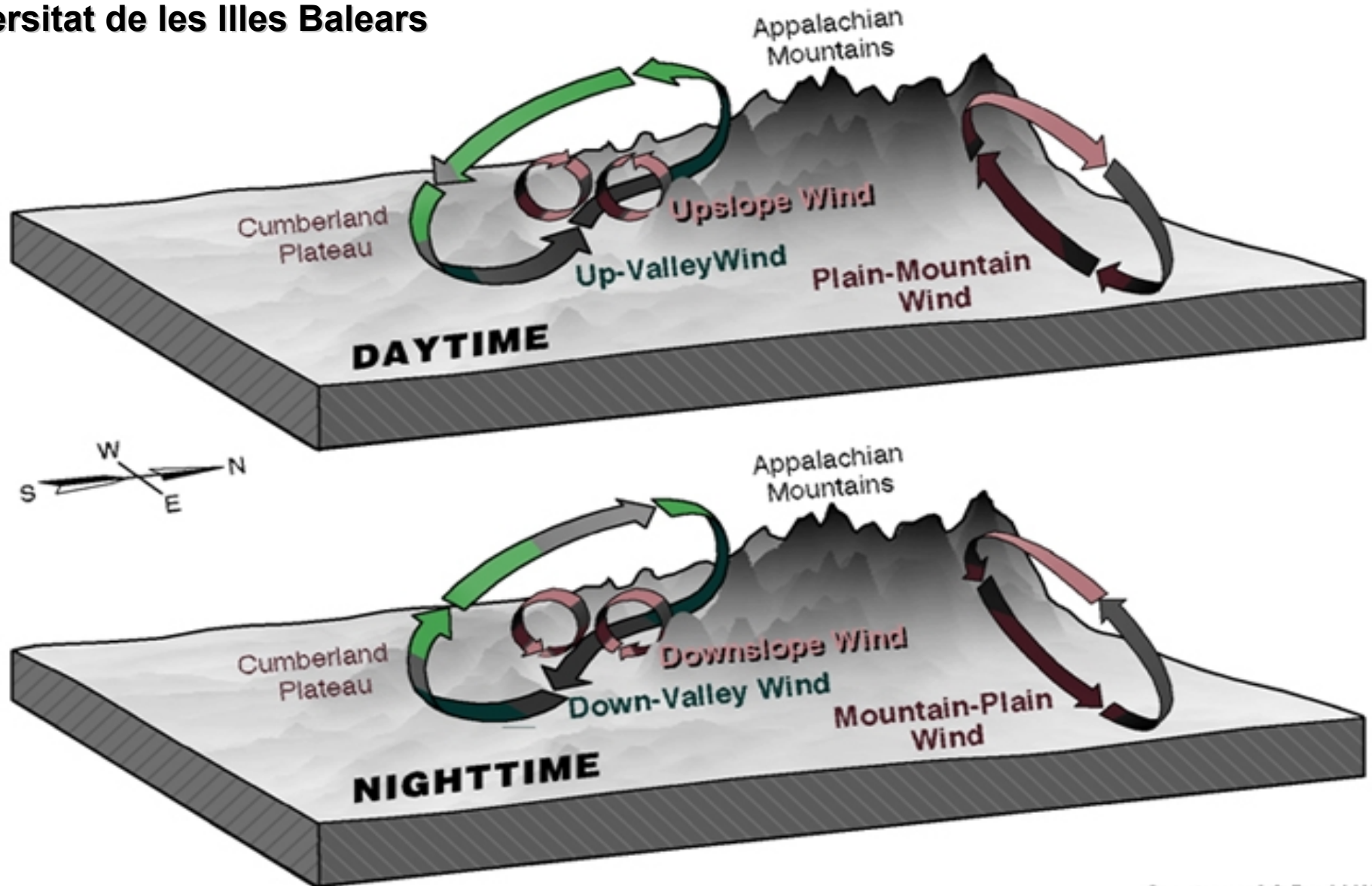


The influence of the Aure Valley on the BL features observed during BLLAST

M.A. Jiménez and J. Cuxart
Universitat de les Illes Balears

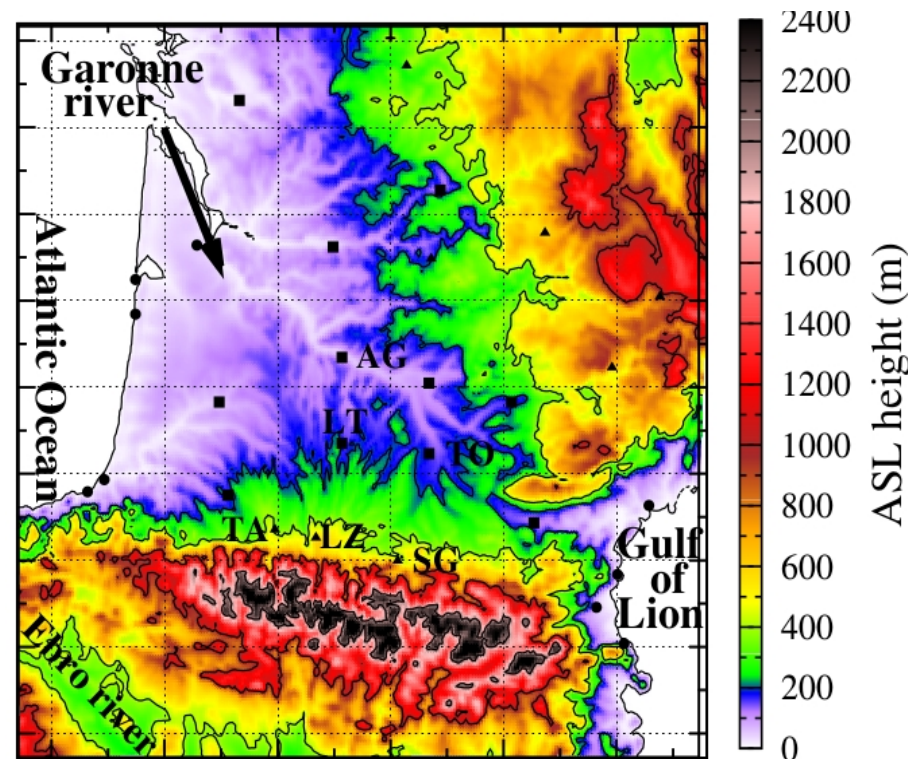


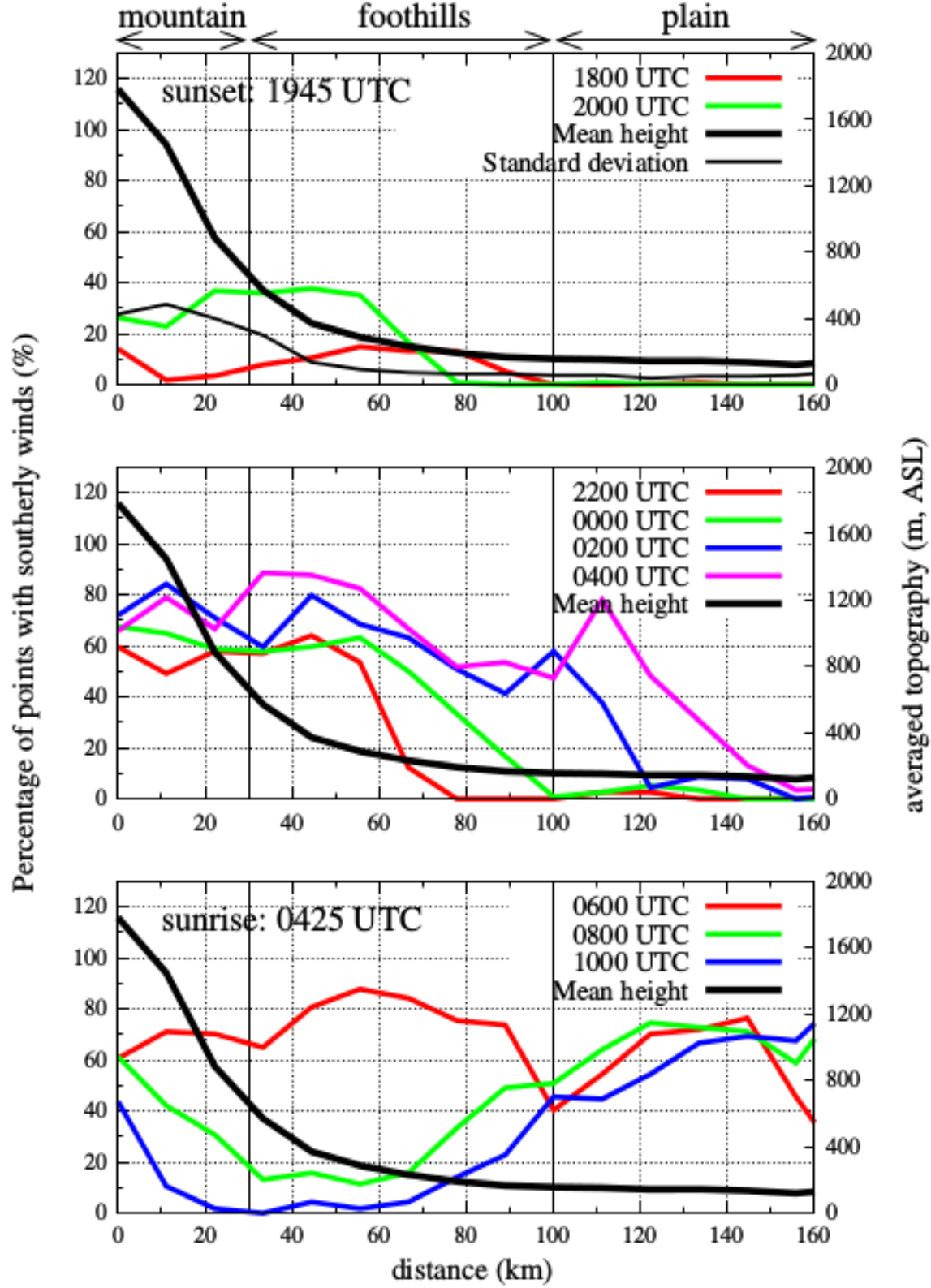
PRE-BLLAST

Study of the nocturnal flows generated in the N side of the Pyrenees (Jiménez & Cuxart 2014)

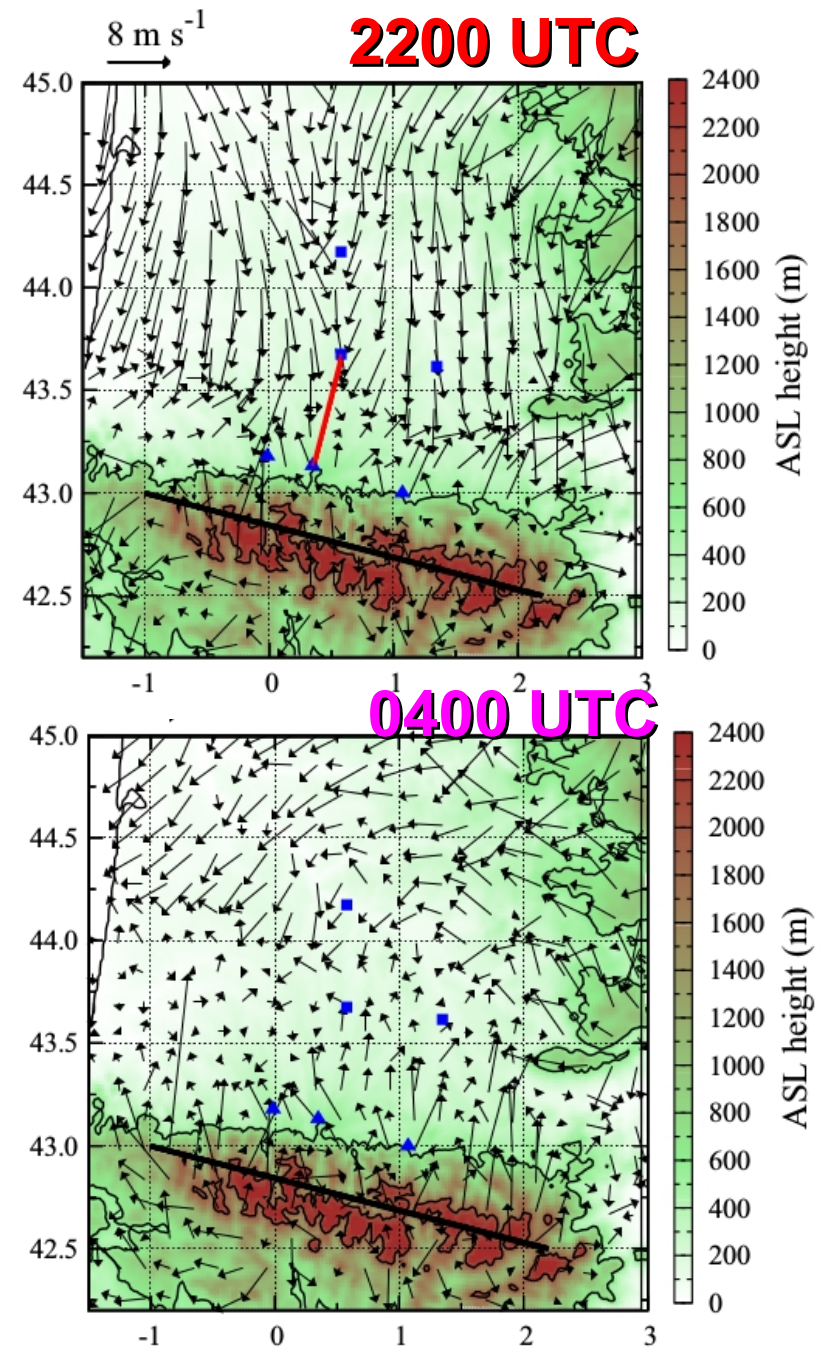
simulated case: 30th June 2010 at 0600 UTC until 1st July 2010 at 1000 UTC (clear skies, no rain and weak pressure gradient conditions)

Domain	200 × 300 gridpoints
Horizontal resolution	2 × 2 km
Vertical resolution (following-terrain coordinates)	near the ground: $\Delta z = 3$ m; at $z = 500$ m: $\Delta z = 7$ m; top of the domain at 9270 m with $\Delta z = 600$ m
Equation system	Durrán (1989)
Initial and lateral boundary conditions	Analysis from the ECMWF every 6 h
Radiation scheme	Morcrette (1990) Longwave: Mlawer et al. (1997) Shortwave: Fouquart and Bonnel (1980)
Advection scheme	Flux corrected second order centred
Turbulence scheme	TKE scheme: Cuxart et al. (2000) Mixing length: Bougeault and Lacarrère (1989)
Surface scheme	Soil and vegetation: ISBA (Noilhan and Planton, 1989) Sea and inland waters: Belamari (2005) Urban and artificial areas: Masson (2000) Land use: ECOCLIMAP (Masson et al., 2003)





PRE-BLLAST



Description of IOPs

IOP	Period	wind direction(*) 1300 UTC	wind direction(*) 2300 UTC	sky	Large-scale circulation(**)
1	15-16 June	N	-	clouds and rain	weak winds, not clear direction
2	19-20 June	N	low S	clear skies,light rain	high-pressure, weak E wind
3	20-21 June	E	low S	clear skies	high-pressure, weak NE-E wind
4	24-25 June	-	E/S	clouds only during day	Atlantic high-pressure, strong NE-E winds
5	25-26 June	E	E/S	clear skies	Atlantic high-pressure, strong NE-E winds
6	26-27 June	E	E/S	clear skies	Atlantic high-pressure, winds from N-E
7	27-28 June	-	-	clouds	strong E winds
8	30-1 July	-	-	clouds and rain	strong N winds (fronts)
9	1-2 July	N	E/S	clear skies	Atlantic high-pressure, weak NE winds
10	2-3 July	N	E/S	clear skies followed by clouds	Atlantic high-pressure, weak NE winds
11	5-6 July	N	W	clear skies	Atlantic high-pressure, weak S winds

(*) extracted from the soundings within the BL extend (about 1000 m agl). Slope wind directions in Lannemezan: upslope (N) and downslope (S).

(**) corresponding to the surface level. At higher levels winds were from W for all the IOPs.

(-) indicates no sounding.

No rain

+

slope winds

+

no clouds (in Lan)

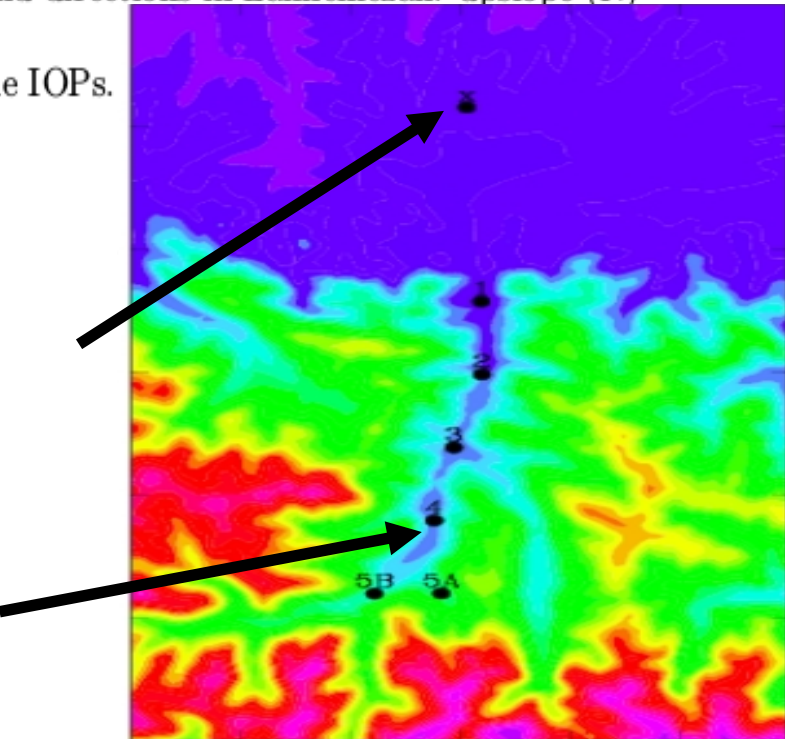
IOP 3

IOP 5

IOP 6

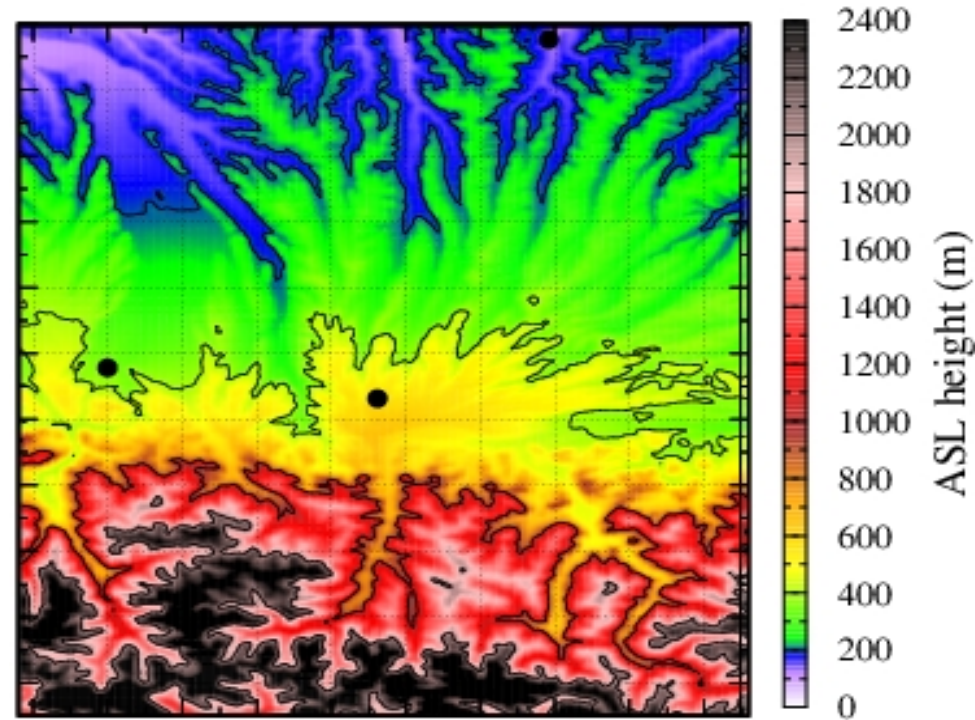
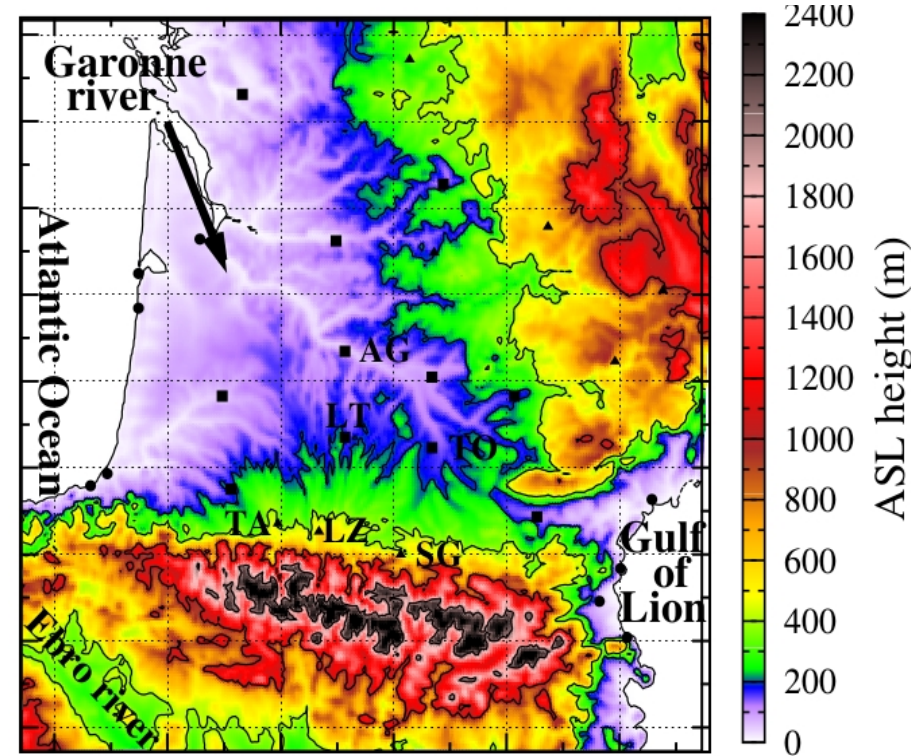
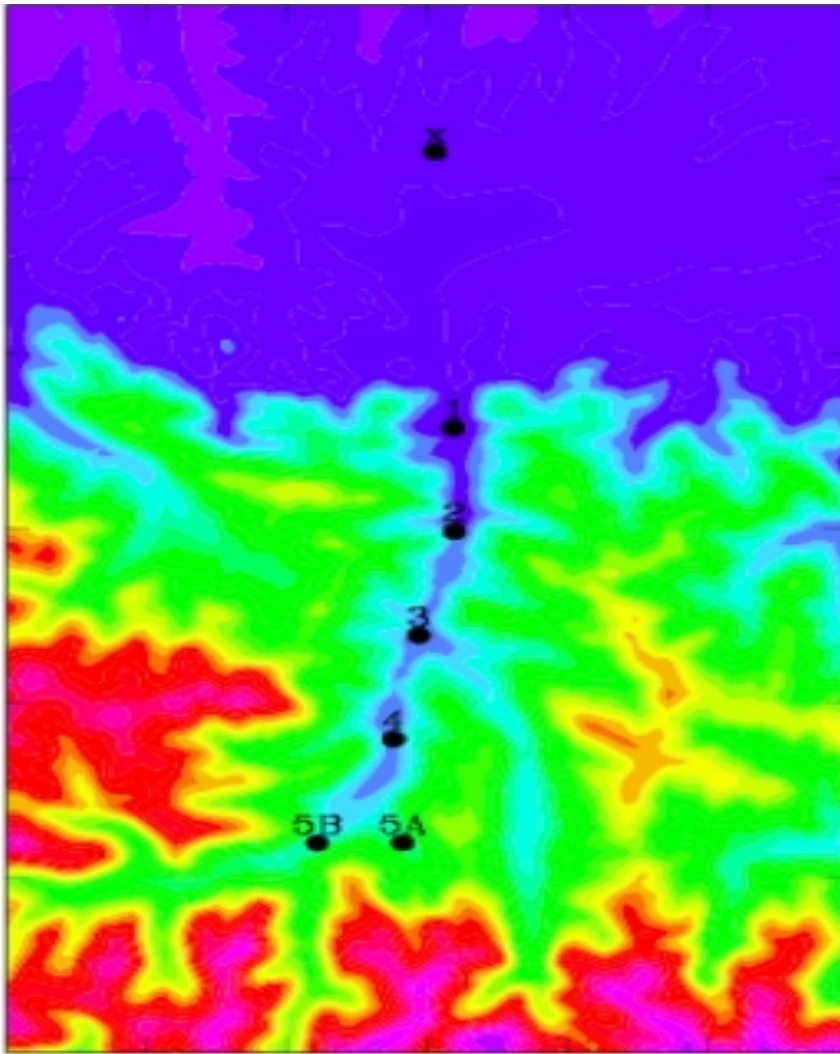
IOP 9

IOP 11

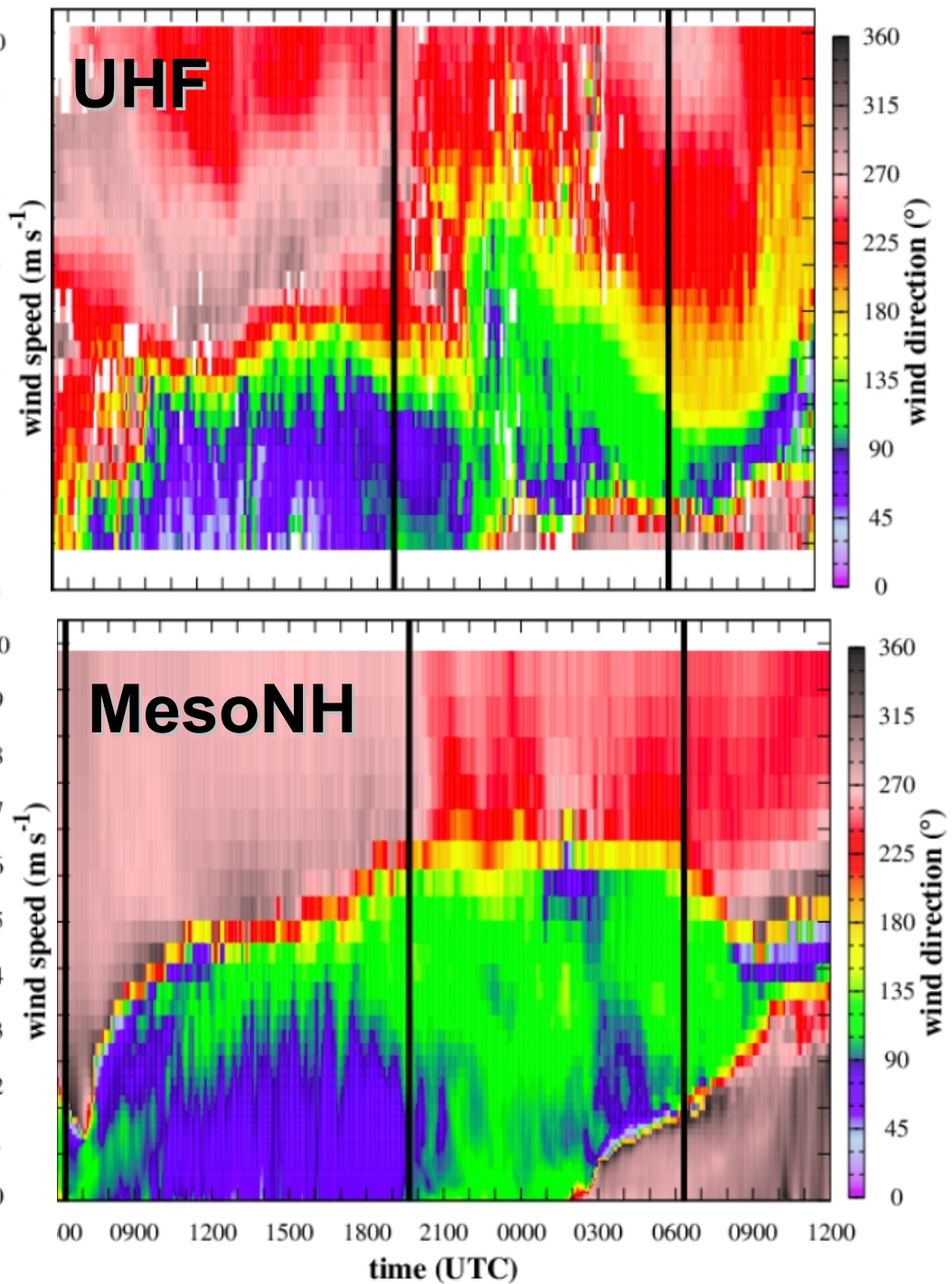
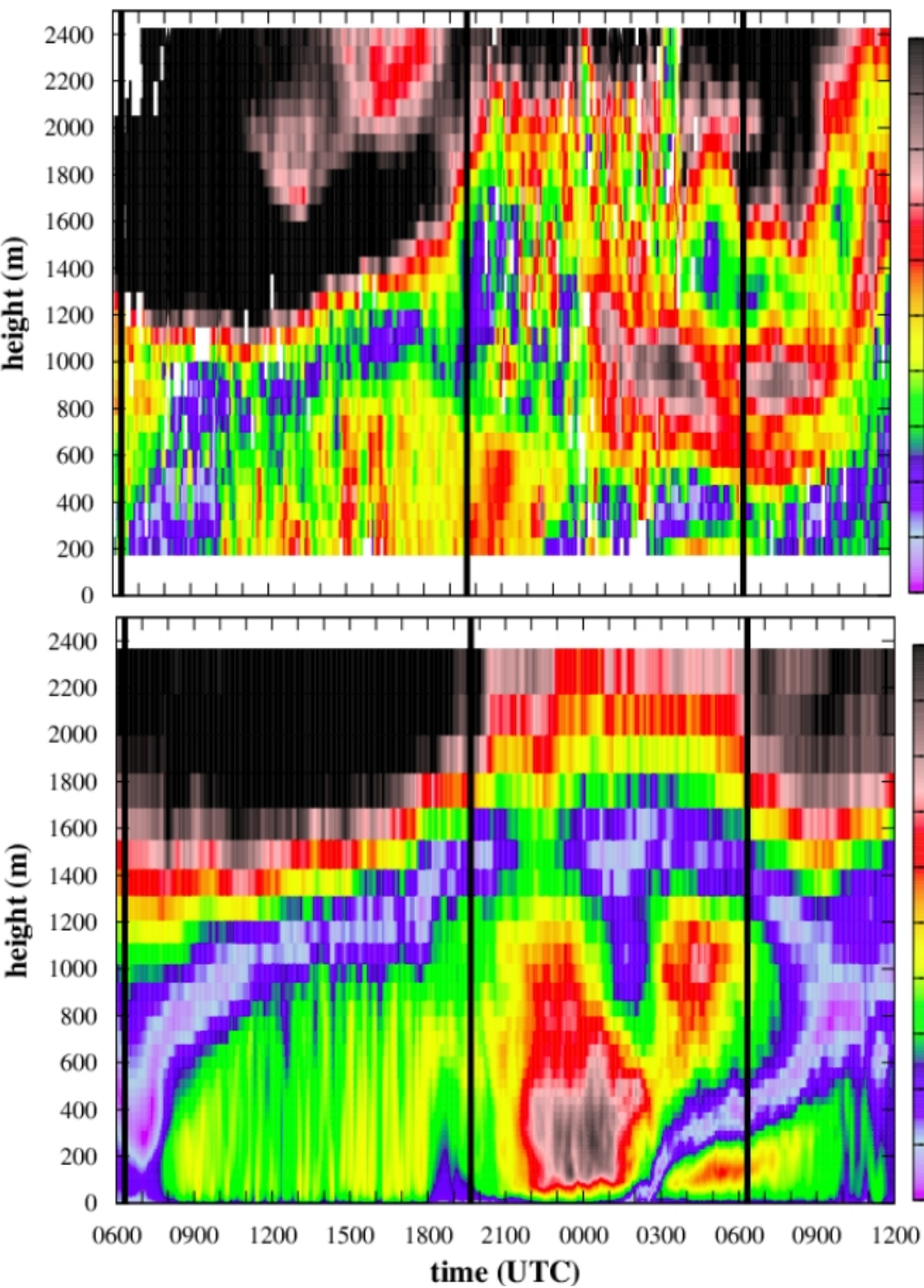


Mesoscale simulation

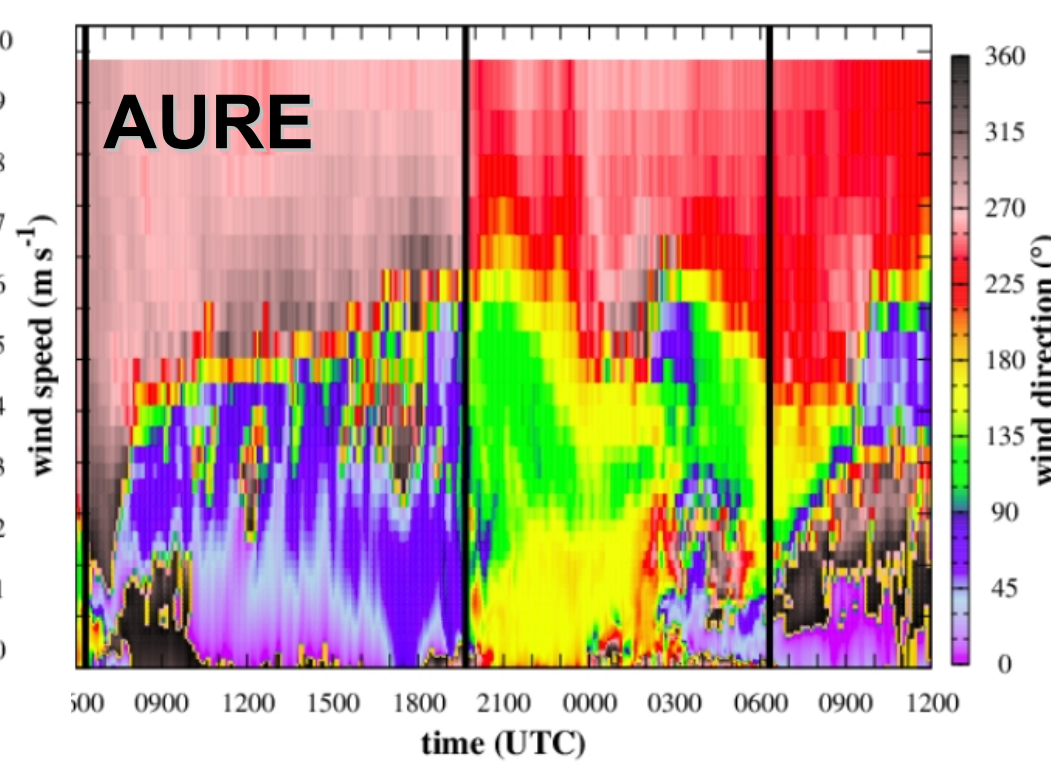
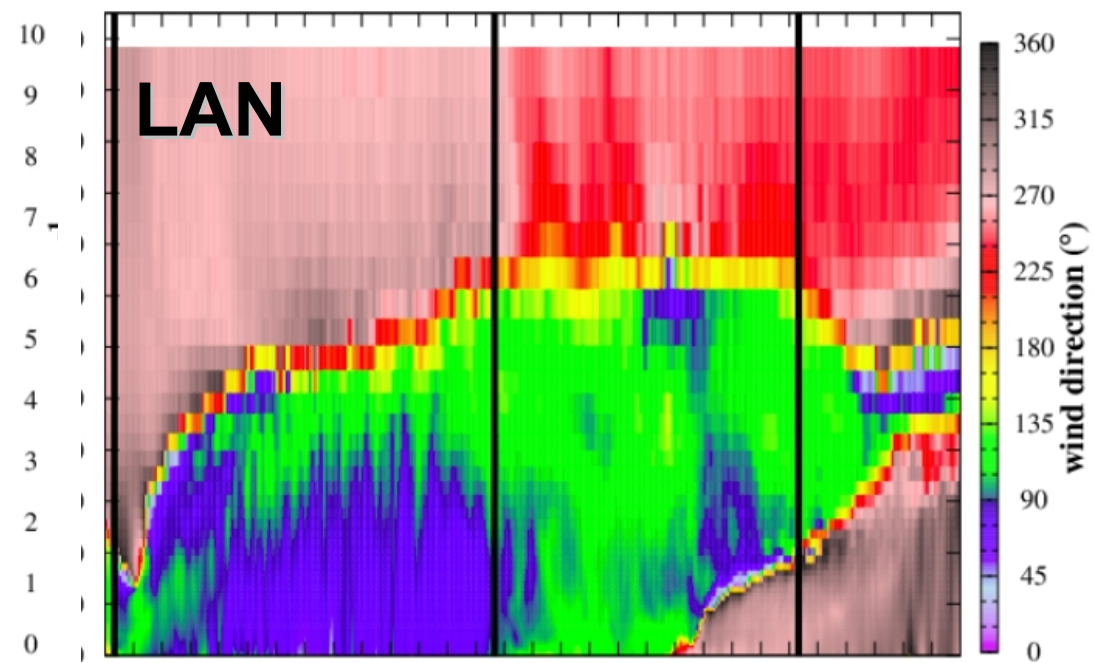
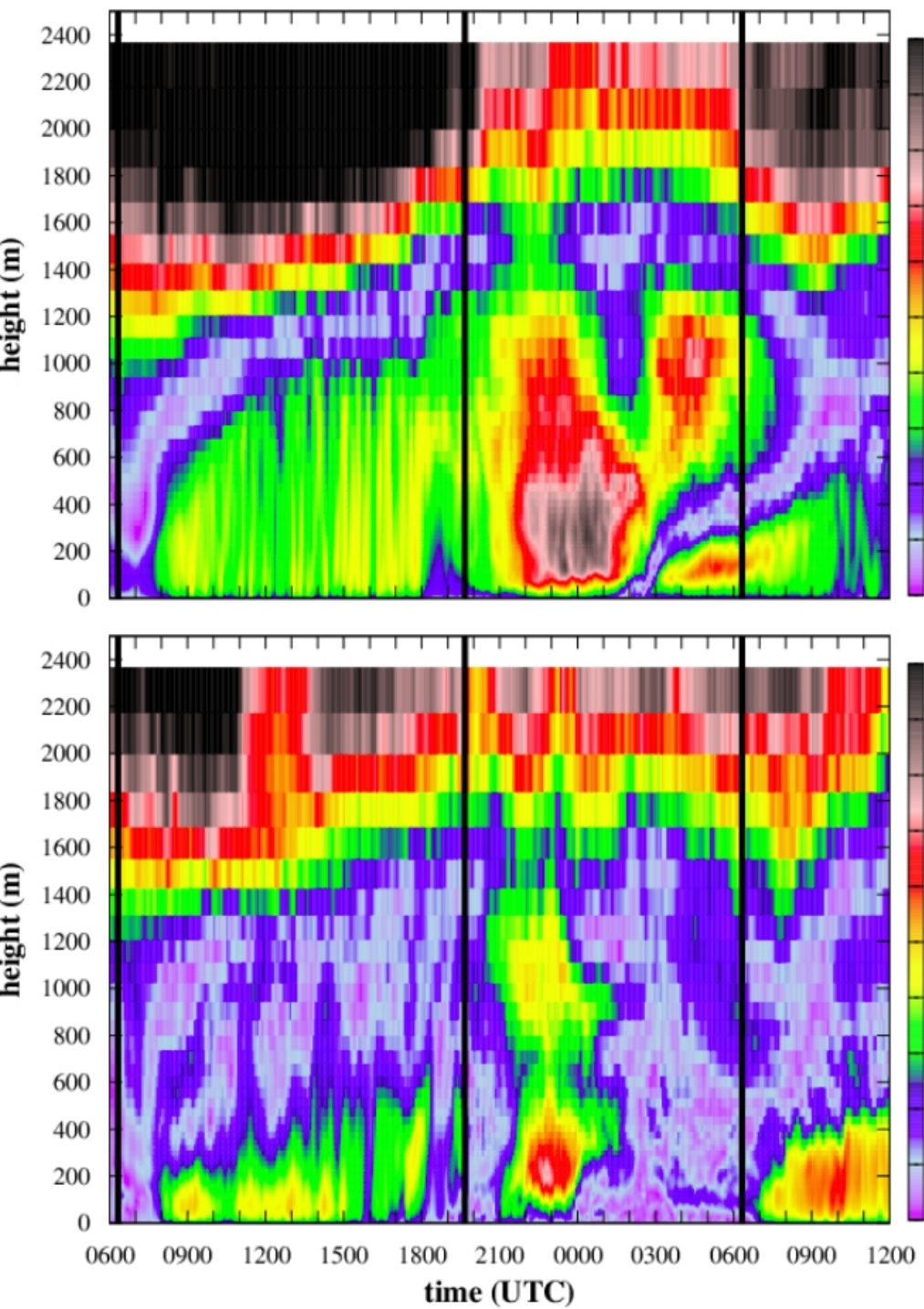
- * 2 nested domains (2km, 400m)
- * Vertical grid (dz=3m and stretched above, 85 levels up to 9000m agl)
- * Simulated period: 30 hours (from 0600 UTC until 1200 UTC of the next day)

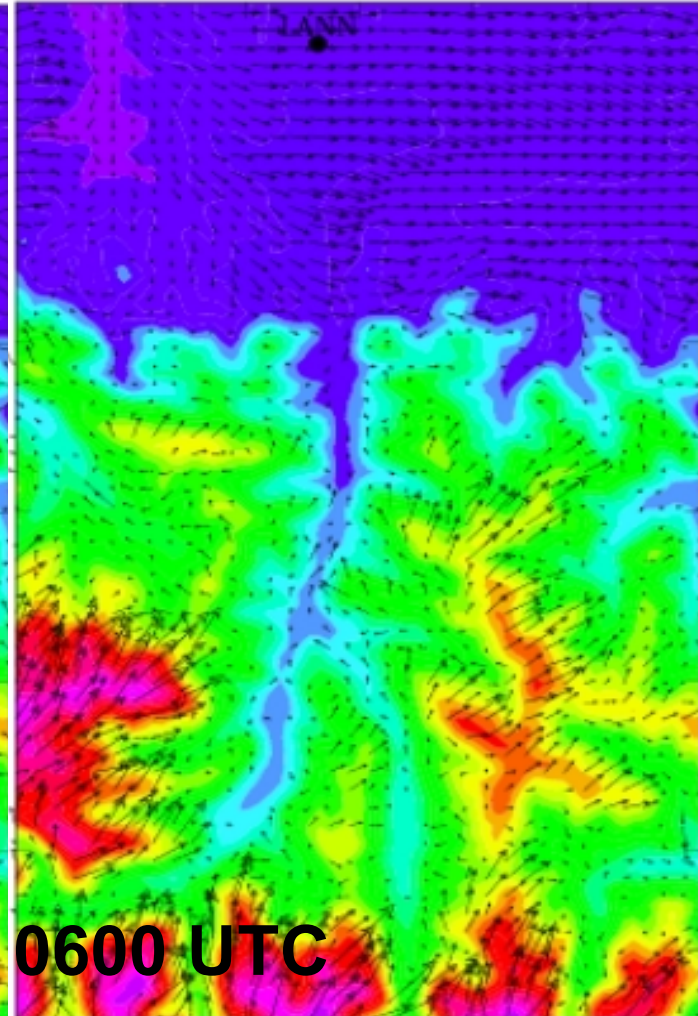
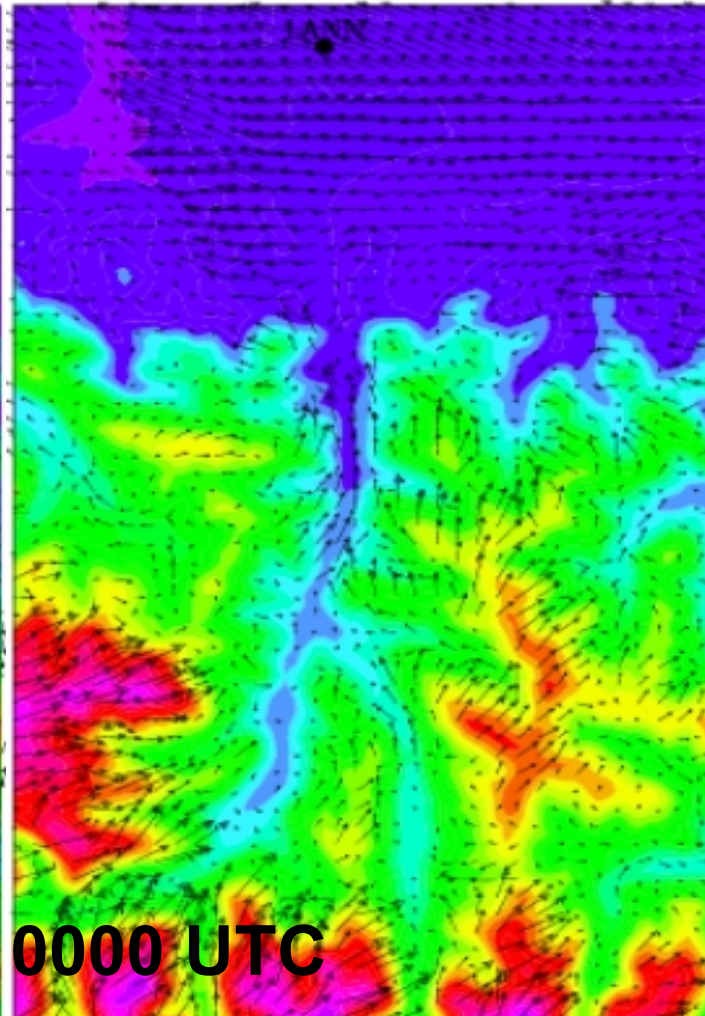
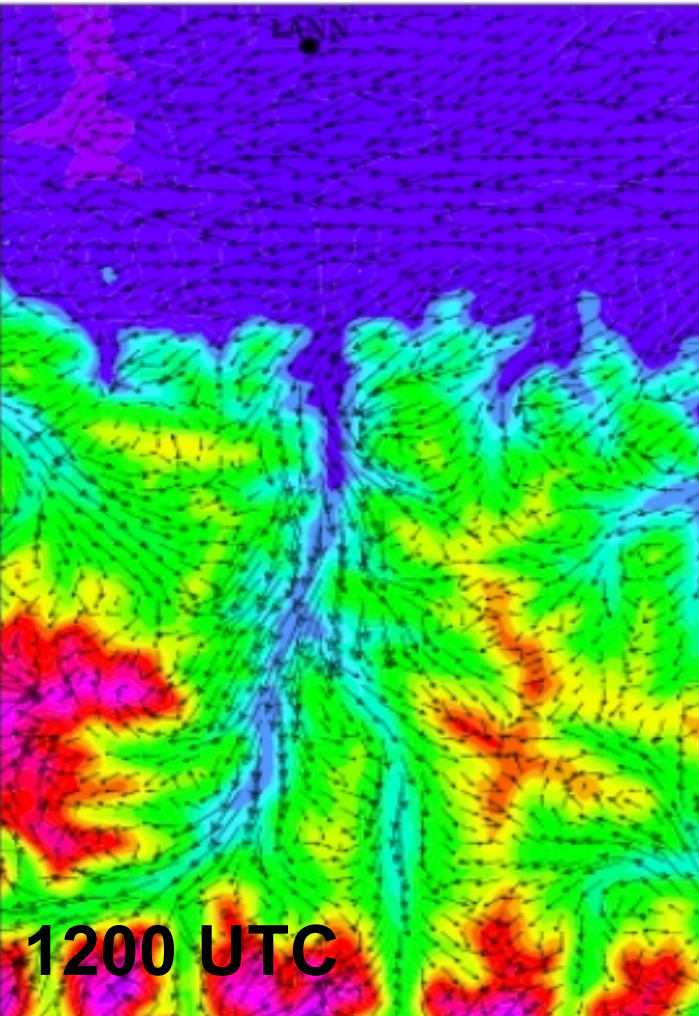


IOP3: 20-21 June 2011



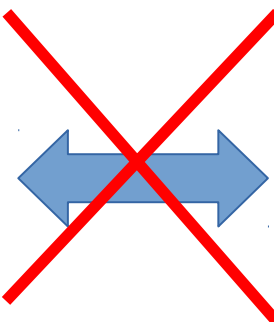
IOP3: 20-21 June 2011





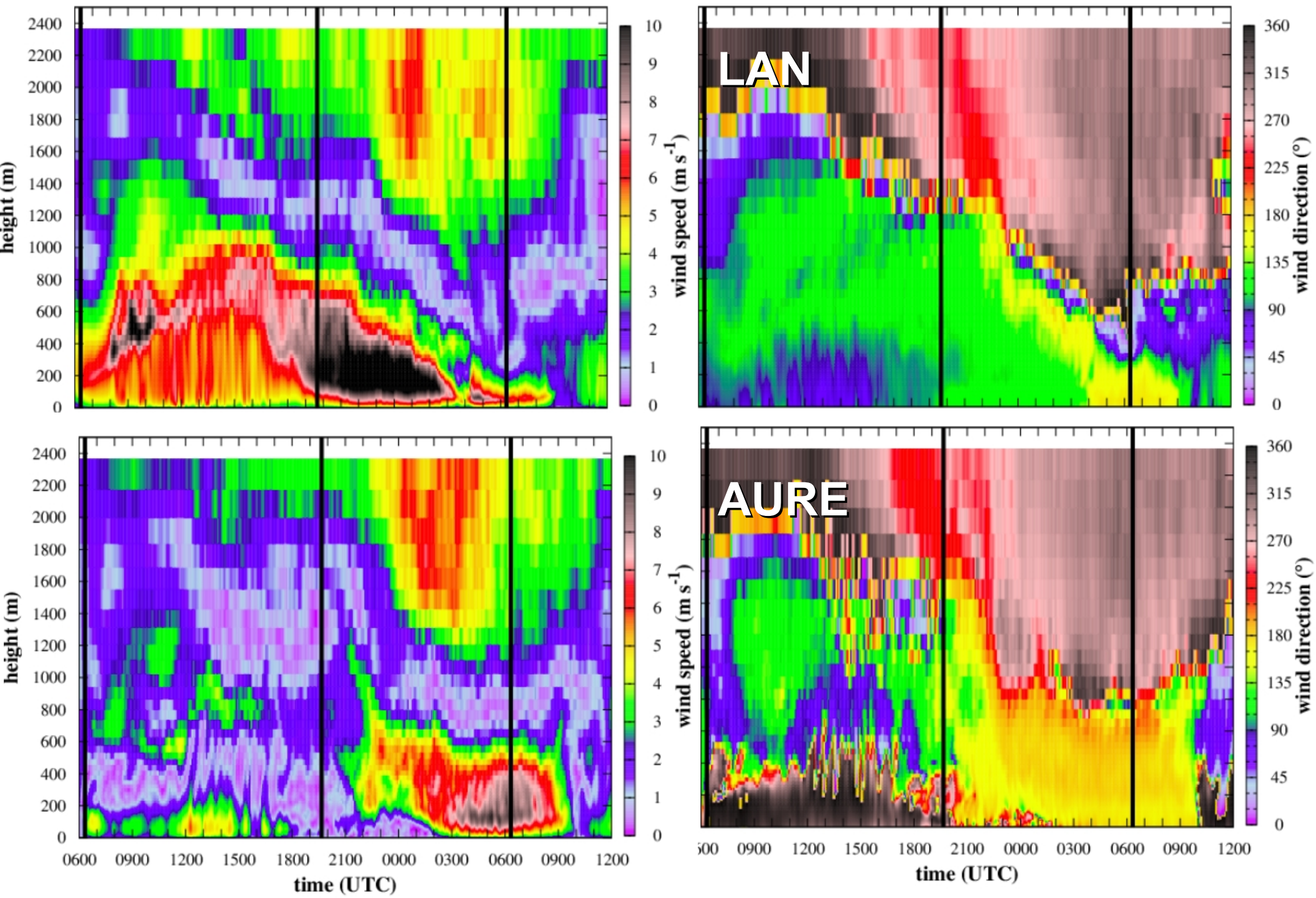
50m AGL wind

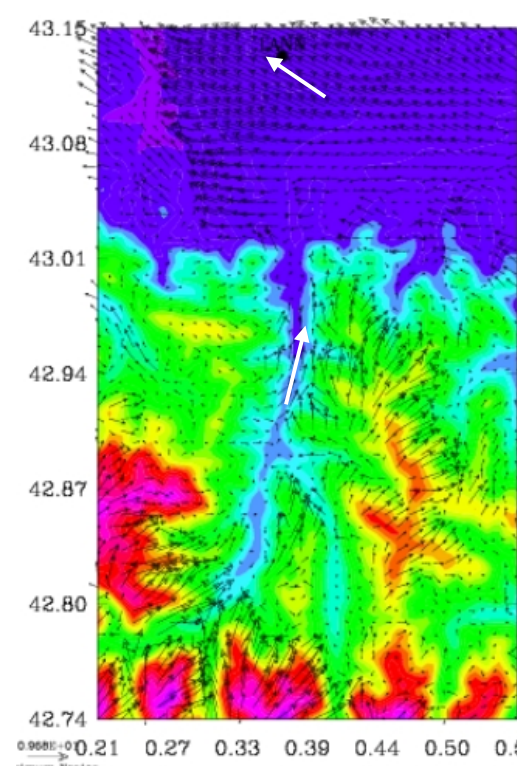
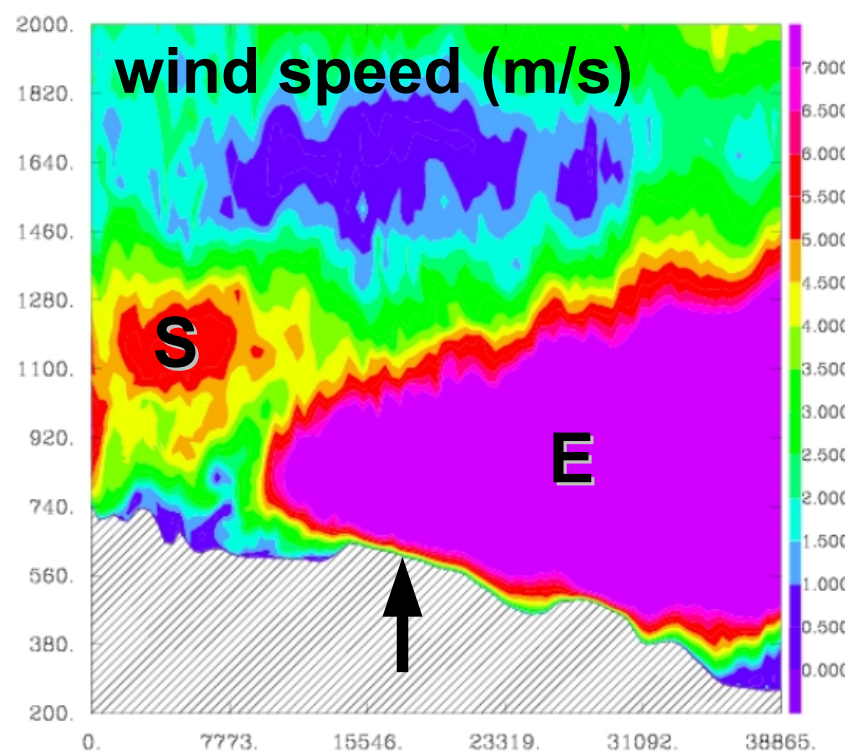
Aure valley



Lannemezan

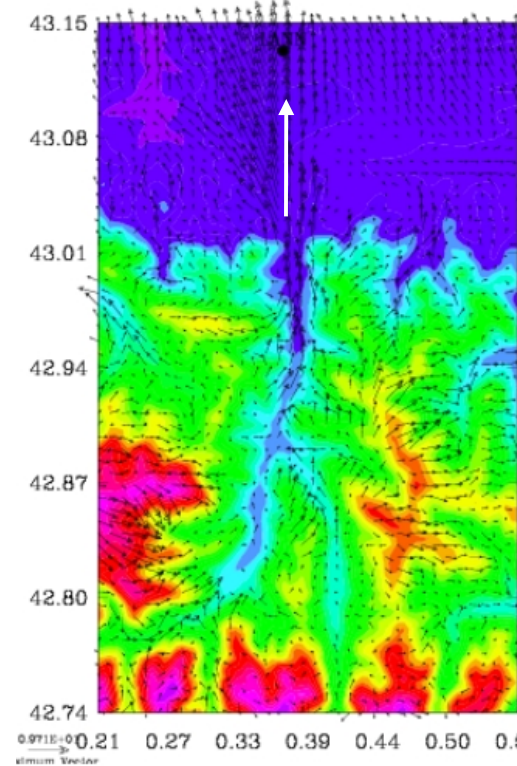
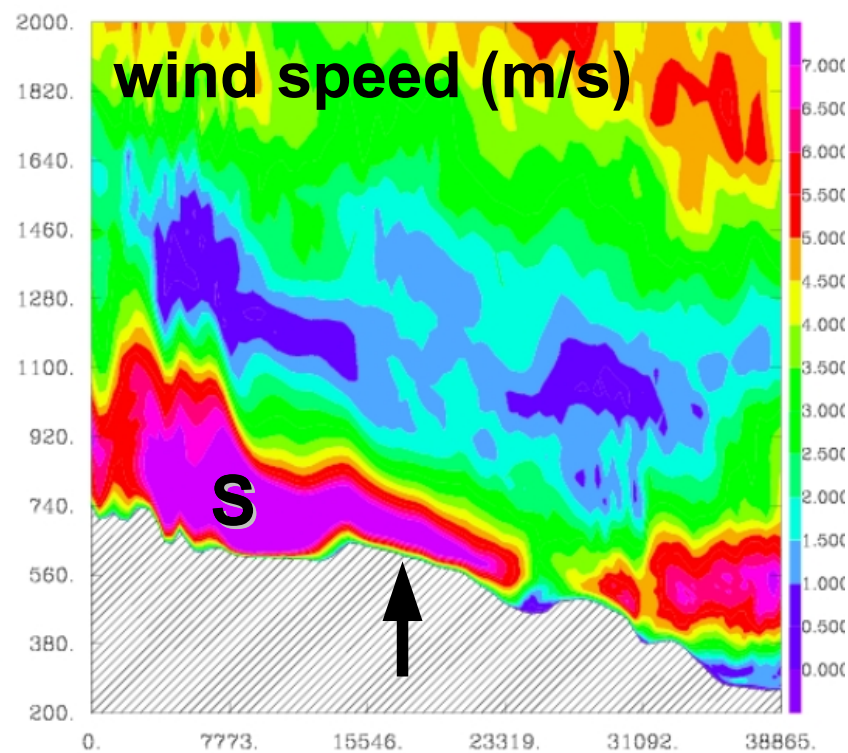
IOP5: 25-26 June 2011





**25 June 2011
2300 UTC**

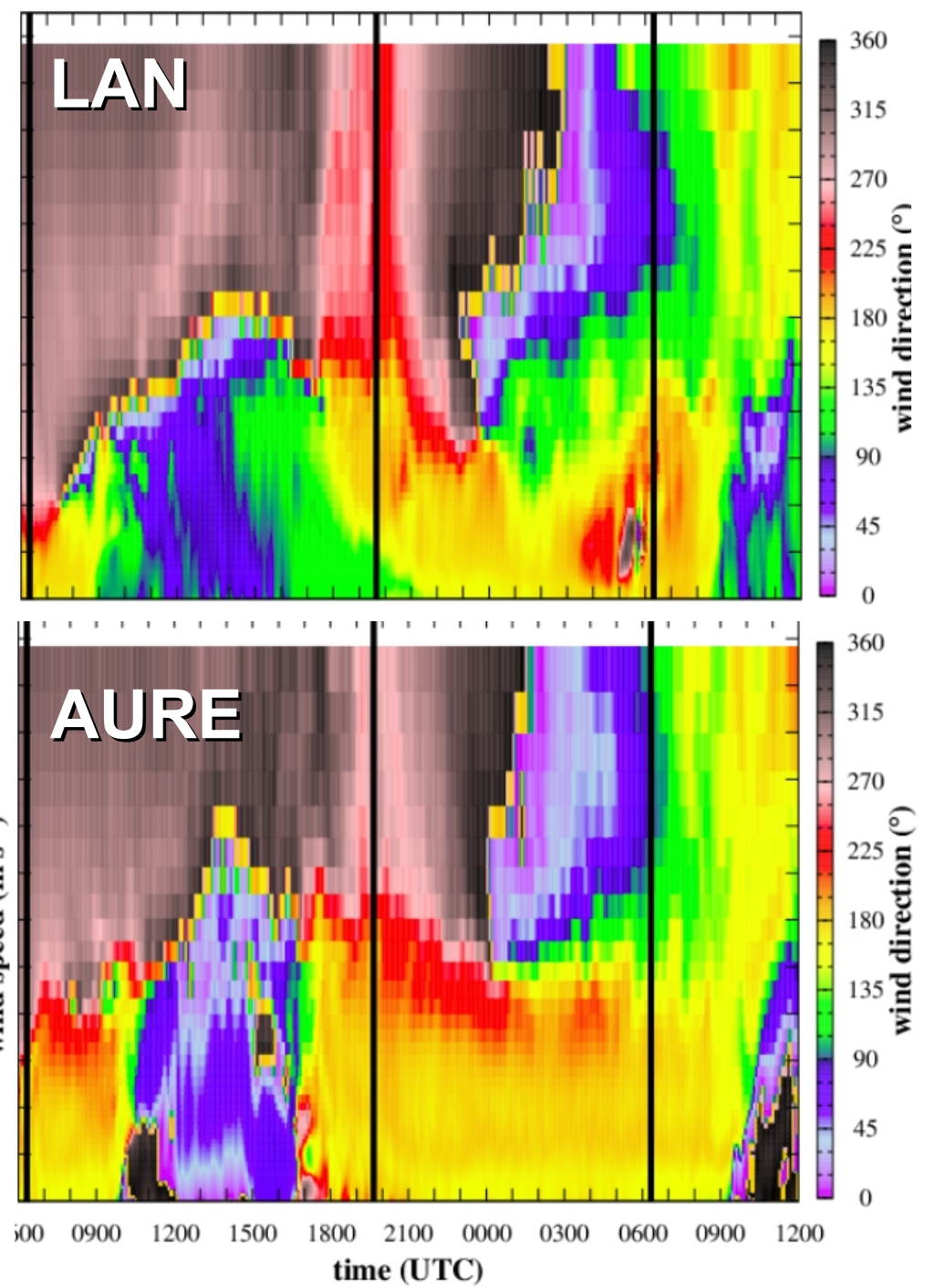
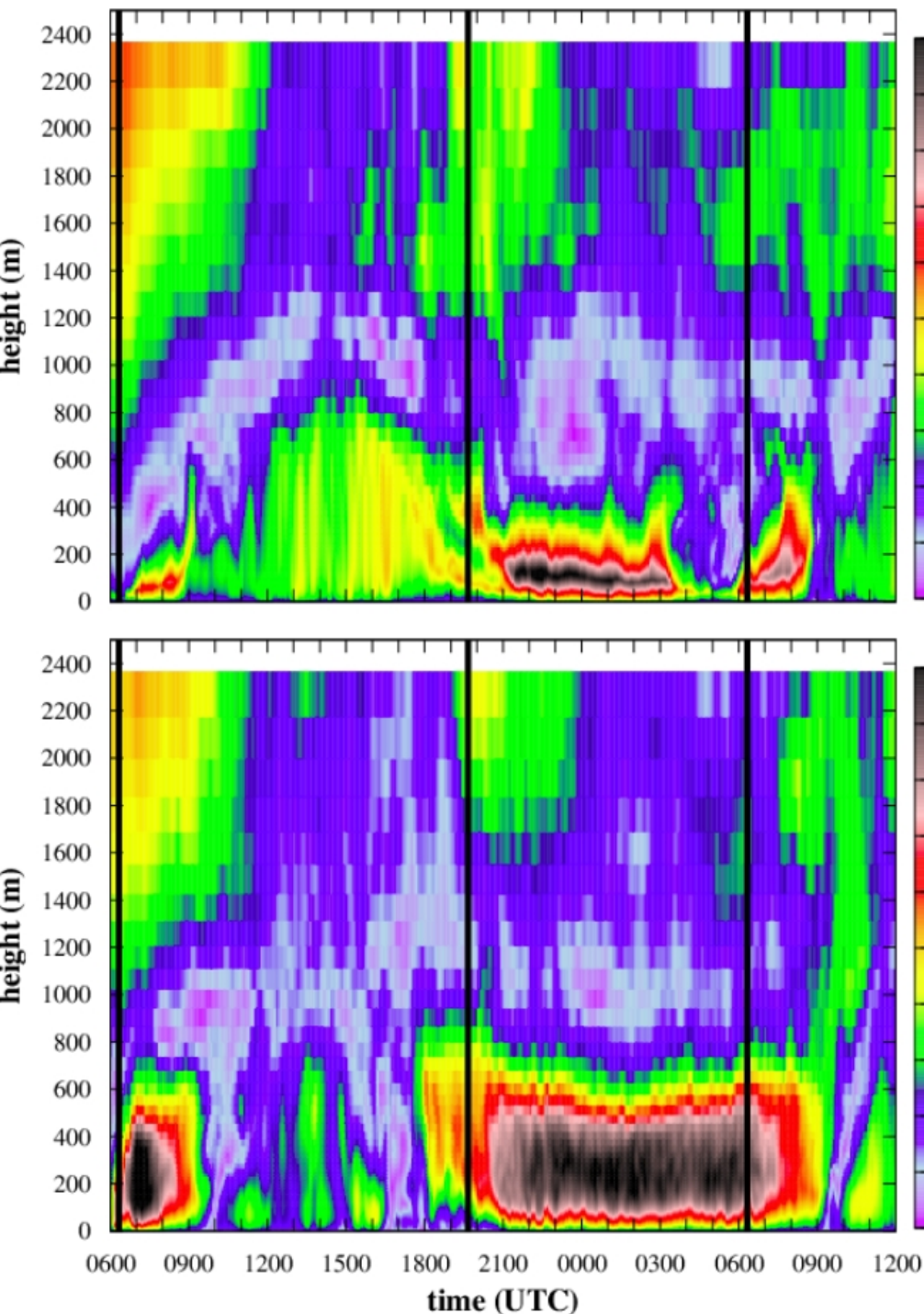
50mAGL



**26 June 2011
0500 UTC**

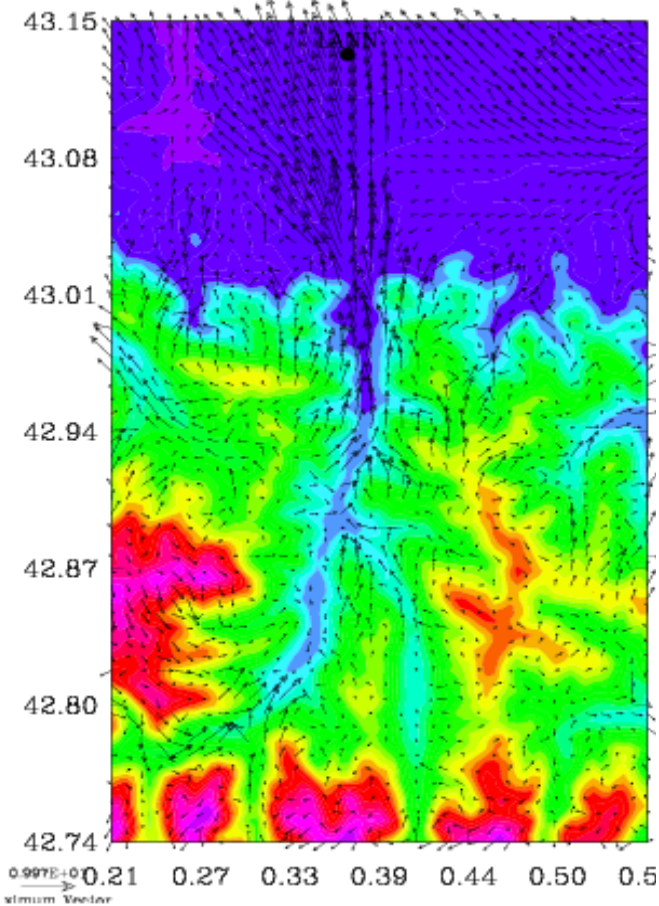
50mAGL

IOP6: 26-27 June 2011

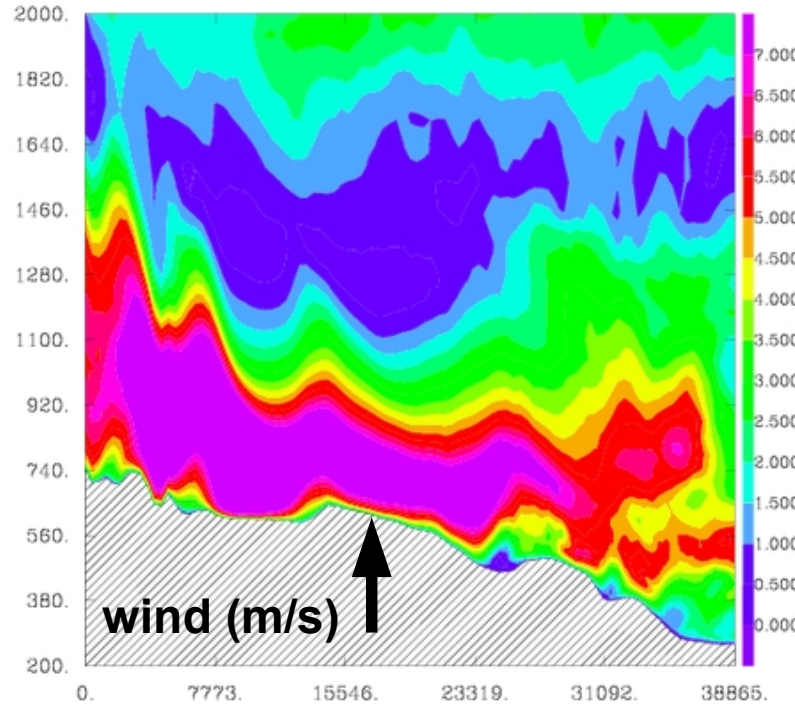


27 June 2011 at 0000 UTC

50mAGL



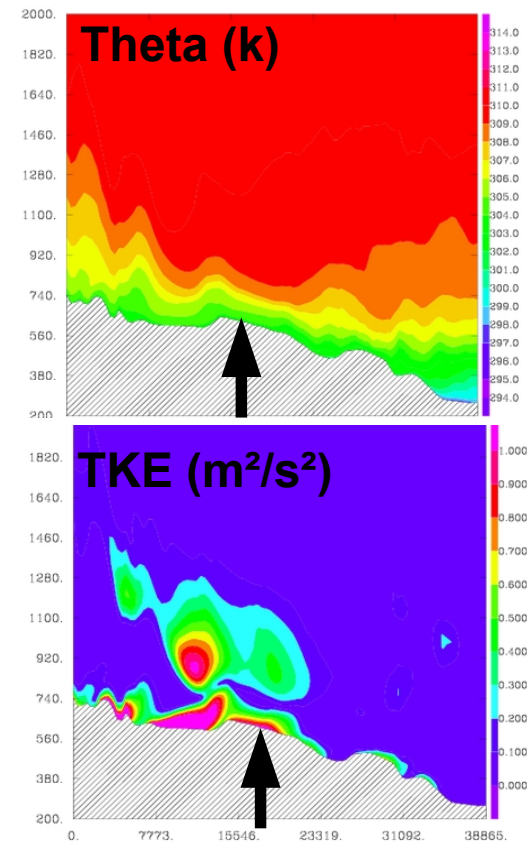
S-N vertical cross-section



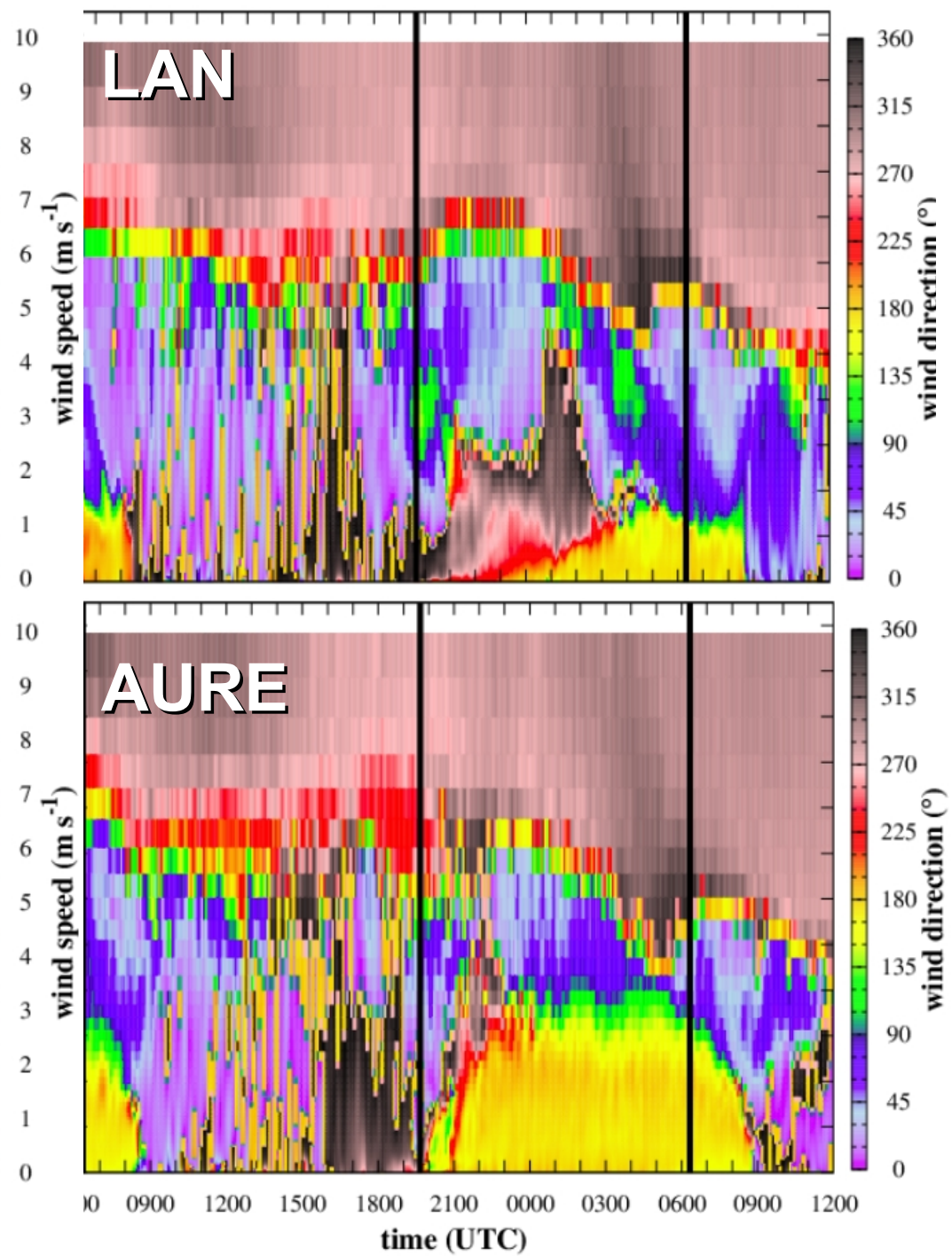
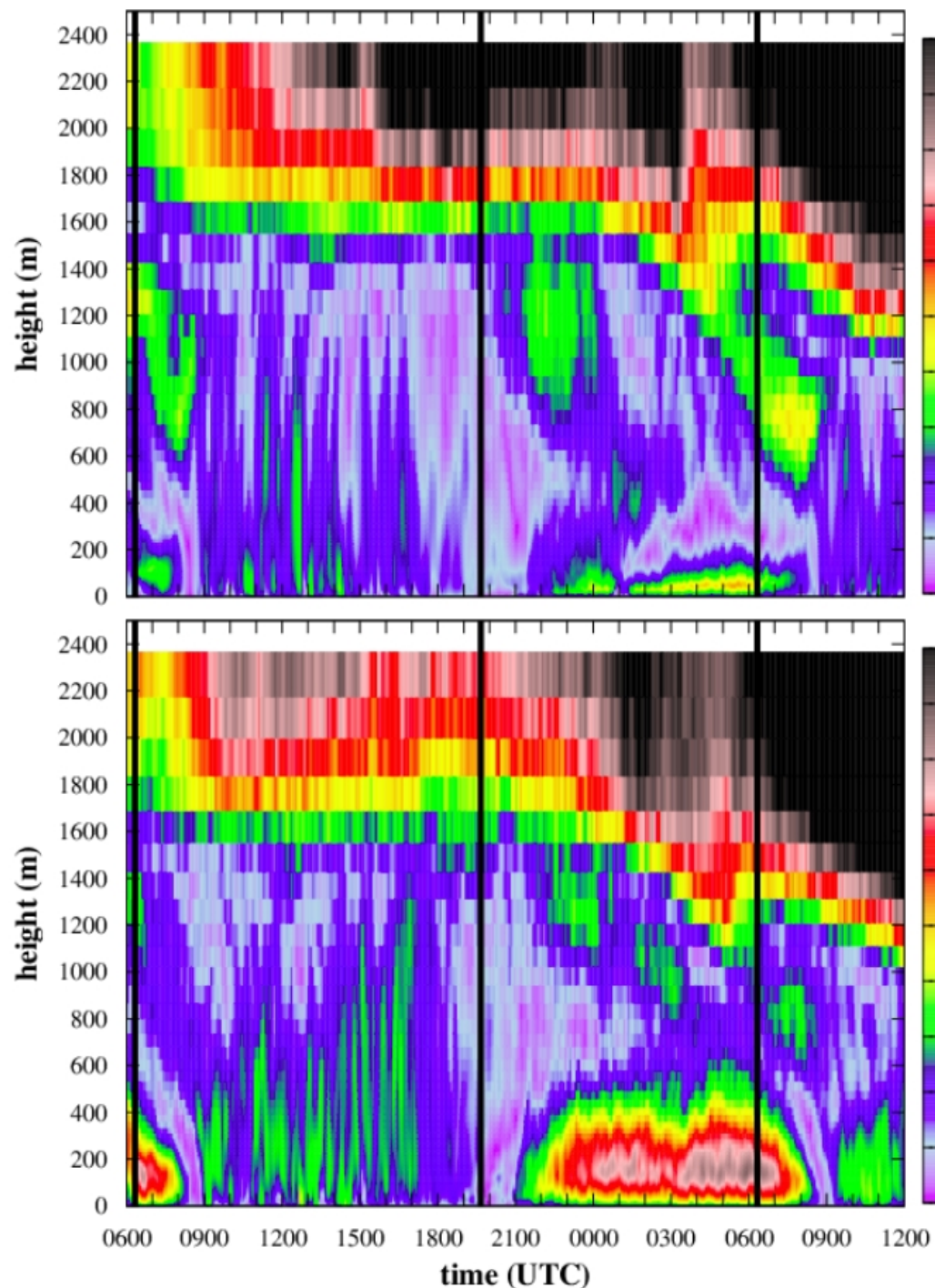
Aure valley



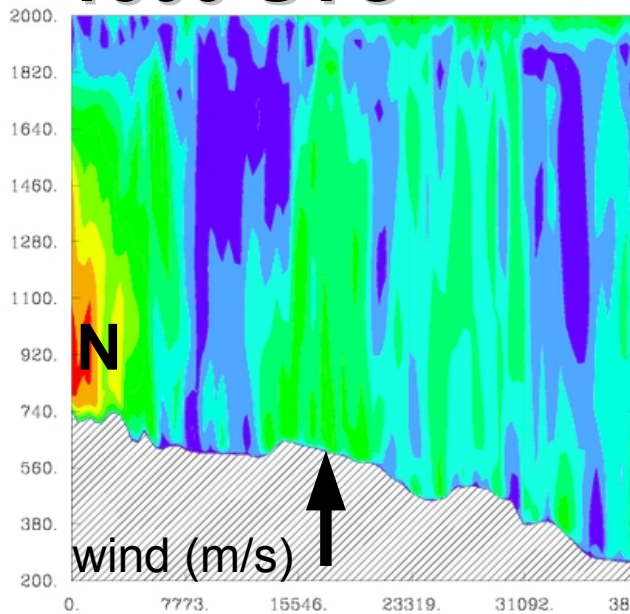
Lannemezan



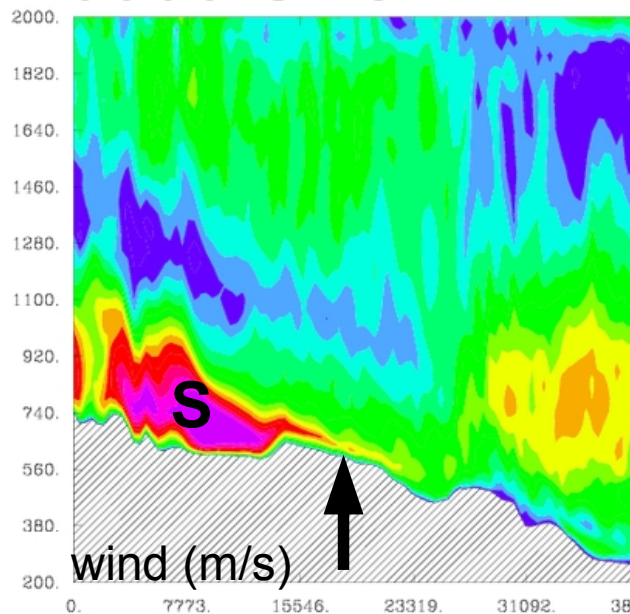
IOP9: 1-2 July 2011



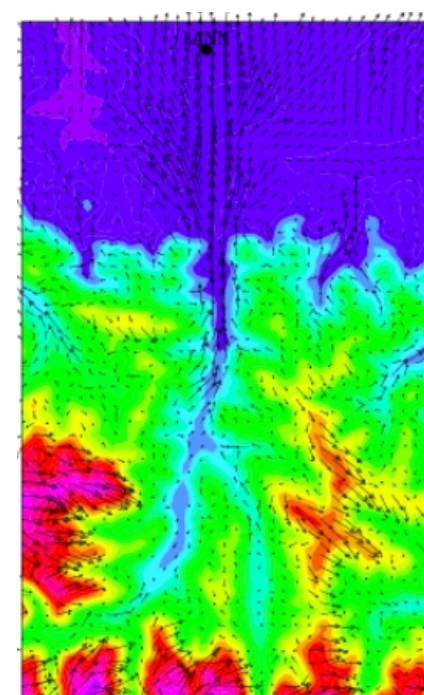
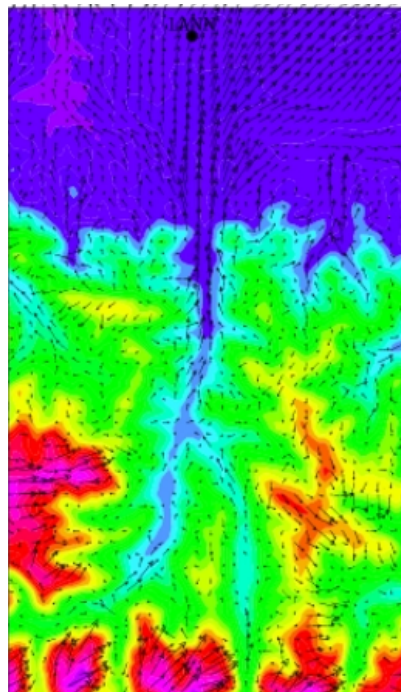
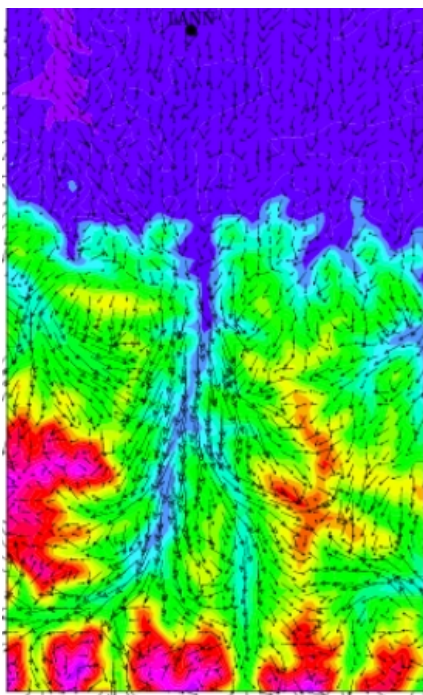
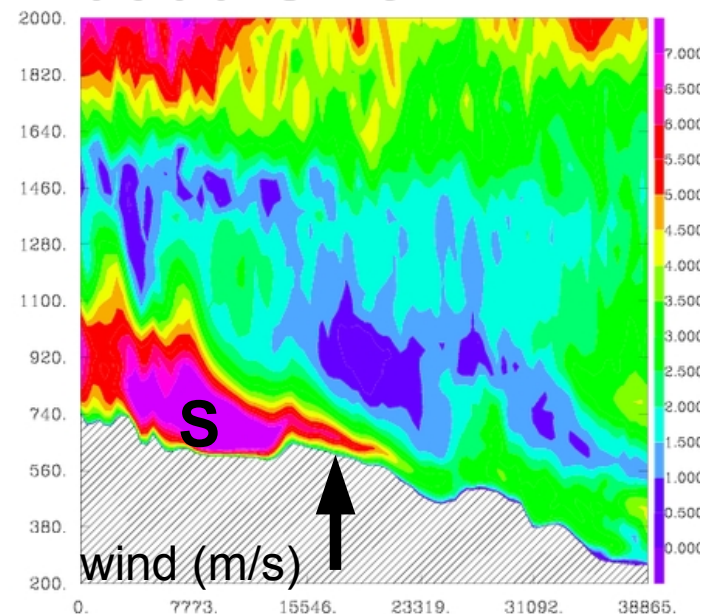
1500 UTC



0000 UTC



0500 UTC



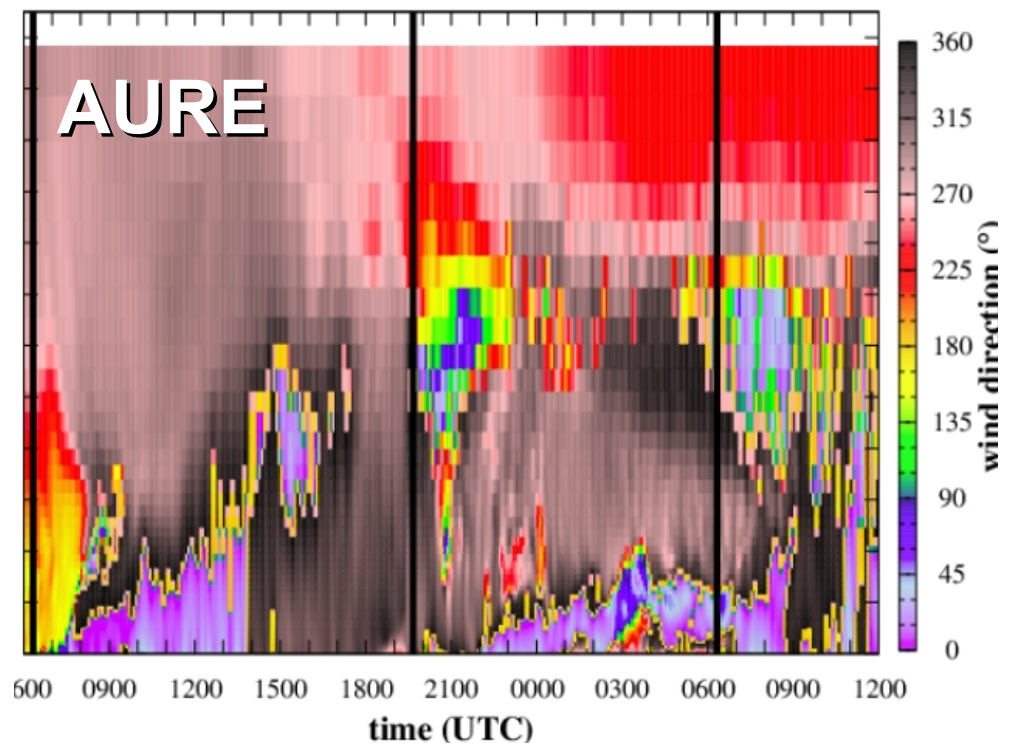
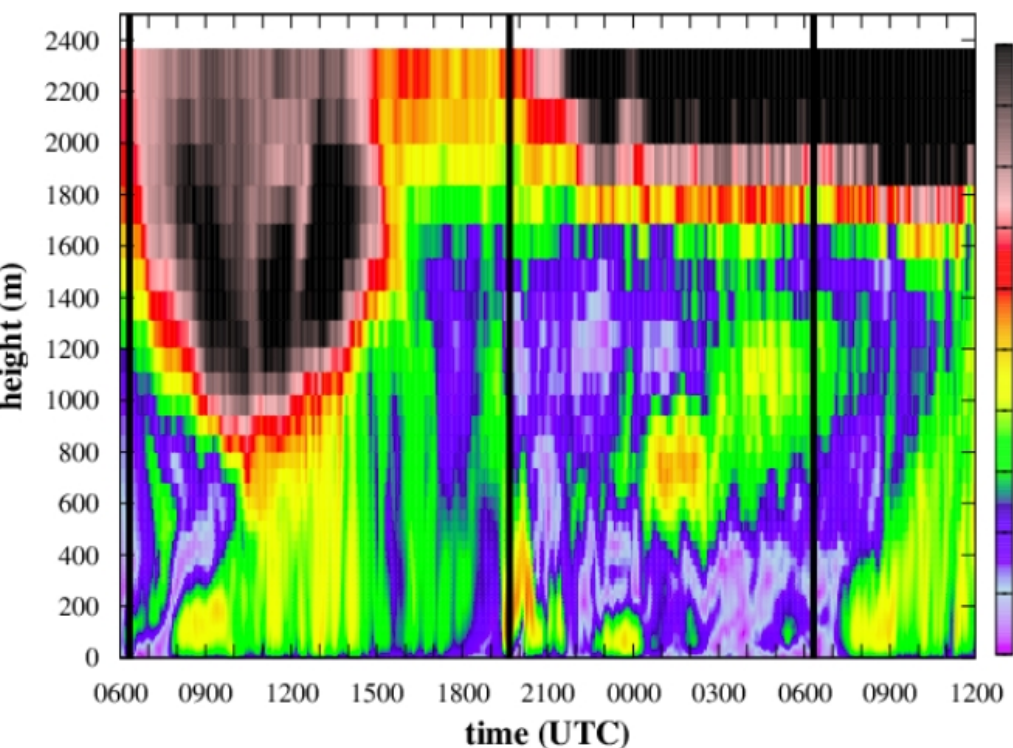
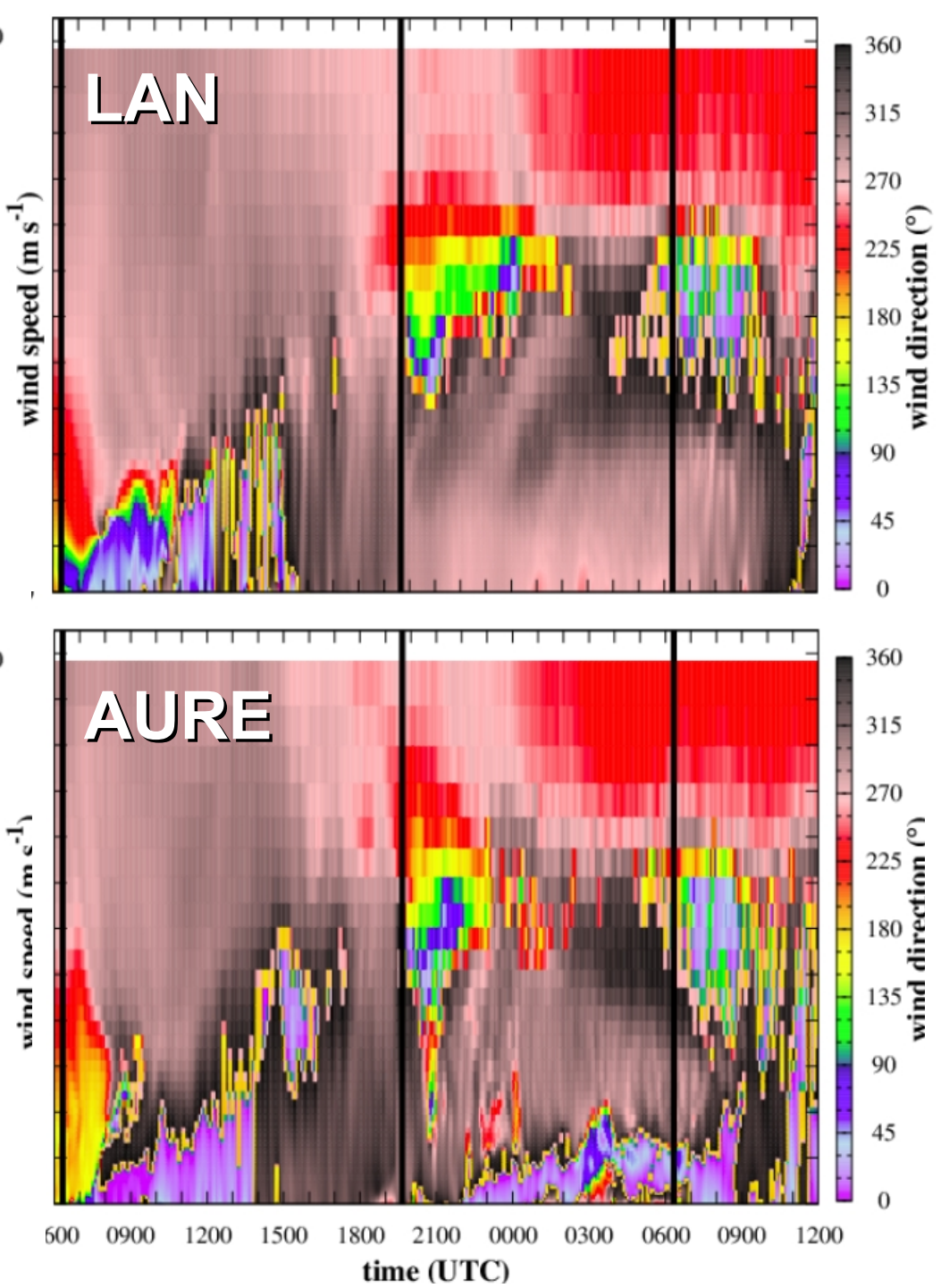
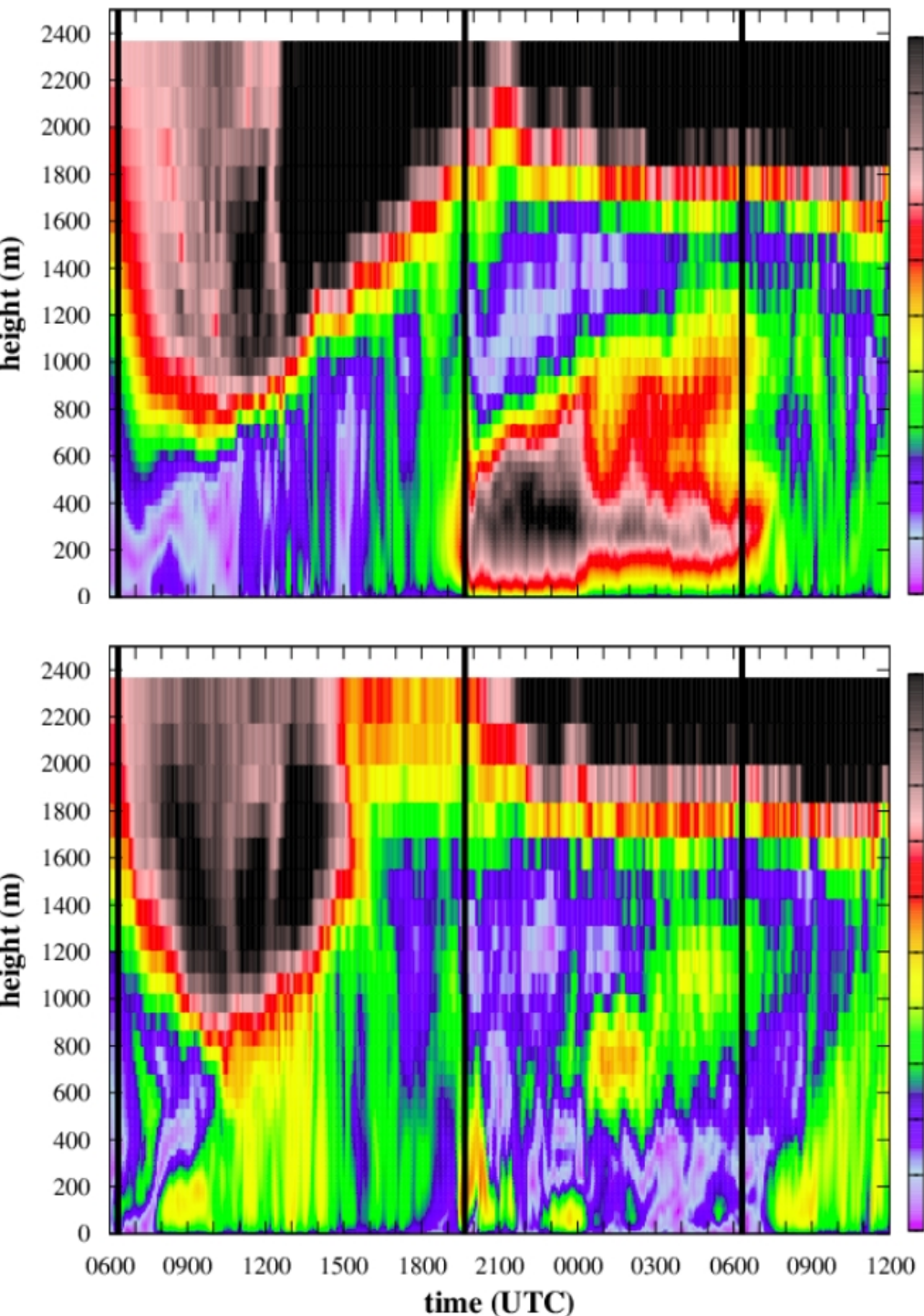
Aure valley



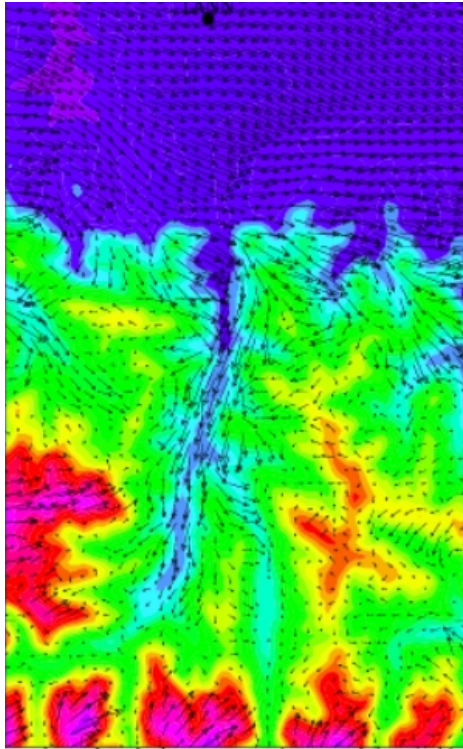
Lannemezan

50mAGL

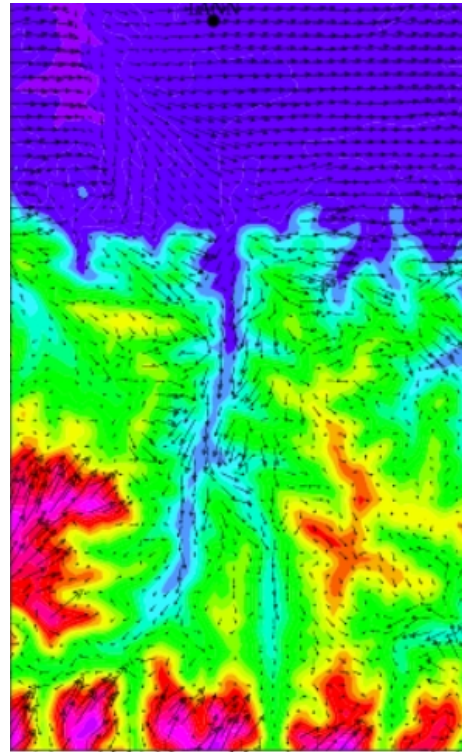
IOP11: 5-6 July 2011



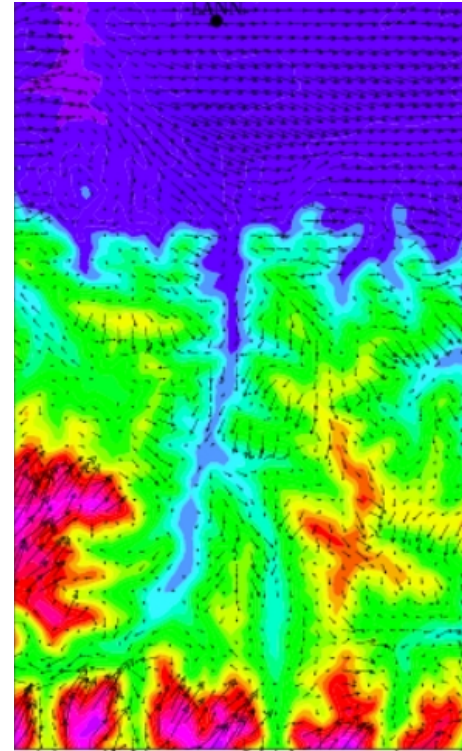
2100 UTC



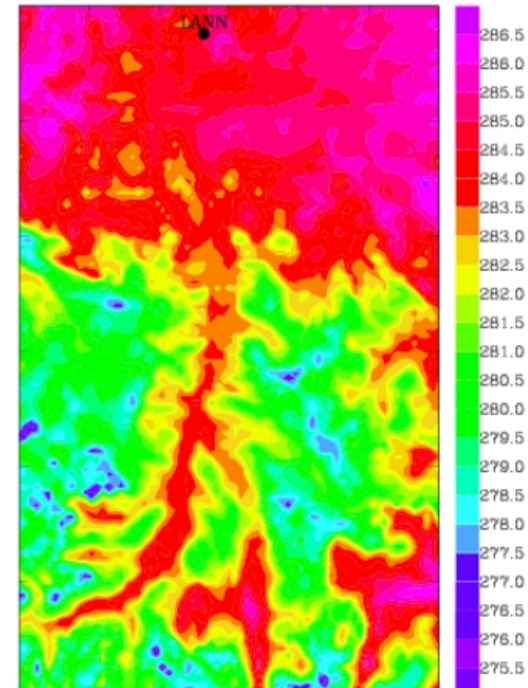
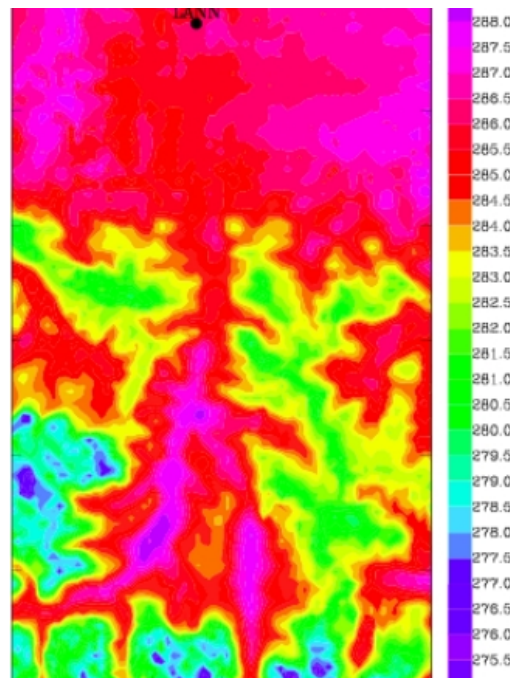
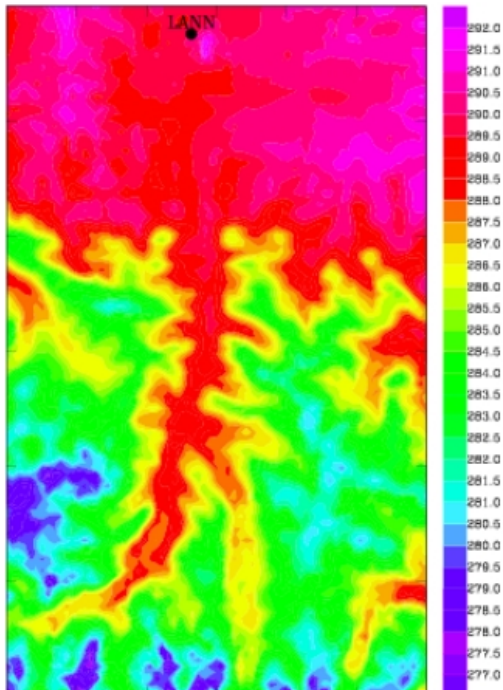
0100 UTC



0500 UTC



50mAGL



Ts (K)

Foehn?

SUMMARY OF THE STUDIED IOPS

IOP	Up/Down slope in Lannemezan	Up/Down slope exit Aure valley	Interaction Aure-Lann (Day/Night)	REASONS
3 20-21 june	NO / YES	YES / YES	NO / NO	LS wind
5 25-26 june	NO / YES (late)	YES / YES	NO / YES	When LS wind weakens, the exit valley jet reaches Lannemezan
6 26-27 june	NO / YES	YES / YES	NO / YES	Aure valley and Lannemezan linked during the whole night
9 1-2 july	YES / YES	YES / YES	YES / YES	LS winds are weak. Local winds present
11 5-6 july	YES / NO	YES / NO	YES / YES	LS winds from S and W. No local slope winds present. Foehn?

Preliminary CONCLUSIONS

1) Upslope winds

They are **not frequent** in Lannemezan (only IOP9) because in most of IOPs well-defined LS winds were present.

However, up-valley and upslope winds are **common in the Aure valley**, more sheltered. As a result during the day **there is not an interaction** between Lannemezan and the Aure valley.

2) Downslope winds

They are **present during all the studied IOPs** in Lannemezan and in the Aure valley. If LS winds are weak, an **exit valley jet is formed that reaches Lannemezan** (lower and less intense than at the exit of the valley).

3) For the studied IOPs, only the observations (and model) during **IOP9** reported upslope winds during day and downslope winds during night-time. There are other IOPs with no upslope winds during day but downslope winds are generated at night when the LS weakens