

## Underlying structures in the valley winds during IOP6

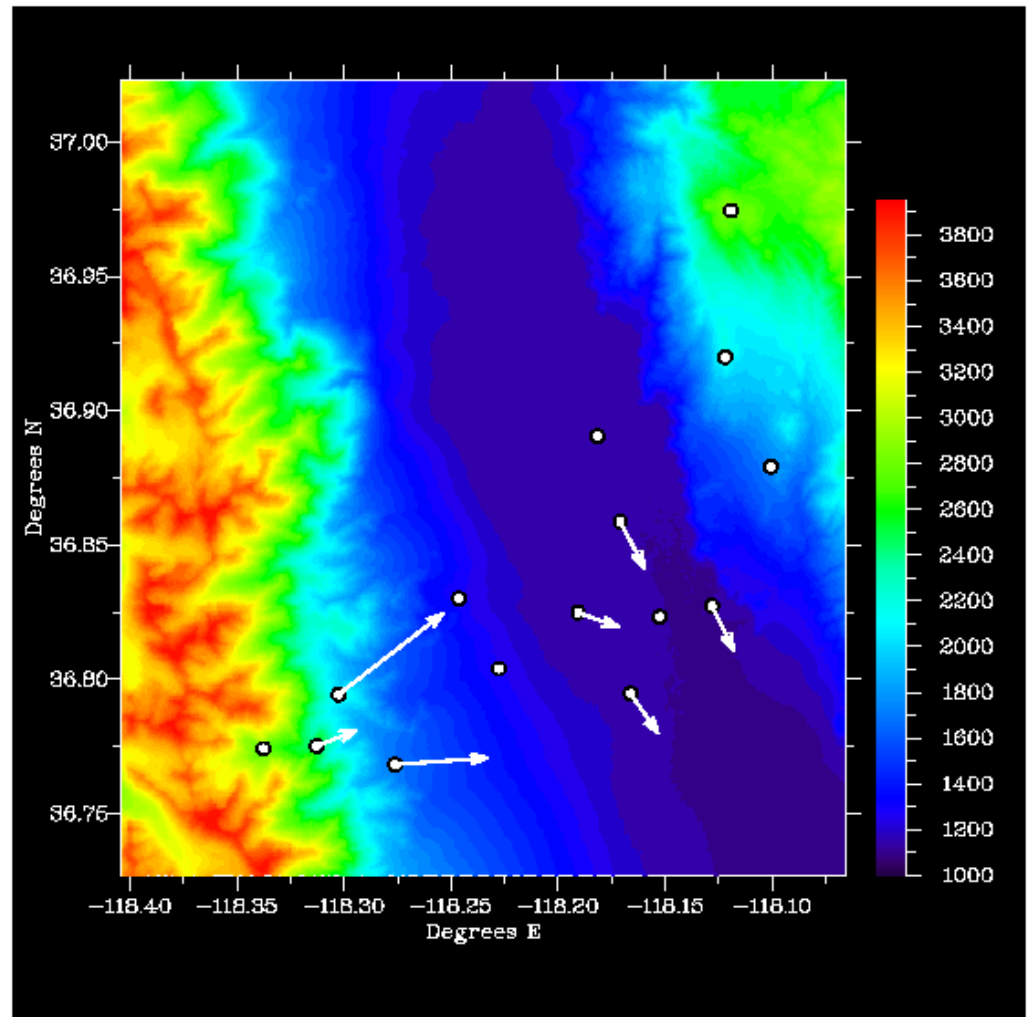
Ralph Burton, Ian Brooks, Stephen Mobbs

- A time series of the available AWS was constructed for 24<sup>th</sup> - 26<sup>th</sup> March and subjected to a principal components analysis
- This allows the dominant, underlying patterns in the wind vectors to be determined
- The EOFs (i.e. the underlying patterns) can be interpreted in a physically meaningful manner, and are *significant*
- Can the PC scores (i.e. how “important” each of the EOFs are; vary in time) be correlated with other parameters?  
(ongoing)

### EOF #1 *The dominant wind pattern in the valley*

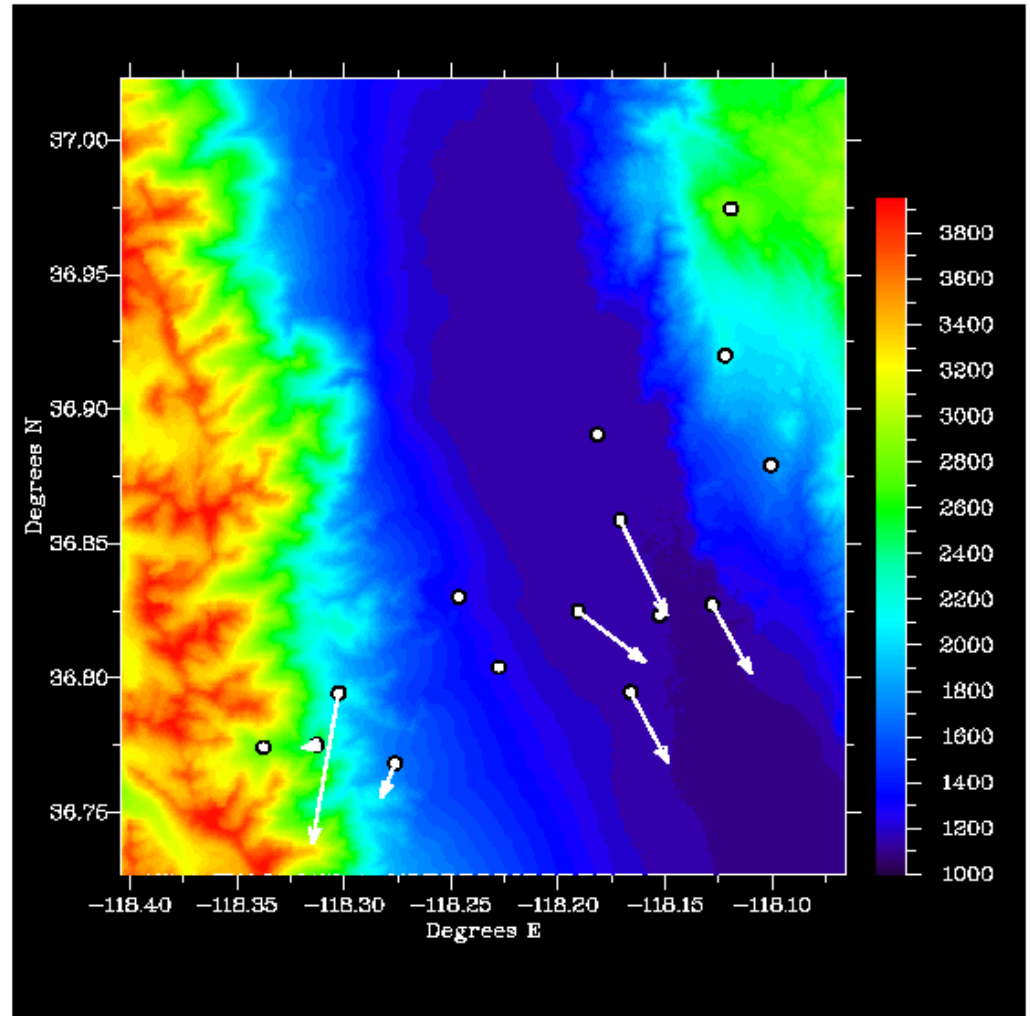
When PC1 is positive, this represents a night-time drainage-type flow, with winds directed down the slopes of the Sierras and also down the Owens Valley.

When PC1 is negative, this EOF represents an anabatic type flow, up the slopes of the Sierra and up the Owens Valley.



*EOF #2 Alters the relative strengths of the upslope and downslope winds*

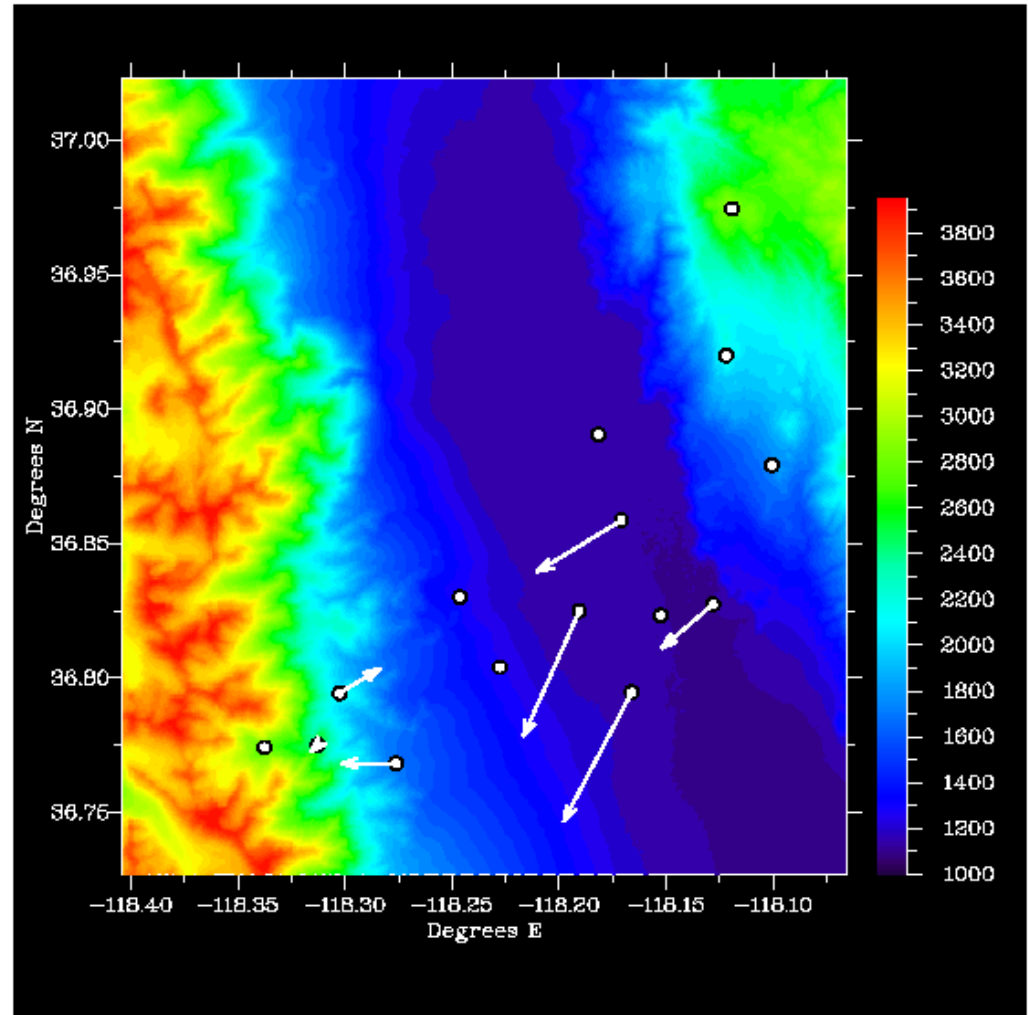
This is similar to EOF1, but represents a mix of katabatic and anabatic flows. The flow is still along the valley for this pattern.



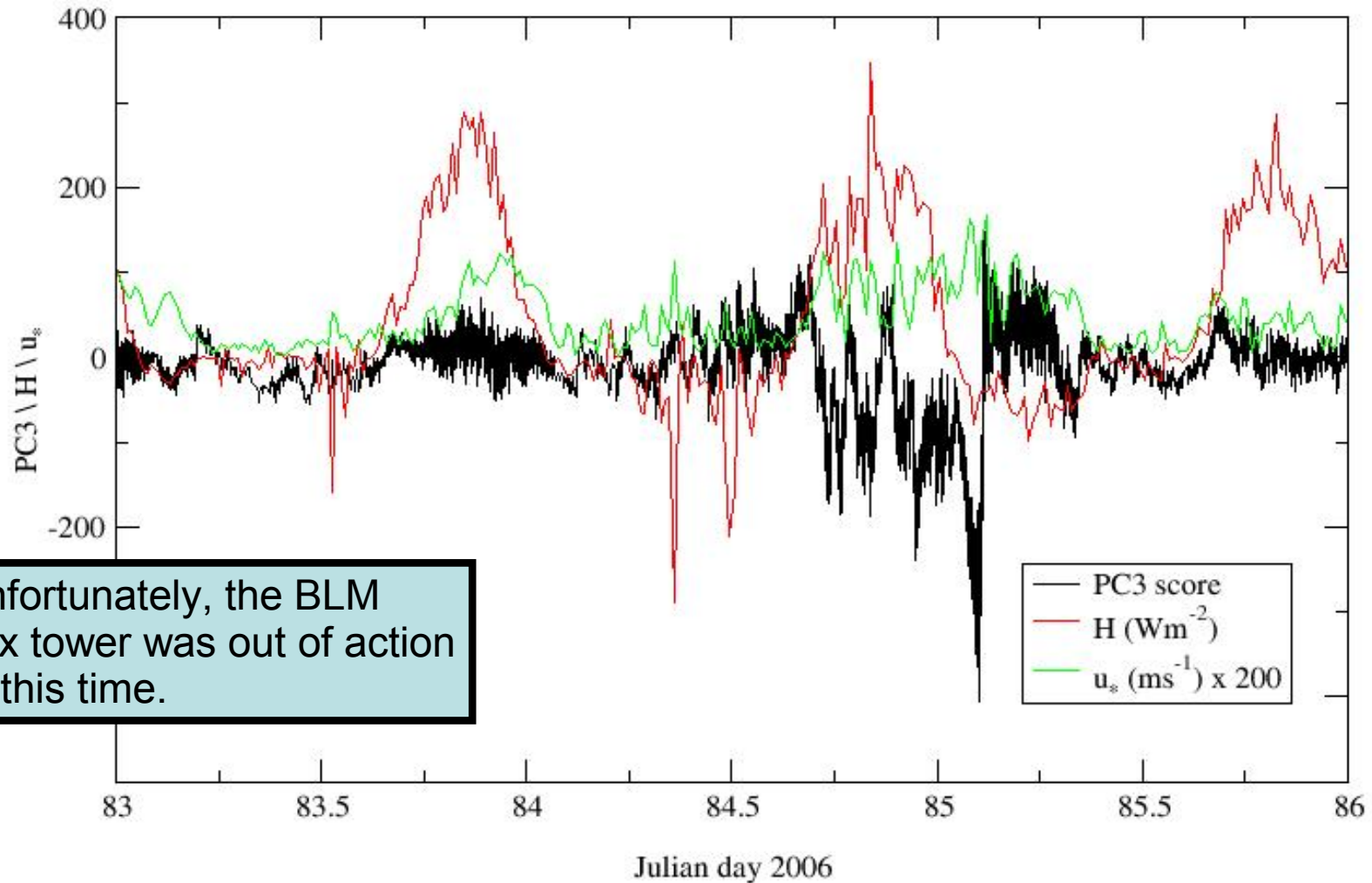
EOF #3 Represents the  
cross-valley wind  
component

When PC3 is large and  
negative, we may expect  
strong westerly flow

*This pattern is very important  
and must be present during  
rotor events*



## Comparison with flux data from Railroad site

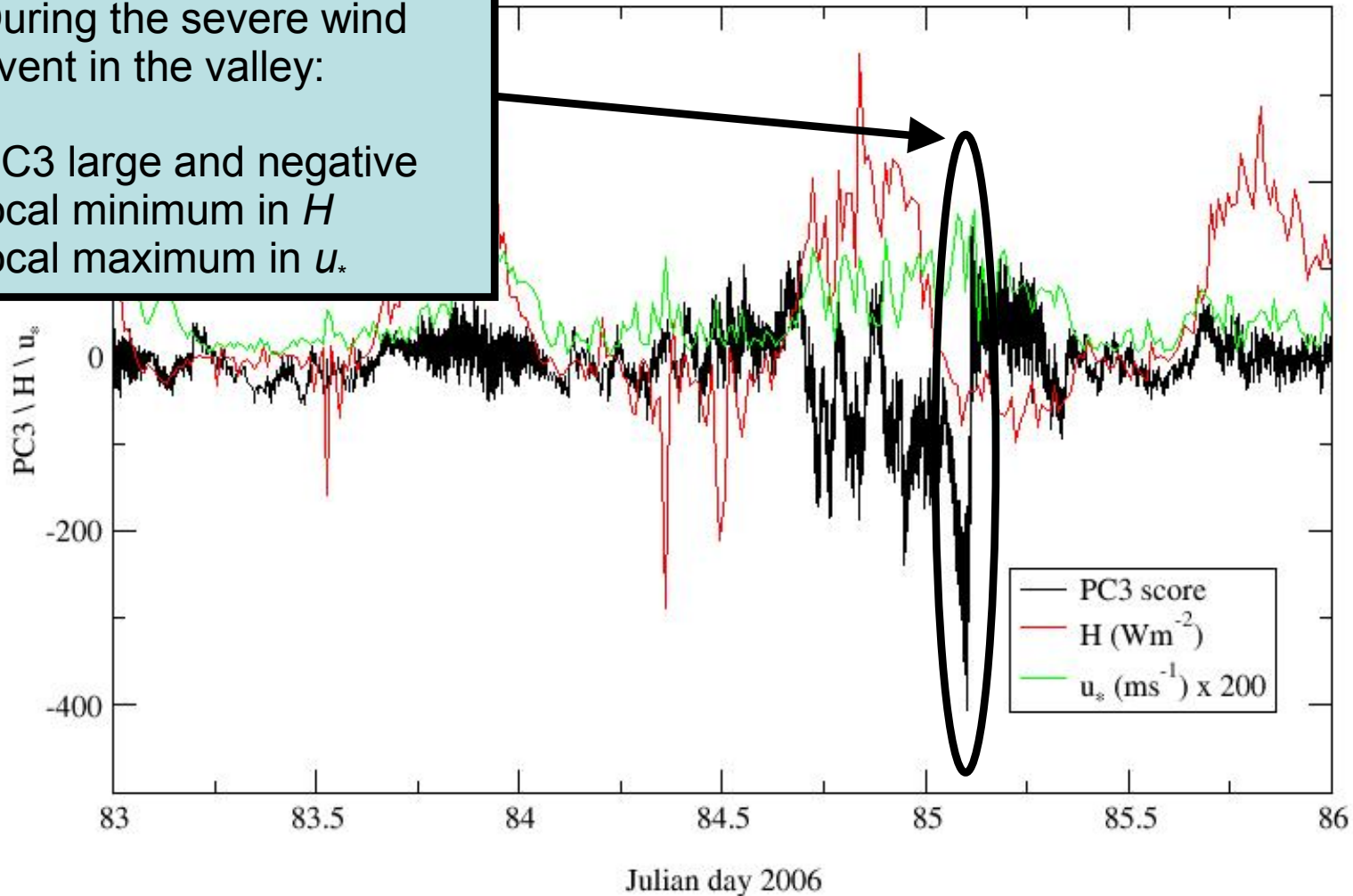


Times in UTC

# Comparison with flux data from Railroad site

During the severe wind event in the valley:

PC3 large and negative  
local minimum in  $H$   
local maximum in  $u_*$



Times in UTC

## Summary

There are coherent, physically meaningful important patterns in the wind data during IOP6.

This suggests that robust correlations will be able to be found (cf. Burton *et al.* 2006) relating the strength of the rotor-type EOF with upstream parameters:

- Upstream wind profiles
- Upstream thermodynamic profiles

*This then could suggest a causal link between winds in the valley and the upstream conditions, and has important consequences for forecasting extreme events.*