparison of evolution of Dec 06 Alpine Fires [MODIS data] and ruggedness. [McRae, BCRC]



Infrared from distant fires at Thredbo reflected off clouds in their convection columns and off high-altitude lenticularis clouds. [Aust Govt].


NAMADGI NP FIRE AGE SPECTRUM
Area (ha)
100000
90000
80000
70000
60000
50000
40000
30000
20000
10000
0
1919
1923
1927
1931
1935
1939
1943
1947
1951
1955
1959
1963
1967
1971
1975
1979
1983
1987
1991
1995
1999
2003
2007
Year
Fire age over 50 yrs
Fire age 20 to 50 yrs
Fire age 10 to 20 yrs
Recently burnt (<10 yrs)


NAMADGI NP FIRE AGE SPECTRUM
Area (ha)
100000
90000
80000
70000
60000
50000
40000
30000
20000
10000
0
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
2085
2090
Year
Fire age over 50 yrs
Fire age 20 to 50 yrs
Fire age 10 to 20 yrs
Recently burnt (<10 yrs)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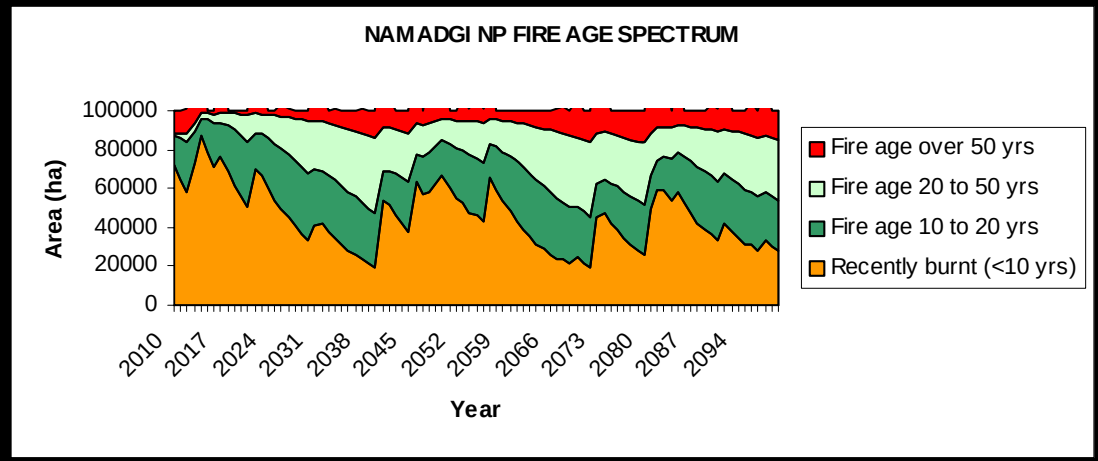
Area (ha)
100000
90000
80000
70000
60000
50000
40000
30000
20000
10000
0
2010
2015
2020
2025
2030
2035
2040
2045
2050
2055
2060
2065
2070
2075
2080
2085
2090
2095
2100
Year
Fire age over 50 yrs
Fire age 20 to 50 yrs
Fire age 10 to 20 yrs
Recently burnt (<10 yrs)


NAMADGI NP FIRE AGE SPECTRUM
Area (ha)
100000
80000
60000
40000
20000
0
2010
2017
2024
2031
2038
2045
2052
2059
2066
2073
2080
2087
2094
Year
Fire age over 50 yrs
Fire age 20 to 50 yrs
Fire age 10 to 20 yrs
Recently burnt (<10 yrs)

Extreme fuel loads, *E. delegatensis* forest, Dec 02. [McRae, BCRC]

SUMMARY

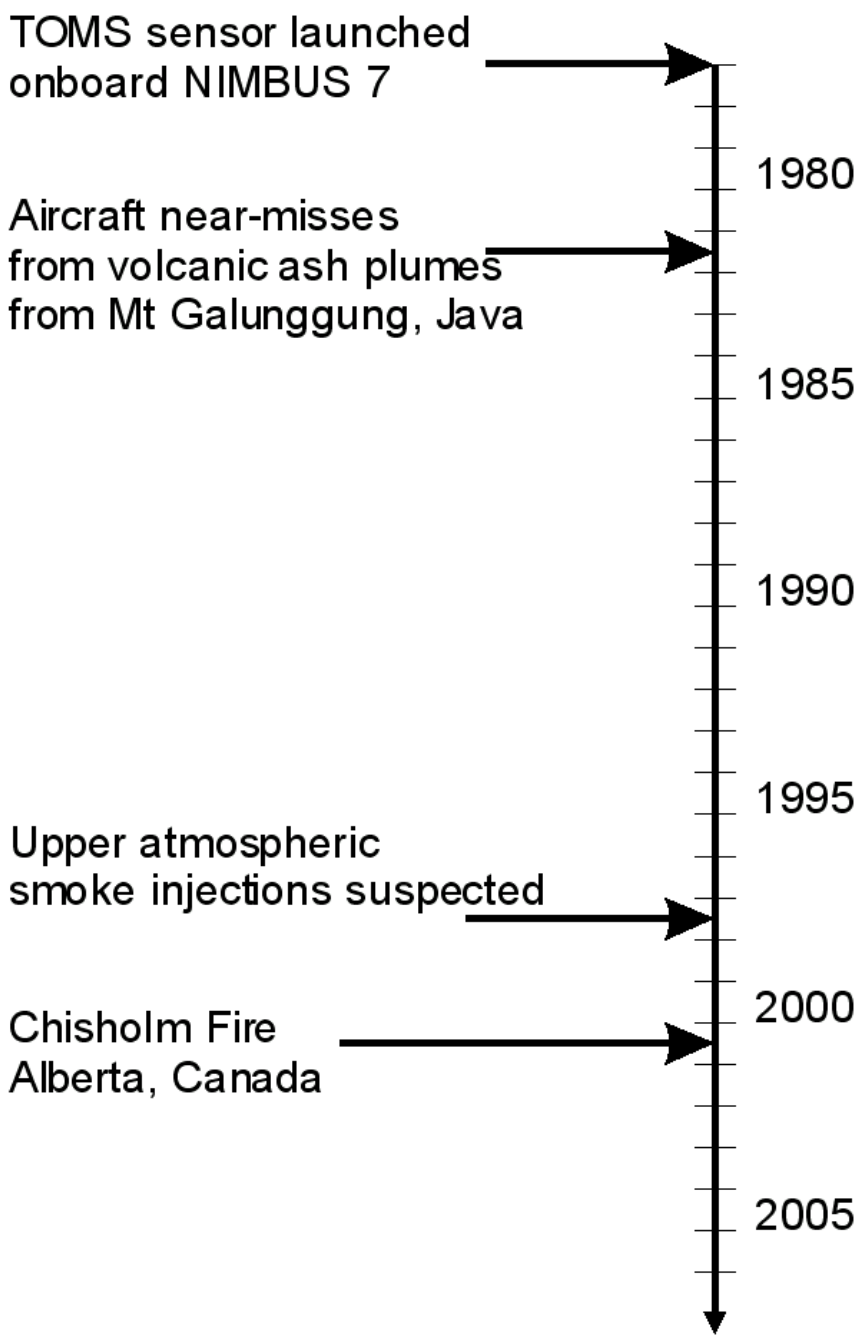
- In particular, the high country exhibits the following characteristics:
  - A landscape that is prone to multiple ignitions in places where fire suppression is most difficult.
  - A landscape that is prone to a range of processes that can affect the probabilities of fire escalation.
  - A landscape that stores the effects of past large fires in the landscape-scale fuel-age distribution – the last big fire primes the landscape for the next one.

CLIMATE CHANGE

- How would climate change manifest itself in the Australian wildfire arena?
- Examine data from 30 years of global satellite monitoring for major upper atmospheric particulates injection events (includes volcanoes, dust storms and nuclear detonations).

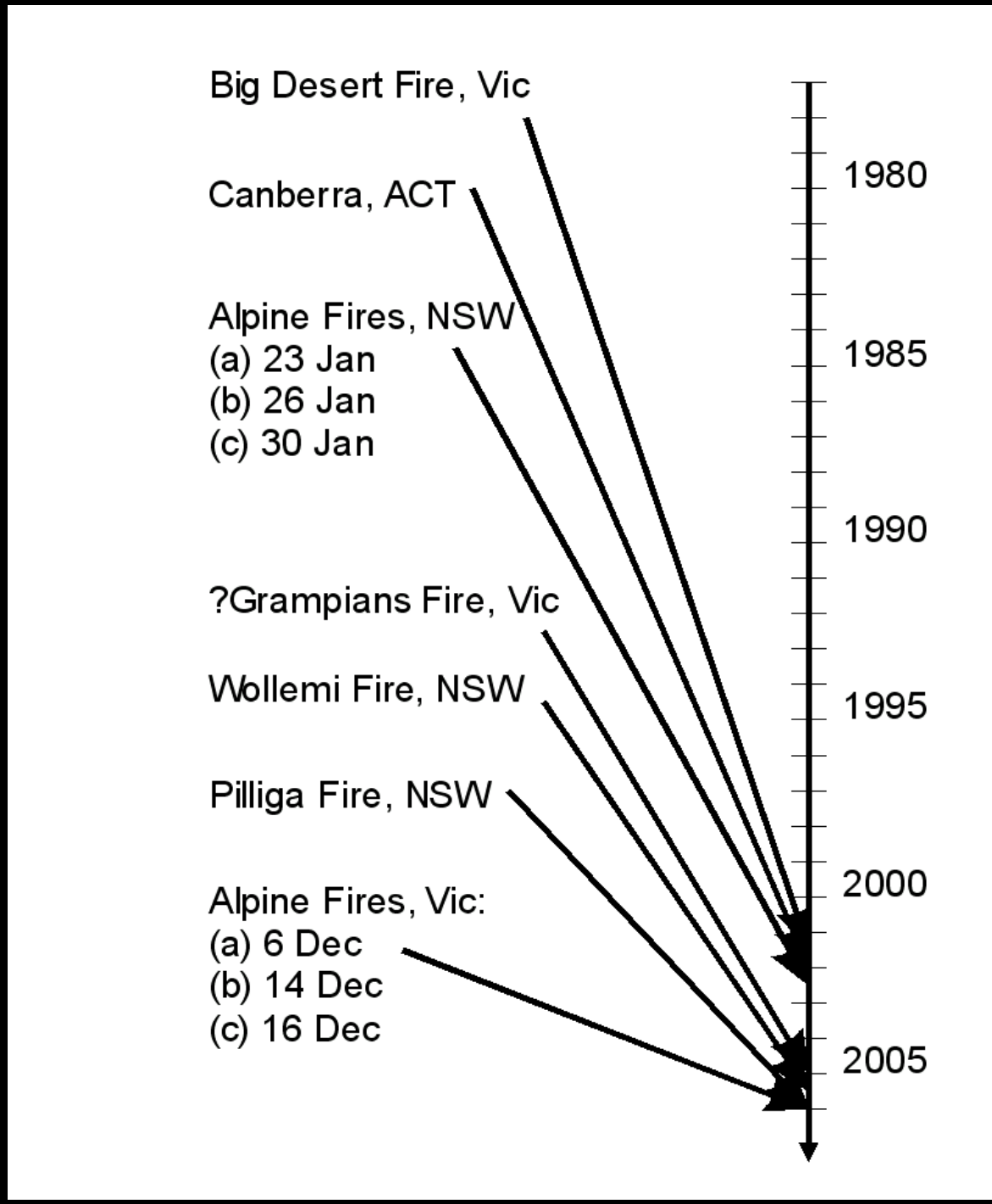
Global pyroCb hunt

- Chisholm = first confirmed pyroCb and UTLS injection



Aust pyroCb data

- Canberra = first well observed case study & first validation of “nuclear winter” hypothesis.
- 1983 Ash Wednesday did not earn a place on this list.



QUESTIONS?