

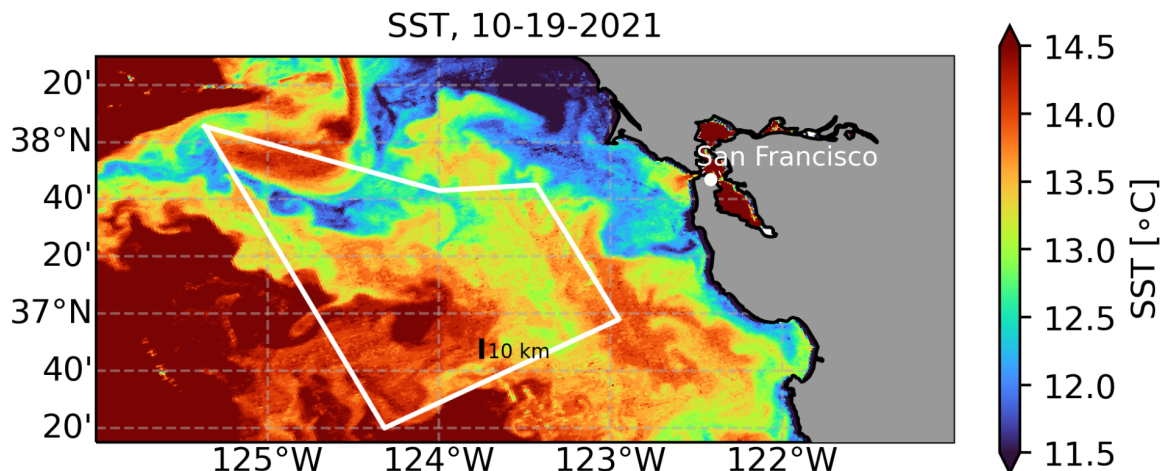
S-MODE Science Report - Oct 21, 2021

Overall weather conditions:

- The synoptic weather situation presents challenges for the first week of the three-week campaign.
- The region is experiencing a series of “atmospheric river” events, with an exceptionally strong event expected to arrive in the area on Sunday, 10/24
- Wave heights are expected to reach 9 m (30 feet) on Sunday evening.

Ocean conditions

- Ocean conditions are excellent! There are strong oceanic fronts in the region, and ocean model forecasts suggest that conditions will remain favorable for at least the next week.
- Using a combination of remote sensing and a suite of increasingly higher resolution models, we have honed in on the cold filament seen in the NW corner of the S-MODE domain in the satellite SST image below. This is a region of oceanic frontogenesis and strong submesoscale features.
- After identifying this feature as a primary target, we have begun to characterize it in more detail using aircraft remote sensing, robotic surface vehicles and a research vessel.



Satellite SST image (from the AVHRR instrument on EUMETSAT's Metop-A), showing the S-MODE Pilot campaign operations area (white polygon). We are currently focusing sampling on the cold filament in the NW corner of the operations area. (The shape of the operations area is constrained by aircraft warning areas.)

R/V Oceanus

- Oceanus departed Newport, OR around noon local time on October 19. The ship is en route to the S-MODE operations area but is experiencing rough seas, which has slowed down the transit.
- Three of the four Wave Gliders (WGs) onboard the R/V Oceanus were damaged overnight on October 20 by a very large wave. One WG is undamaged, two are fixable, and one requires repairs on a timeline that will not work for this campaign. This is not a major setback, as aircraft operations are limited due to weather conditions.

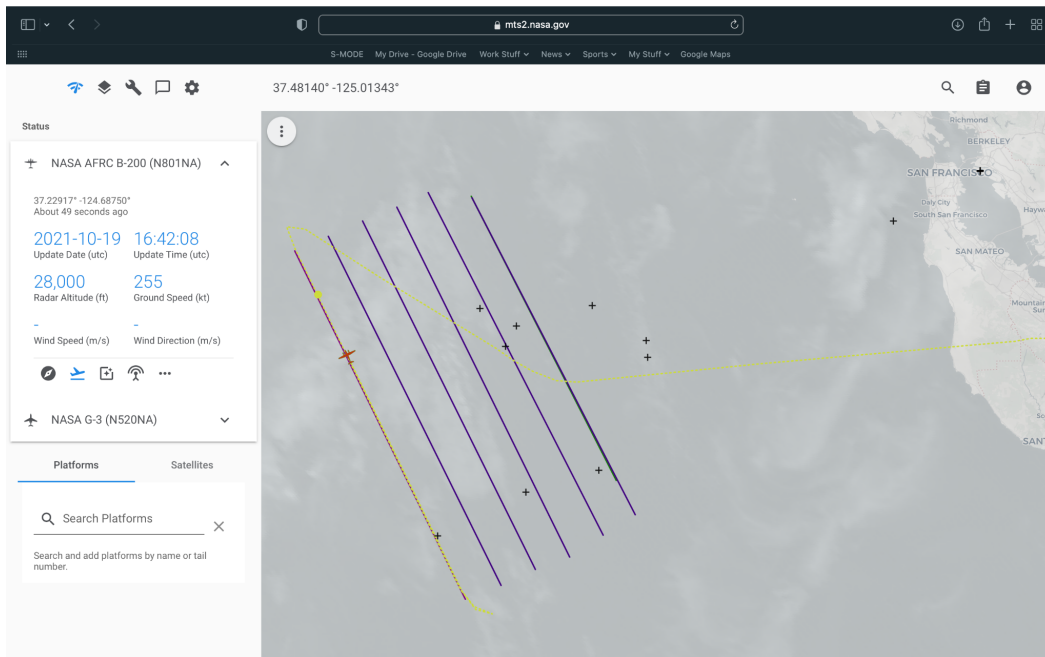
- Oceanus is currently scheduled to arrive in the northwest corner of the operations area Friday morning. After collecting coincident data with the B200 and Twin Otter overflights, the ship will cruise to calmer waters in San Francisco Bay and dock at Pier 19 near Embarcadero, so the repairs can begin on the damaged WGs. This situation is fast evolving.



R/V Oceanus sailing south during the afternoon of October 19, 2021.

AFRC B200

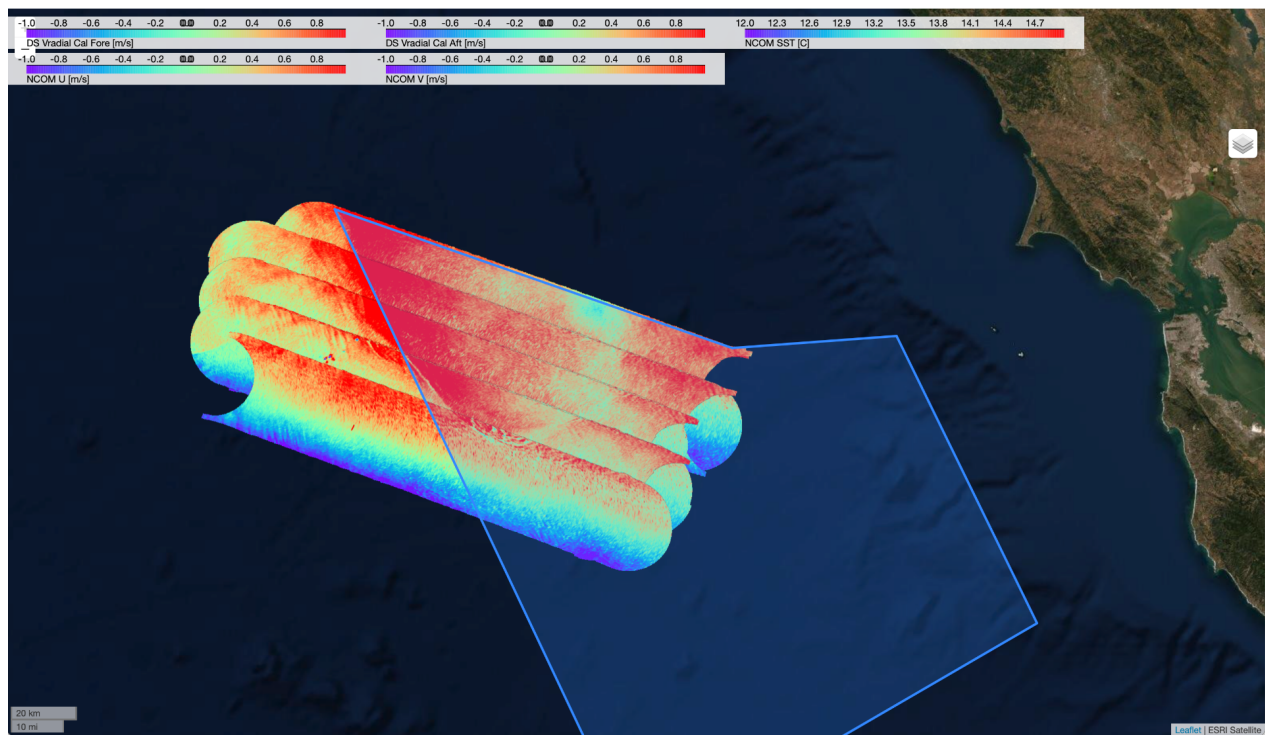
- The AFRC B200 has completed two 4.5-hour science flights with a third expected tomorrow. Both the DopplerScatt and MOSES instruments are delivering good data.
- The primary goal of the first two (and upcoming) B200 flights is to characterize a “cold filament” area, which is located in the northwest section of the S-MODE operations area. This area is also being transected by Saildrones.



NASA Mission Tools Suite display of B200 SF1. The small crosses in the picture are Saildrones and NAVO Gliders.



From L to R: Scott "Jelly" Howe (NASA AFRC), Federica Polverari (NASA JPL), Delphine Hypolite (UCLA), and Mike Stewart (NASA ARC) during B200 Science Flight (SF) #2 on October 20, 2021.



Quick look DopplerScatt current radial velocity from Doppler data from B200 SF2. The signature of the cold front on the radial velocities can be seen clearly as a diagonal feature in the image. The S-MODE operations area is illustrated by the blue polygon.

Twin Otter

- The Twin Otter transited to Monterey Regional Airport midday on Wednesday. The team is planning its first science flight tomorrow with the MASS instrument, overflying Oceanus and coinciding with the B200.

Saildrones

- Saildrones SD-1072 and SD-1073 continue to collect data near the “cold filament” in the northwestern corner of the operations area.
- Three additional Saildrones will be coming online early next week.