The purpose of this research is to use the WRF model to simulate the effects of orography in the generation of mesoscale turbulence structures. Satellite and local observations are used to chart occurrences of eddies (commonly seen around the coast of Grover Beach, CA, Catalina Island, Guadalupe Island, for example (Muller et. al, 2015; Muller and Herbster, 2015). Model runs are conducted using the WRF model with a resolution high enough to re-create the eddies, yet maintaining computational efficiency to save computer time. The goal is to be able to forecast terrain-induced turbulence, which could have potential safety concerns in the field of general aviation.

**Background / Methodology**

A systematic selection of different model resolutions and the associated forecast turbulence is presented. This study is focusing on a specific case where a northwest wind flow disturbed by the large Guadalupe Island resulted in the formation of eddies and Von Karman streets on 3/25/2014. Satellite data was gathered from the NOAA’s CLASS archive and are compared to three WRF model simulations. The 12km “control run” was initialized using NARR data and was used as a basis to initialize the following 4km and 1km simulations.

**Satellite Imagery**

GOES West visible satellite imagery from 3/25/2014. Images in 1-hour intervals from 16:00 to 19:00. There are well-defined Von Karman streets downwind of Guadalupe island.

1-hour intervals from 16:00 to 19:00. At this WRF resolution, the island isn’t even detectable, and leaves no imprint on the 10m wind field. This run shows significant continental orographic effects on the wind to the east.

30-minute intervals from 16:00 to 18:30. The island is resolvable at 4km, and there are rudimentary signatures of Von Karman streets.

**Conclusions**

- 12km and 4km simulations are not discrete enough to resolve eddies, but the 4km can resolve convergence associated with the topography.
- The 1km simulations can resolve small eddies formed downwind of Guadalupe Island as well as eddies that form close to southeast direction of the island.

**Island Area:**

243.988 km² (94.204 mi²)

**Highest elevation:**

1,297.5 m (4,257 ft)

**References / Acknowledgements**


Integrated Data Viewer (IDV) from Unidata: http://www.unidata.ucar.edu/software/idv/

The NOAA/NWS Science and Training Resource Center (STRC) Unified Environmental Modeling System: http://strc.comet.ucar.edu/software/uems/