MLS observations of emissions from the Australian bush fires of February 2009

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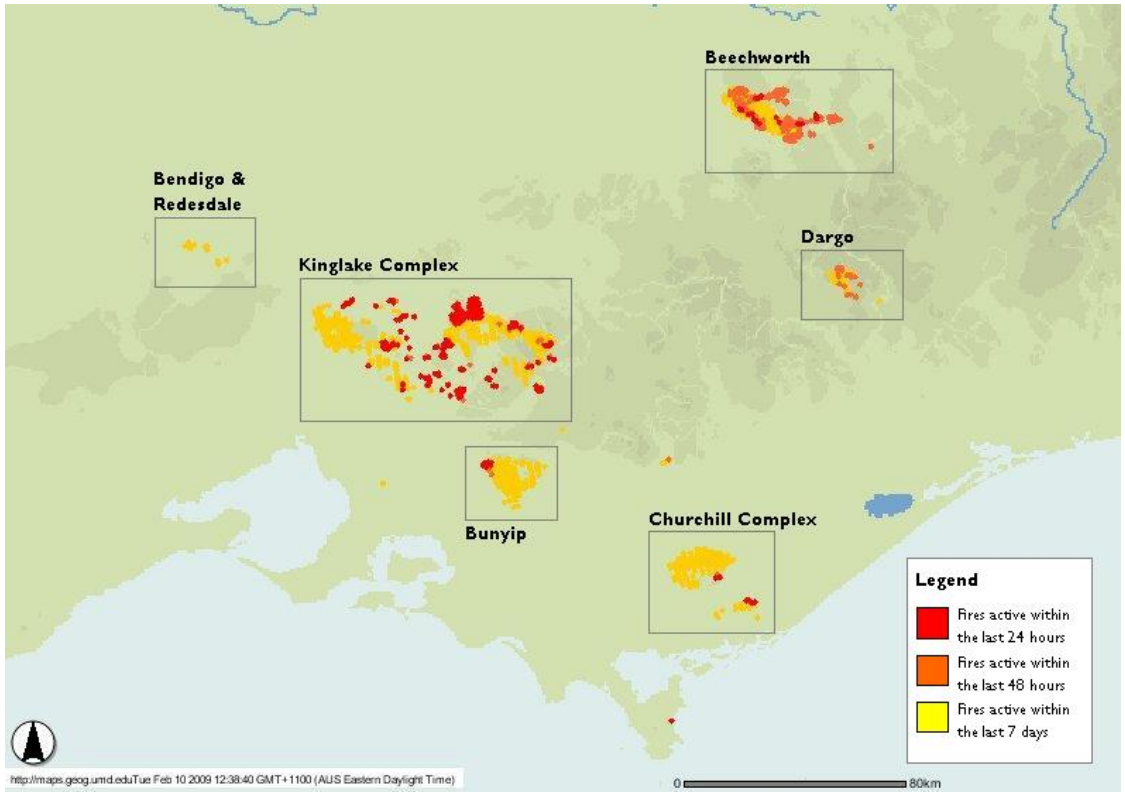
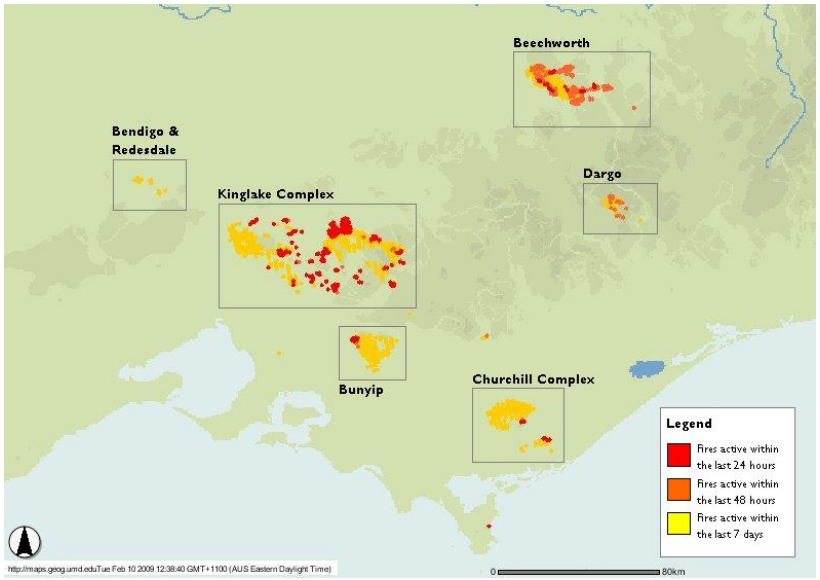
(with thanks to the entire MLS team at NASA JPL)

The University of Edinburgh

September 2, 2009

Australia for orientation

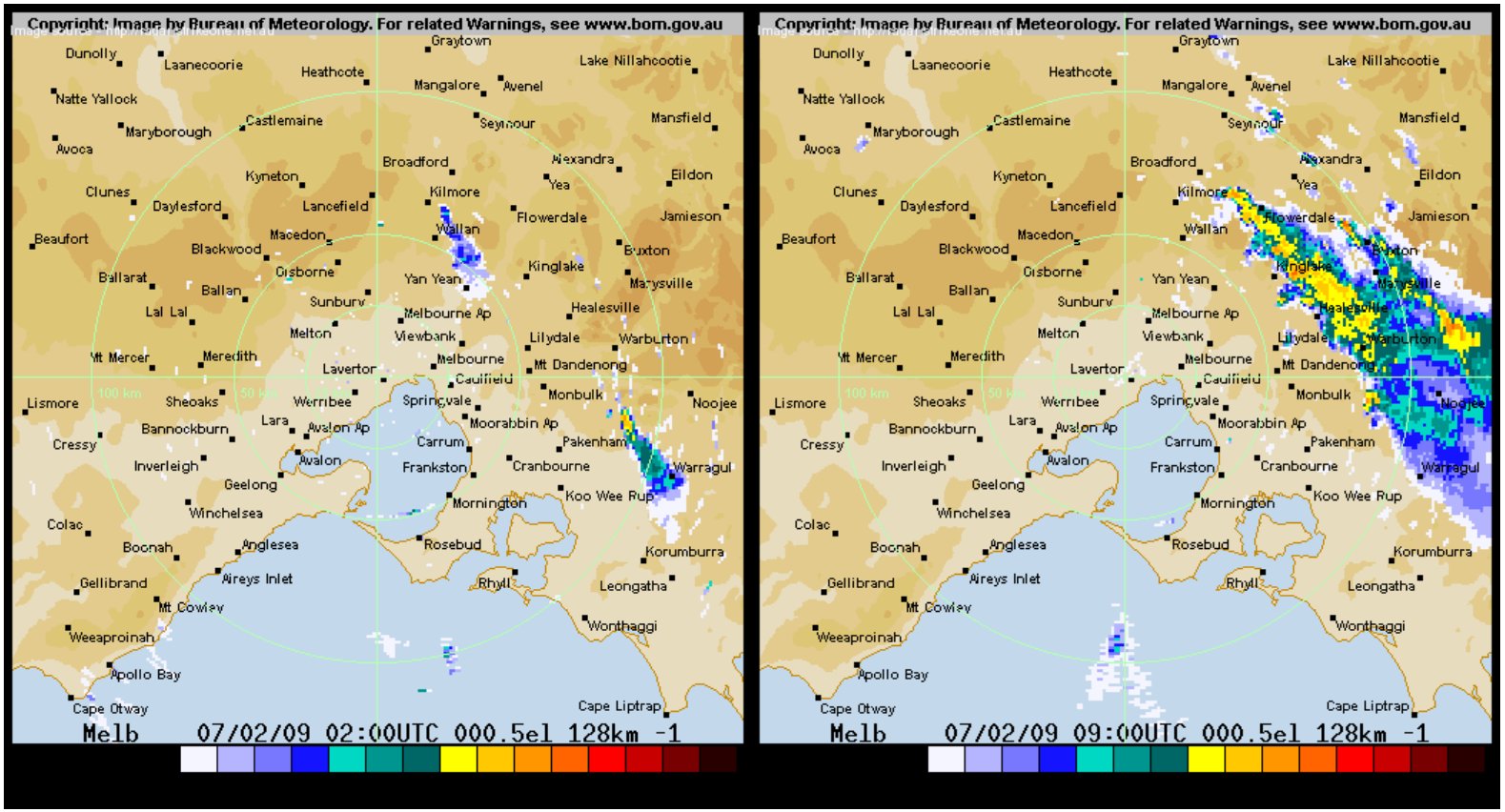


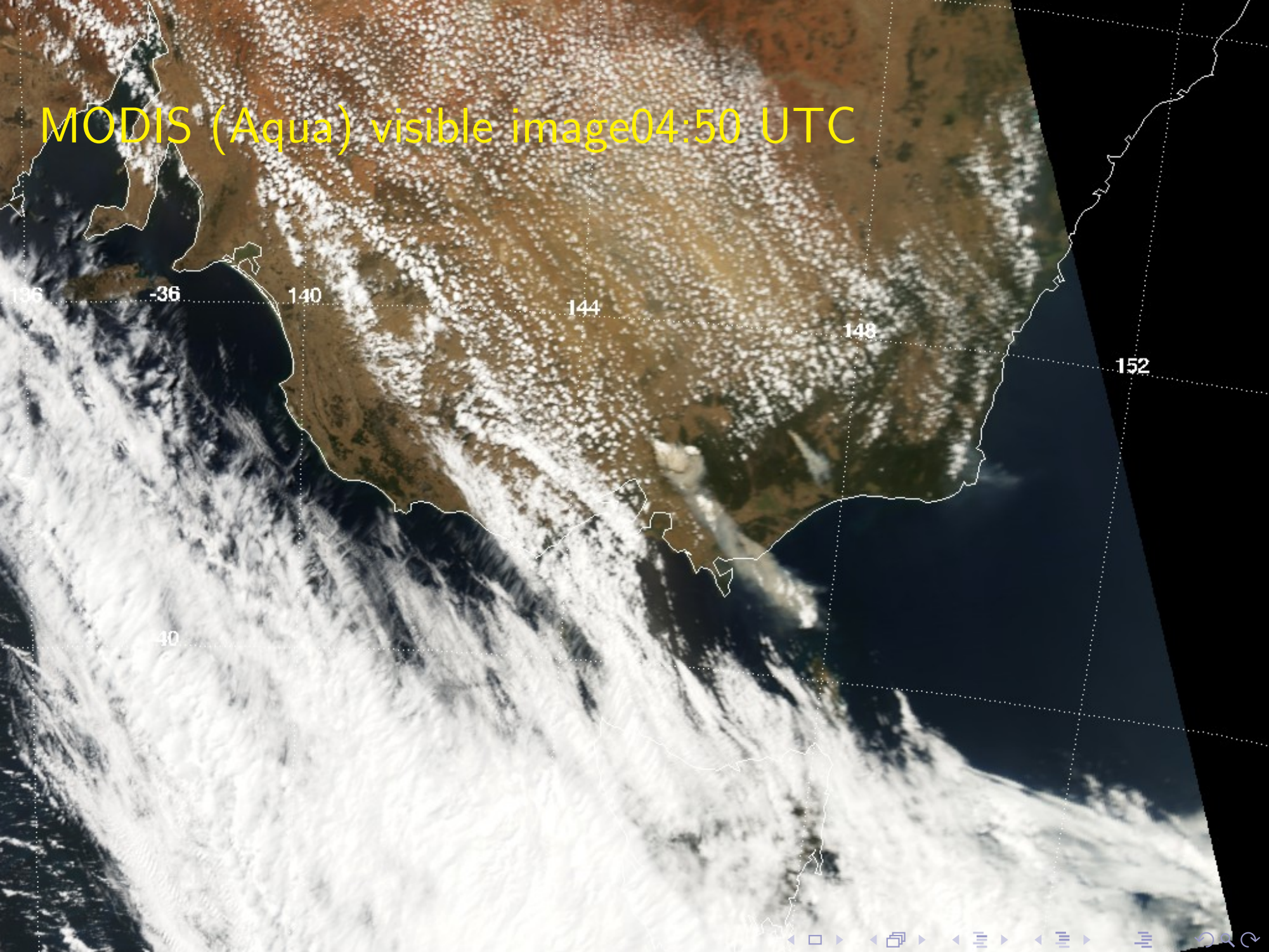


← Main fire areas

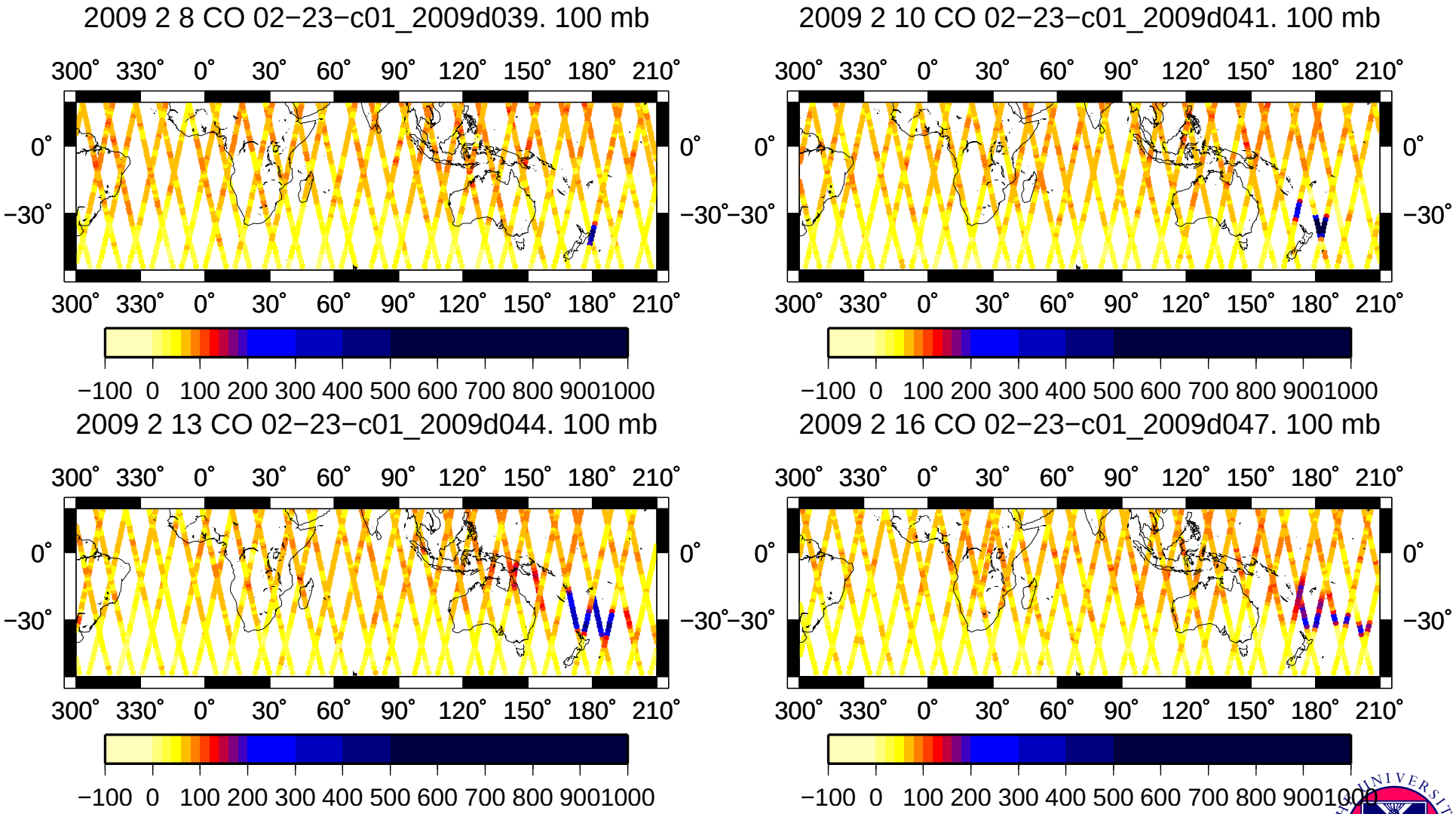
Rain radar images (showing smoke)

↓



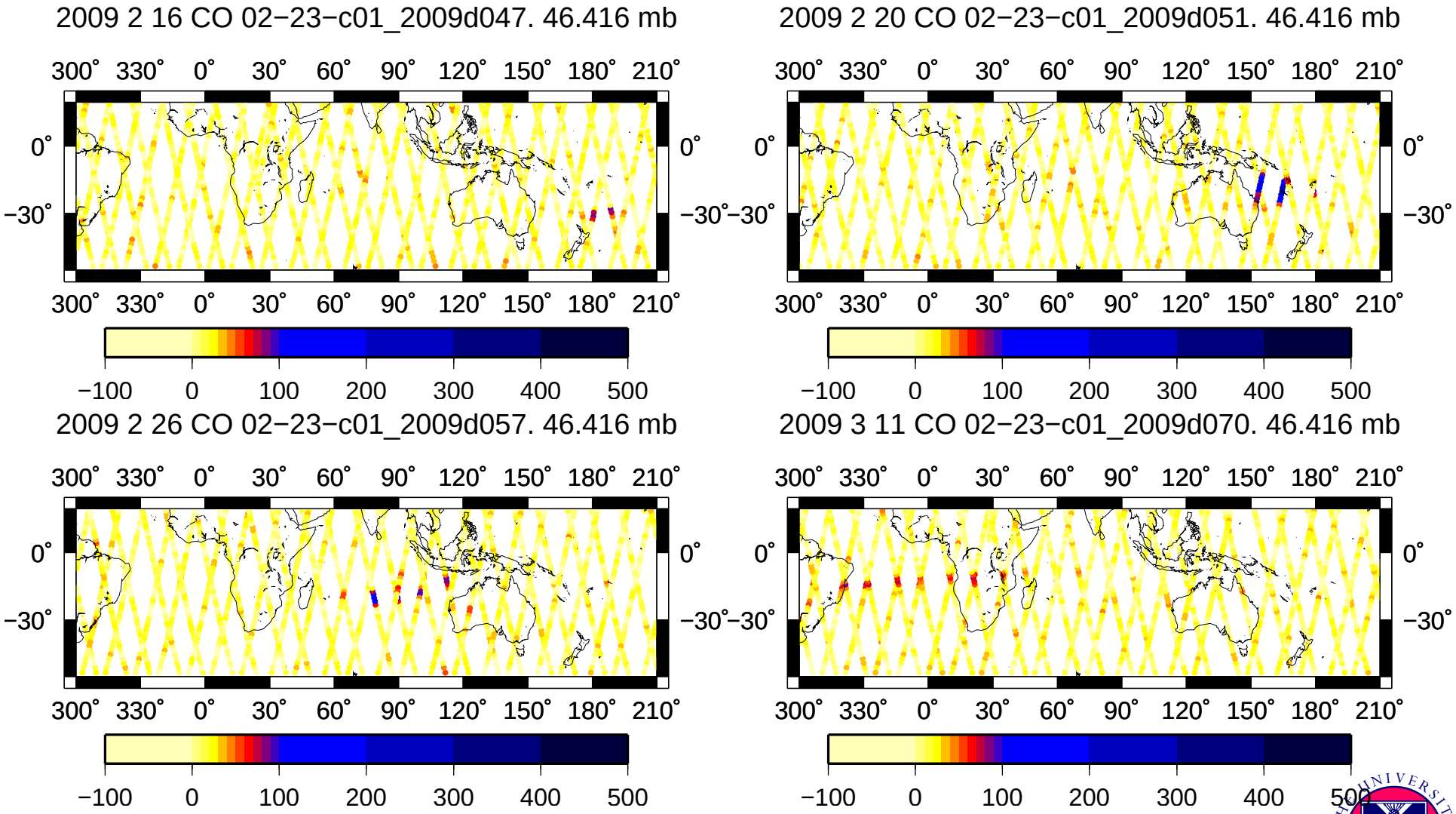

MODIS (Aqua) visible image04:50 UTC
136
-36
140
144
148
152
40

MLS observations of CO at 100 hPa (Mixing ratio in ppbv)



Note: "2009 2 8" means "7 **and** 8 Feb 2009"

MLS observations of CO at 46 hPa (Mixing ratio in ppbv)

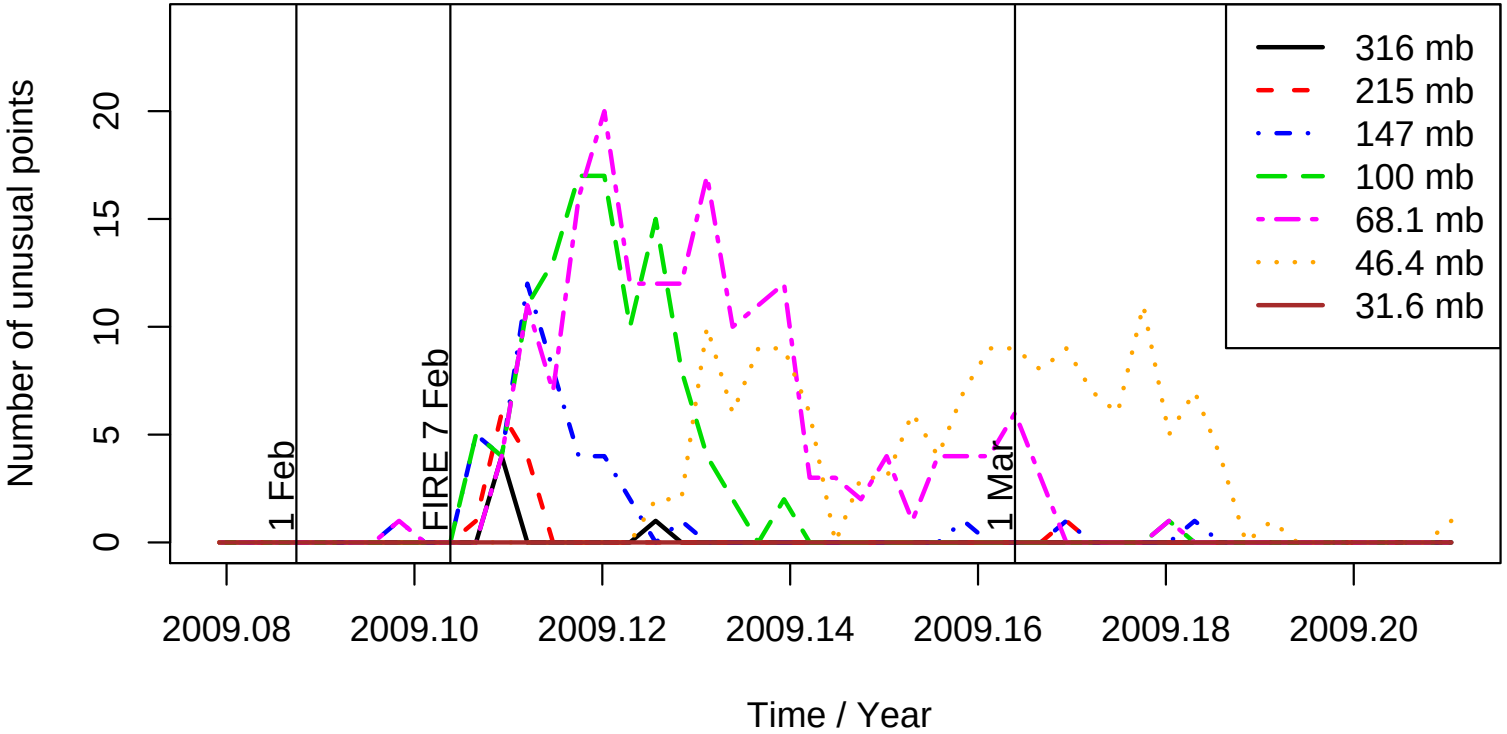


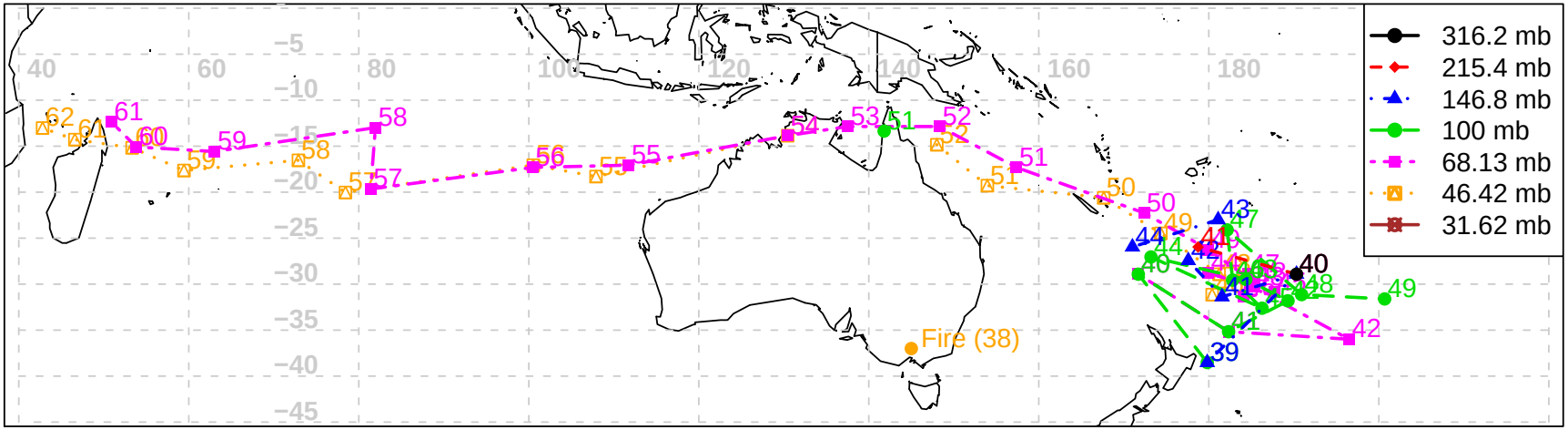
Note: "2009 2 16" means "15 **and** 16 Feb 2009"

Questions:

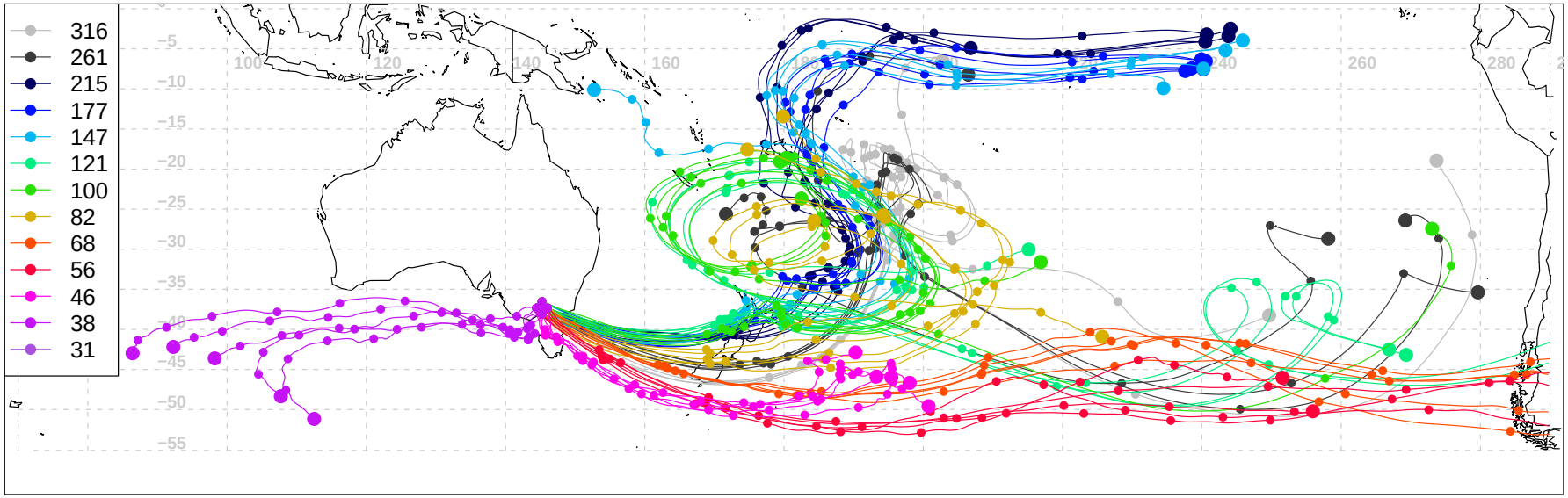
- What range of altitudes are affected by this event?
- Can we show that the unusual airmass comes from the fire of 7 February?
- Does MLS observe enhancements of any other species?

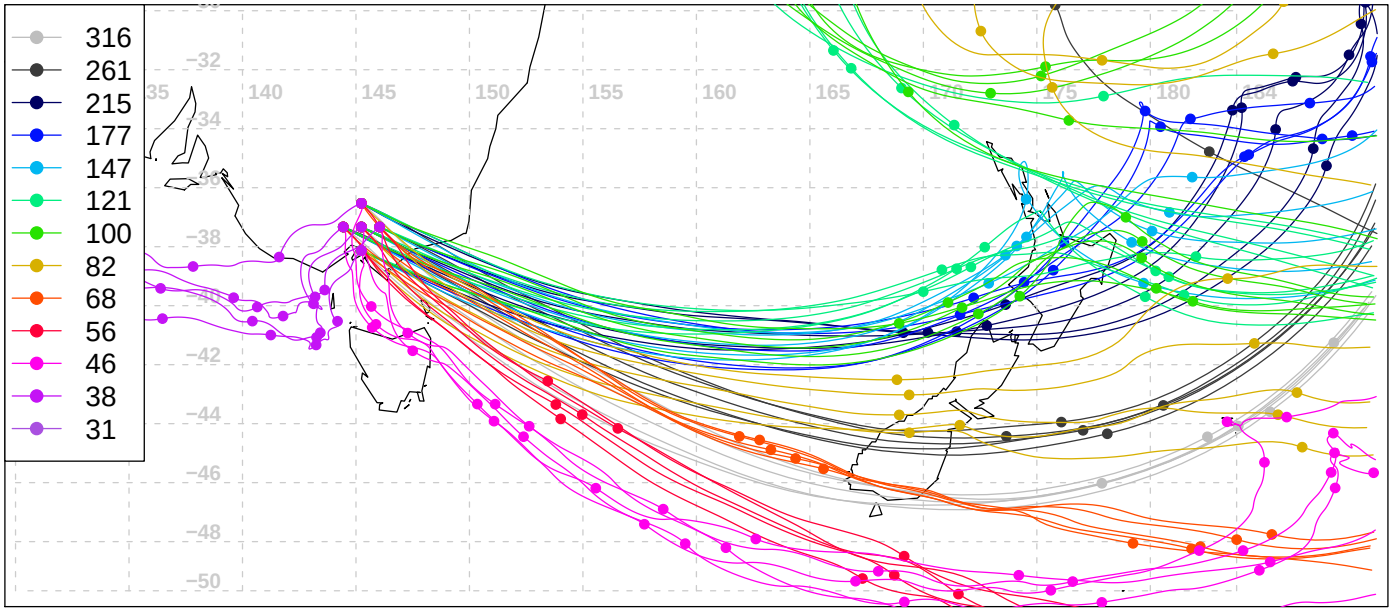
Tracking the plume



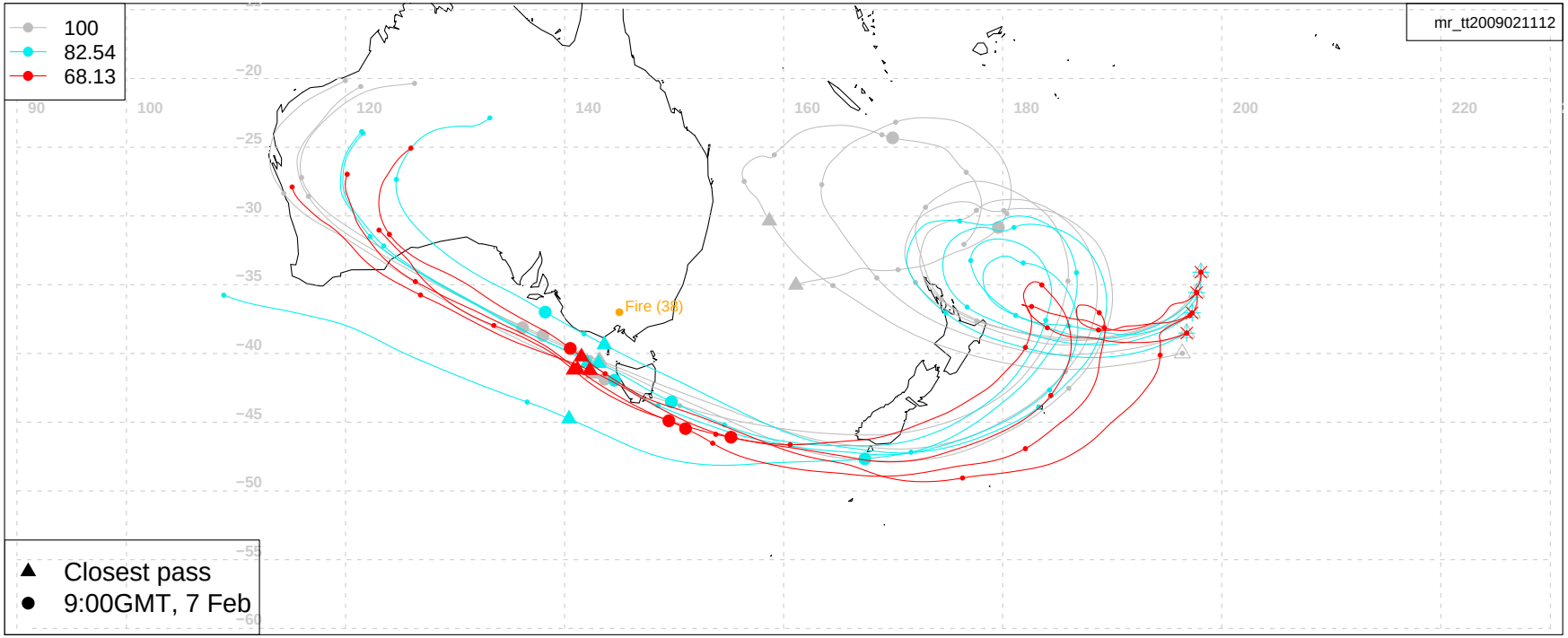


10-day forward trajectories from fire



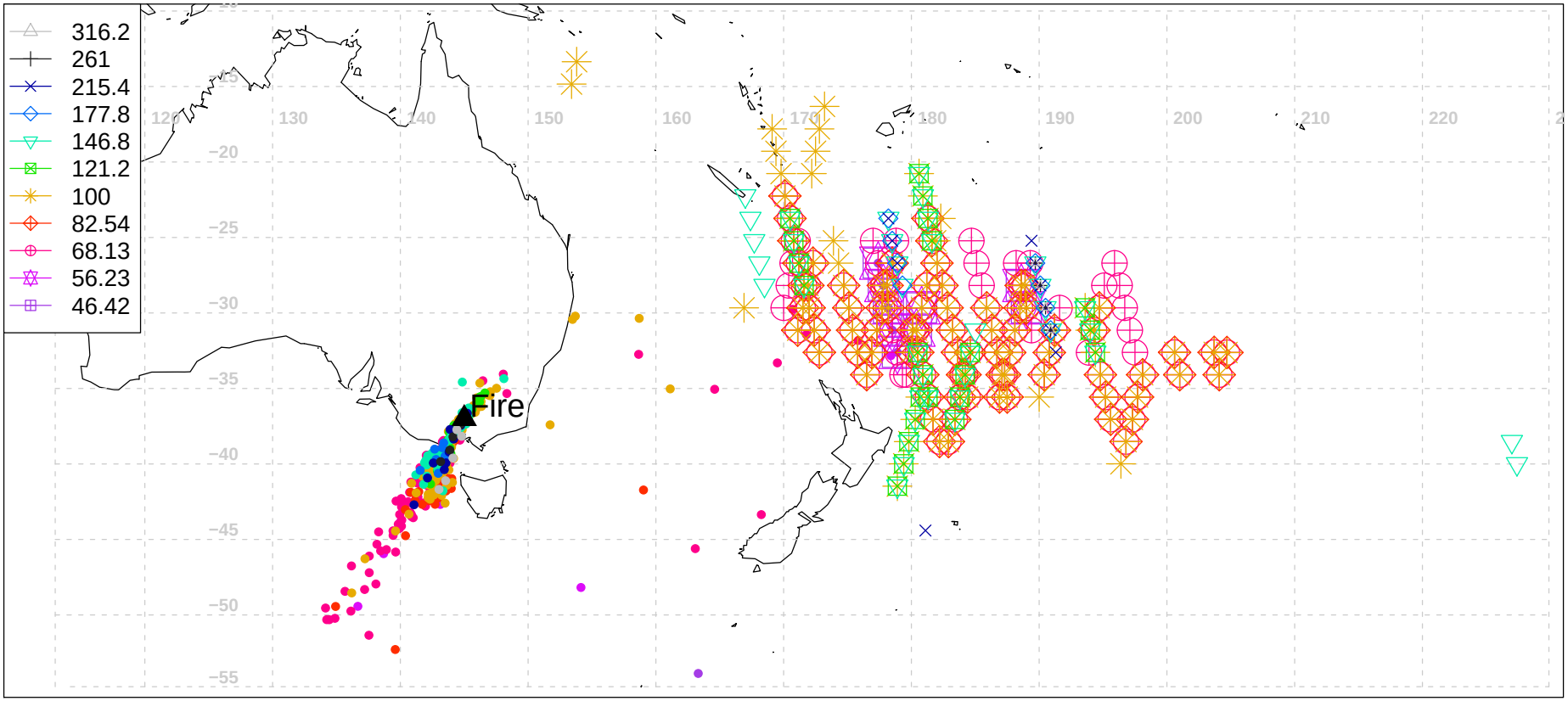


Back trajectories from observations

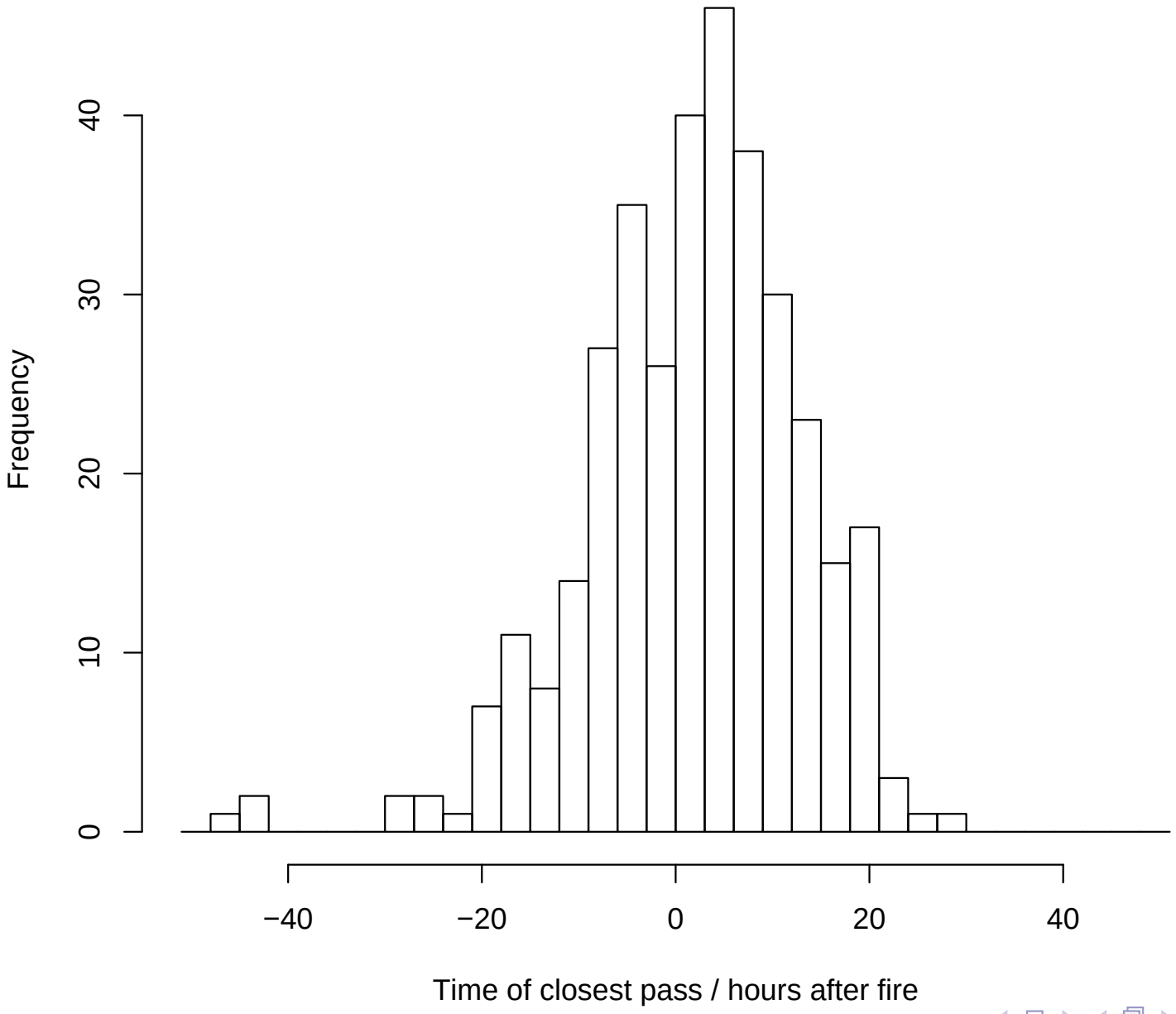


- Example showing trajectories launched near 12:00UTC on 11 Feb 2009
- Trajectories from BADC trajectory service `http://badc.nerc.ac.uk`
- Triangles are point of closest pass to fire
- Filled circles: Position at nominal fire time (09:00UTC on 7 Feb 2009)

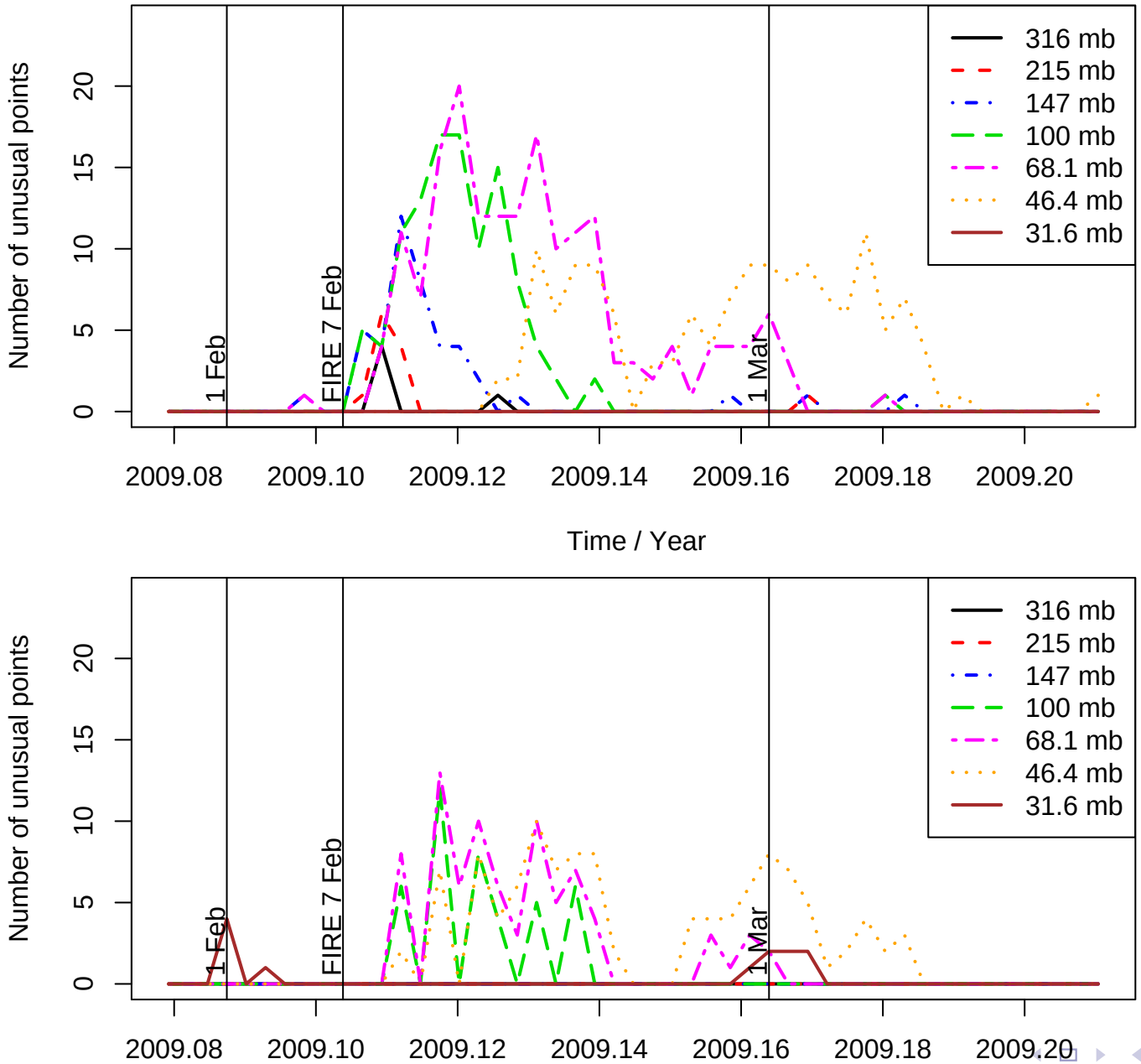
Back trajectories from observations: summary



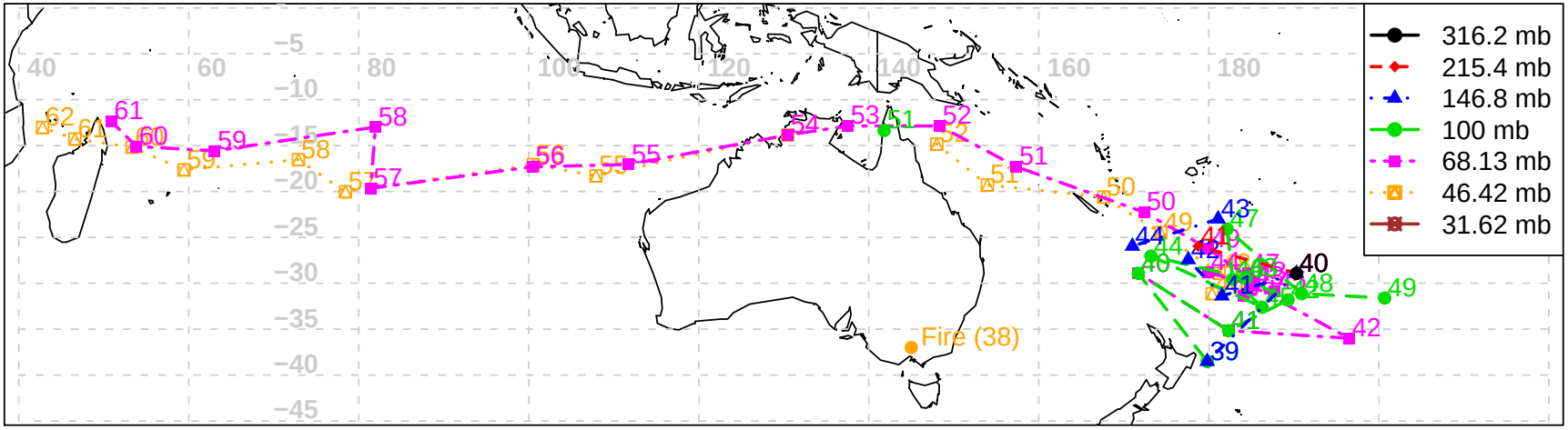
Back trajectories from observations

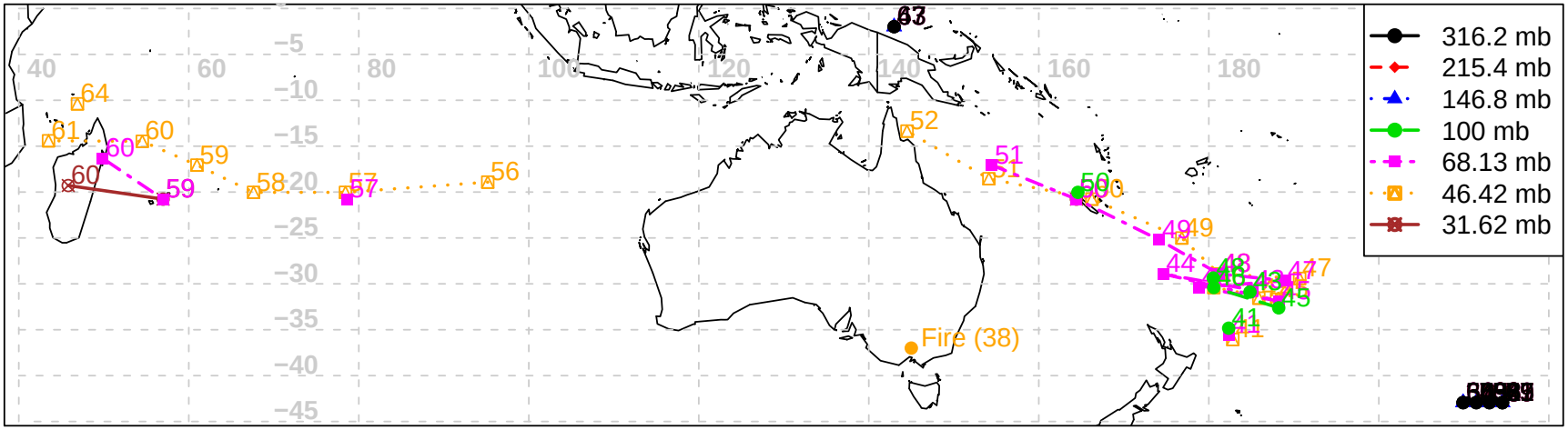


Number of unusual obs: CO (top) and HCN (bottom)

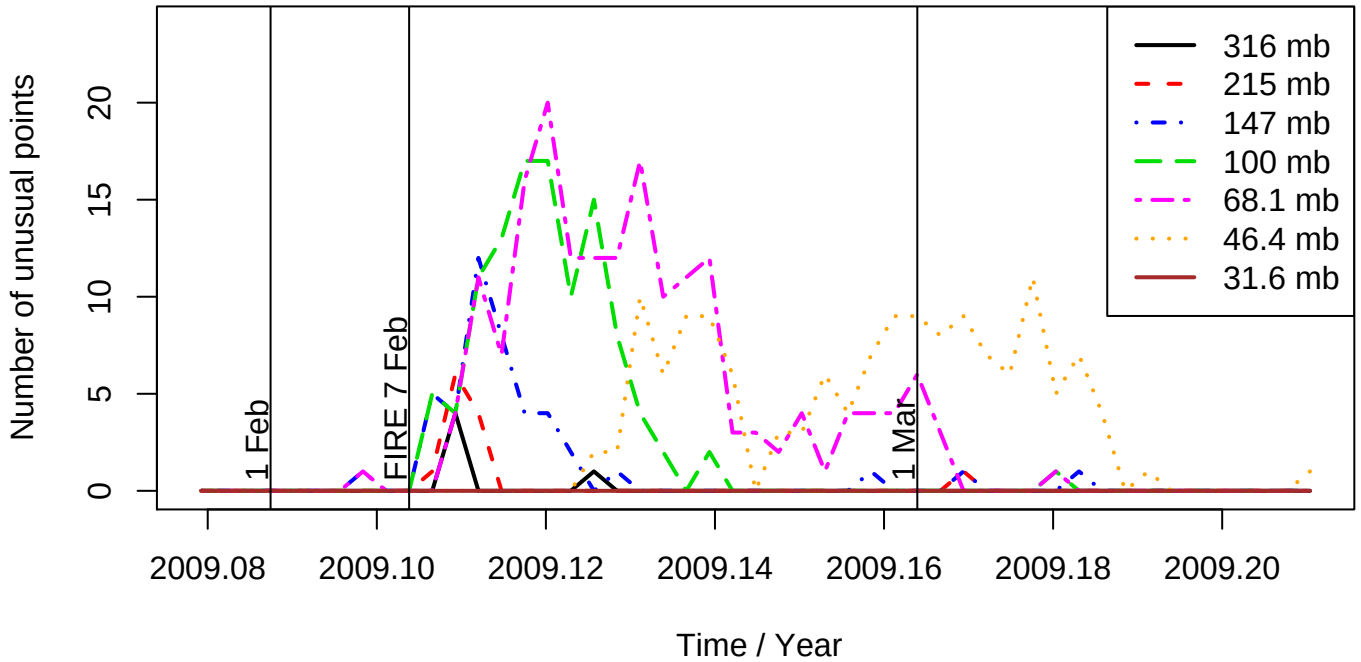


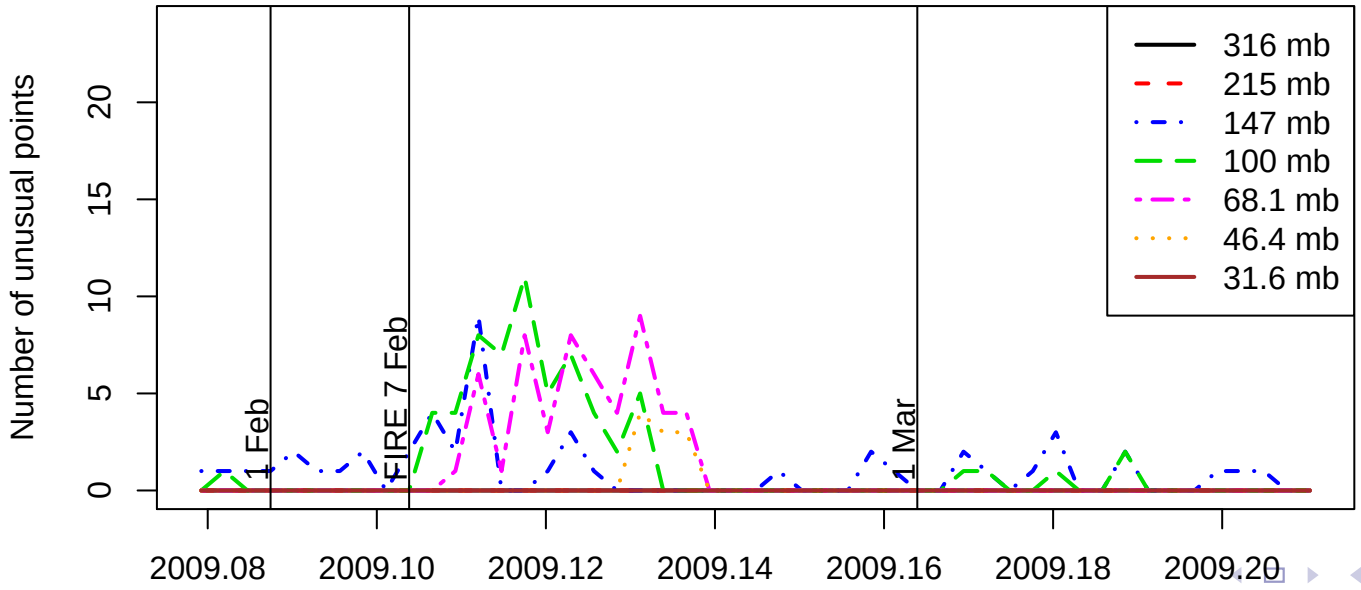
Tracking the plume: CO (top) and HCN (bottom)



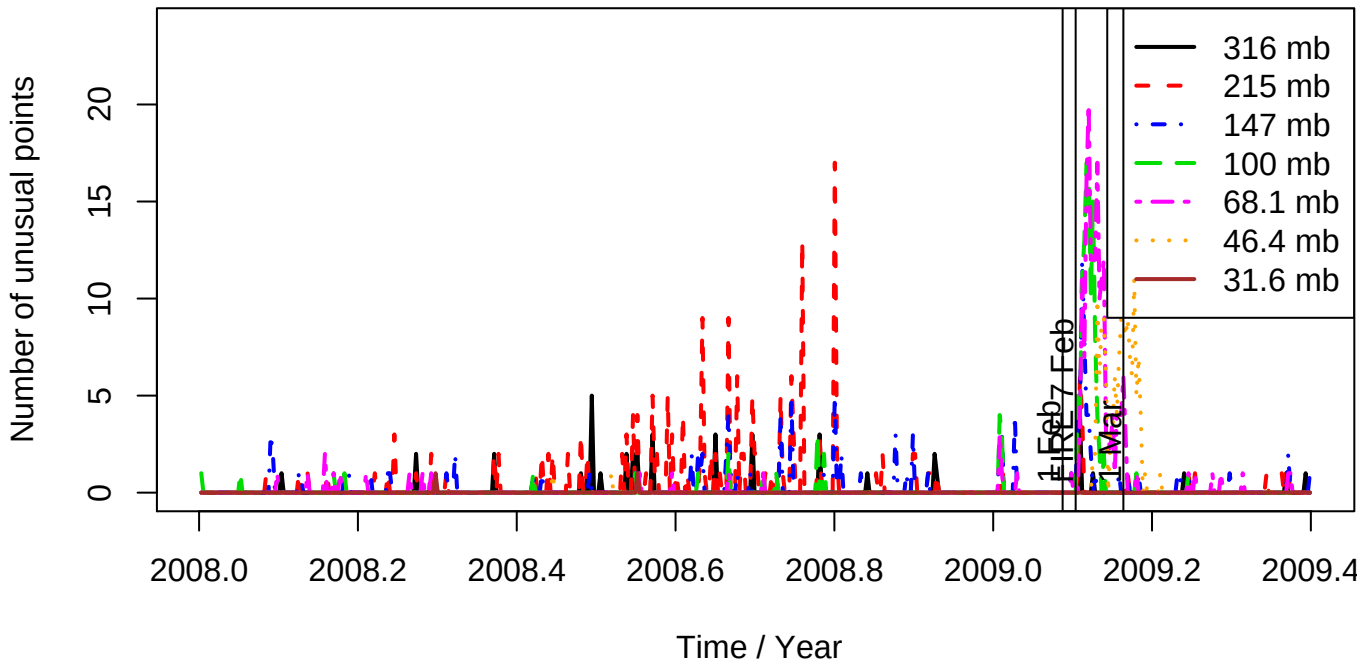


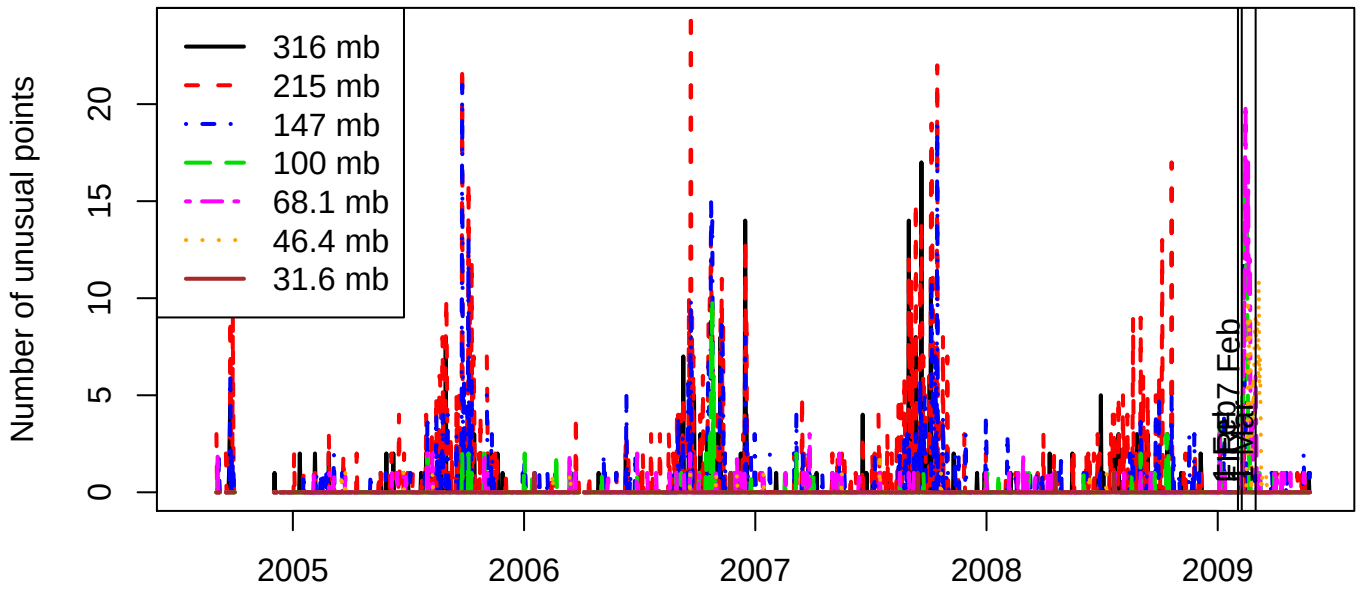
Number of unusual obs: CO (top) and CH_3CN (640 GHz)





How unusual was the event?





Summary

- In February/March 2009 MLS observed an unusual airmass in the lower stratosphere containing high concentrations of several biomass-burning products.
- Trajectory calculations link this airmass to the large bush fires in the state of Victoria, Australia.
- The event was observed by several other instruments in the A-Train, notably by CALIPSO.
- There is no other event of the same type and magnitude in the 5-year MLS dataset.