MASTER OF SCIENCE
IN
METEOROLOGY AND PHYSICAL OCEANOGRAPHY

ANALYSIS OF EDDY RESOLVING MODEL OF THE CALIFORNIA CURRENT SYSTEM
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A high-resolution, multi-level, primitive equation ocean model is used to investigate the combined role of seasonal wind forcing, thermohaline gradients, and coastline irregularities on the formation of currents, meanders, eddies, and filaments in the California Current System from 22.5° N to 47.5° N. An investigation of the dynamical reasons for the generation and growth of meanders and eddies is conducted along with a sensitivity study to investigate the formation of the Davidson Current.

Model results are consistent with the generation of eddies from instabilities of the equatorward current and poleward undercurrent via barotropic and baroclinic instability processes. The meandering equatorward jet south of Cape Blanco is shown to be a continuous feature, which divides coastally-influenced water from water of offshore origin. The area off southern Baja is shown to be a highly dynamic environment for meanders, filaments, and eddies, while the area off Point Eugenia is shown to be a persistent cyclonic eddy generation region. Both the Southern California Countercurrent rounding Point Conception and the shoaling of the poleward undercurrent are shown to play important roles in generating the Davidson Current in the fall.

DoD KEY TECHNOLOGY AREA: Modeling and Simulation

KEYWORDS: Primitive Equation Model, California Current System, Currents, Meanders, Eddies, Filaments

COMPARISON OF ADVANCED ARCTIC OCEAN MODEL SEA ICE FIELDS TO SATELLITE DERIVED MEASUREMENTS
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Numerical models have proven integral to the study of climate dynamics. Sea ice models are critical to the improvement of general circulation models used to study the global climate. The object of this study is to evaluate a high-resolution ice-ocean coupled model by comparing it to derived measurements from Scanning Multichannel Microwave Radiometer (SMMR) and Special Sensor Microwave/Imager (SSM/I) satellite observations. Utilized for this study was the National Aeronautics and Space Administration

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(NASA) Goddard Space Flight Center (GSFC) Sea Ice Concentration Data Set from the National Snow and Ice Data Center. Using animations of side-by-side presentations, variability comparisons and anomaly values of the similarities and differences between the model and the satellite were noted. The model shows a true representation of the seasonal cycle of ice concentration variation, with natural growth, advection, decay. Model performance is weakest in the East Siberian and Laptev Seas where excessive ice is developed. A 30-day lag in the freezing and melting of ice in Hudson Bay was noted in the model. The use of monthly mean Levitus temperatures adversely affects model performance evidenced by a tendency to grow and retain excess ice in the marginal seas of the Arctic Ocean.

DoD KEY TECHNOLOGY AREAS: Modeling and Simulation, Space Vehicles

KEYWORDS: Numerical Models, Climate Dynamics, Sea Ice General Circulation Model, SMMR (Scanning Multichannel Microwave Radiometer), SSM/I (Special Sensor Microwave/Imager), Satellite, NASA National Aeronautics and Space Administration), Goddard Space Flight Center, National Snow and Ice Data Center, Ice Concentration, East Siberian and Laptev Seas, Hudson Bay, Arctic Ocean