MICROSCALE PROPERTIES OF DOWNSLOPE WINDSTORMS OVER COMPLEX TERRAIN: NUMERICAL ANALYSIS USING THE WRF MODEL

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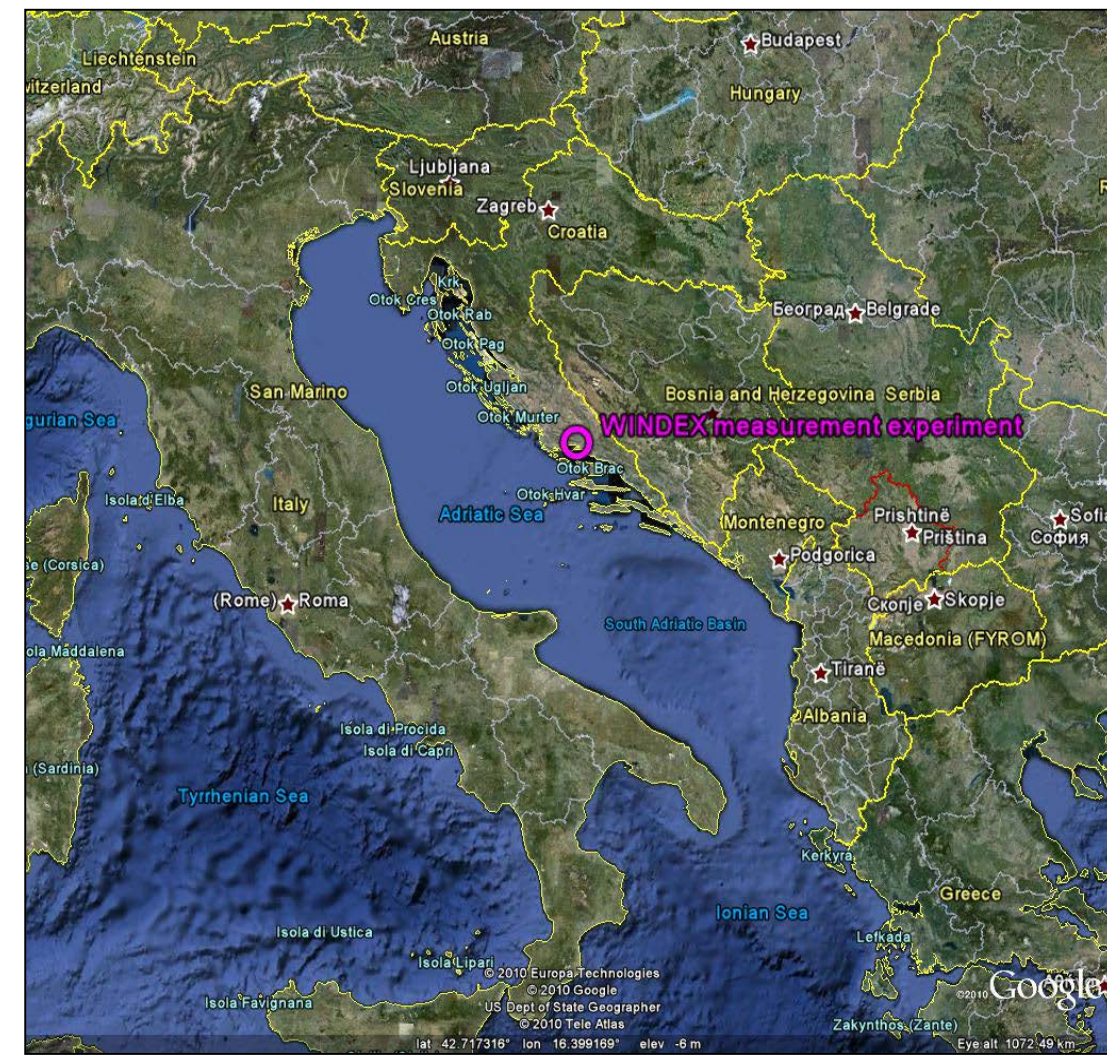Email addresses: kristian.horvath@cirus.dhz.hr, branko@ucar.edu

THE EVENT

Goals
:: study mesoscale and sub-mesoscale structure of of bora flow over very complex terrain
:: perform multiscale simulations of the event

The case
:: 28-29 Apr 2010, mid-Adriatic
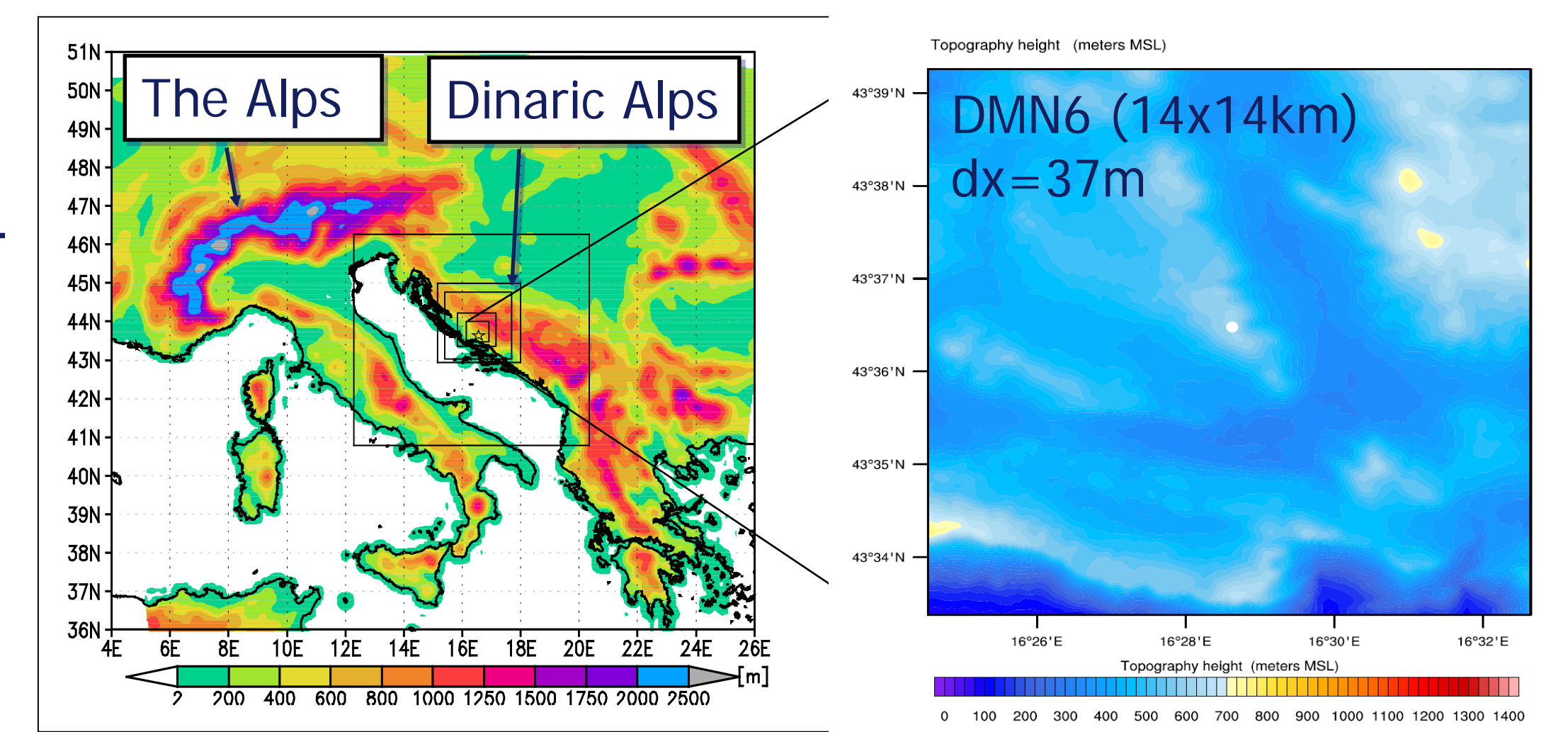:: strong deep anticyclonic bora

THE MODEL

The WRF model
Mesoscale domains
:: 9, 3, 1, 0.333 km
:: MYNN2.5&MYJ PBL
:: G-F. CPS(d1), Th. MPS, Noah LSM
LES domains
:: 111m, 37m
:: horizontal mixing
:: eddy coef.–TKE1.5

RESULTS

Horizontal structure
:: complex flow with many secondary jets and wakes
:: airflow modulated by to individual secondary mountain peaks and Valleys

Sensitivity study
:: with PBL
:: Levels - 35, 47, 82
:: MYJ, MYNN
:: large sensitivity to both PBL scheme and no. of levels after 15 hours of Integraton
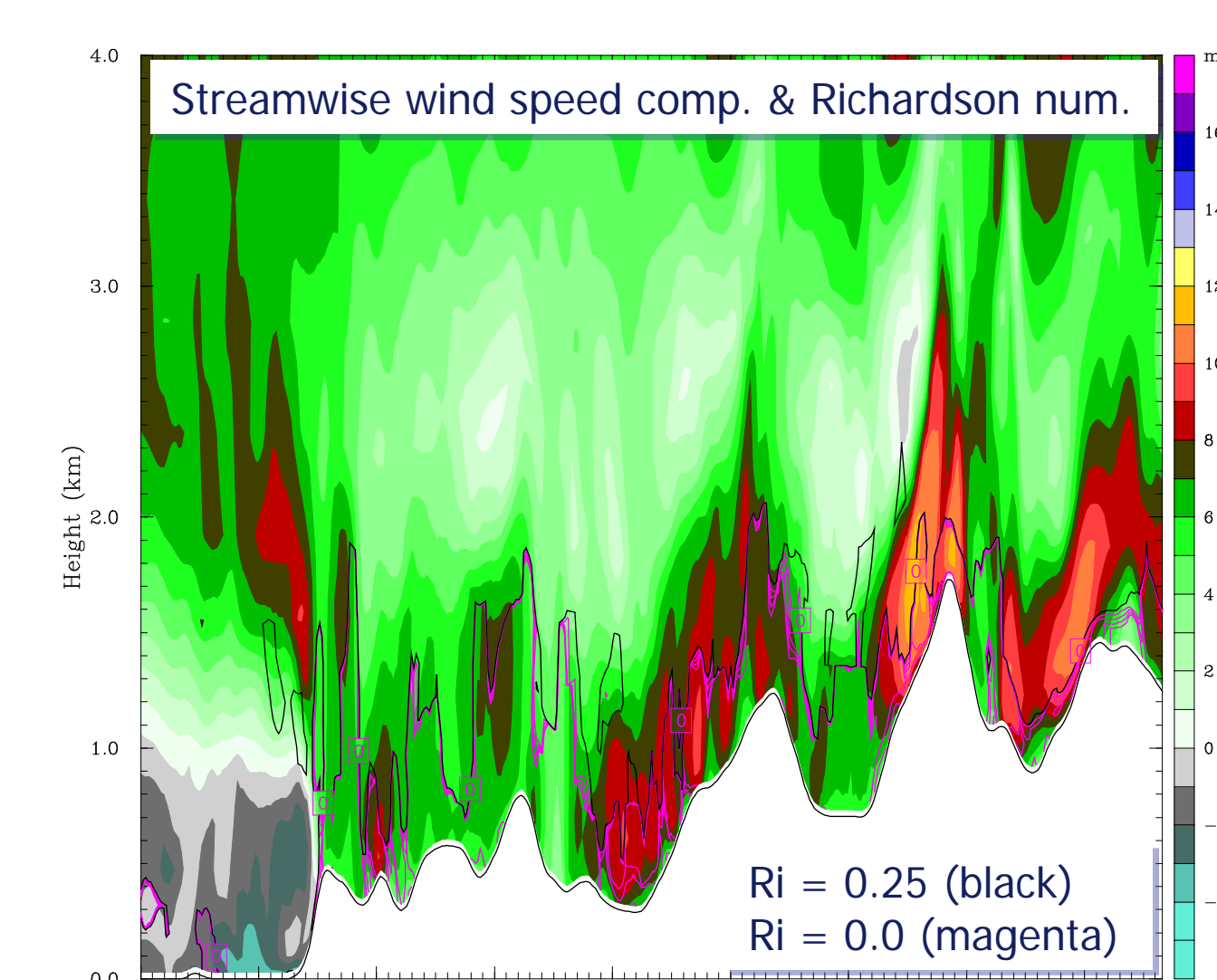:: simulations with LES domains being tested
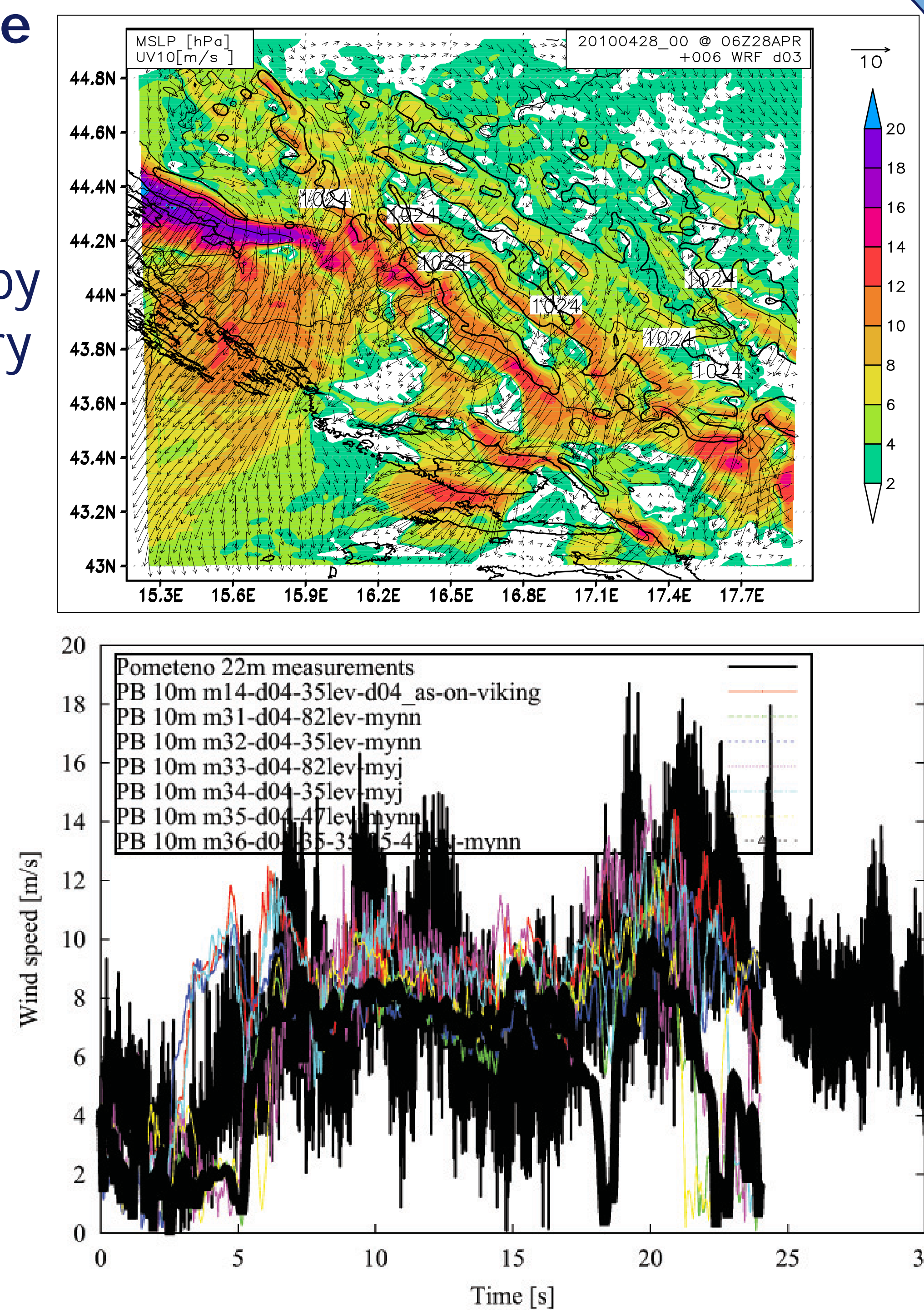
Vertical structure
:: deep bora flow, wave interference and breaking
:: lee maximum over every individual peak in the lee
:: individual mountain peak aids the local-only flow recovery
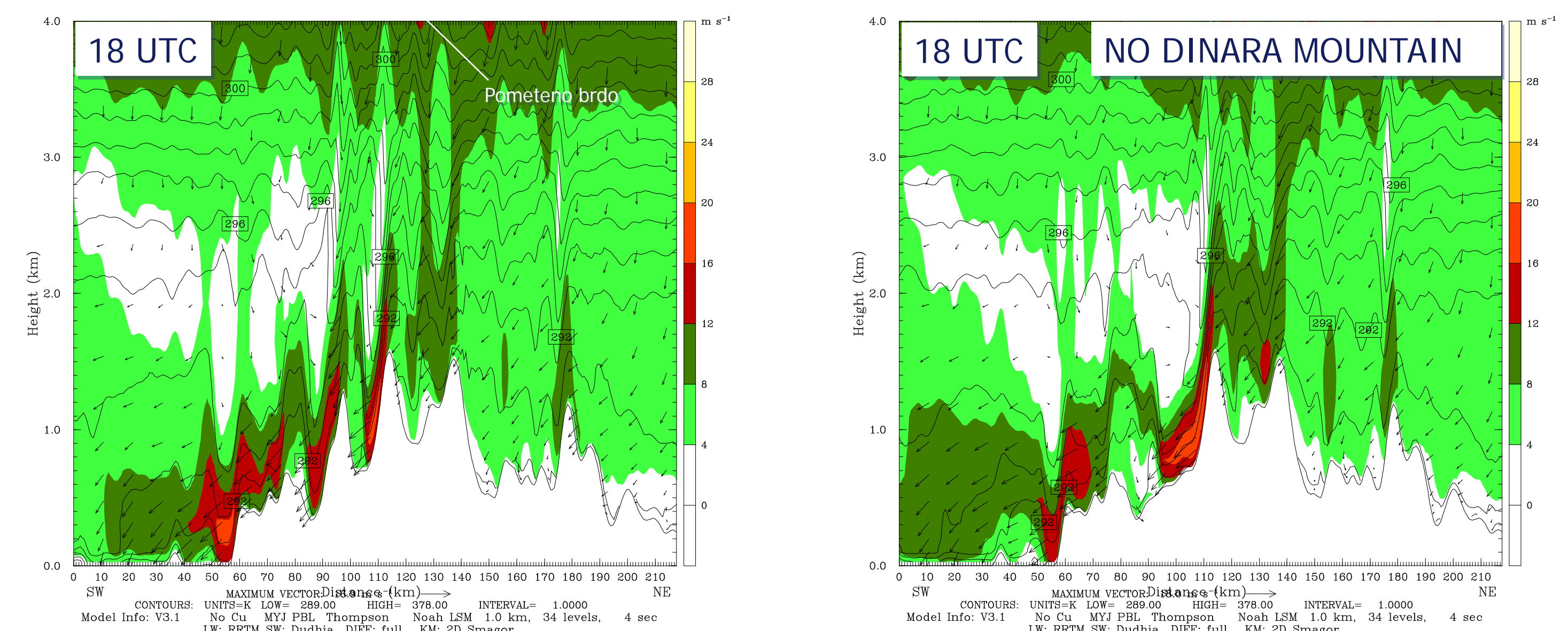
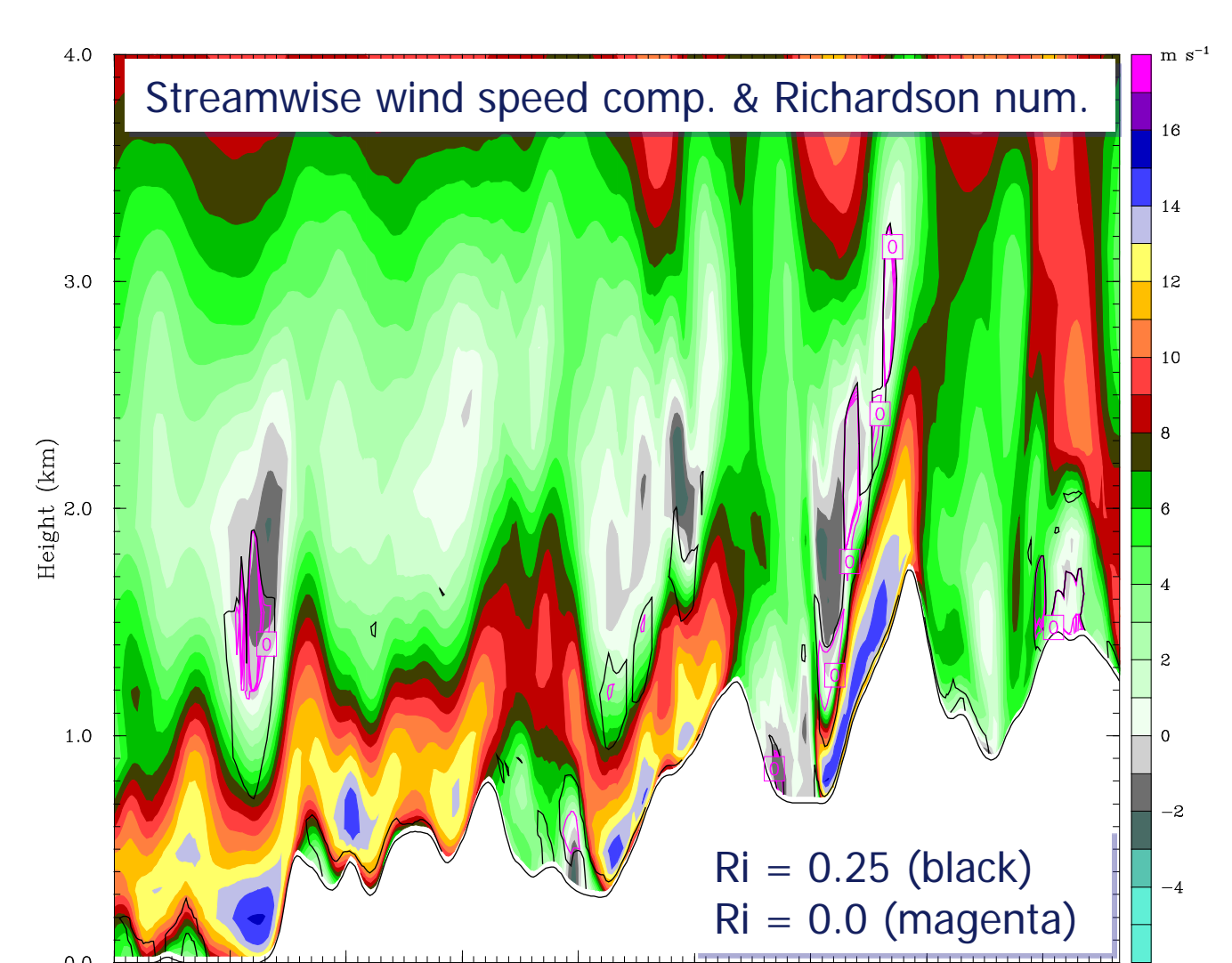**Individual pulsations**
DAYTIME (12 UTC)   NIGHTTIME (18 UTC)

:: Pulsations are quasi-permanent, no dynamical instability aloft

:: Pulsations are more dissipative, dynamical instability aloft

CONCLUSIONS

:: Large sensitivity exists wrt no. of vertical levels and type of PBL parametrization
:: Simulations with LES domains being tested
:: in mid-Adriatic more complex bora behavior than in the northern Adriatic
:: the influence of an individual peak aids the local flow recovery and propagates far downstream, but also upstream
:: pulsations of periods 7-11 min are simulated
:: pulsations are more persistent/dissipative during day/night