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Background

- The World Meteorological Organization's operational requirements for satellite observations are not met [1].
- ODYSEA (Ocean Dynamics and Surface Exchange with the Atmosphere) would close the gap and investigate open questions in physical oceanography [2].

25 km

Resolution of Program of Record (PoR) [2]

5 km

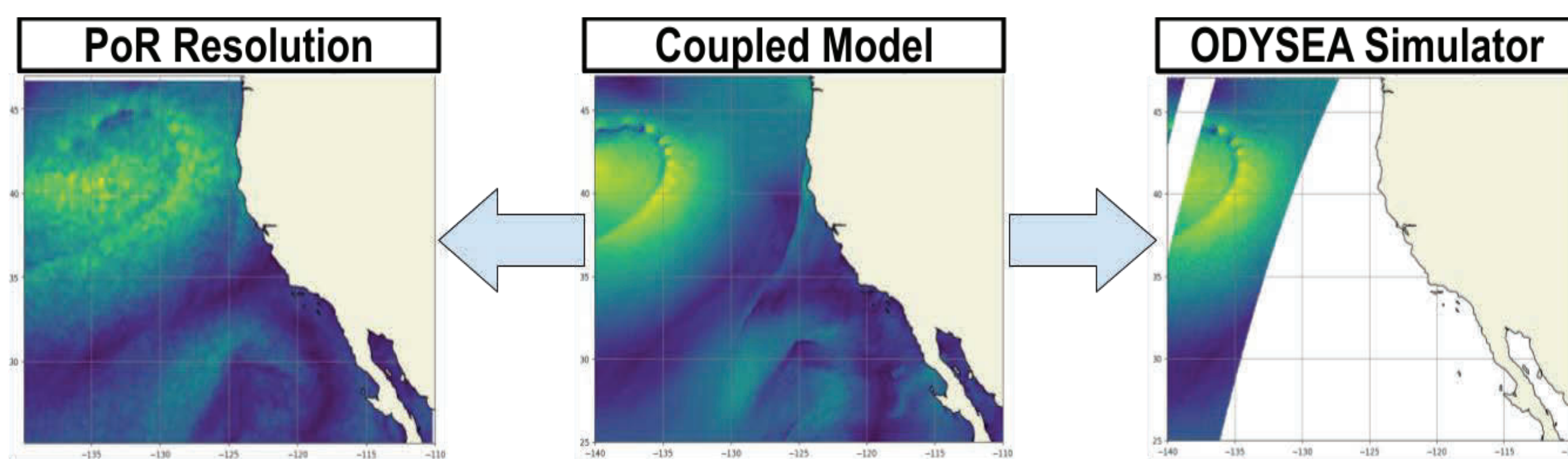
Resolution of ODYSEA [2]

Objectives

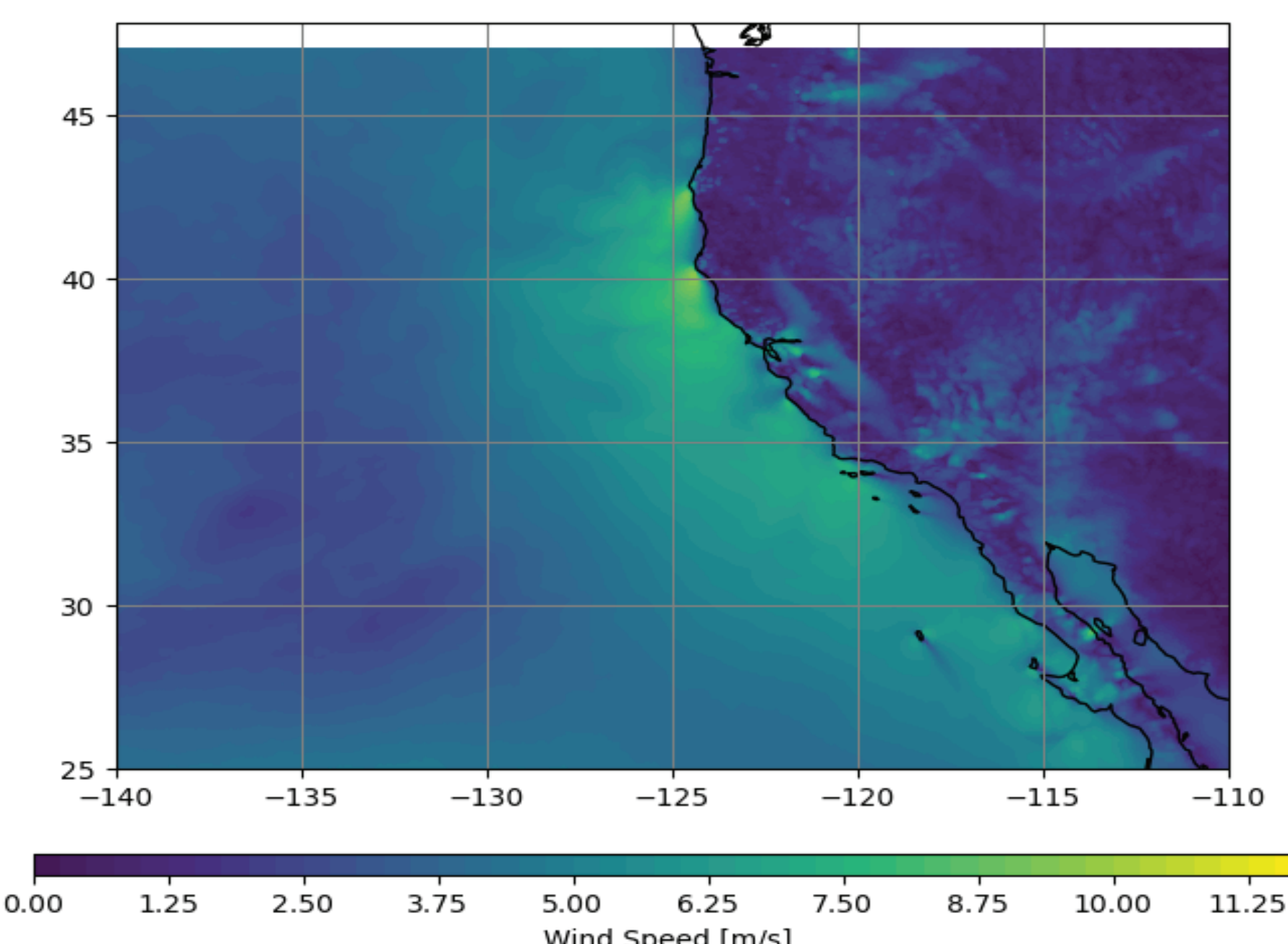
To extend the functionality of an ODYSEA simulator to explore ODYSEA's capacity to measure expansion fan events in the California Coast region.

Methods

We adapt the ODYSEA simulator designed by Alex Wineteer [3] to run with a high resolution coupled winds-and-currents model.



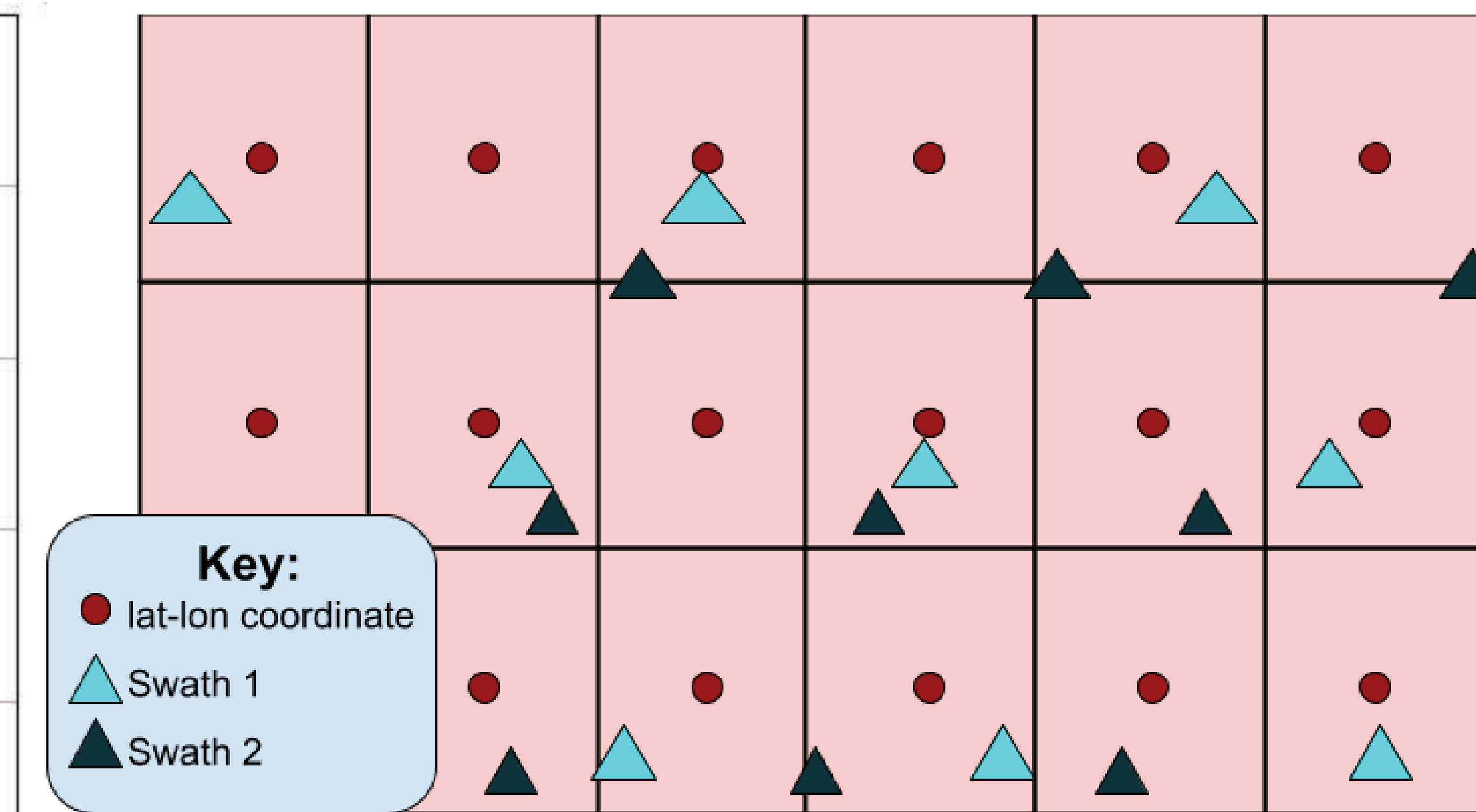
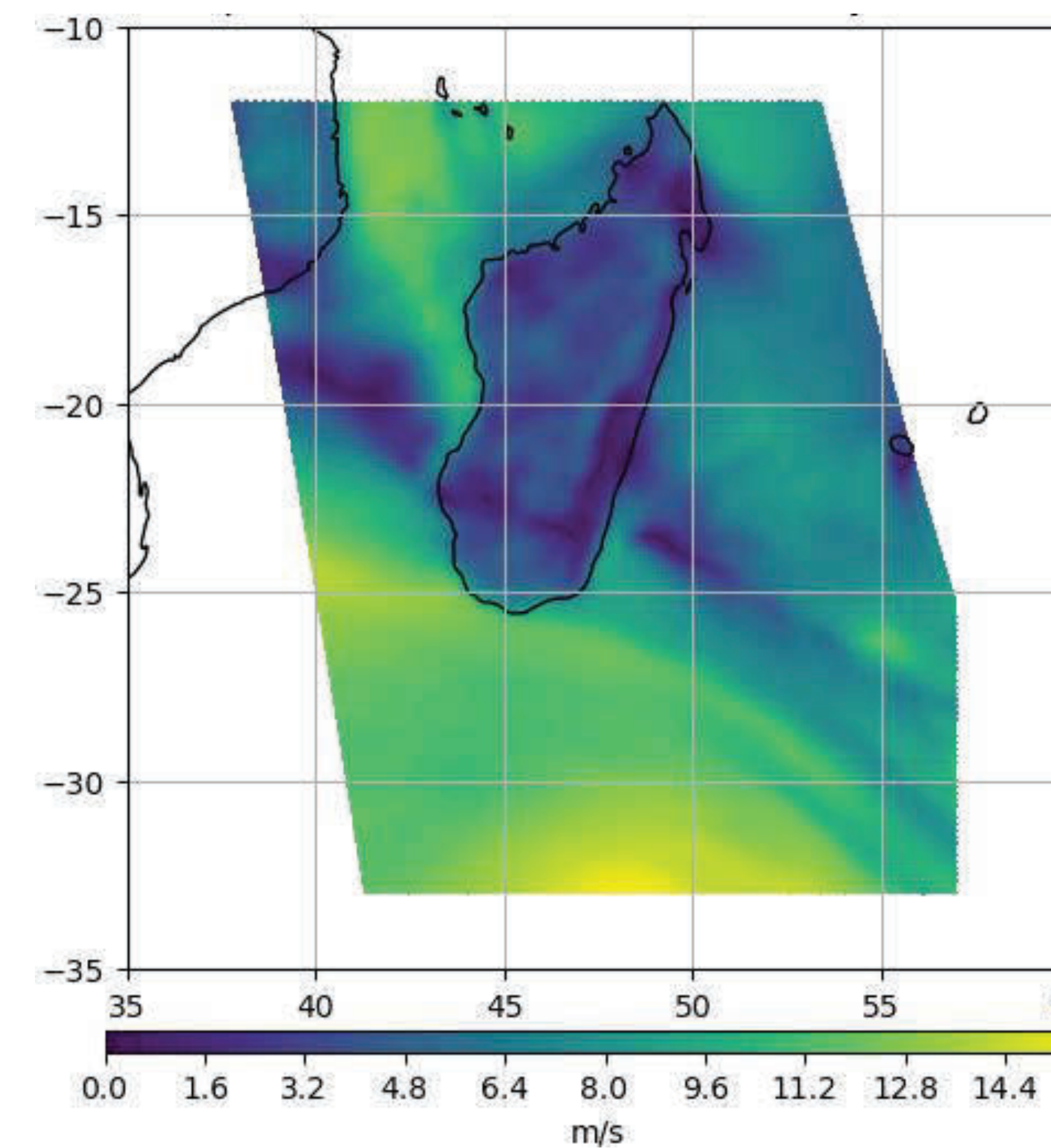
1. Sample the model using the ODYSEA simulator
2. Resample the model to the resolution of the PoR
3. Compare the model to the PoR and ODYSEA



Expansion Fans:
Localized high winds caused by the gulfs and capes along the California coast from April to August.

Simulator Improvements

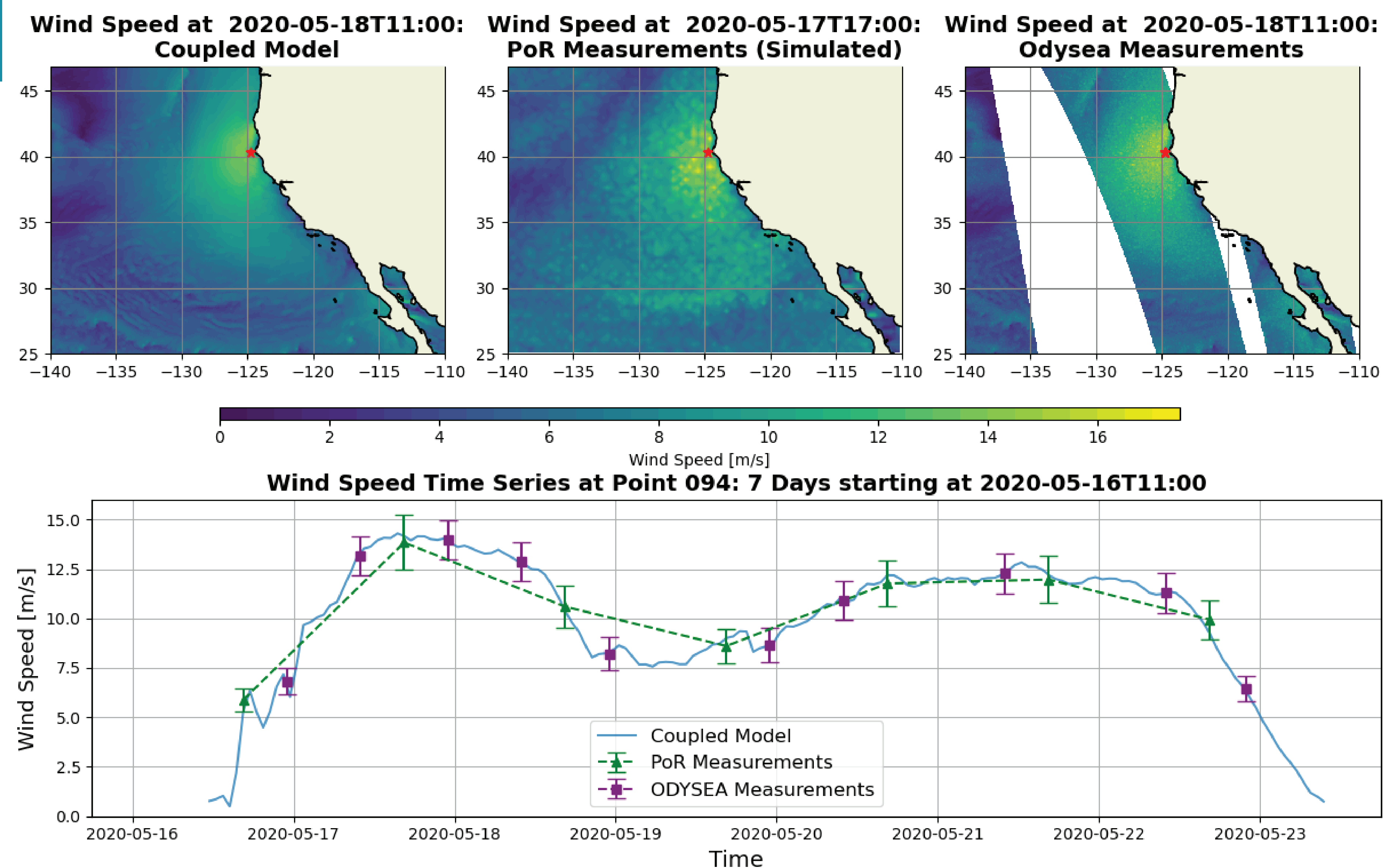
- Versatility in supported formatting when reading model
- Independent sampling of winds or currents
- Support and optimization for compiling large ODYSEA datasets from many orbits
- Comprehensive guide to using ODYSEA simulator



- Support for regionalizing output
- Interpolation of swath data to regular lat-lon grids

Results

- ODYSEA can resolve expansion fans in the California Coast region
- PoR does not fully resolve sudden shifts in wind speed
- ODYSEA improves sampling resolution and accuracy compared to the PoR



Directions for Future Work

- Quantitative analysis of ODYSEA's detection of expansion fan events compared to the PoR
- Exploration of ODYSEA's vector current measurement capabilities
- Testing of ODYSEA's ability to measure theorized coupled wind-current phenomena
- Further optimization of the simulator to improve runtime

References

- [1] World Meteorological Organization, "Manual on the WMO Integrated Global Observing System: Annex VIII to the WMO Technical Regulations," WMO, WMO-No. 1160, 2021. [Online]. Available: <https://library.wmo.int/idurl/4/55063>
- [2] S. Gille *et al.*, "ODYSEA: Ocean Dynamics and Surface Exchange with the Atmosphere: An Earth System Explorers Proposal," AO NNH23ZDA0160.
- [3] A. Wineteer, "odysea-science-simulator." Jun. 21, 2023. [Online]. Available: <https://github.com/awineteer/odysea-science-simulator>

Acknowledgements

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