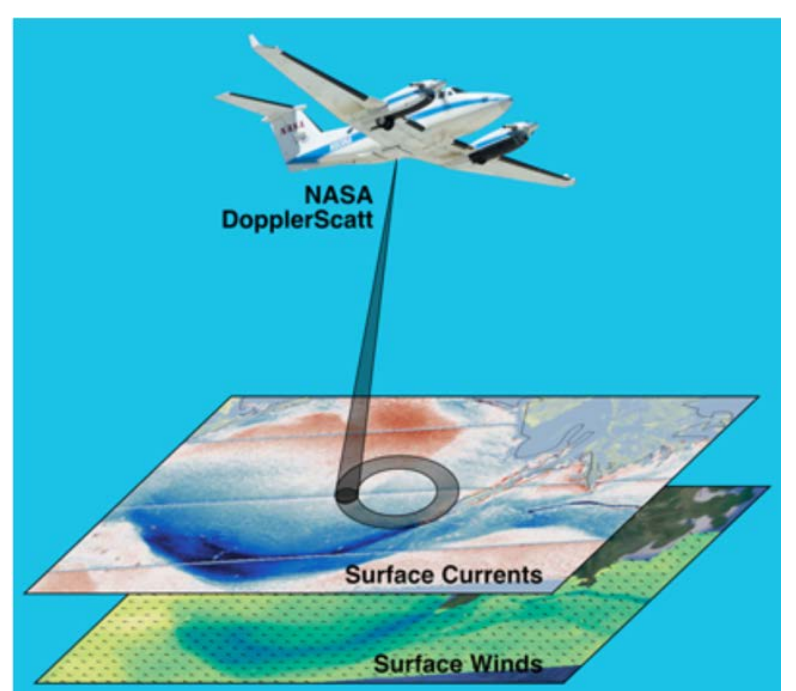


Simultaneous Winds and Surface Currents from Space: ODYSEA (Ocean Dynamics and Surface Exchange with the Atmosphere)

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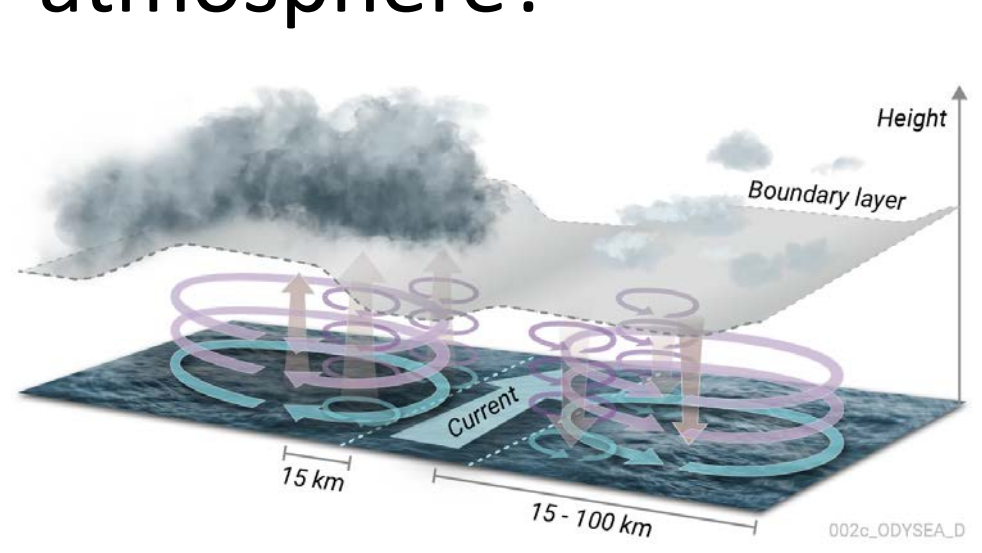
BACKGROUND: Interactions between winds and currents are critical for the Earth system but remain poorly sampled. ODYSEA, a proposed satellite-based Doppler scatterometer will provide global daily speed and direction for both winds and total currents, with unprecedented 5 km postings.

FOUNDATION: ODYSEA employs a tested measurement technique, demonstrated with DopplerScatt in the airborne S-MODE program to study sub-mesoscale frontal features.



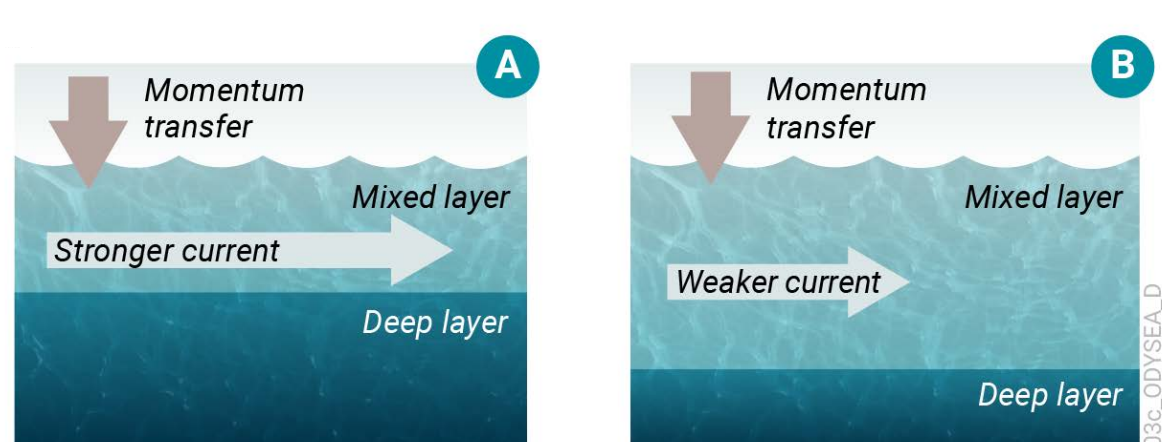
SCIENCE OPPORTUNITIES: ODYSEA will yield critical understanding of coupled air-sea interaction:

- How do ocean currents influence the atmosphere?



Is the atmospheric response to ocean currents localized or geographically distributed?

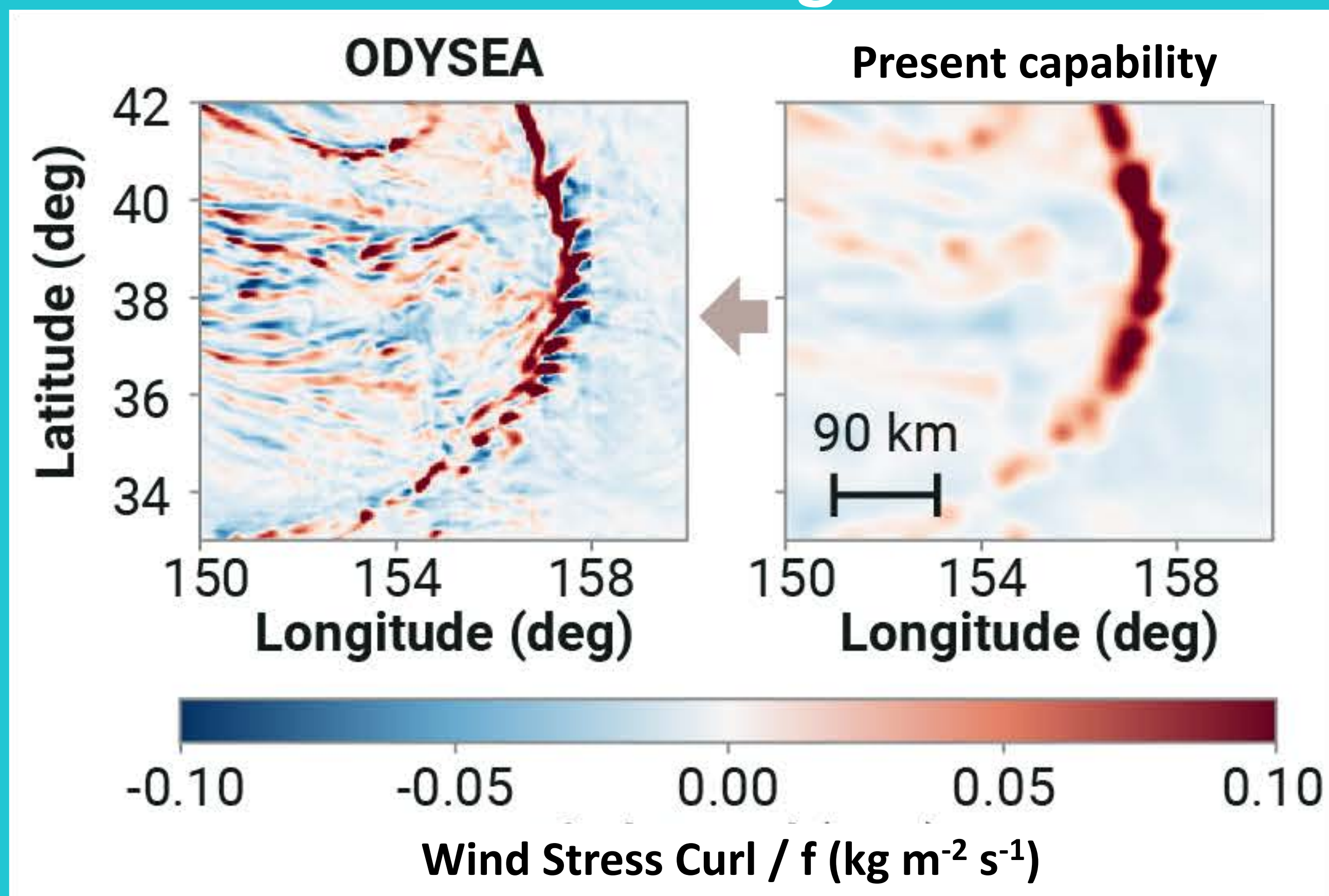
- How do ocean currents vary on small and rapid scales? What controls these changes?



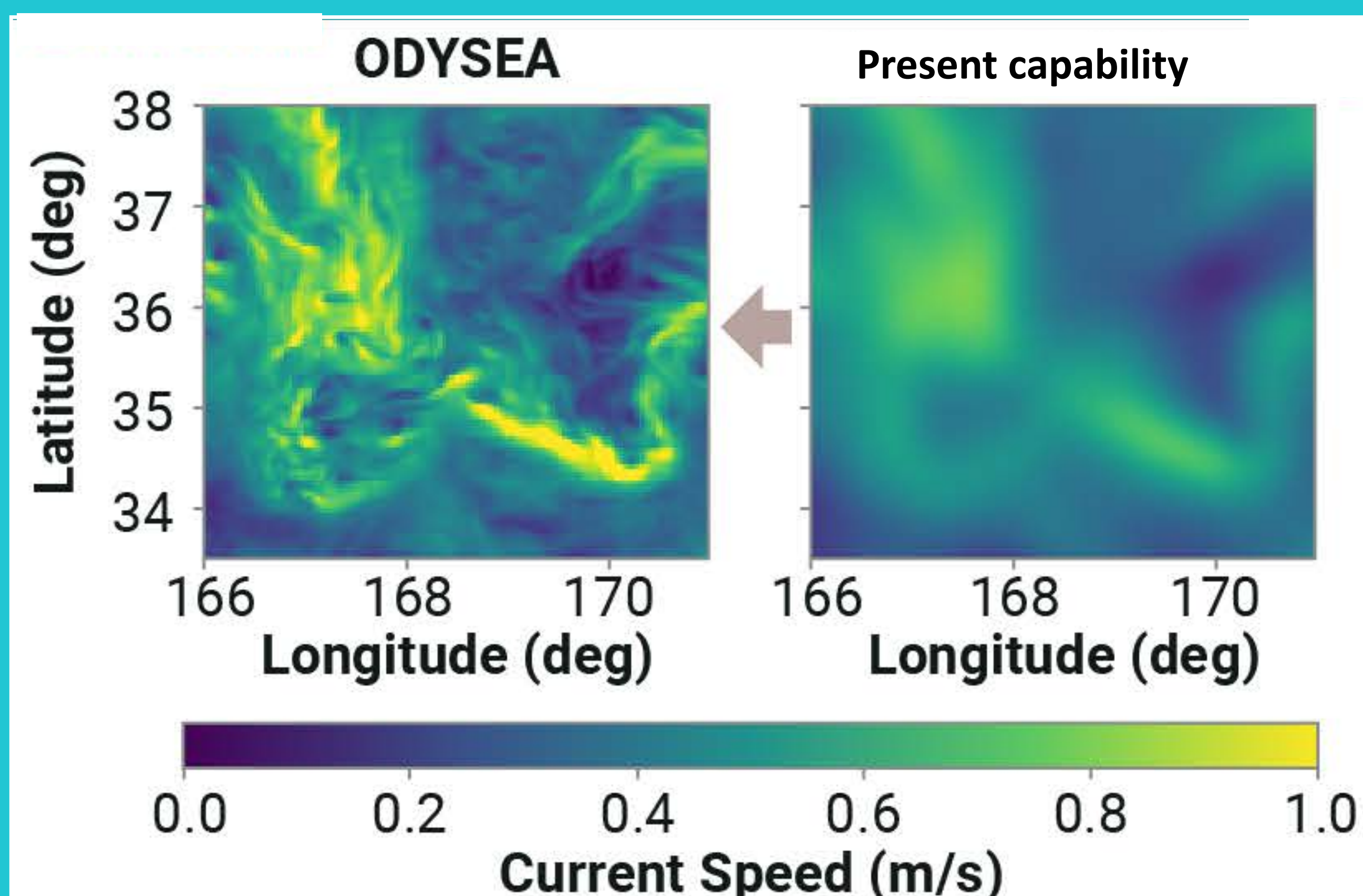
Do currents accelerate more readily in response to wind when the mixed layer is shallow or deep? Do coastal regimes differ from open ocean?

The ODYSEA satellite will bring into focus daily global surface currents and their interactions with winds ...

Structure in wind gradients



With 5 km postings, frontal-scale features come into view.



Filamented currents

... to explore the Earth system and to improve weather & climate predictions.

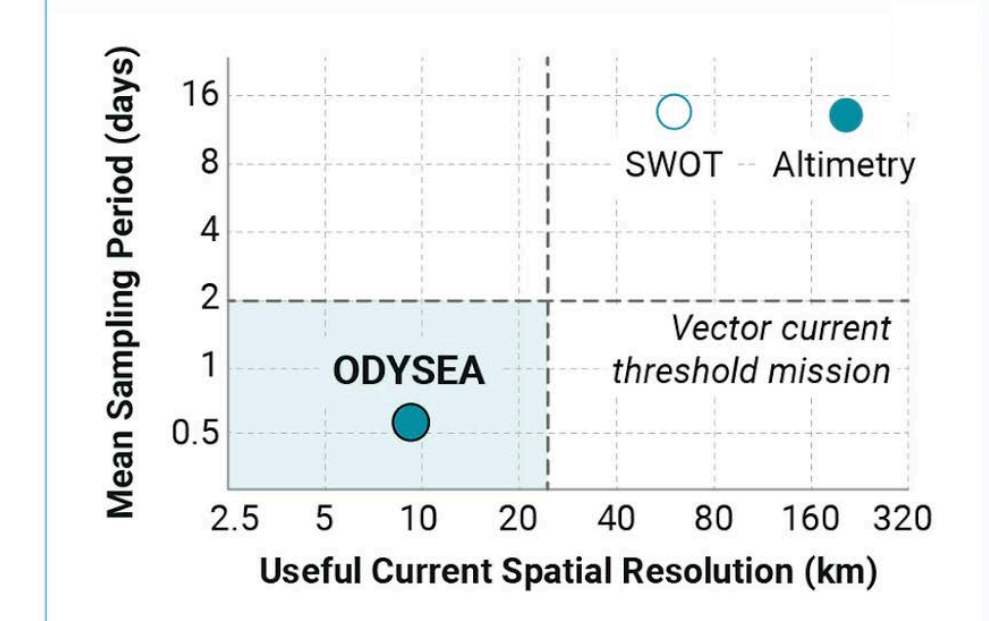
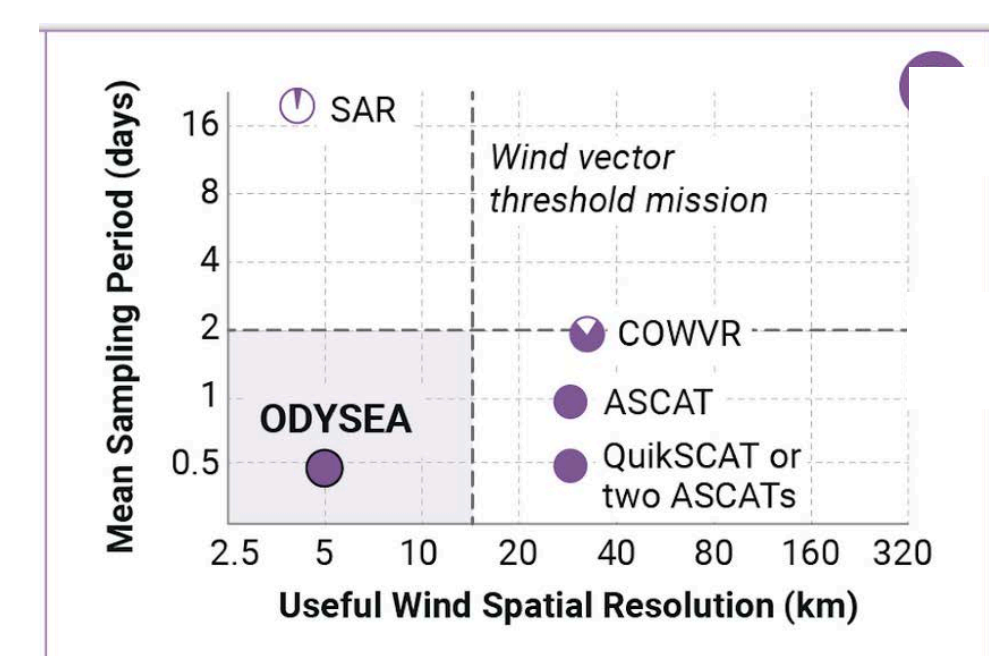


Take a picture to access our web site with links to references and webinar sign-up.

APPLICATIONS: ODYSEA's wind and current observations will constrain models of ocean circulation, weather, and climate, helping with critical operations and providing key information for biology and biogeochemistry:

- Search and rescue at sea requires frequent and high-resolution currents on 24–48 hour time scales.
- The global constellation of wind satellites lacks observations around 4:30 am/pm local time. ODYSEA will fill this gap to track the evolution of diurnal winds and fast-moving storm systems.

The details....



For both winds and currents, ODYSEA will provide notable improvements in spatial and temporal resolution relative to existing satellite missions and gridded products.

ODYSEA will improve on altimeter products by providing ageostrophic plus geostrophic currents.

TIMELINE: ODYSEA is conceived as a joint effort by NASA and the French Centre National d'Etudes Spatiales (CNES). The concept was identified in the US National Academies 2017 Decadal Survey of Earth Systems and Applications from Space:



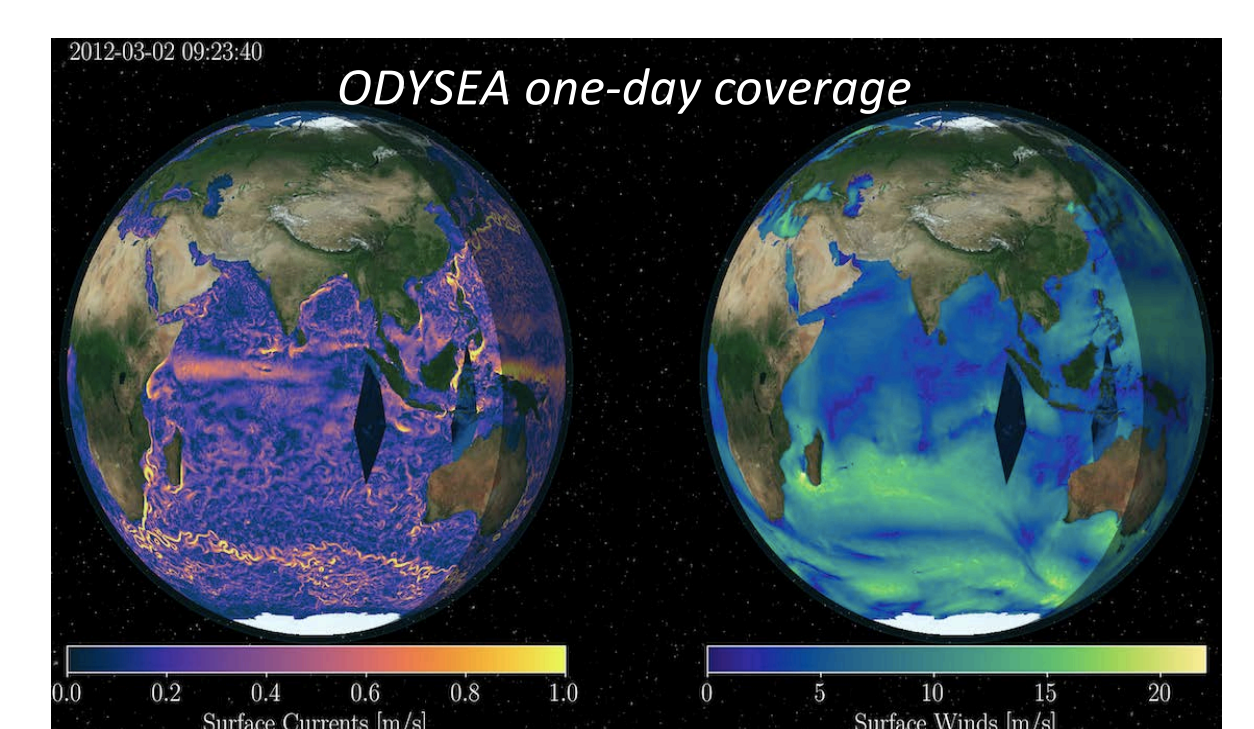
Ocean Surface Winds and Currents | Coincident high-accuracy currents and vector winds to assess air-sea momentum exchange and to infer upwelling, upper ocean mixing, and sea-ice drift | Doppler scatterometer

ODYSEA will be formally proposed in mid-2023 as a competed mission in NASA's Earth System Explorers program, with a potential launch date in the 2029–2031 timeframe.

SPECIFICATIONS:

- Orbit: 4:30 am sun synchronous
- Swath width: 1700 km
- Resolution: 5 km for wind, ~10 km for currents
- Effective revisit time: ~daily (and 2/day in many places)

DATA ACCESS: ODYSEA data will be free and open, as is true for all NASA missions.



LEARN MORE:

Read: For technological details, see the Rodriguez et al (2019) OceanObs'19 Frontiers paper:

<https://www.frontiersin.org/articles/10.3389/fmars.2019.00438/full>

Join the discussion: ODYSEA hosts a weekly webinar on Tuesdays at 8 am Pacific to advance community discussion of key science. Find the sign-up form: <http://odysea.ucsd.edu>