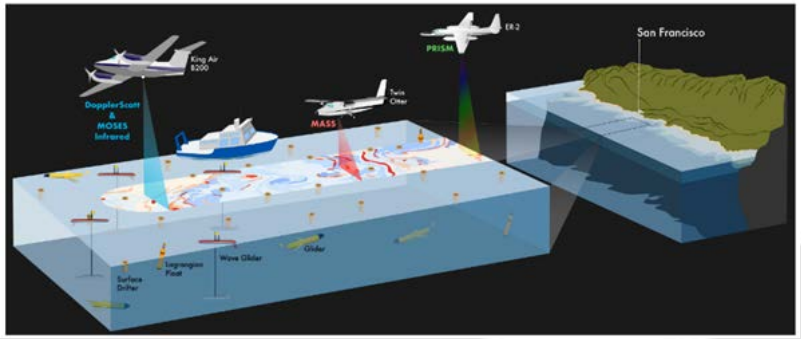
EVS-3 Sub-Mesoscale Ocean Dynamics Experiment (S-MODE)

Start Date:	**June 1, 2019**
Confirmation:	**TBD**
End Date:	**May 31, 2024**
Airborne Platforms:	**B200 King Air (AFRC)** **Gulfstream V (JSC)** **Twin Otter (Twin Otter International)**
Ship Platform:	**UNOLS Ocean-Class**
Data Center:	**not assigned**
Principal Investigator:	**Tom Farrar (WHOI)**
Investigation Manager:	**Erin Czech (ESPO/ARC)**
Deputy PI:	**Ernesto Rodriguez (JPL)**
Program Executive:	**Bruce Tagg (HQ)**
Program Scientist:	**Eric Lindstrom (HQ)**
ESSP Mission Manager:	**Jennifer Olson (LaRC)**
Project Cost Cap:	**$30M over 5 years (2019-2024)**

Summary: The vertical exchange of climate and biological parameters between the surface ocean layer with both the atmosphere above, and with the deeper ocean below plays a critical role in the climate system. Modeling studies suggest that submesoscale variability can have a net effect on ocean-atmosphere heat exchange that could be larger than the heating from the greenhouse effect. In the absence of “ground truth” observations of sufficient resolution and detail to test this prediction, there is a pressing need for a comprehensive benchmark data set on these submesoscale motions. The aim of S-MODE is to test the hypothesis that submesoscale ocean dynamics are instrumental in impacting vertical exchange in the upper ocean. The study will use measurements from a novel combination of platforms and instruments along with data analysis and modeling to make this assessment.



Implementation: The experimental plan includes a two-week pilot campaign and two 25-day intensive operating periods during spring and fall of 2021. The nominal site is 300 km from San Francisco. S-MODE will utilize three instrumented aircraft to collect simultaneous measurements aimed at quantifying the three-dimensional structure of submesoscale features responsible for vertical exchange in the upper ocean. Airborne instruments include NASA’s DopplerScatt and PRISM, and the SIO MASS and UCLA MOSES instruments. In conjunction with the measurements from aircraft, in situ data will be obtained using surface drifters, wave-propelled autonomous vehicles, Lagrangian floats that follow the 3D flow, vertically profiling autonomous underwater vehicles, and a research vessel.

NASA Earth Science Relevance: Several science priorities, goals, and objectives of NASA’s Earth Science Research Program will be addressed, including contributions to enhanced Earth system models and contributions to planning for future satellite observations. S-MODE addresses questions that are central to interests and activities of many NASA projects, including the SWOT Science Team, the Ocean Vector Wind Science Team, the Ocean Surface Topography Science Team, the Physical Oceanography Program, the Ocean Biology and Biogeochemistry Program, and the NASA PACE and EXPORTS field programs.