Review of the article titled "*Determining an optimal transport velocity in the marginal ice zone using operational ice-ocean prediction systems*" by Sutherland et al. (2021)

Recommendation: **Minor Revision**

General Comments:

Based on the oil transport equation in marginal ice zones (MIZs), the authors proposed a generalized transport equation for estimating the transport velocity in the MIZ by primarily introducing a leeway coefficient in the ice (i.e., α_i) into the former equation. The transport velocity u, by design, then is a weighted mean of the ice and water velocities, either of which has been corrected by the respective leeway coefficient (i.e., α_i and α_w). Using the field observations from 4 drifters, the authors further determined the optimal leeway coefficients ($\alpha_w = 0.03$ and $\alpha_i = 0.02e^{-\pi/6}$) which would minimize the MAE between the observations and the results predicted by the model.

I found the manuscript is very interesting and the general leeway model suggested here could be very useful for future operations in the Arctic. I therefore suggest to accept the manuscript once it goes through a **minor revision**. Please see my specific comments below.

Specific Comments:

L112: "as well as for wave models (Rogers et al., 2016)" to "... (Masson and Leblond, 1989; Rogers et al. 2016; Liu et al. 2020)"

Masson, D., & Leblond, P. (1989). Spectral evolution of wind-generated surface gravity waves in a dispersed ice field. Journal of Fluid Mechanics, 202, 43-81. doi:10.1017/S0022112089001096

Liu, Q., Rogers, W. E., Babanin, A., Li, J., & Guan, C. (2020). Spectral Modeling of Ice-Induced Wave Decay, Journal of Physical Oceanography, 50(6), 1583-1604.

L117: "... calculate their solutions " to "... calculate their source terms or source functions"?

L147-151: This paragraph does not read well. If I understood correctly, both the CAPS and TOPAZ simulations were forced by the CAPS winds. But line 148 presents that "TOPAZ is forced by ECMWF IFS ...". Please revise here for clarity.

L193: "... at a fixed value of α_w" to "... α_w (0.03)"

L200: "... at a fixed value of α_i" to "... α_i ($0.02e^{-i\pi/6}$)"

P12, Fig. 5 caption: "for each of the four drifters" to "... drifters with the constant $\alpha_i = 0.02e^{-i\pi/6}$"

- Fig. 2 uses the unit "m/s" for all the velocities. Figs. 4 and 5, however, adopt "km/day". I am a bit confused why two different units are used for velocities in these

figures. Furthermore, to better understand how large the errors are, it may be better to also include the relative error (i.e., in %) in Tables 1 and 2.

L206: "Lagrangian ... n), which is a ..." - delete "which is"