**Master thesis**

# Investigation of the wake of the island of Helgoland with the means of the mesoscale model WRF

Recent observations of the sea surface roughness with a satellite-borne scatterometer indicate that the sea surface roughness downstream of the island of Helgoland is reduced compared to the roughness of the sea surface in the surrounding. The lower roughness of the sea surface indicates that the wind speed is also reduced in the area downstream of the island of Helgoland. The satellite images indicate that the area of decreased roughness of the sea surface / wind speed extend several tens of kilometers, sometimes even reaching the North Frisian coast. An accurate estimation of the wind potential in the surrounding of Helgoland might therefore require to take this wake effect into account.

The objective of this master thesis is to simulate the wake of the island of Helgoland with the means of the mesoscale simulation model WRF. A first challenge is that the default geographical dataset delivered with WRF has a too coarse resolution to include the island of Helgoland. Thus, the first task will be to provide geographical data with a higher spatial resolution to WRF. Once the data has been provided WRF simulations shall be carried out for a specific day for that also satellite observations of a wake-like structure behind Helgoland are available. By comparing the simulations with the satellite observations it should be clarified whether the wake-like structures seen in the satellite image can be explained as a wake effect of the island of Helgoland. Finally, additional WRF simulations for days with different atmospheric conditions, e.g. different atmospheric stabilities, wind speeds, etc. should be carried out in order to investigate the dependency of the wake characteristics on atmospheric parameters.

| **Requirements:** | **Begin:** as soon as possible<br>**Duration:** 6-8 months |
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| Bachelor's degree in meteorology, physics, engineering or related fields<br>Interest in offshore meteorology and wind energy<br>Good knowledge in programming and data visualization languages (e.g. Matlab, NCL, R or python) | **Contact:** Dipl.-Phys. Hauke Wurps<br>ForWind – University of Oldenburg<br>+49 (0) 441 798 5079<br>hauke.wurps@forwind.de |