Wind charcteristics in 2019 on the Polish Baltic coast

Katarzyna Starosta, Andrzej Wyszogrodzki

Institute of Meteorology and Water Management-National Research Institute, Warsaw, Poland

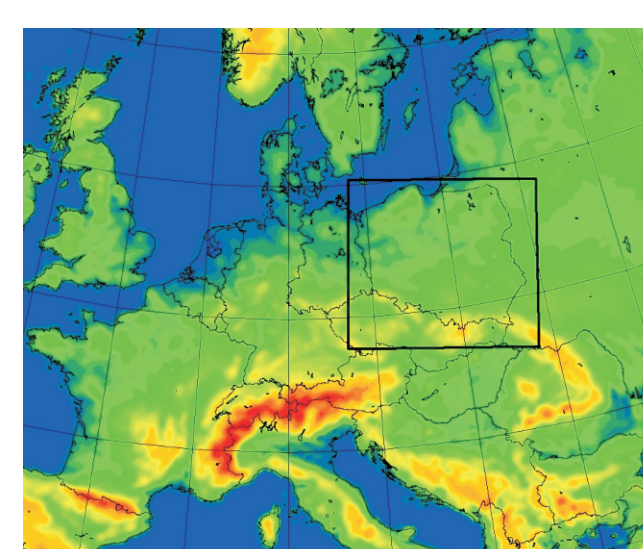katarzyna.starosta@imgw.pl andrzej.wyszogrodzki@imgw.pl

INTRODUCTION

Wind is one of the main complex elements that affects the climate and weather of our planet. The topic of our presentation is to show characteristics of the wind for the Polish coastal areas. In our presentation we show distribution of wind speed and wind direction based on the COSMO model forecasts at a mesh resolution of 2.8 km and their verification with daily measurements during 2019 for a five synoptic stations: Swinoujscie, Kolobrzeg, Ustka, Leba and Hel.

International division of the Baltic sea by WMO
B9-South-east Baltic
B10 South Baltic
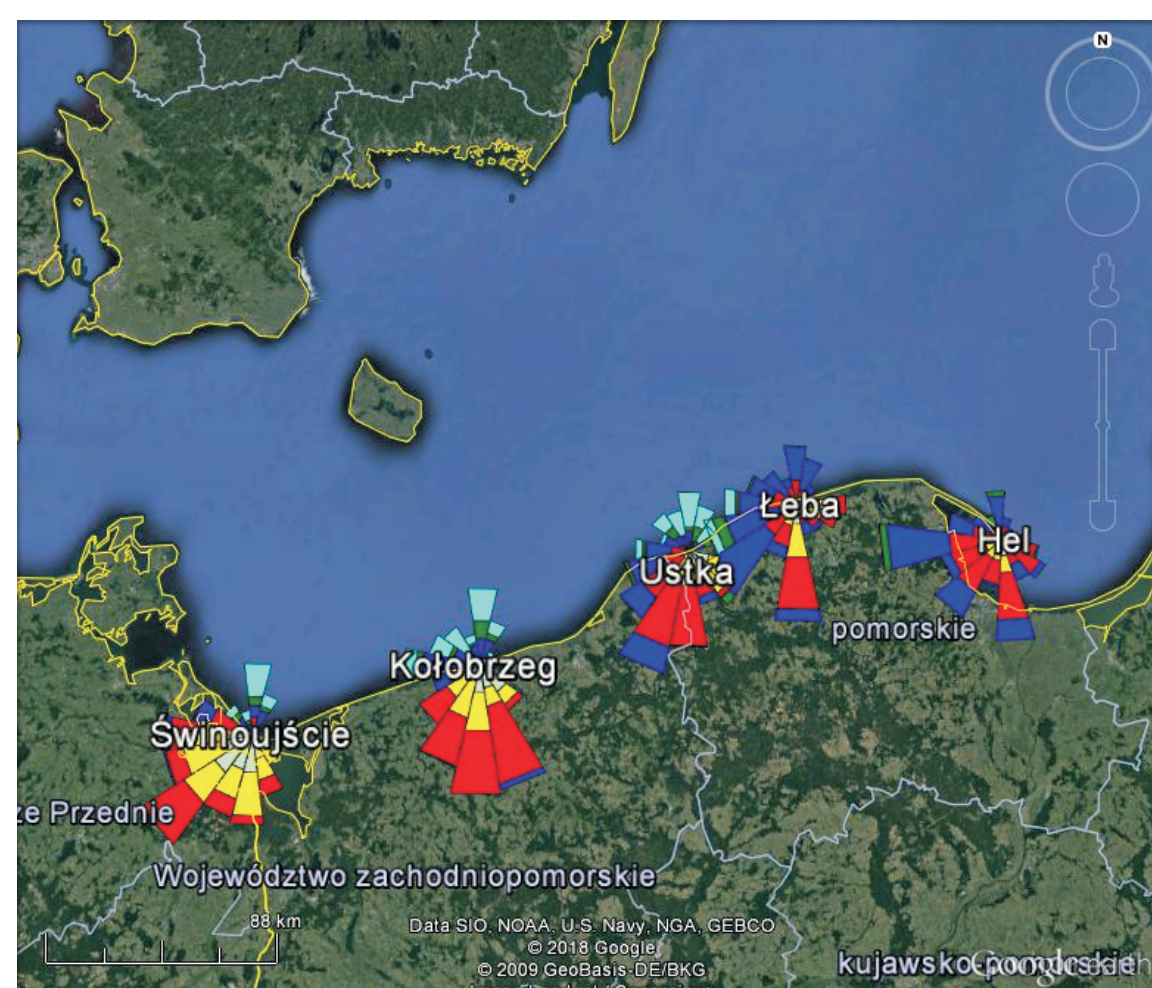
Synop stations in the Baltic seashore. January 2019

COSMO MODEL at IMWM-NRI

The Polish Institute of Meteorology and Water Management –National ResearchInstitute (IMWM-NRI) runs an operational model COSMO (Consortium for Small-scale Modelling) using two nested domains at horizontal resolutions of 7km and 2.8 km. The model produces 36 hour and 78 hour forecasts four times per day for 2.8 and 7km domain resolutions respectively. However only the 00 UTC forecasts are utilized in this study. The maritime border in Poland is 440 km. We analyzed the wind in Poland for five synoptic stations on the coast of the Baltic Sea during entire 2019 year, as compared with the data from prognostic model COSMO. We observe the highest wind speeds in the winter season and the lowest in the summer. At the station Łeba and Ustka highest monthly average wind speed was observed in January and at the station Hel in December. At the stations of Łeba and Świnoujście, the highest monthly averages were recorded in spring: Łeba in March and Świnoujście in April
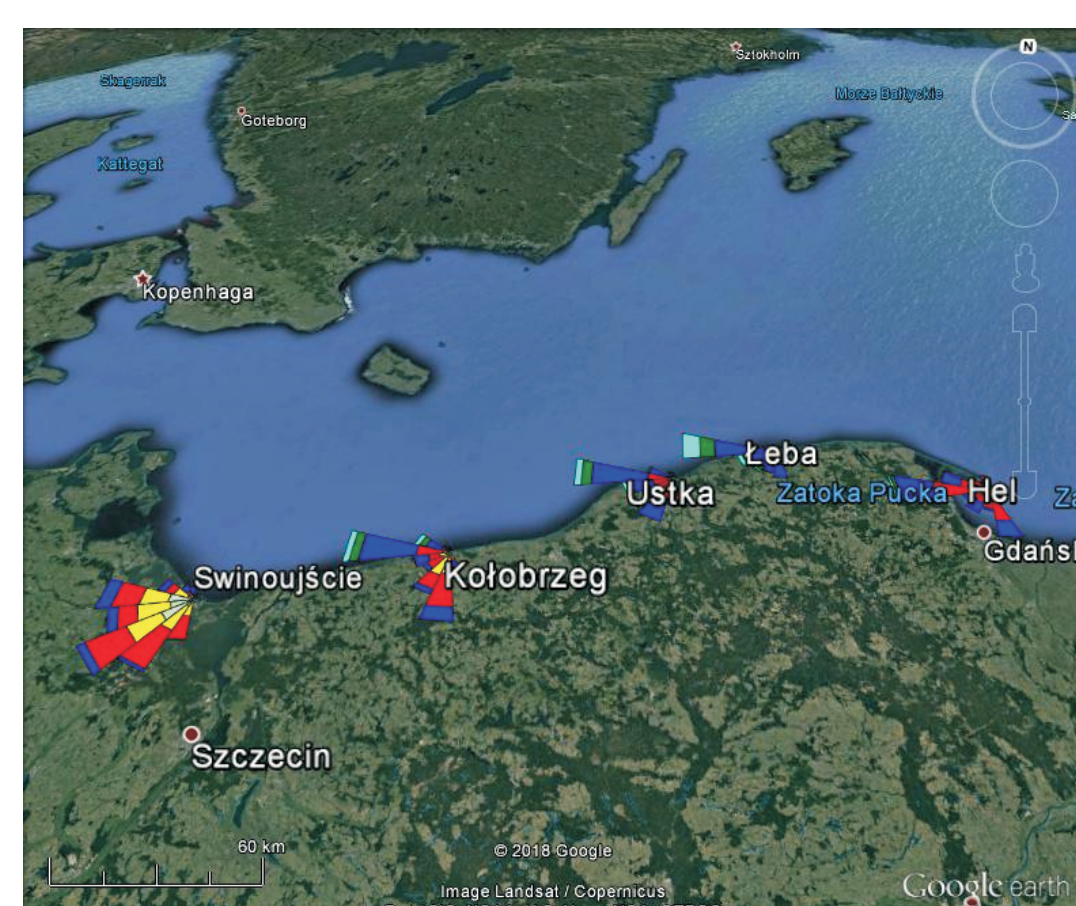
Model domain
7.0 km and 2.8 km

Wind speed 2019 synop-model
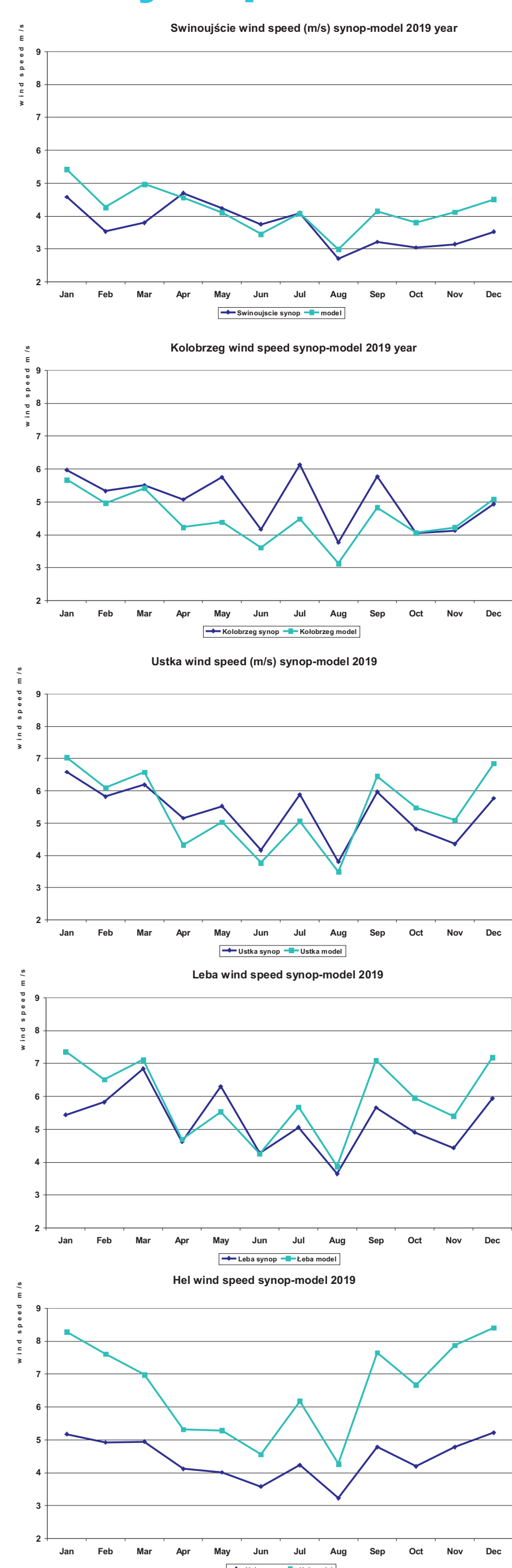
Wind roses January 2019 COSMO model

Swinoujscie Kolobrzeg Ustka Łeba Hel

Wind speed (m/s) January 2019 synop-model
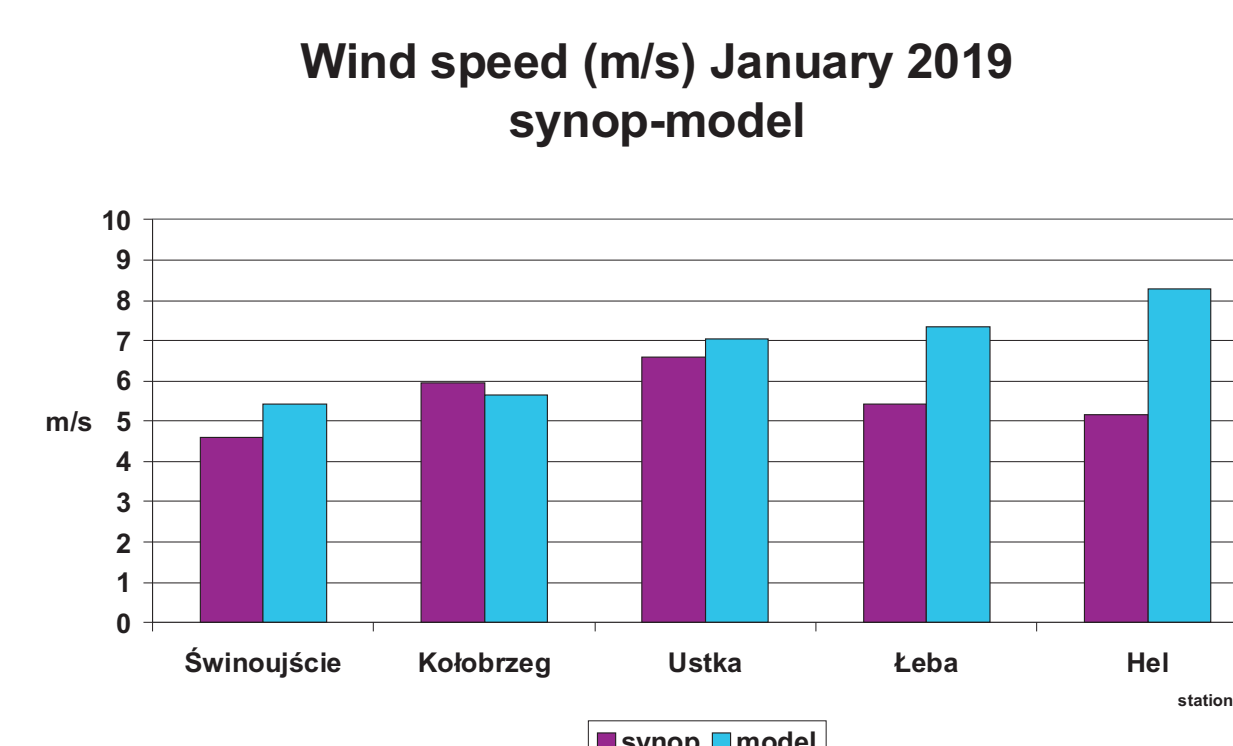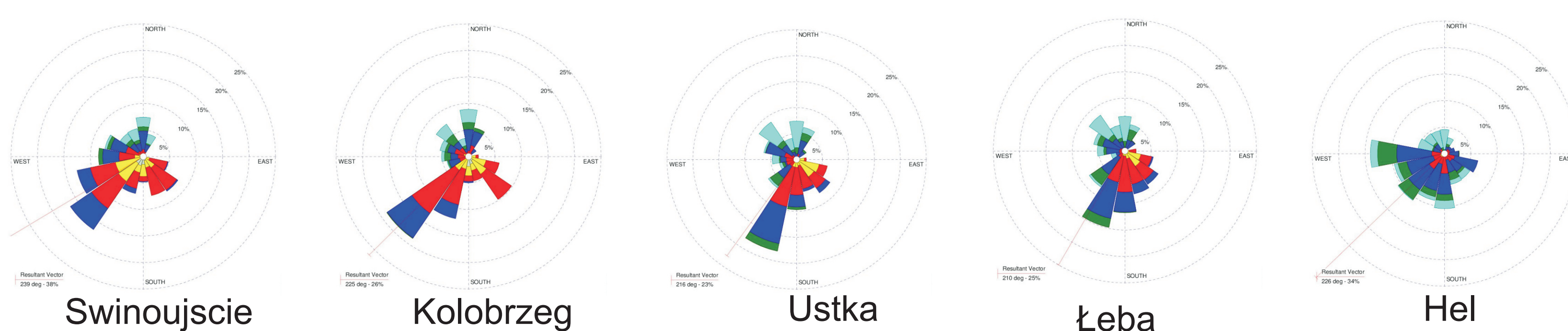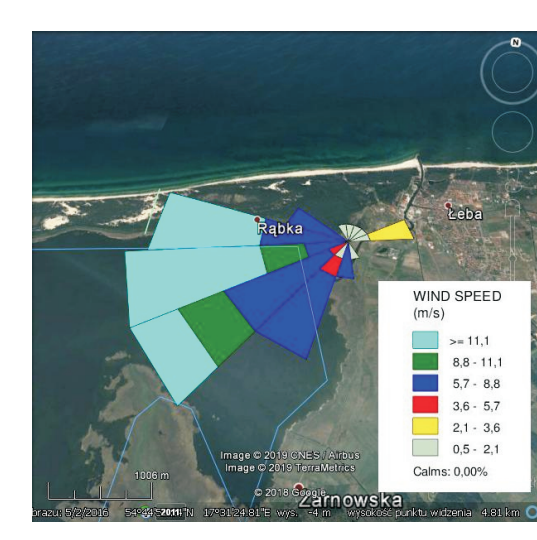
Wind roses March 2019 synop - COSMO model

model

Wind roses March synop

Łeba March Hel March

synop
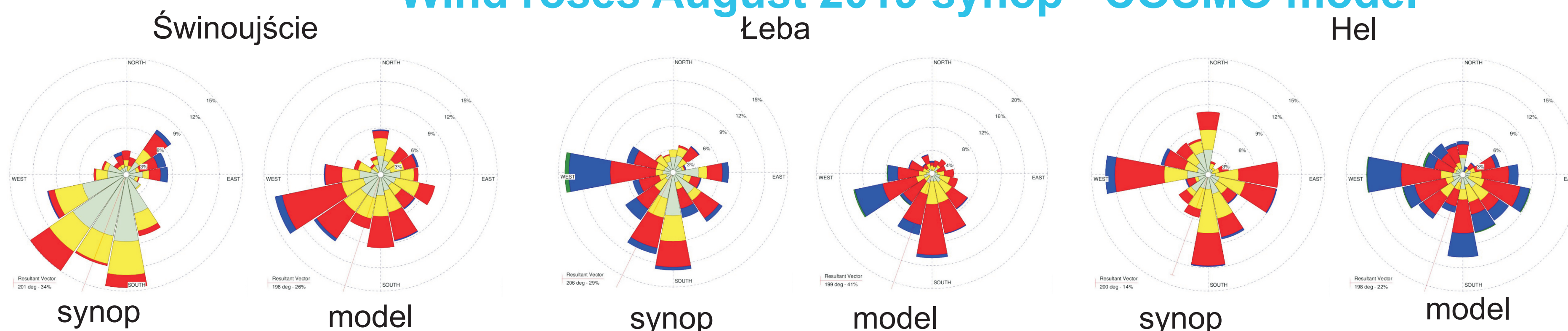
Łeba 4-5 March Hel 4-5 March

Wind speed March 2019 synop-model
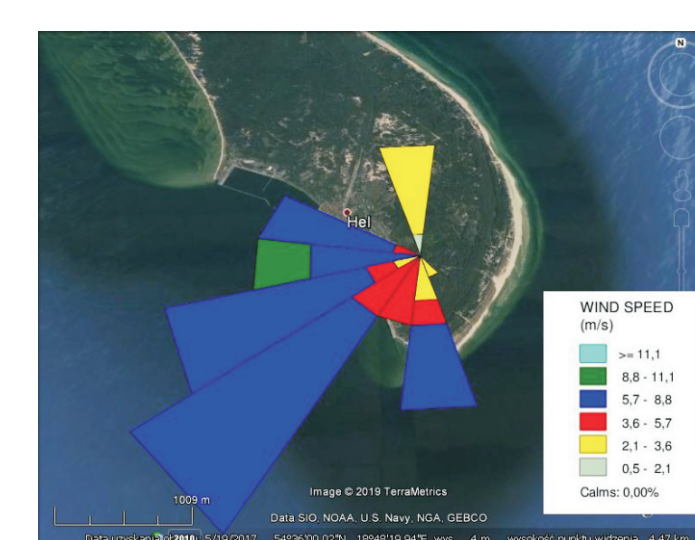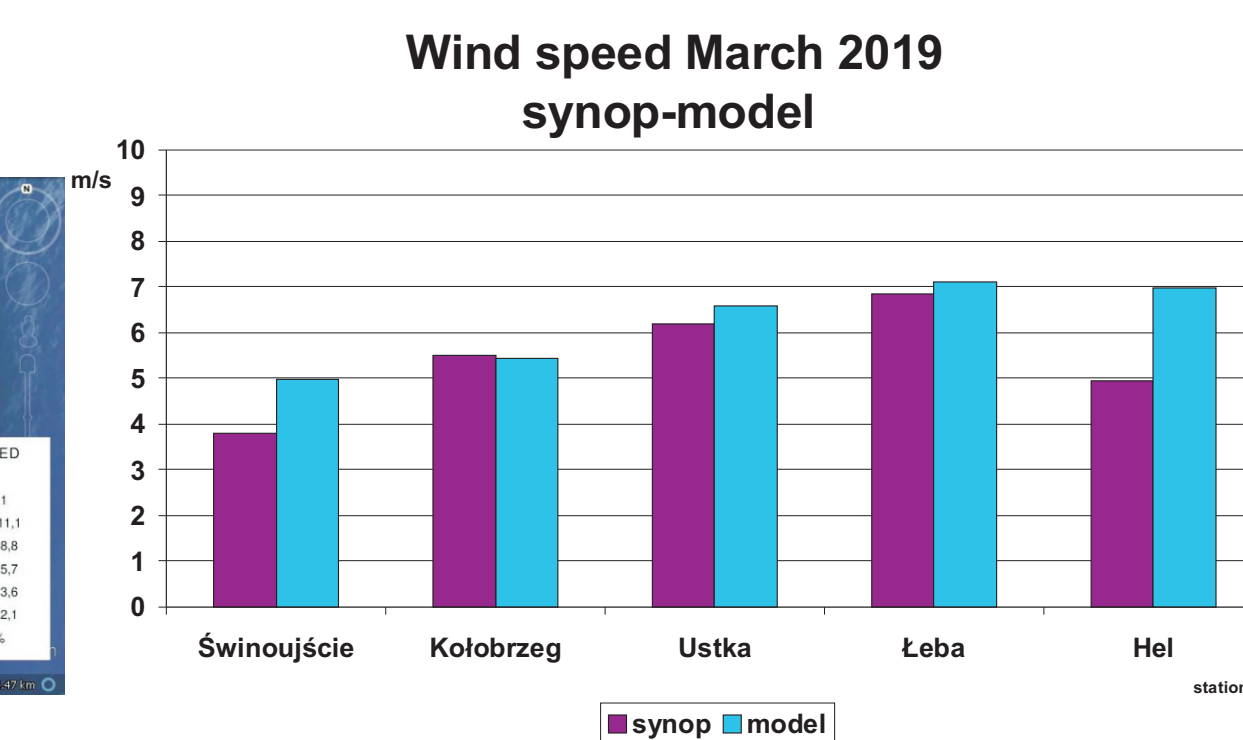
Wind roses August 2019 synop - COSMO model

Świnoujście Łeba Hel

synop model synop model synop model

Wind speed m/s August 2019 synop-model

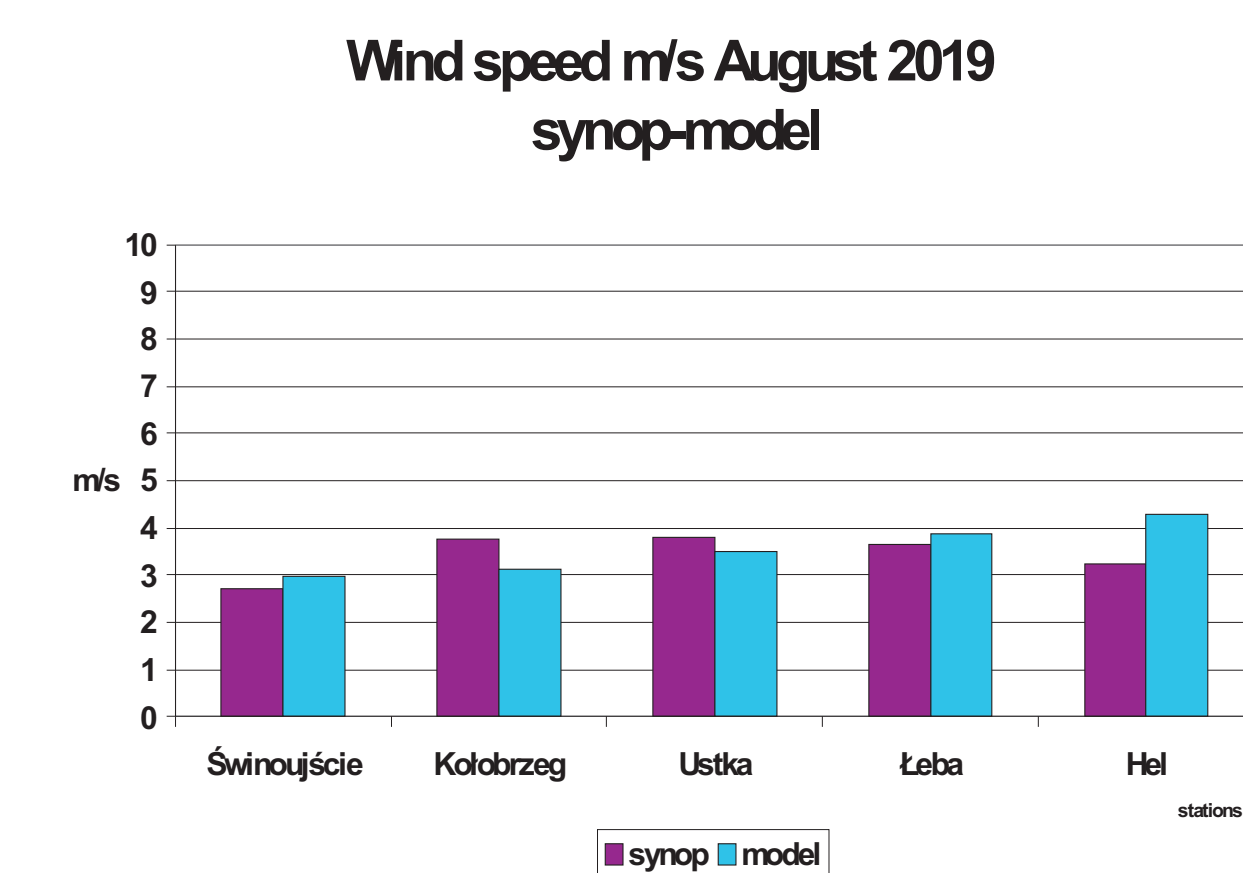## Wind class frequency distribution

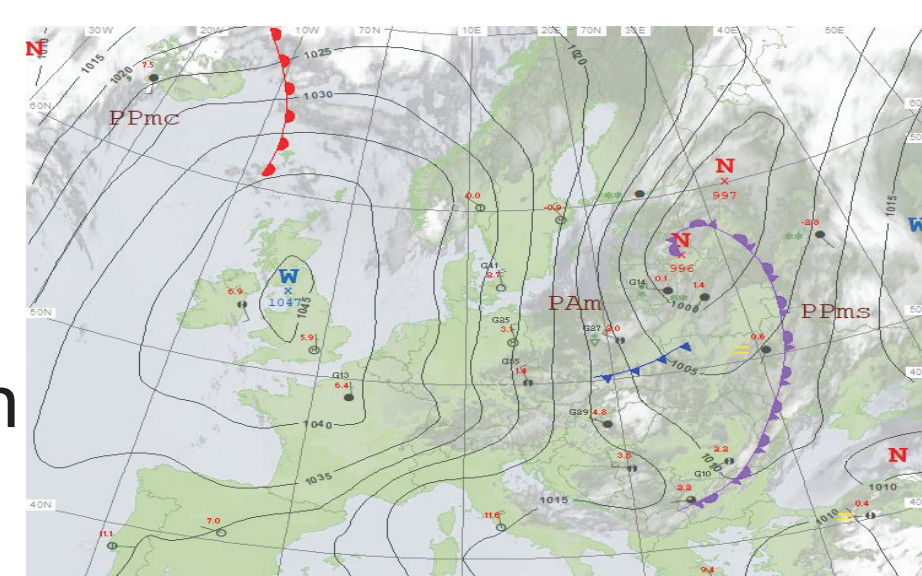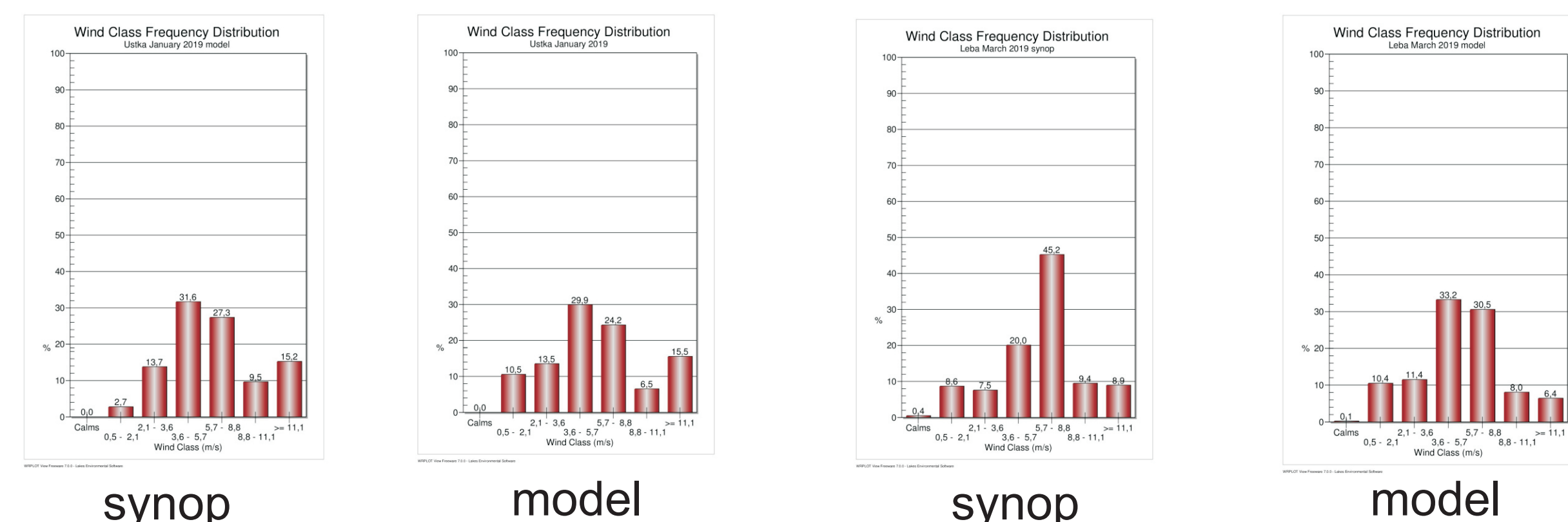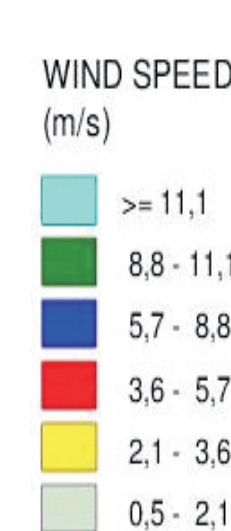Ustka January Łeba March

synop model synop model

ALFRIDA HURRICANE ON THE POLISH COAST

The wind is both destructive and conducive to human action. It causes local flooding, damage in ports, knocks down trees but also provides clean energy for wind farms or serves tourism activities as yachting or surfing.
Similar storms as Alfrida (1-5 January 2019) happens every few years.During Alfrida, dangerous wind blef from the north of Polish coast,and caused back flow, flooding ,and large damage.Storm waves flooded entire beaches, wind broke more than two thousand trees, and PŻ ferries have been suspended

WIND SPEED (m/s)
>= 11,1
8,8 - 11,1
5,7 - 8,8
3,6 - 5,7
2,1 - 3,6
0,5 - 2,1

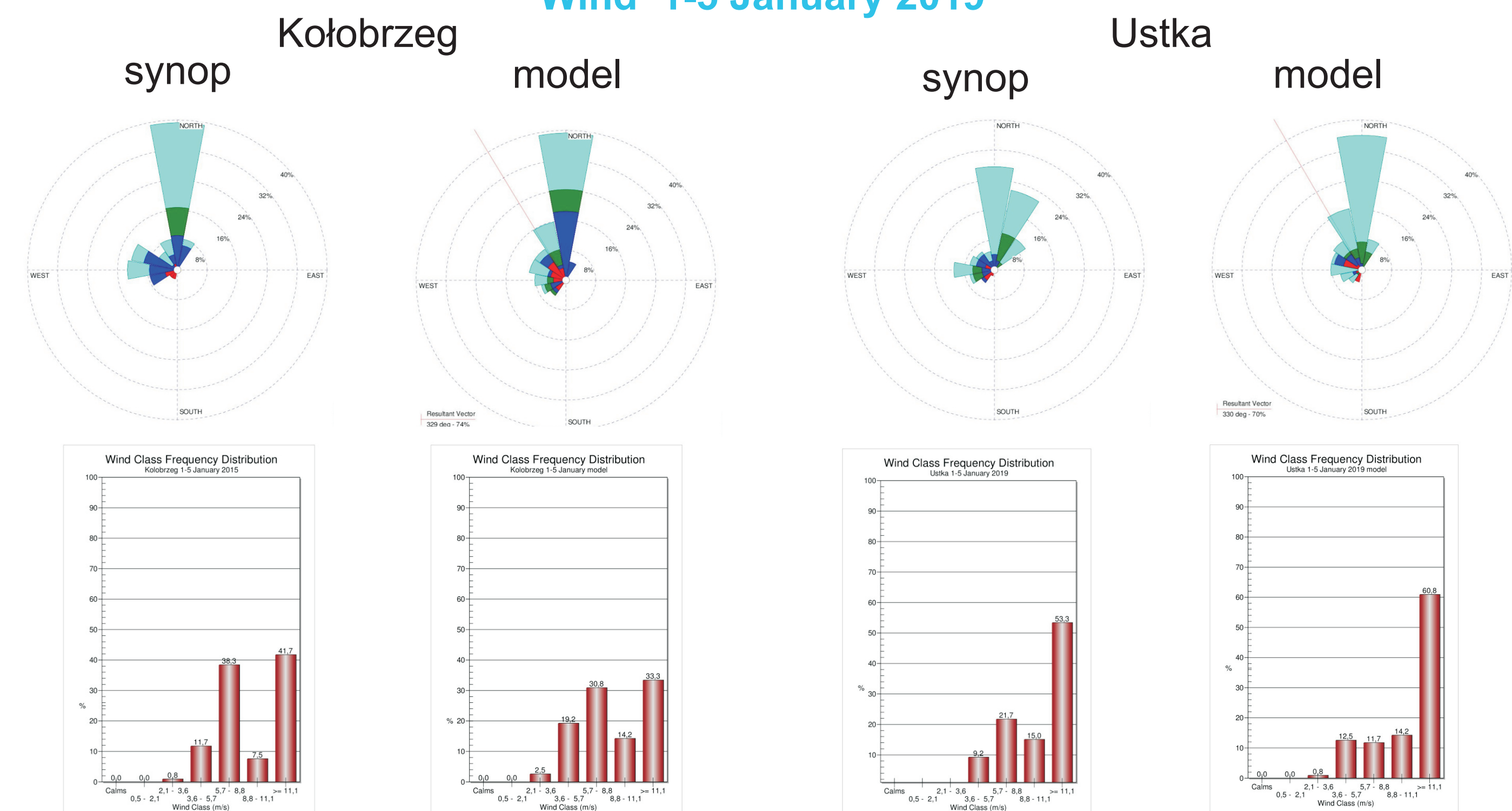Synoptic map
2 I 2019,12 UTC

Wind 1-5 January 2019

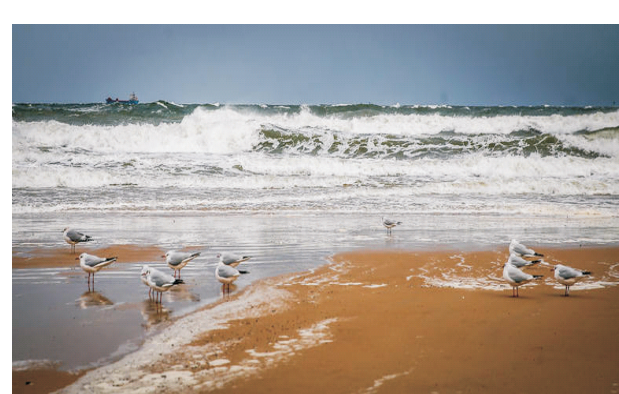Kołobrzeg Ustka

synop model synop model

WIND FARM IN THE BALTIC SEA

Poland plans recently to build an offshore wind farm in the Baltic Sea. Increasingly accurate wind forecasts are then one of the necessary elements for assessing the local climatology at the wind farm site and to further provide warnings and decisive support to its operation.

CONCLUSION

The results show characteristic distribution of wind speed and direction at the interface between sea and land .The forecasted wind speed by COSMO model for the stations located in the open sea quite well reflect the actual rate observed at the stations. Only at the Hel station, where the shoreline turns south, forming the Hel Peninsula within the Gulf of Gdańsk, the forecasted speeds far exceed the observed values.

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