

# Recent extreme bora wind cases in Croatia - ECMWF forecast evaluation



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## Introduction

In March 2015 several windstorms hit the area of Croatia, causing large damages. Extreme wind speeds and wind gusts were measured.

The first was the case of hurricane speed bora wind at the Adriatic coast on 5, 6 and 7 March, accompanied by very strong wind also in the interior. Another very strong case occurred on 27 and 28 March.

It is evaluated here to which extent ECMWF forecasts helped Croatian forecasters to issue forecasts and warnings for high-impact weather. The forecasts are verified vs. wind speeds measured at the automatic weather stations.

## 5 - 6 March 2015 bora episode

Bora on 5 and 6 March was one of the strongest on record. 62,2 m/s gust was measured on Pag Bridge, 58,6 m/s on Krk Bridge. The ECMWF model forecast mean wind for northern Adriatic did not exceed 24 m/s - the measured 10 min mean was about 28 m/s during most of the day.

The gusts were also slightly underestimated and there was no significant change in the result of the different model runs.

The only model that correctly forecast gusts was 2km resolution Aladin model.

For 5 March red warning was issued for northern Adriatic (Krk Bridge) and orange for Split area.

The ECMWF forecast showed decrease of the wind speed in Split towards the evening on 5 March - in reality there was no decrease until 6 March afternoon.

Model underestimations were more pronounced on the 6 March. On 6 March for Split area even 2 km Aladin model greatly underestimated the speed and the gusts.

For 6 March orange warning for northern Adriatic was issued, whereas for Split area due to measured wind speeds, despite the model underestimation, red warning was issued. According to damage reports warnings were well in place.

## 27 - 28 March 2015 bora episode

Bora that started on the afternoon on 27 March and ended in the night from 28 to 29 March reached hurricane force gusts.

The ECMWF model captured well the duration but underestimated the mean and the maximum wind speed. Due to this, yellow warning was issued for 28 March for Split area, although mean wind speed in Split was reaching 21 m/s and maximum wind was up to 35 m/s which satisfies the criteria for orange warning.

## Conclusion

Occurrence and the duration of the extreme bora episodes was fairly well forecast by ECMWF model, however in all investigated cases both mean and maximum wind speed were underestimated.

It seems that the problems occur often in Split area, probably due to model orography. Comparison to 2km Aladin model results showed that the model with better horizontal resolution captures the wind more accurately.

