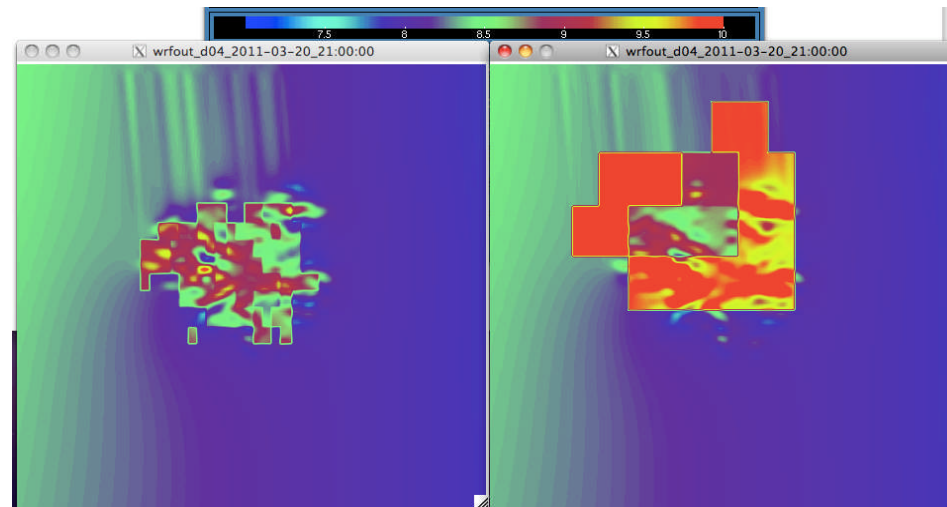# WRFLES
A system for high-resolution limited area numerical simulations

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Introduction

- What is WRFLES?
- Some examples of its use
- SW-windstorm in Iceland
  - 2011 and the 10th century
- Summary

WRFLES

- The WRFLES software tool takes care of:
  - Setting up a directory hierarchy suitable for executing the steps of a WRF LES simulation.
  - Calculating the namelist parameters corresponding to user defined criteria for the simulation region and generating the necessary namelists.
  - Generating PBS scripts from templates that take care of the various steps in a WRF run.
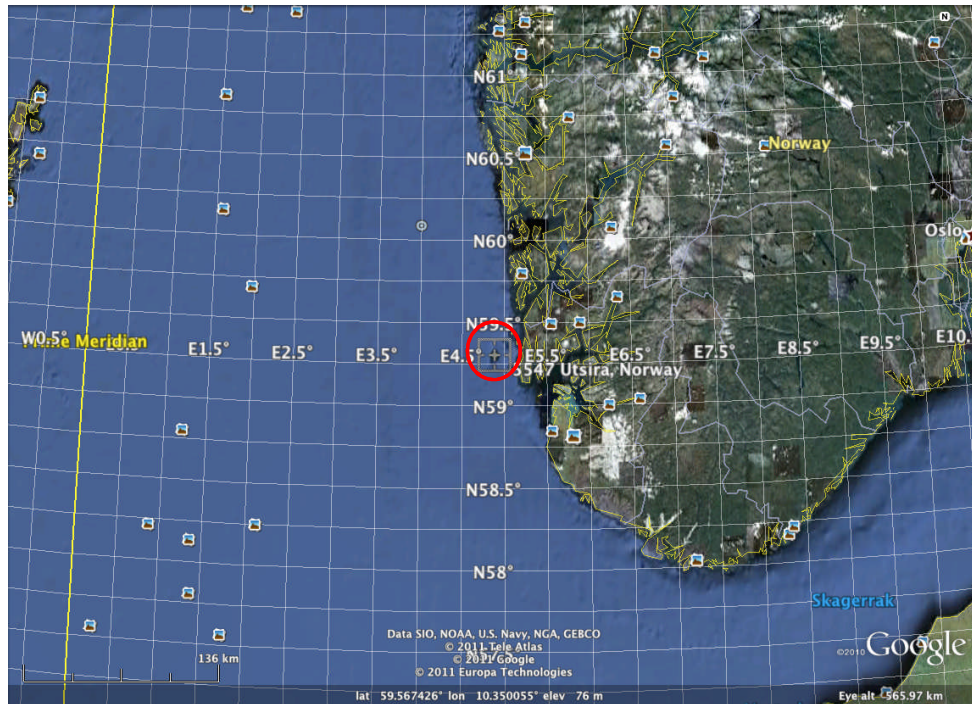
WRFLES

- Includes "stand alone" python scripts to correct the geo_em and met_em files

- Includes instructions on how to import 1sec ASTER topography data into WRF

- Can be used with high resolution Corine land use data

WRFLES

- The user should only need to edit one config file – WRFLES.config.yml
- Most important features are:
  - from_lat, from_lon, to_lat, to_lon – The innermost domain can be defined by setting a pair of corner points. The domain can also be defined by setting the center latitude and longitude, as well as radius, of the innermost domain. In the latter case the user comments out the from_* and to_* parameters and defines instead the center_lat, center_lon and radius parameters
  - start_date – Initial time of the simulation
  - end_date – Ending time of the simulation
  - input_data_timestep – The time interval (hours) between available input data
  - asterdir – The location of the 1 sec ASTER topography data for the region in question.

Example – Island of Utsira

Example – Island of Utsira

D01=8100m, 66x66pts

D02=2700m, 94x94pts

D03=1350m,
103x103pts
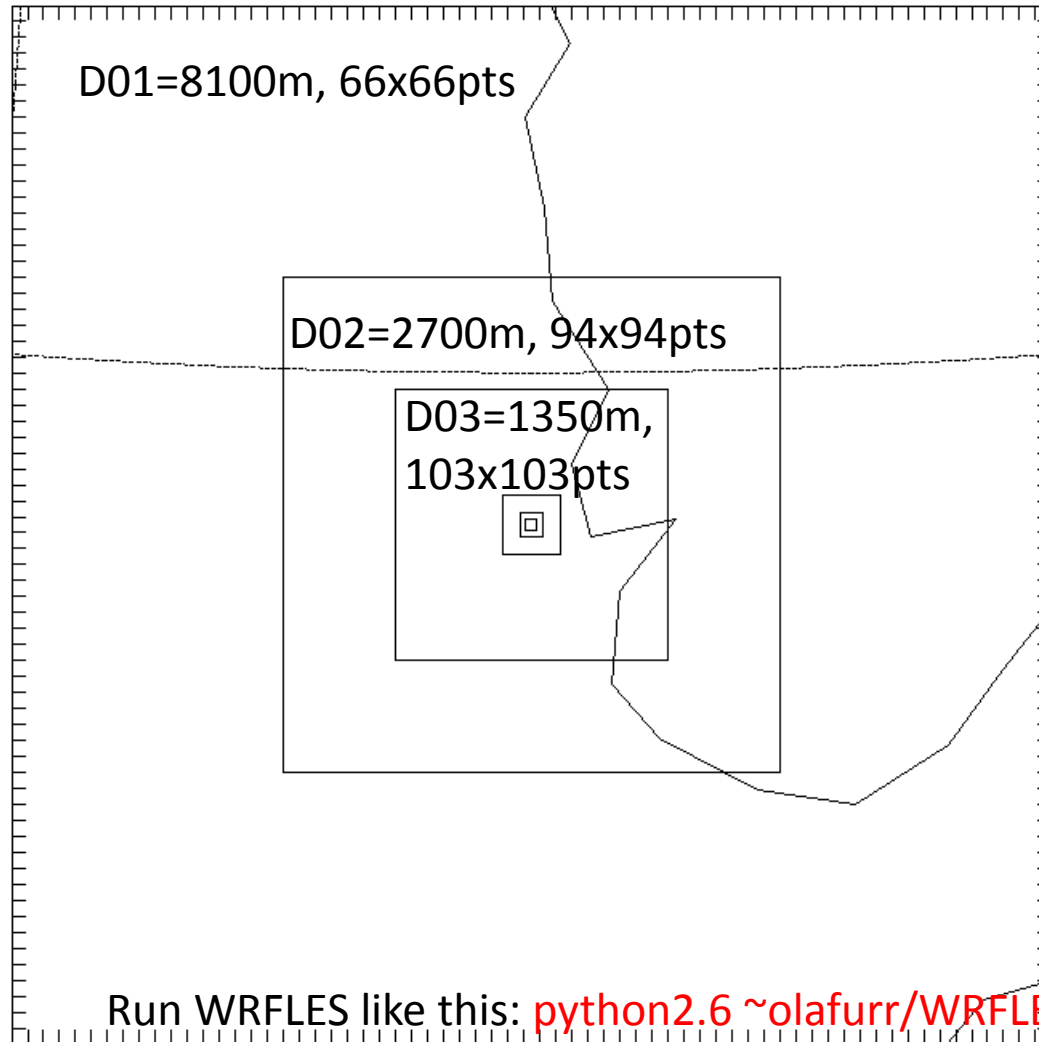
center_lat: 59.306732
center_lon: 4.885415
radius: 1.5

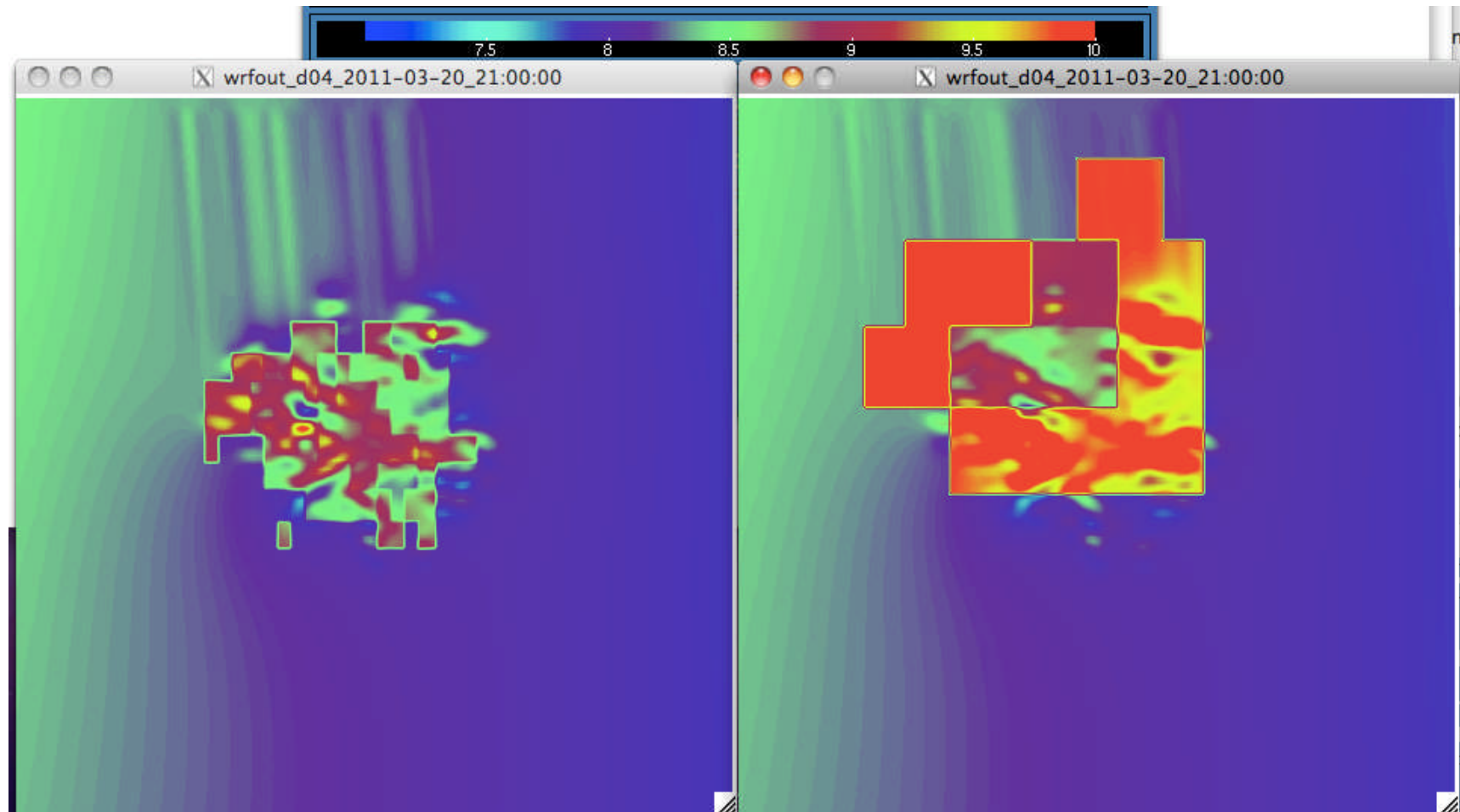D04=450m, 67x67pts
D05=150m, 79x79pts
D06=50m, 112x112pts

Additional parameter
border_width : [25, 20,
20, 40, 20, 17]

Run WRFLES like this: python2.6 ~olafurr/WRFLES/src/WRFLESSetup.py -d
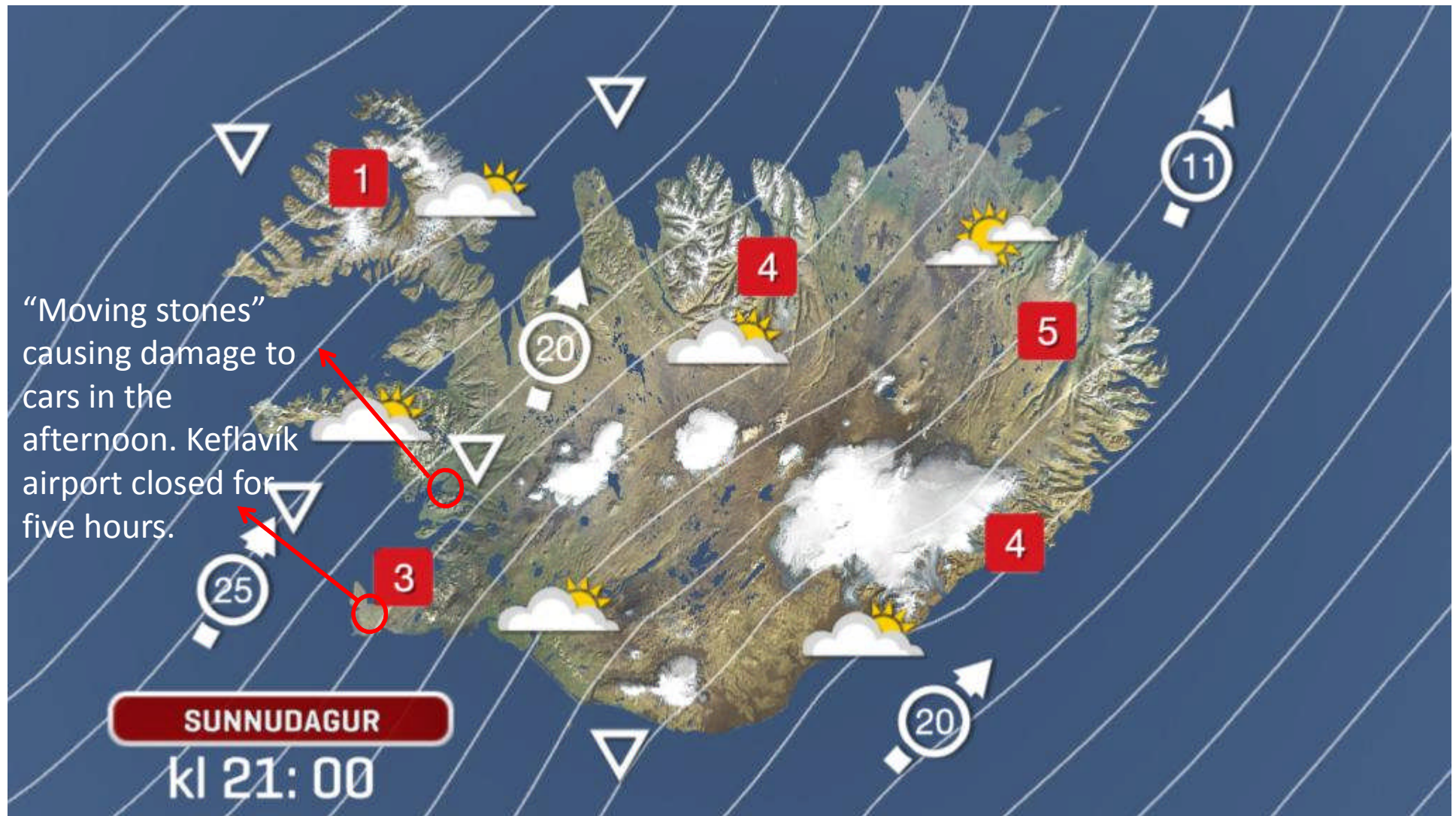/home/geofysisk/olafurr/wrf-les/utsira/WRFLES.config.yml -o /work/olafurr/utsira

Example – Island of Utsira

30sec USGS

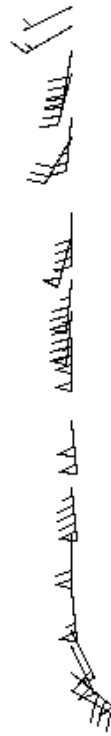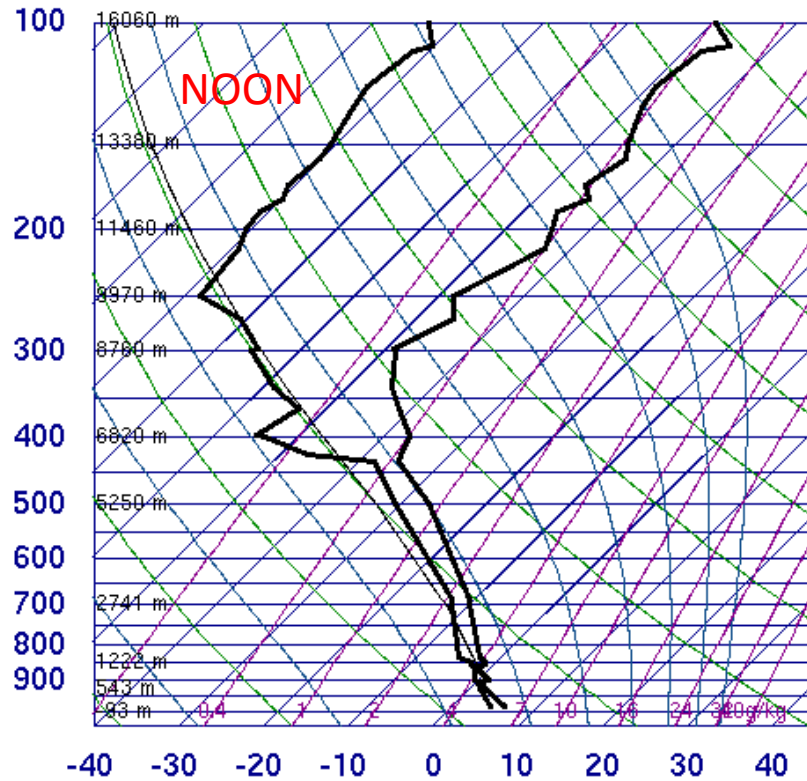1sec ASTER
300m Corine

5.5 km
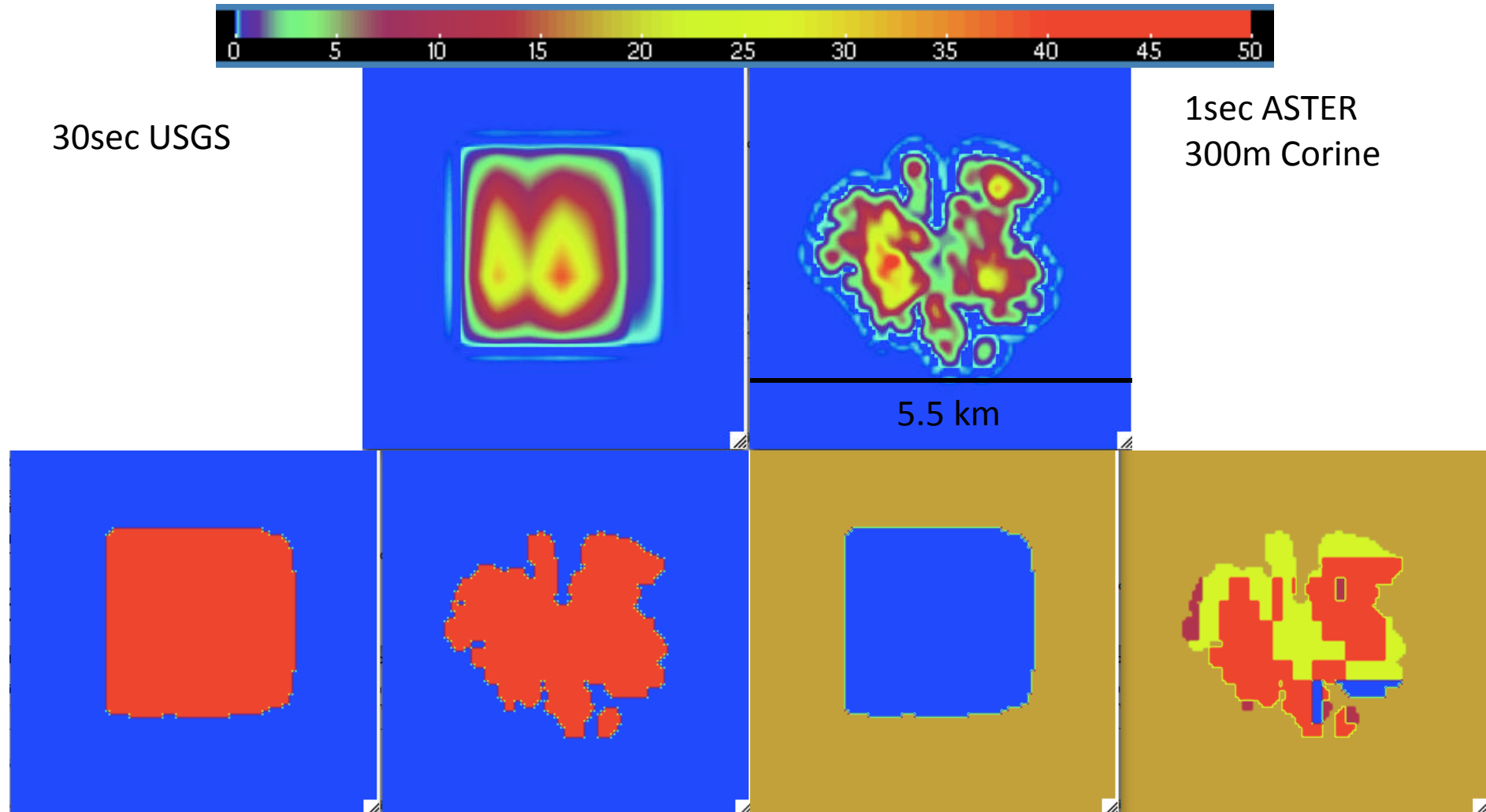
Does it matter?

Simulated sfc wind speed over Utsira using Corine (left) and Modis (right) land use data

Windstorm of 10 April 2011

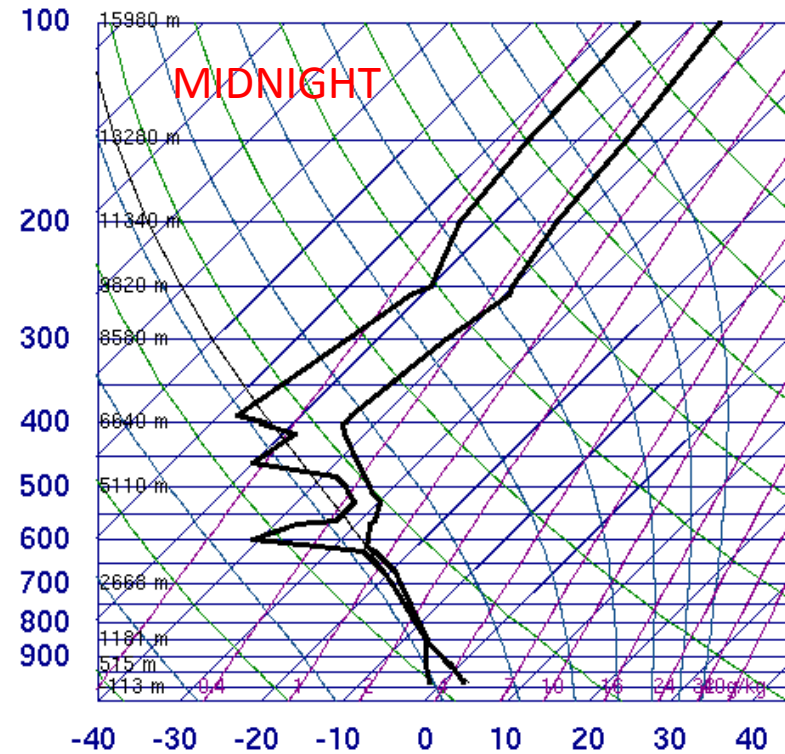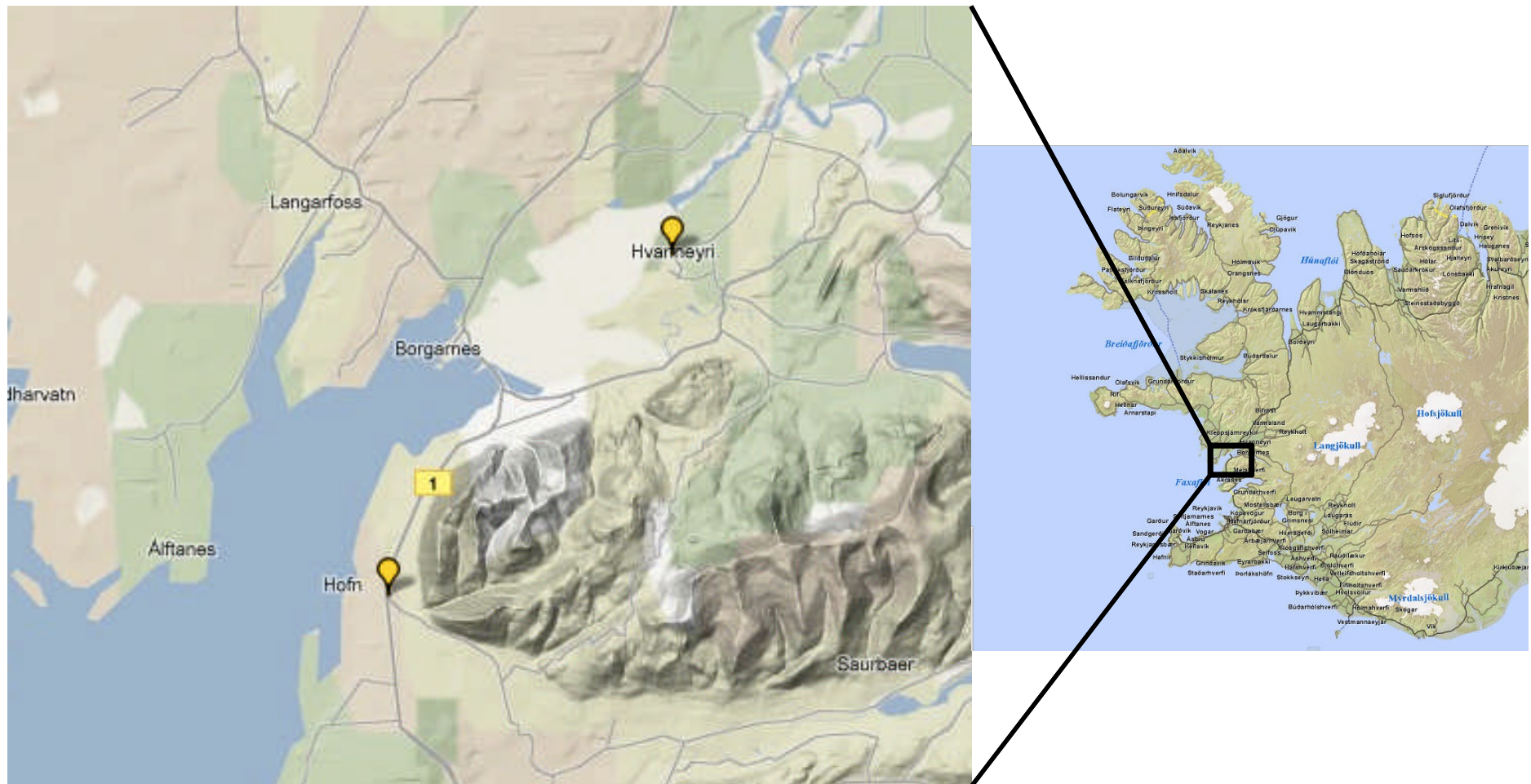# Upper air observations

Surface observations

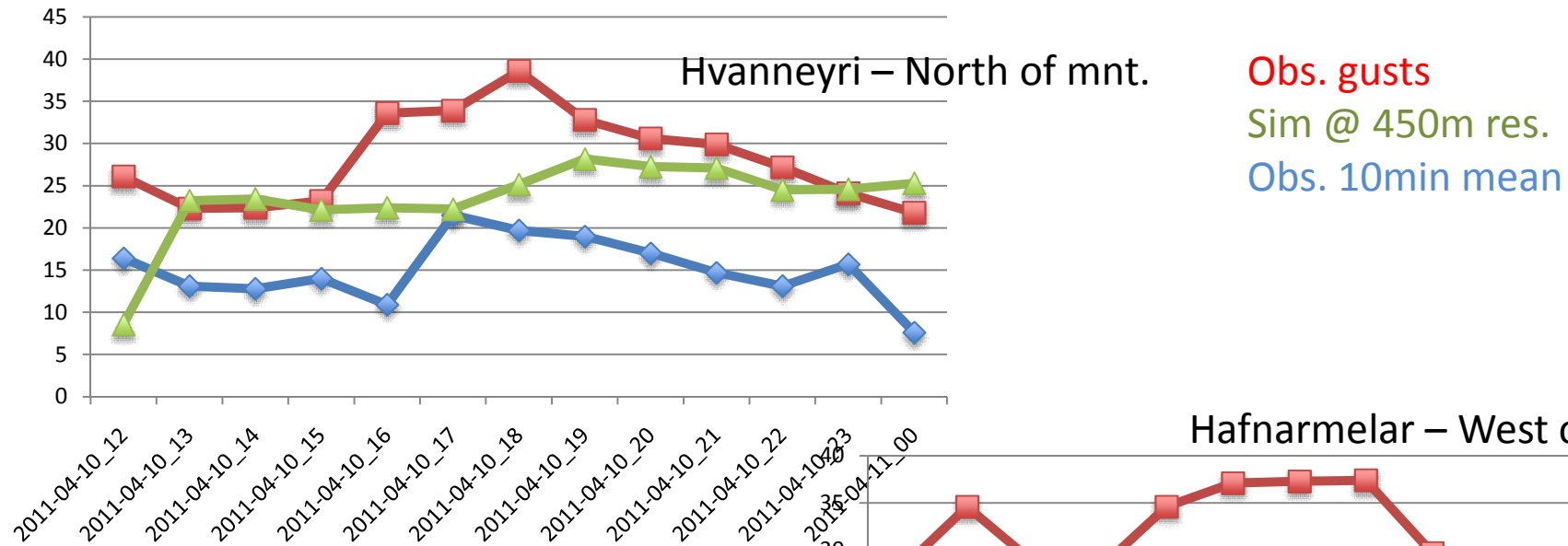# Strong winds and gusts

Hvanneyri – North of mnt.

Obs. gusts
Sim @ 450m res.
Obs. 10min mean

Hafnarmelar – West of mnt.
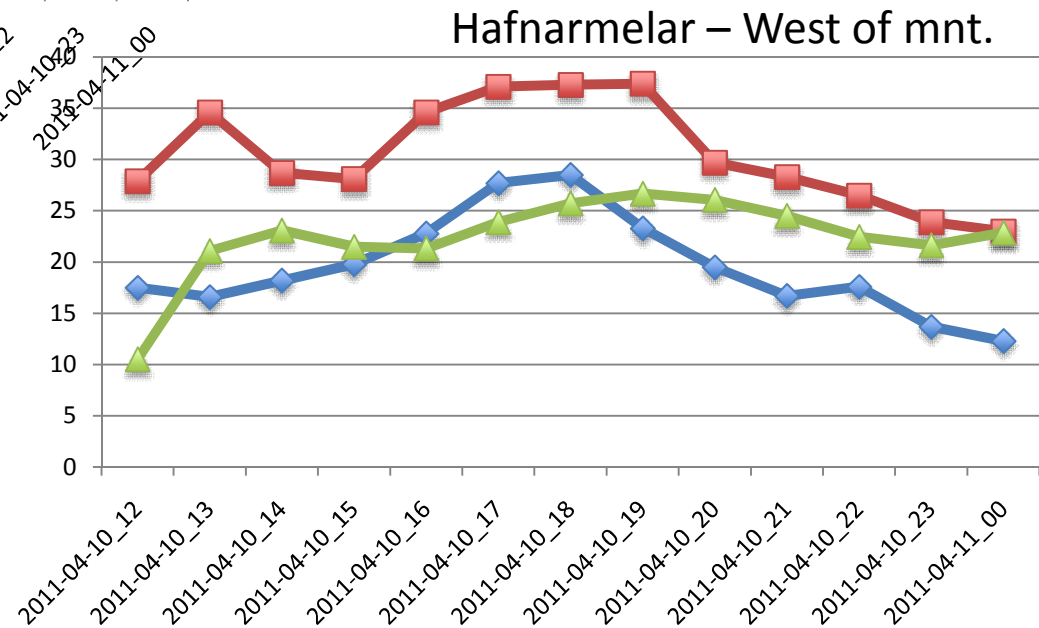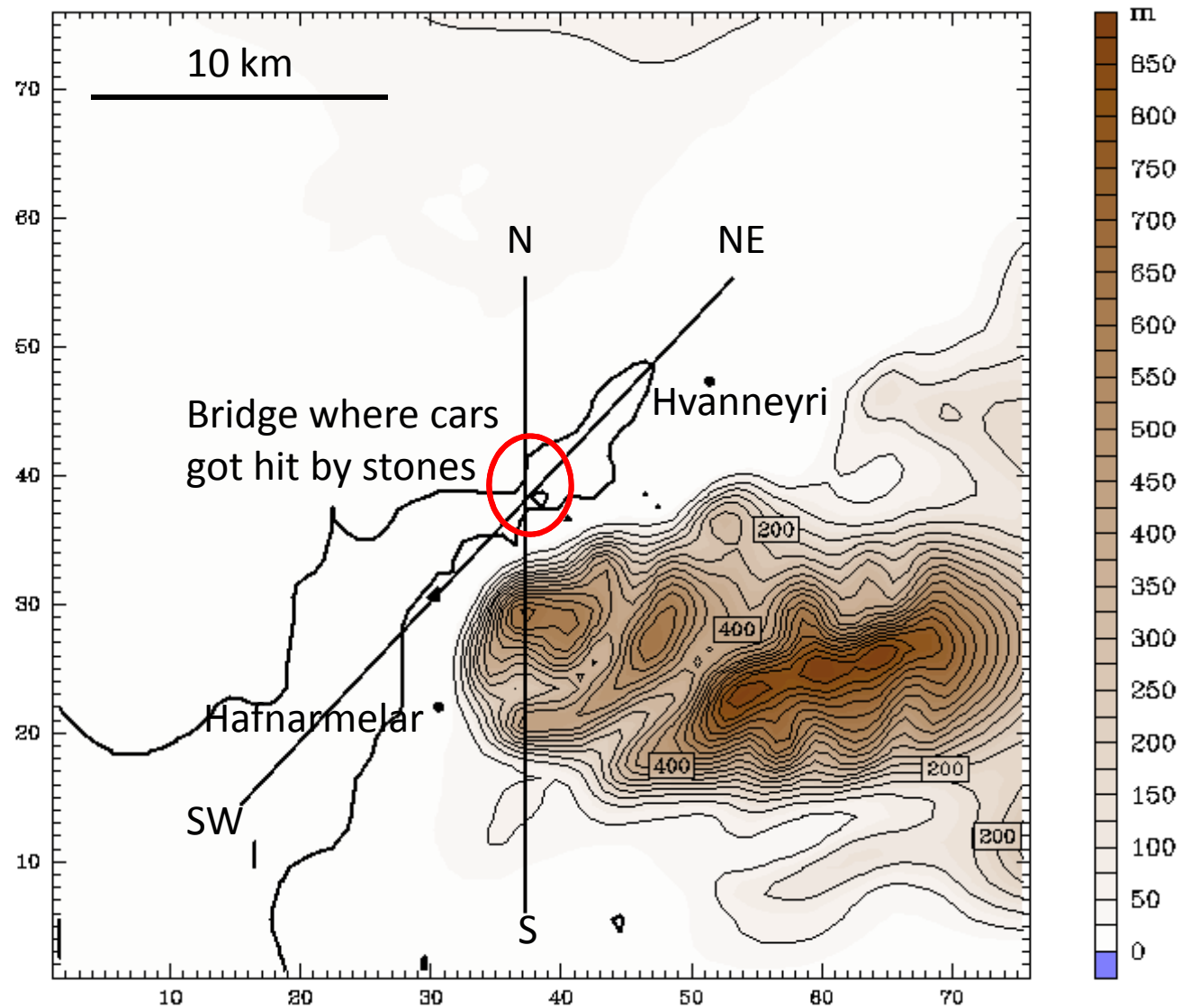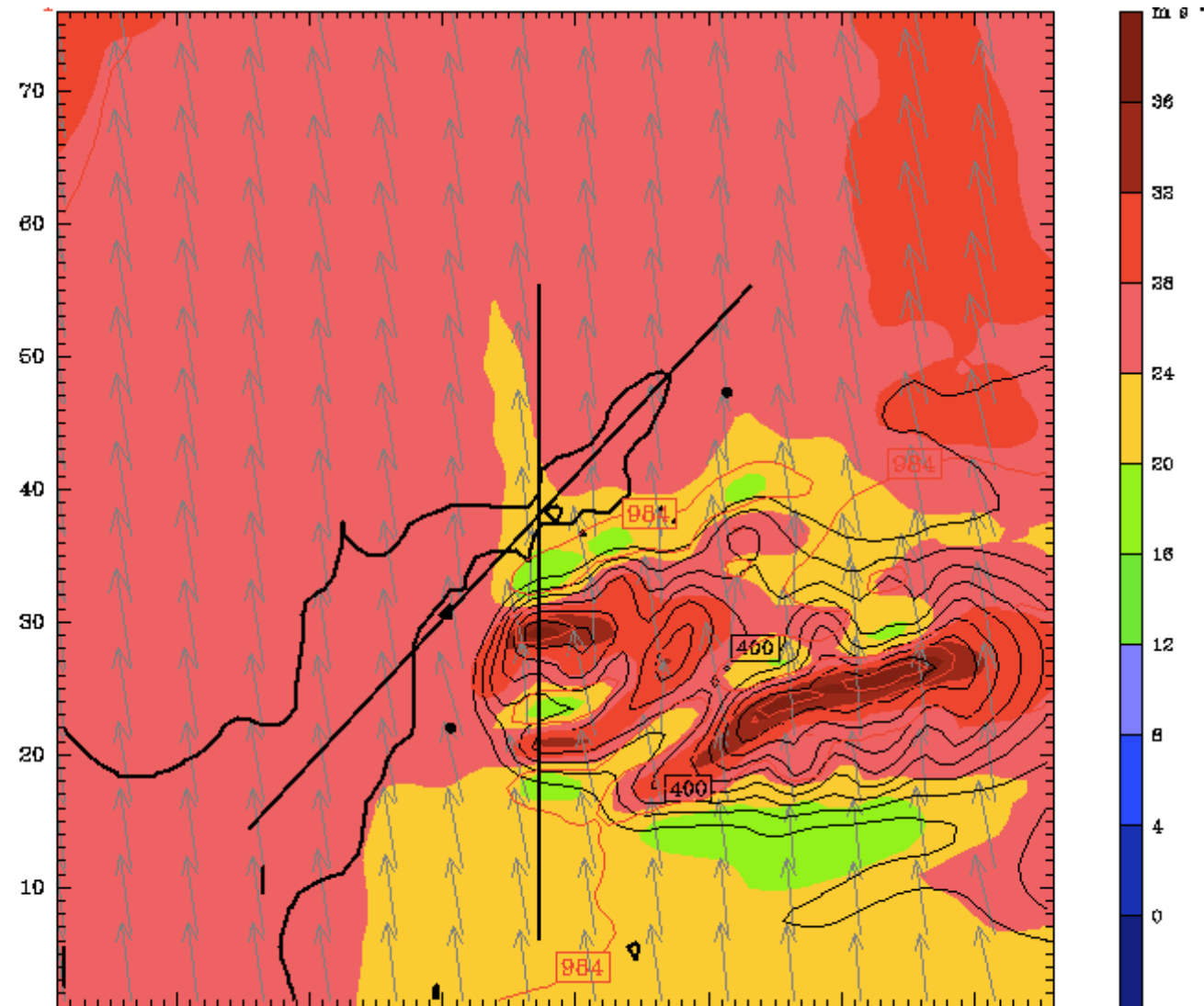
For most of the time, wind direction at location Hvanneyri (N) is 20-30°more the the west, compared to Hafnarmelar (W)
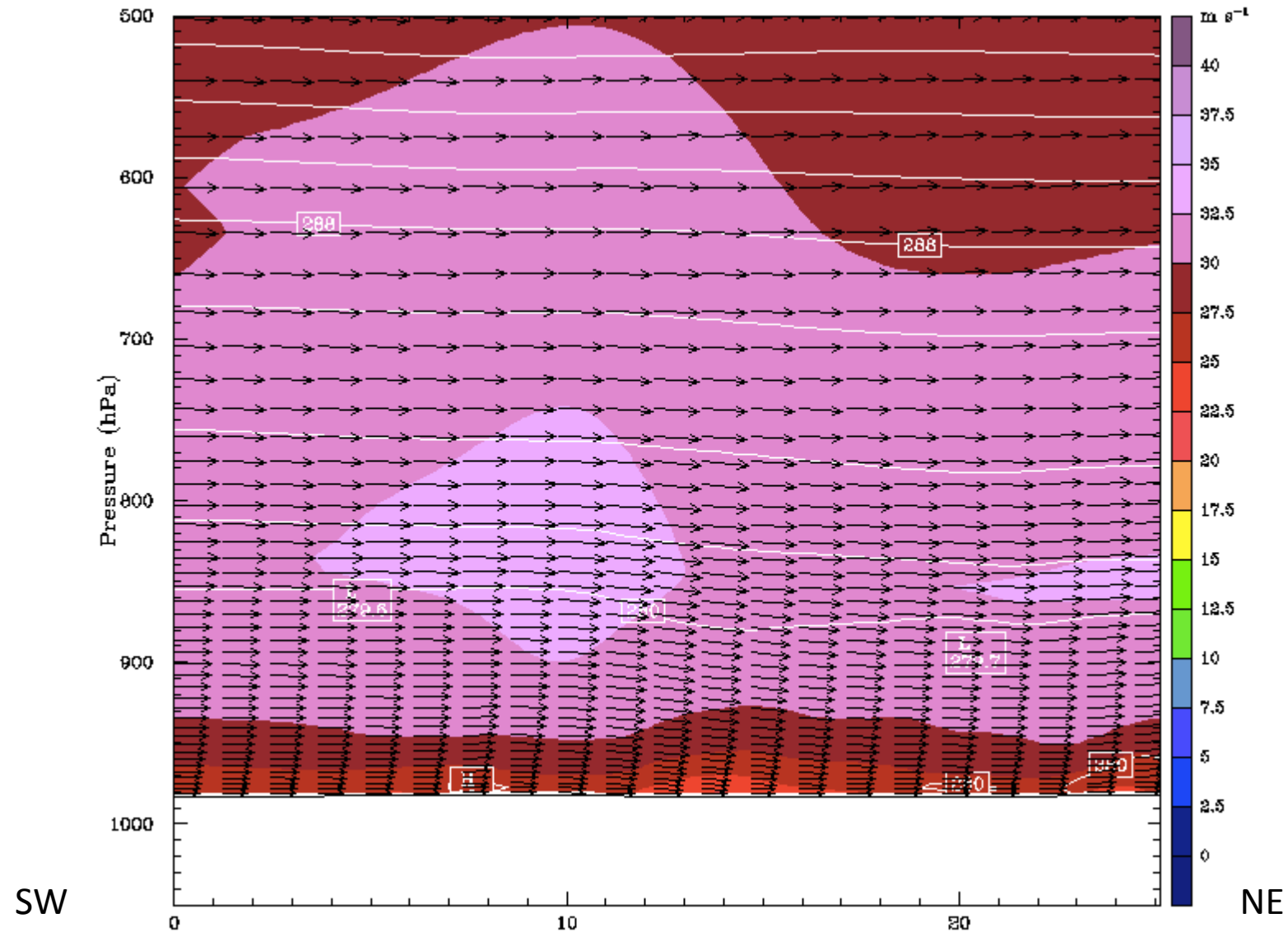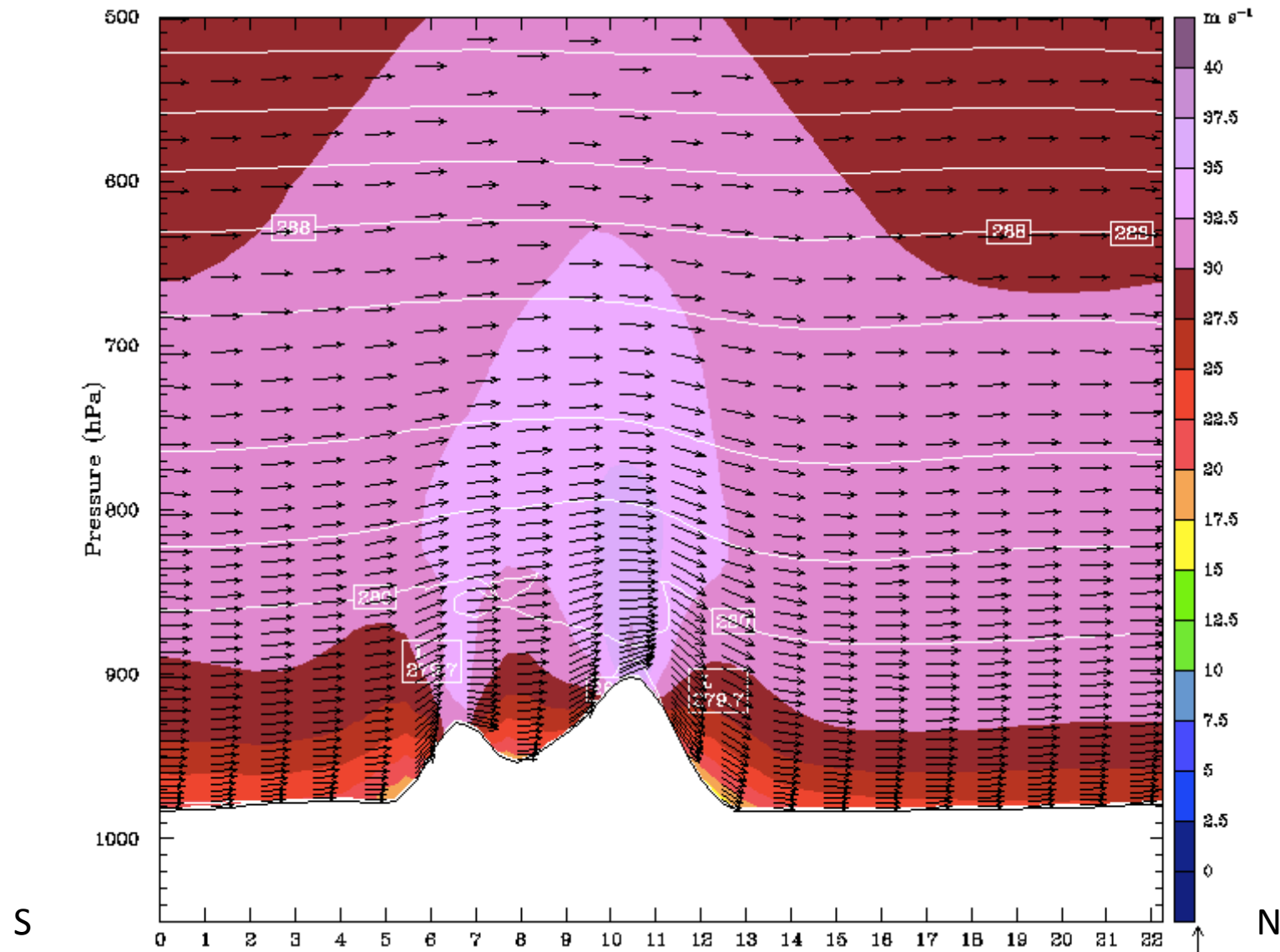
LES domain

Simulated sfc winds @ 18:00hrs

Cross sections @ 18:00hrs

Cross sections @ 18:00hrs

Summary

- WRFLES simplifies running the WRF model in LES mode
  - Work was funded by the University of Bergen
  - Open source solution
    - Will be made available to the community soon
- The "moving stone" weather of April 2011
  - Strong winds observed and simulated
  - Neutral upstream conditions, yet a clear pattern that resembles blocked flow