



Supplement of

Nondimensional parameter regimes of Arctic ice keel-ocean flow interactions and internal wave drag

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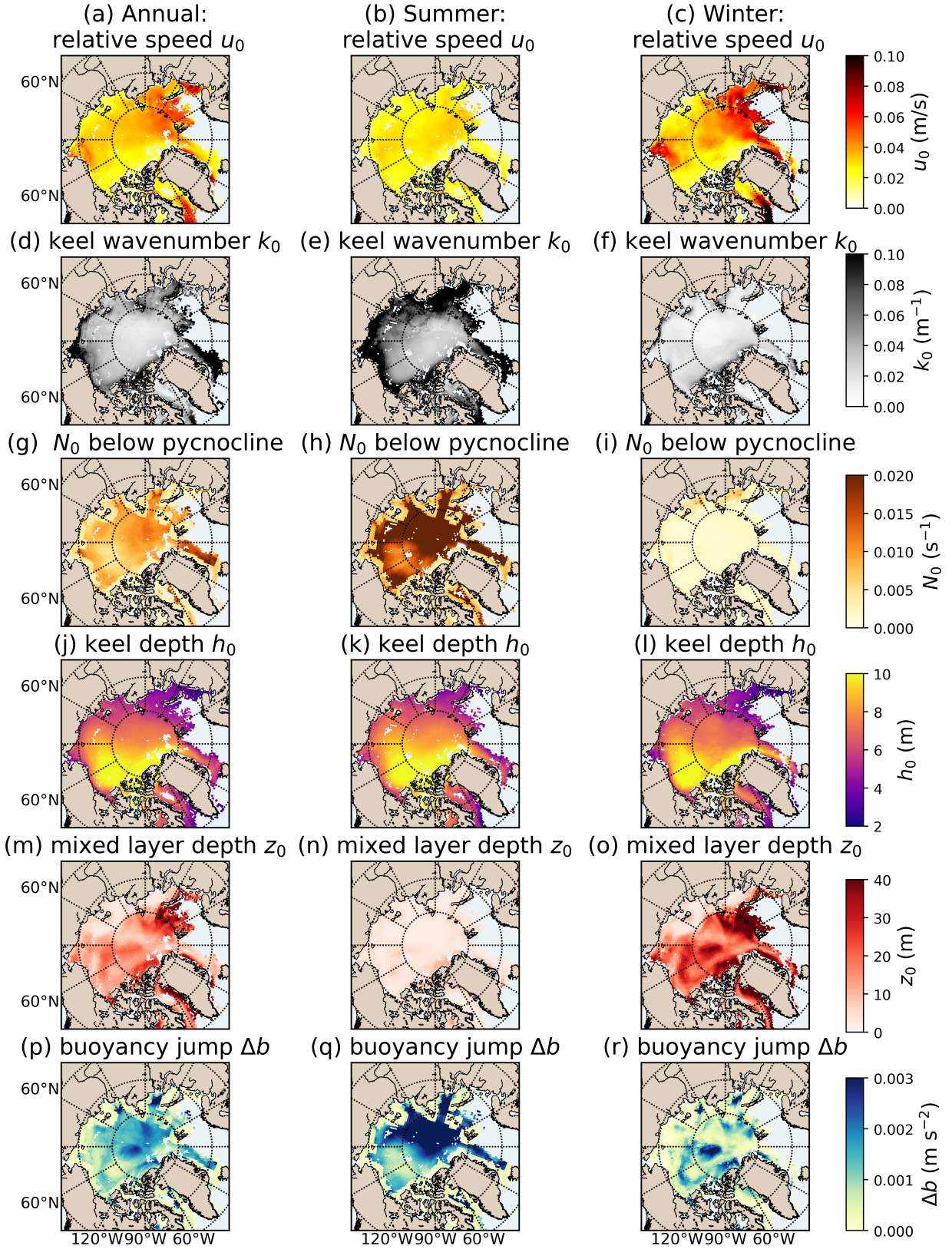


Figure S1: Spatial distribution across the Arctic of the six dimensional parameters used in calculation of the four nondimensional parameters in the main text: (a-c) relative speed of the ice keel u_0 , (d-f) keel wavenumber k_0 , (g-i) buoyancy frequency of the water below the pycnocline N_0 , (j-l) keel depth h_0 , (m-o) mixed layer depth z_0 , and (p-r) buoyancy jump across pycnocline Δb . Left column: annually-averaged values; middle column: values averaged over the summer months (JJA); right column: values averaged over the winter months (DJF). Physical meaning of each of the dimensional parameter is also shown in the schematic in Figure 1 in main text.

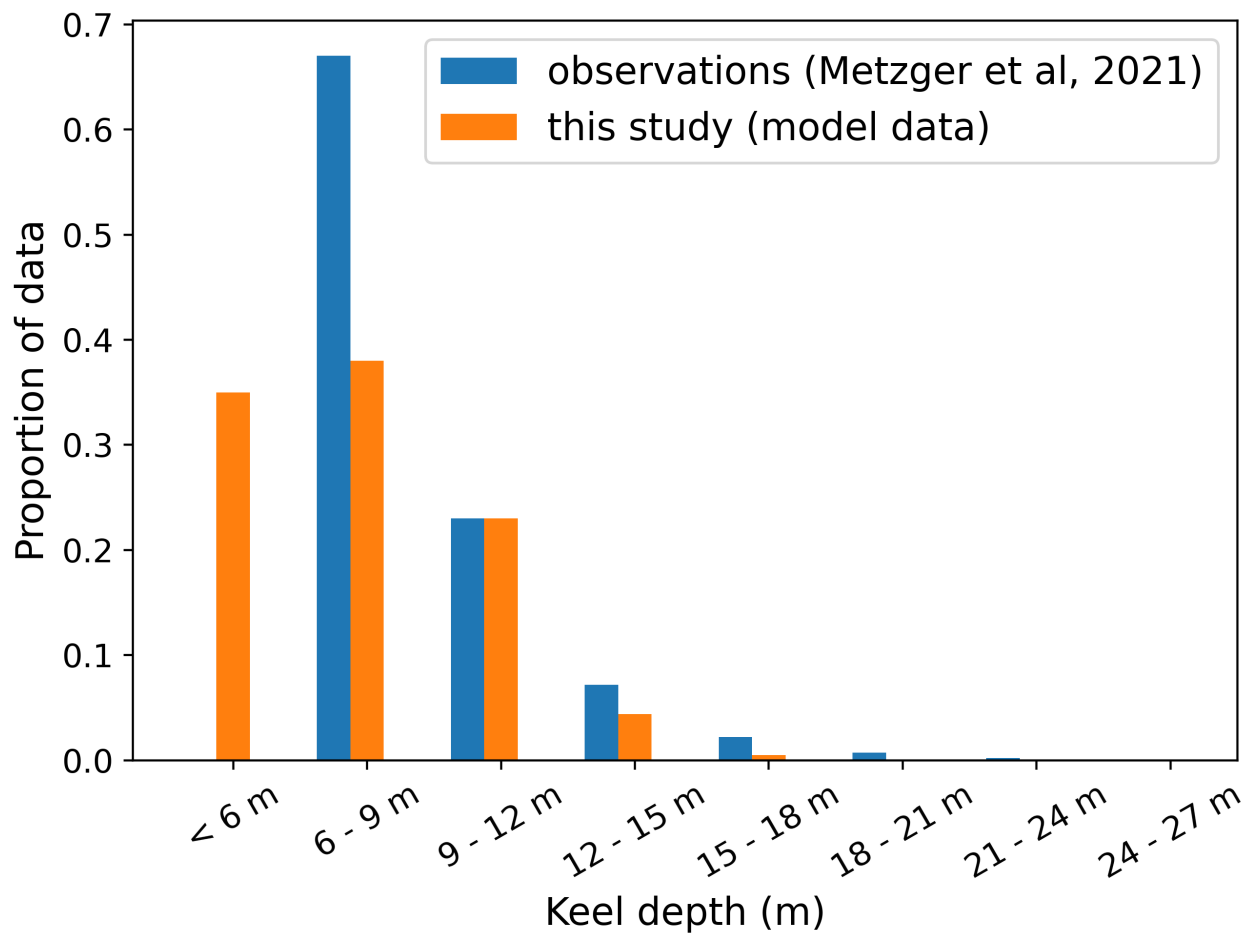


Figure S2: Distribution of keel depths based on (blue) the observational study by Metzger et al (2021) and (orange) model output from Flocco et al (2024) that is used as inputs in this study. For the model output, the shown distribution reflects all data points, not only the ones within the lee wave radiation range ($\chi < 1$).

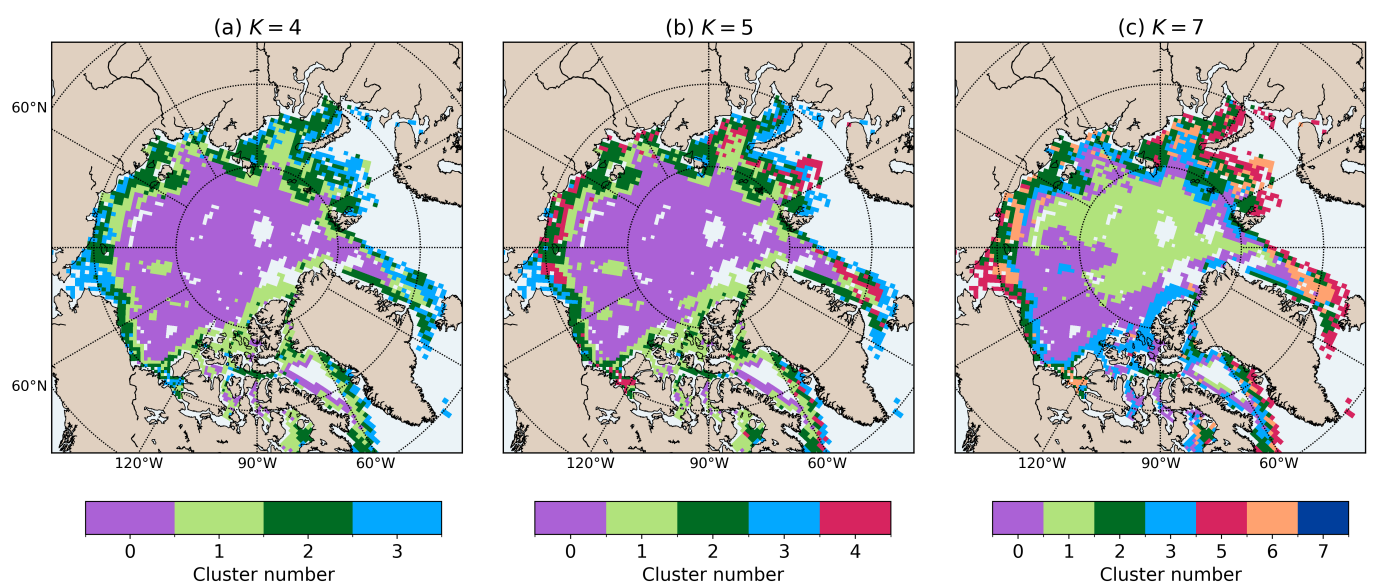


Figure S3: The spatial distribution of GMM clusters for the summer-averaged data changing input values of the number of clusters K : (a) $K = 4$, (b) $K = 5$, and (c) $K = 7$. The case with $K = 6$ is shown in main text Fig. 6(b). Clusters are all ordered in the descending proportion of data points that belong to each cluster (i.e., most data points belong to cluster 0).