Your Abstract Submission Has Been Received

Click here to print this page now.

You have submitted the following abstract to AGU23. Receipt of this notice does not guarantee that your submission was free of errors.

Efficient recovery of multi-year ocean field in the marginal ice zone with uncertainty quantification

Zihong Xu[1], Jeffrey Covington[2], Nan Chen[2] and Minki M. Kim[3], (1)University of Wisconsin Madison, Madison, WI, United States, (2)University of Wisconsin-Madison, Department of Mathematics, Madison, United States, (3)Brown University, Center for Fluid Mechanics, School of Engineering, Providence, RI, United States

Abstract Text:
Understanding the multi-year time evolution of the ocean flow field in the Arctic marginal ice zone (MIZ) significantly impacts the climate system. Despite the lack of direct observations of the ocean velocity due to the ice coverage, the trajectories of individual floes extracted from satellite images can be used as Lagrangian observations to infer the underneath ocean field. However, the cloud covers constantly blur the satellite images and lead to the break of these Lagrangian trajectories. Meanwhile, key parameters, such as the thickness of each floe, need to be estimated. In this talk, we will present an efficient modeling and data assimilation framework. A simple discrete element model is coupled to a set of reduced-order stochastic models for the atmosphere and ocean fields that allows using closed analytic formulae to infer the ocean field with a quantification of the uncertainty. The framework also automatically estimates thickness and other key parameters using semi-analytic statistical inference. The framework will be used to study the variation of the ocean field in the MIZ in different years over the 21st century to better understand the impact of the climate on ocean and sea ice dynamics.

Session Selection:
NG004. Efficient Data-Driven Methods for Multiscale Stochastic Modeling and Uncertainty Quantification

Submitter's E-mail Address:

zxu455@wisc.edu

Abstract Title:
Efficient recovery of multi-year ocean field in the marginal ice zone with uncertainty quantification

Requested Presentation Type:
Poster Only

Virtual Participation:
In-person

Recording Permission Given?
Yes

Previously Published?:
No

Abstract Payment:
Paid (agu-fm23-1289176-9750-5664-0936-0050)

I would not like to volunteer as an OSPA Reviewer.

First Presenting Author
Presenting Author

Zihong Xu
Primary Email: zxu455@wisc.edu

Affiliation(s):

University of Wisconsin Madison
Madison WI (United States)

Second Author

Jeffrey Covington
Primary Email: jmcovington@wisc.edu

Affiliation(s):

University of Wisconsin-Madison
Department of Mathematics
Madison (United States)

Third Author

Nan Chen
Primary Email: chennan@math.wisc.edu

Affiliation(s):

University of Wisconsin-Madison
Department of Mathematics
Madison (United States)

Fourth Author

Minki M. Kim
Primary Email: minki_kim@brown.edu

Affiliation(s):

Brown University
Center for Fluid Mechanics, School of Engineering
Providence RI (United States)

If necessary, you can make changes to your abstract submission

To access your submission in the future, point your browser to: User Portal
Your Abstract ID# is: 1289176.
Any changes that you make will be reflected instantly in what is seen by the reviewers.
After the abstract proposal is submitted, you are not required to go through all submission steps to make edits. For example, click the "Authors" step in the Abstract Submission Control Panel to edit the Authors and then click save or submit.
When you have completed your submission, you may close this browser window or submit another abstract proposal: Call for Abstracts.

Tell us what you think of the abstract submission process