

UPPER LEVEL DRY AIR AND REDUCED SURFACE HUMIDITY

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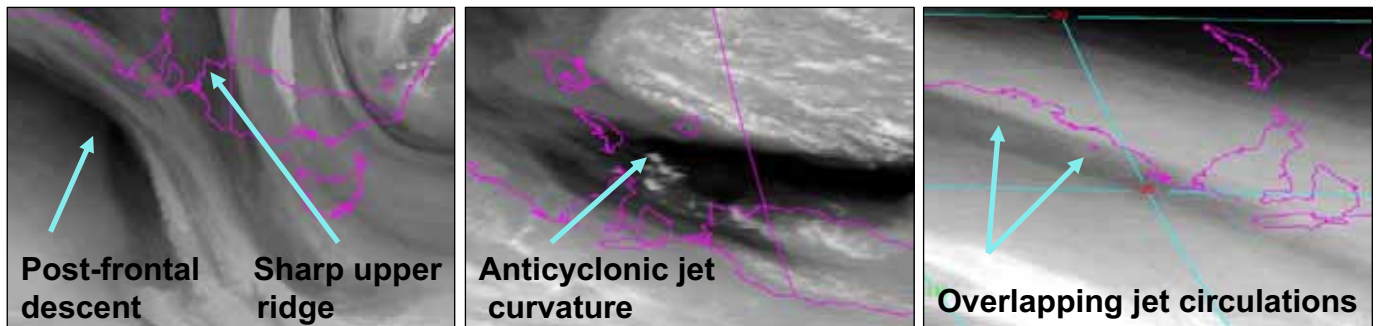
Why the link to fire weather forecasting?

On a number of recent fire events, such as the 18 January 2003 fires in the Canberra suburbs, abrupt and extreme reductions in surface humidity were observed.

Given the short response time of fine fuels to changes in atmospheric humidity, these humidity decreases may affect fire behaviour.

These reductions have been linked to bands of dry air, or “dry slots”, some 5-7 km above the surface. As these dry slots can frequently be seen in the 6.7 μ wavelength water vapour (WV) channel satellite imagery, then monitoring these dry slots may be a potential short-range forecast tool to enhance fire weather services.

DRY SLOTS are a consequence of the ascent and descent in the upper levels of the troposphere due to jet stream and upper trough circulations. They are a regular feature and have a range of morphologies and lifetimes of many hours. EG:



How does this air reach the surface?

- More than 70% occur with troughs/fronts
- Most often occur in mid-afternoon, so dry convective mixing seems a major factor.
- Contributing factors include:
 - Pre-frontal updrafts
 - Self-destabilisation above mixed layer
 - Low-level jet entrance vertical circulations
 - Post-frontal descent
 - Mountain-wave breaking / Lee trough circulations

