Environmental Studies Program: Ongoing Study

Field	Study Information
Title	Improvements to the Oil Spill Risk Analysis (OSRA) Input Quality Assurance/ Quality Control (QA/QC) and Validation (AK-20-05)
Administered by	Alaska Regional Office
BOEM Contact(s)	Dr. Heather Crowley (heather.crowley@boem.gov)
Procurement Type(s)	Contract
Conducting Organization(s)	Axiom Data Science, LLC
Total BOEM Cost	$274,948
Performance Period	FY 2020–2022
Final Report Due	March 2023
Date Revised	February 22, 2023
Problem	General Circulation Model (GCM) data fields input to the OSRA model do not have a standardized QA/QC check. Every contracted GCM is validated in a different way from the one previous. A need exists for standardized validation and QA/QC procedures.
Intervention	Model results need to be examined in detail for GCM quality and errors. Artifacts such as insufficiently radiative boundaries and grid issues need to be identified if present. Sea ice concentration, velocity and water velocity need to be examined for reasonable values and to determine that the GCM is performing well.
Comparison	A product will be created to compare GCM output to observational datasets in a standardized way.
Outcome	This study will produce a set of standardized processes and tools to facilitate verification and validation of GCM results and formatting those model results for input to OSRA.
Context	Study products will be applicable to all Alaska OCS Planning Areas and may be extended to all OCS Planning Areas.

BOEM Information Need(s): Output from the OSRA model is used to drive National Environmental Policy Act (NEPA) analyses for OCS block sales. Refinements in GCM inputs are essential for keeping the OSRA model up to date. Understanding oil spill risk is essential to managing OCS resources.

Background: OSRA is a key component in driving NEPA analysis. Oil spill trajectories are essential when identifying impacts to important sociocultural, biological, and ecological resources. When offering up lease blocks for sale, it is vital that BOEM provides both the risk of an oil spill occurring and the chance a spill could contact these resources. GCM inputs are key in order to accurately forecast the chance of a spill contacting resources, thus it is necessary to validate these data before input into the OSRA model. Currently we have no formal validation method for this data and would like to standardize this process.

Objectives:

- Streamline QA/QC and visualization of OSRA GCM inputs.

- Provide methods for additional ground-truthing of OSRA GCM inputs with real world data.

- Develop tools to format GCM outputs for use in OSRA.

Methods: Researchers will develop standardized processes and tools to facilitate verification and validation of GCM results and formatting those model results for input to OSRA. Approaches for use in the Arctic could include processing SSMI sea ice concentration from the National Snow and Ice Data Center (Cavalieri *et al.*, 1996) and the IFREMER sea ice drift dataset (Girard-Ardhuin and Ezraty, 2012) into the appropriate time and space bins for comparison to GCM output. An example of an ADCP dataset to validate surface current vectors for Arctic areas could come from OCS Study BOEM 2017-65 (Weingartner *et al.*, 2017). This dataset would also be processed into the appropriate time and space bins for comparison to the GCM. Other circulation studies would be used for various parts of the Alaska OCS. After processing into the appropriate time and space bins, statistics of fit will be performed by a linear regression for all datasets.

Specific Research Question(s): How can validation of results from a GCM be standardized?

Current Status: Awaiting final report.

Publications Completed: None

Affiliated WWW Sites:

http://www.boem.gov/akstudies/

References:

Cavalieri, D. J., C. L. Parkinson, P. Gloersen, H. J. Zwally. 1996, updated yearly. Sea Ice Concentrations from Nimbus-7 SMMR and DMSP SSM/I-SSMIS Passive Microwave Data, Version 1. Boulder, Colorado USA. NASA National Snow and Ice Data Center Distributed Active Archive Center. doi: https://doi.org/10.5067/8GQ8LZQVL0VL.

Girard-Ardhuin, F., R. Ezraty. 2012. Enhanced Arctic Sea Ice Drift Estimation Merging Radiometer and Scatterometer Data. IEEE Transactions on Geoscience and Remote Sensing. 50. 2639-2648. 10.1109/TGRS.2012.2184124.

Weingartner, T. J., R. Pickart, P. Winsor, *et al.* 2017. Characterization of the Circulation on the Continental Shelf Areas of the Northeast Chukchi and Western Beaufort Seas. Fairbanks, AK: U.S. Department of the Interior, Bureau of Ocean Energy Management. OCS Study BOEM 2017-065. 221 p. https://marinecadastre.gov/espis/#/search/study/26869.