

Interactive comment on “Observations of surface momentum exchange over the marginal-ice-zone and recommendations for its parameterization” by A. D. Elvidge et al.

A. D. Elvidge et al.

andy.elvidge@metoffice.gov.uk

Received and published: 5 January 2016

Thank you for your positive comments on our paper, and insightful suggestions.

Comment 1. The first sentence of the Introduction is an oversimplification. In addition to the three forces mentioned, sea ice motion is affected by the sea surface tilt and Coriolis force (e.g. Vihma and Launiainen (1993), JGR, equation (1), but be aware of the missing + sign between ice-water stress and internal stress). The Coriolis force affects the deviation angle between the wind and ice drift vectors (also affected by the internal ice resistance and ice-water drag). The thicker is the ice, the larger is the deviation angle due to Coriolis force.

C11133

Response: Noted, and text changed to include the additional forces. First sentence now reads "Sea ice movement is determined by five separate forces: a drag force from the atmosphere, a drag force from the ocean, internal sea-ice stresses, a downhill ocean-surface slope force, and the Coriolis force (e.g. Notz 2012)."

Comment 2. The importance of the results could be better illustrated via idealized calculations. For example, to illustrate the importance of the differences between the drag coefficients obtained from different parameterizations, you could calculate their effect on 10-m wind speed, assuming neutral stratification and a certain wind speed above the boundary layer. Further, the sensitivity of the ice drift speed on the value of the drag coefficient could be calculated assuming a certain 10-m wind speed, steady-state conditions, no ocean current, and a certain value for the ice-water drag coefficient. Some more assumptions / idealizations may be needed. Such calculations would help a non-specialist to understand how much a small difference in the drag coefficient matters for the dynamics of the atmosphere and sea ice.

Response: Whilst we agree that the above would be an interesting exercise, we don't think it belongs in this paper, where the purpose is to present our results based on our observations and assess the performance of parameterization schemes against these observations. Note that the recent publication by Lupkes et al. (2013) starts on such an exercise. This would certainly be something for the future.

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 26609, 2015.

C11134