

EGU22-6848

<https://doi.org/10.5194/egusphere-egu22-6848>

EGU General Assembly 2022

© Author(s) 2022. This work is distributed under the Creative Commons Attribution 4.0 License.



Effects of inclusion of adjoint sea ice rheology on estimating ocean-sea ice state

Guokun Lyu and Meng Zhou

Shanghai Jiao Tong University, School of Oceanography, China (guokun.lyu@sjtu.edu.cn)

As part of the ongoing development of a data assimilation system for reconstructing the Arctic ocean-sea ice state, we incorporated an adjoint of sea ice rheology, which was approximated by free drift assumption due to stability problem, into an adjoint model of a coupled ocean-sea ice model. The adjoint sensitivity experiments show that the internal stress effect, represented by the adjoint rheology, induced remarkable differences in the sensitivities to ice drift and wind stress in the central Arctic Ocean. In contrast, ice is mostly free drift in the marginal ice zone. The assimilation experiments reveal that including the adjoint of ice rheology helps extract observational information, especially the ice drift observations, which improves the estimation of the sea ice decline process in 2012. The results suggested great potentials for further improving the Arctic ocean-ice state estimation in the framework of the adjoint method with the adjoint sea ice rheology included.