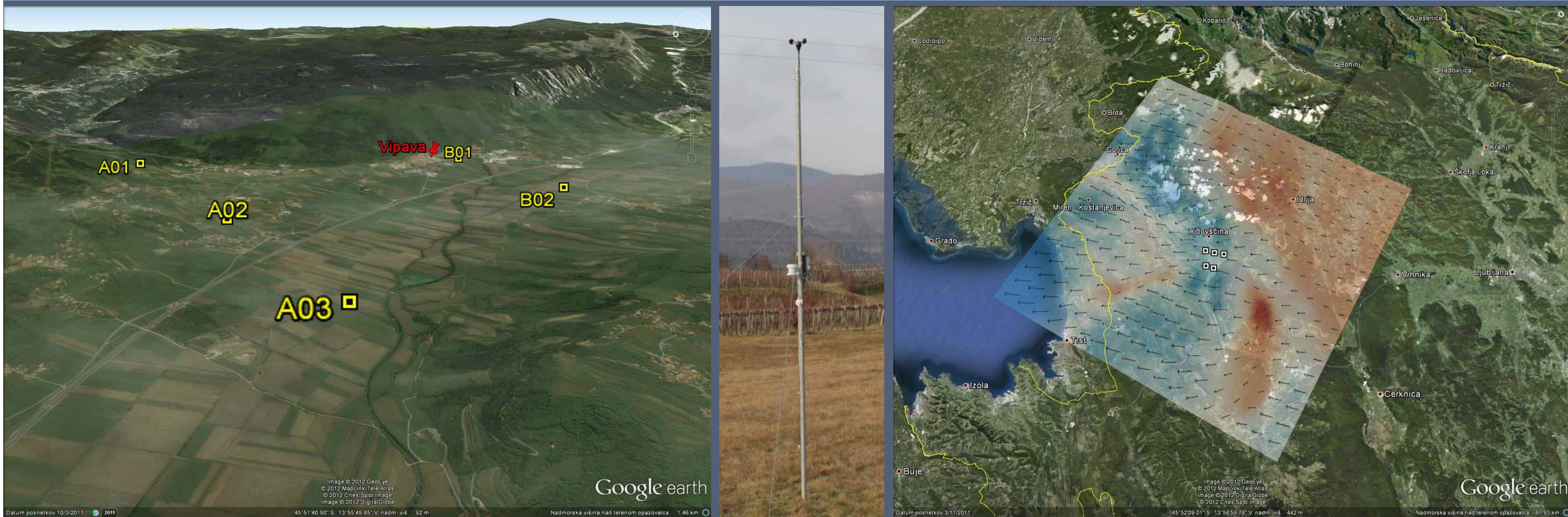


# Bora in Vipava Valley

## Analysis of Observational and Forecast Data



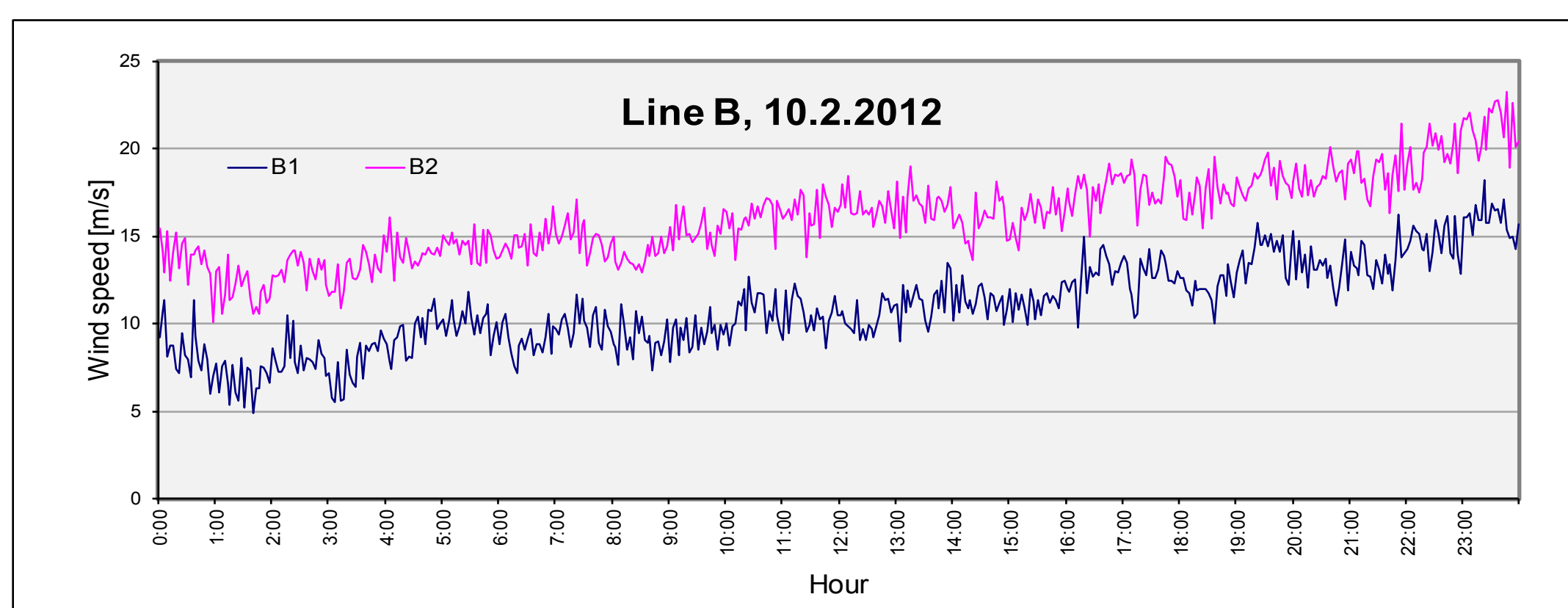
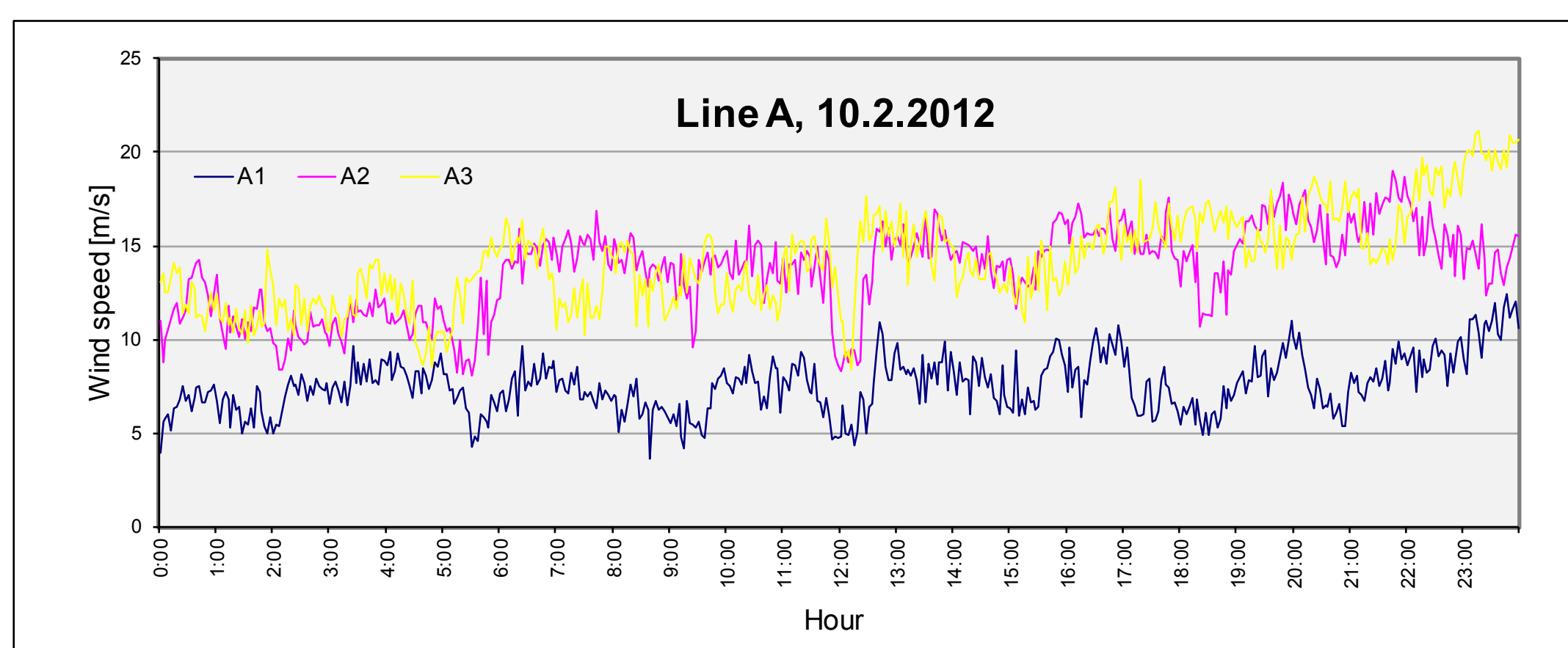
The most important bora property is its gustiness. We studied bora gusts by using new observations collected during the four-month period in 2012. On less than 2 km distance, bora velocity more than doubles. We compared bora forecasts of the SPACE-SI prognostic model with the observations to show that current forecast models lack the ability to describe the bora gustiness.



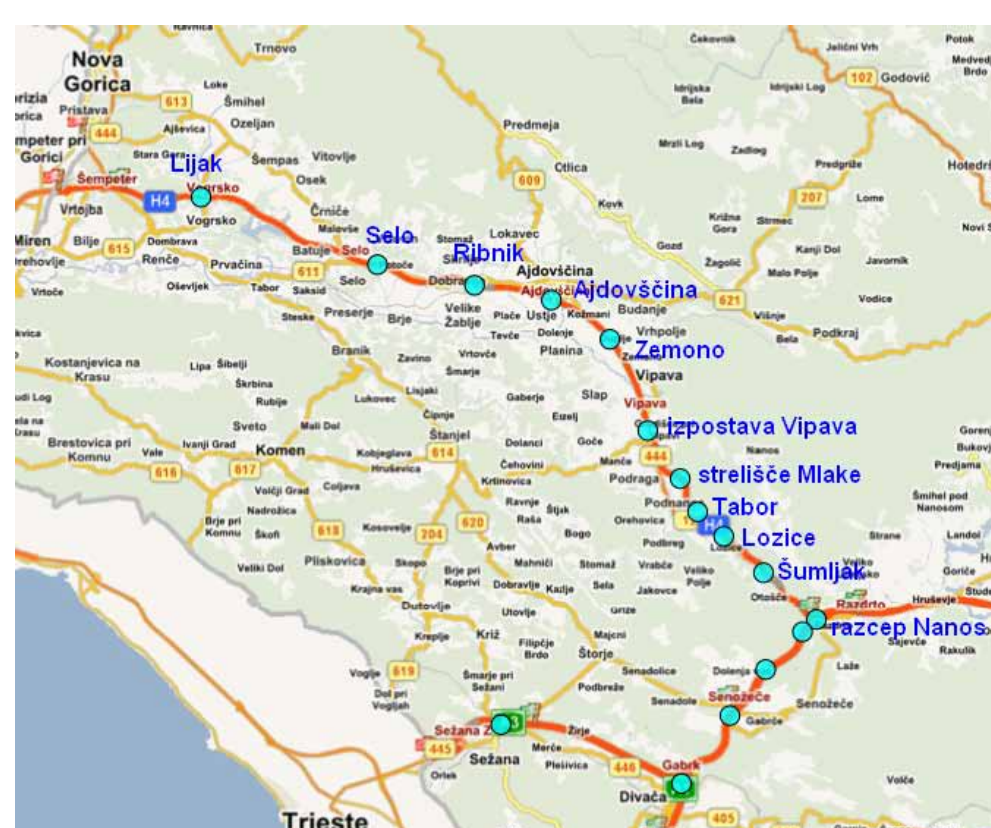
### New observations

We analyzed new observations from 5 instruments along two measurement lines. Horizontal distance between the instruments is about 1.5 km. Bora measurements from 10 February 2012 illustrate the main findings:

- all observations contain high-frequency variability, typical for bora (bora gusts),
- along A line bora strength doubles from A01 towards A02 over 1.5 km horizontal and 100 m vertical distance,
- in the valley average bora speed does not vary from one side to another.



### Other stations

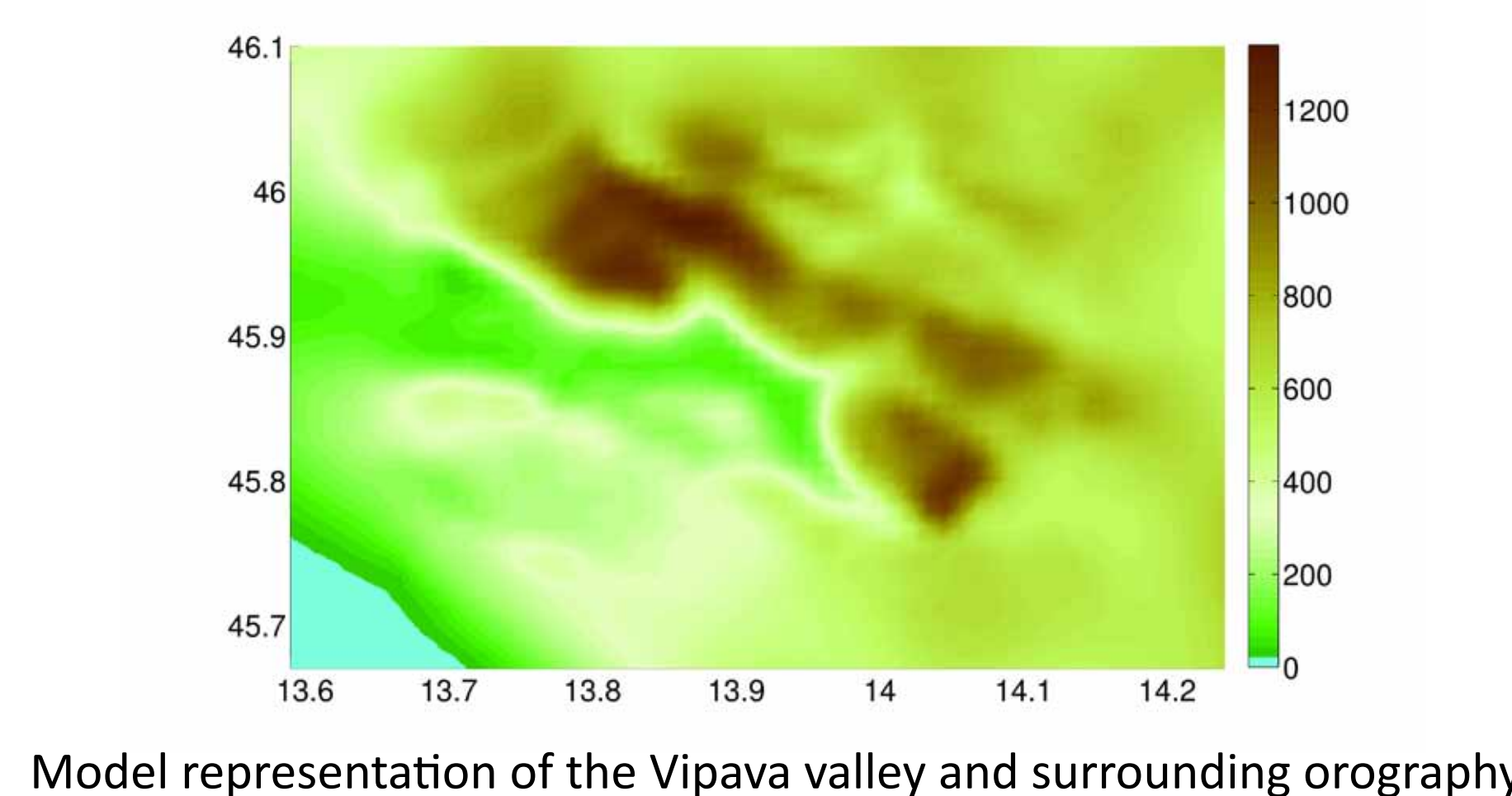


Locations of the DARS (Slovenian motorway company) measurement sites along the highway H4 through the Vipava valley.

### Bora simulations

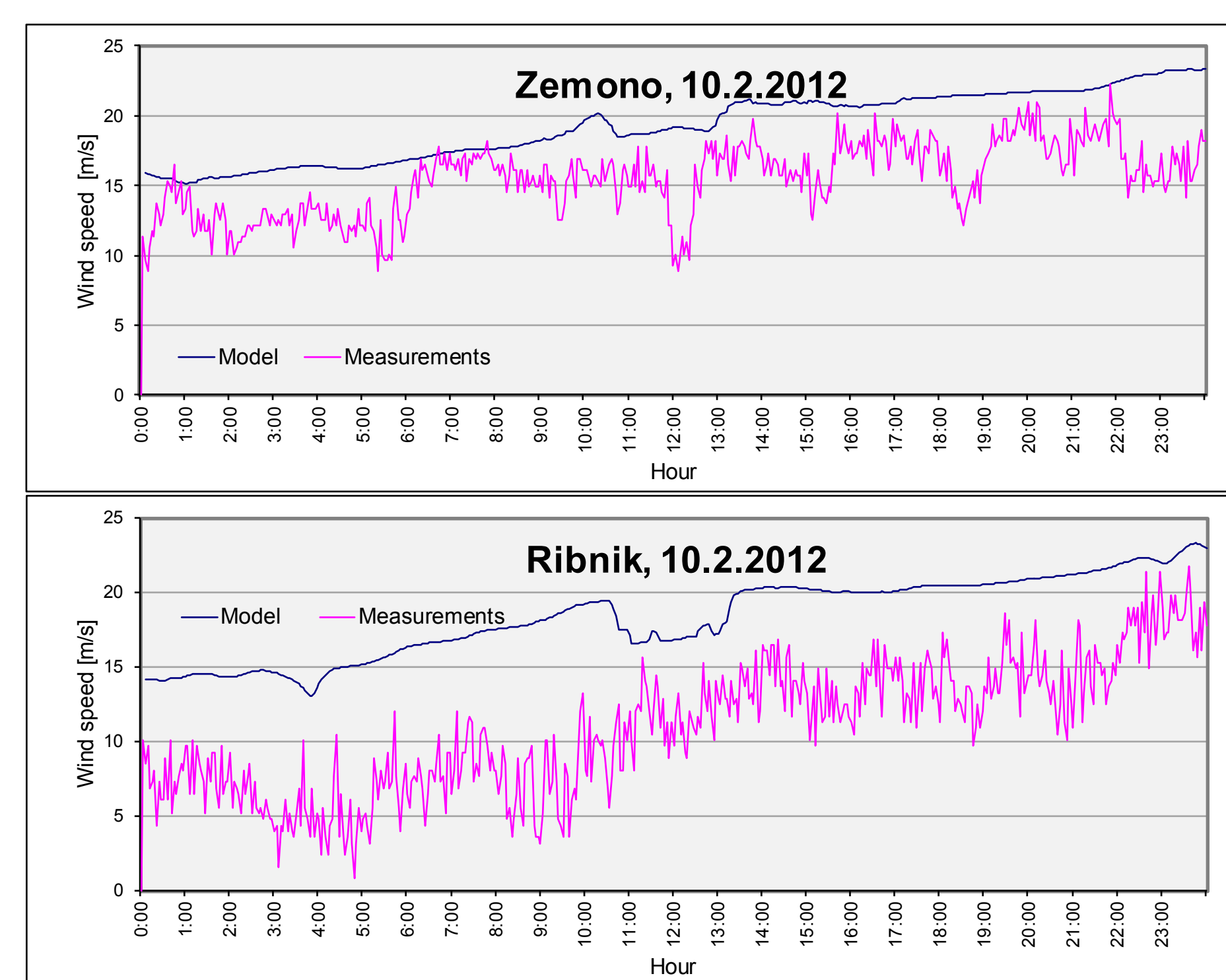
SPACE-SI in collaboration with Chair of Meteorology FMF UL has its own operational weather forecast on 3.7 km spatial resolution with WRF-ARW model (<http://vreme.space.si>).

A special model setup was prepared for this project, focusing on the Vipava valley region and using higher resolution (1.2 km). Model forecasts have been compared with bora observations.

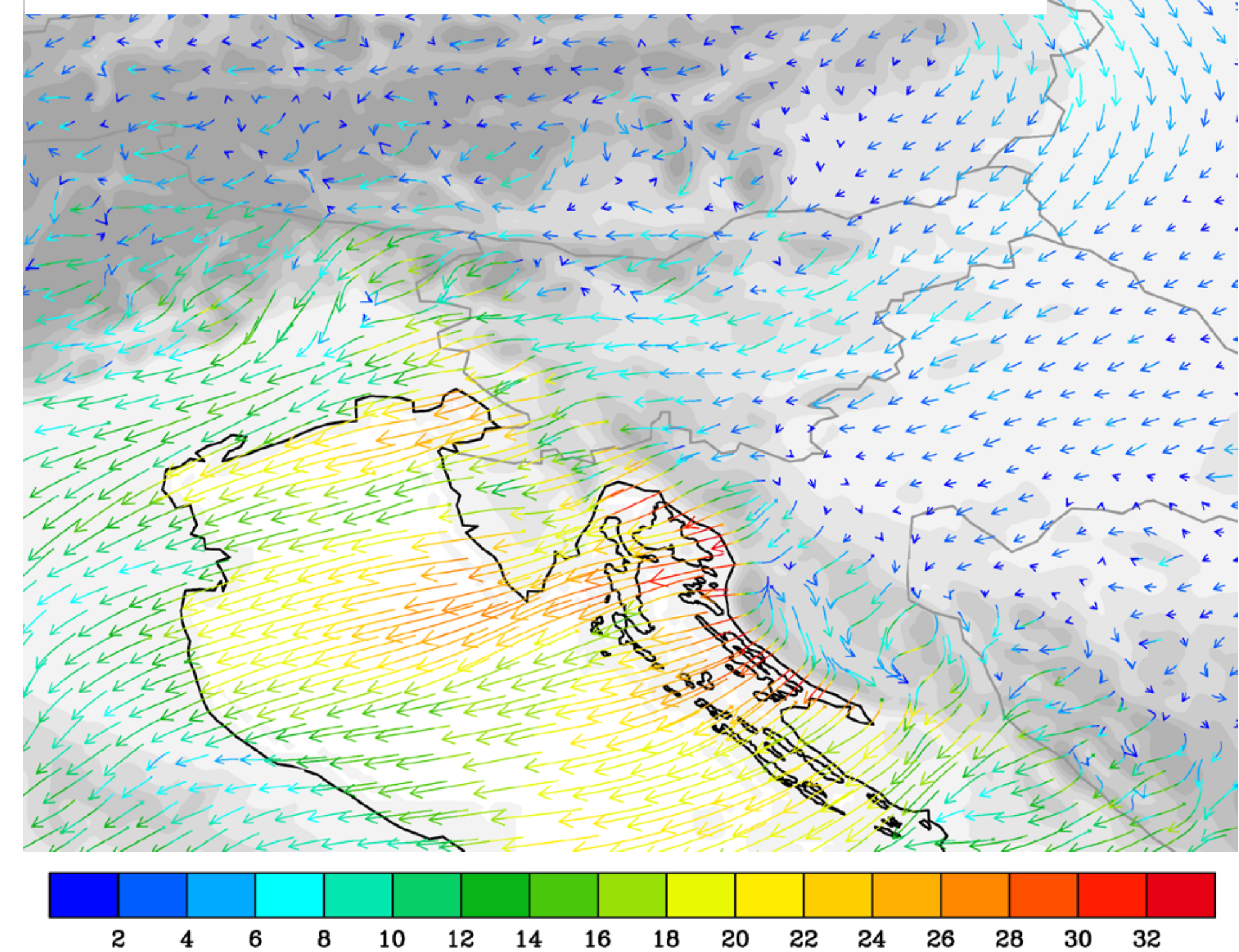


### Model verification

Comparison of model outputs and DARS stations shows that the model predicts bora occurrence, evolution and average speeds well. However, the model is not capable to represent bora gusts.



Example of the Adriatic bora forecast by SPACE-SI model valid for 10.2. 2012 at 19.00.



### Impressions

Nika: “Bora is a part of my life since the birth and I have always taken it as a self-evident fact of our lifes. The project enabled me to understand how bora develops and how we can use physics and mathematics to understand and forecast its occurrence.”

Mirjam: “As a child, I though bora is everywhere and I was not aware it is a specialty of our valley. The project has taught me how different factors work together to make the unique climate of the Vipava valley.”

Andraž: “I am glad that I could participate in the project. Together we came up with interesting findings. In addition, I also improved my knowledge of Excell.”

### Conclusions

- Behind any observations there are errors involved in making it.
- Clouds sitting on the mountain top can tell the story of winds behind and above the mountains.
- Satellites are able to observe clouds with good resolutions.
- Bora speeds in the valley are 2 times greater than on the slopes.
- Current weather models forecast average speeds of bora but can not forecast its gusts.
- Bora variation along the valley basin are not significant.