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Supplement of

Stratification and mixed layer depth around Iceland: Characterization and inter-annual variability

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Sect. S1 PWP 1D model components

In the Price–Weller–Pinkel model (PWP), surface fluxes of heat, freshwater, and momentum were applied at each time step, and mixing was performed until three stability criteria were met. Figures S1-S3 show the different components used in the implementation of the PWP model reported in this study. Both heat-flux and wind-stress are larger during the core winter months for all stations.

The temperature and salinity average profile to initialize the PWP model were obtained from the observations. The corresponding profiles are shown in Figure S1.

The corresponding time series of ERA-5 heat-fluxes, fresh-water-fluxes and wind stress components are shown in Figure S2 and S3.

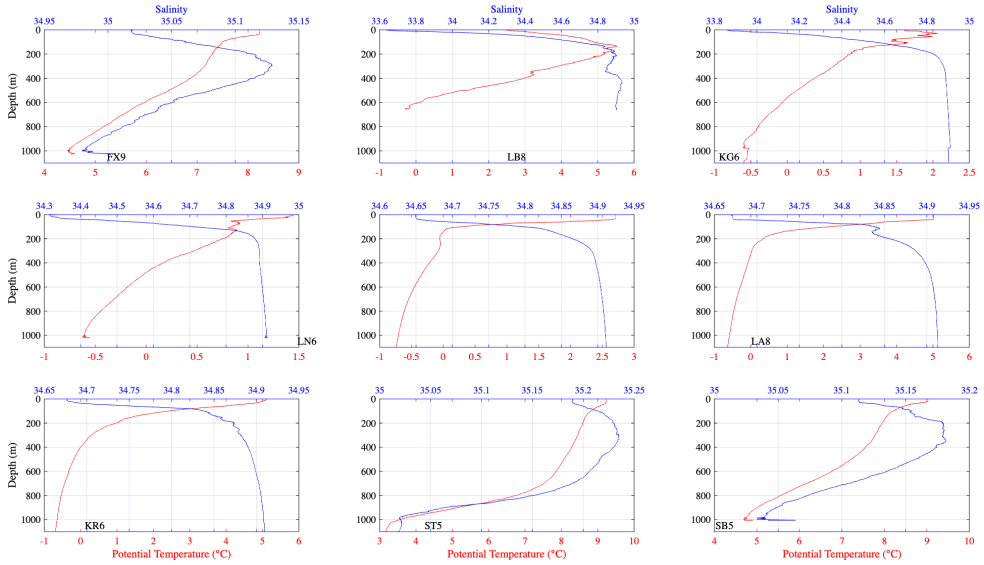

Figure S1: Temperature and salinity average profiles for the fall season (JAS) derived from observations. The panels show the profiles corresponding to the 9 representative stations. These profiles are used to implement the PWP 1D model shown in Figure 8 of the manuscript.

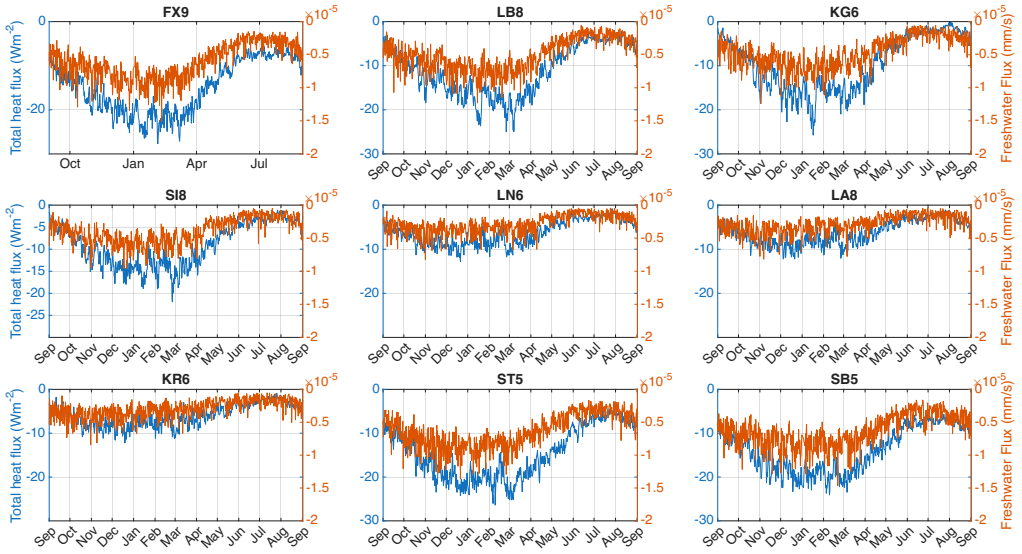

Figure S2: Total heat and freshwater fluxes used in the PWP 1D model time series derived from ERA-5 for starting from the fall season, corresponding to the 9 stations shown in Figure 8 of the manuscript.

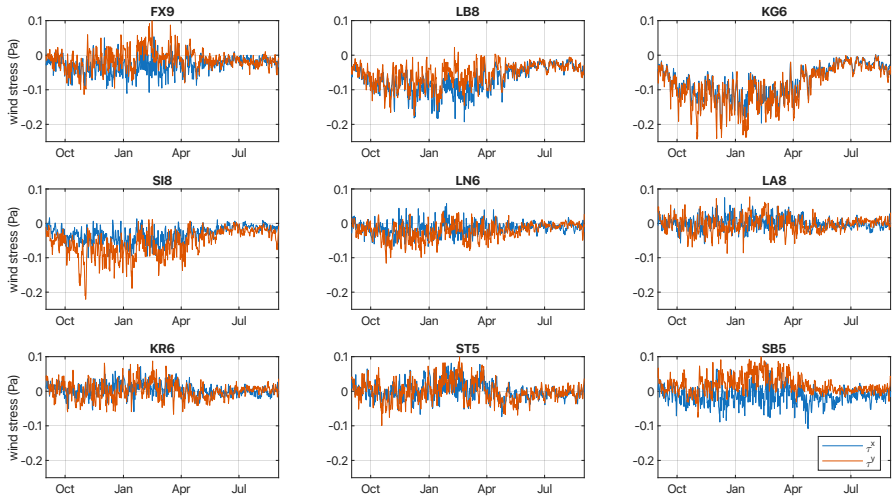

Figure S3: Wind stress components time series used in the PWP 1D model derived from ERA-5 starting from the fall season corresponding to the 9 stations shown in Figure 8 of the manuscript.

Sect. S2 MLD driving mechanisms from PWP-1D model

The summer stratification around Iceland is an order of magnitude higher than in winter and hence summer MLDs are very shallow. Figure S4 shows the PWP 1D model initialized in the fall (excluded from the manuscript) showing the evolution of the MLD over the fall, winter, and summer (the shallowest of all).

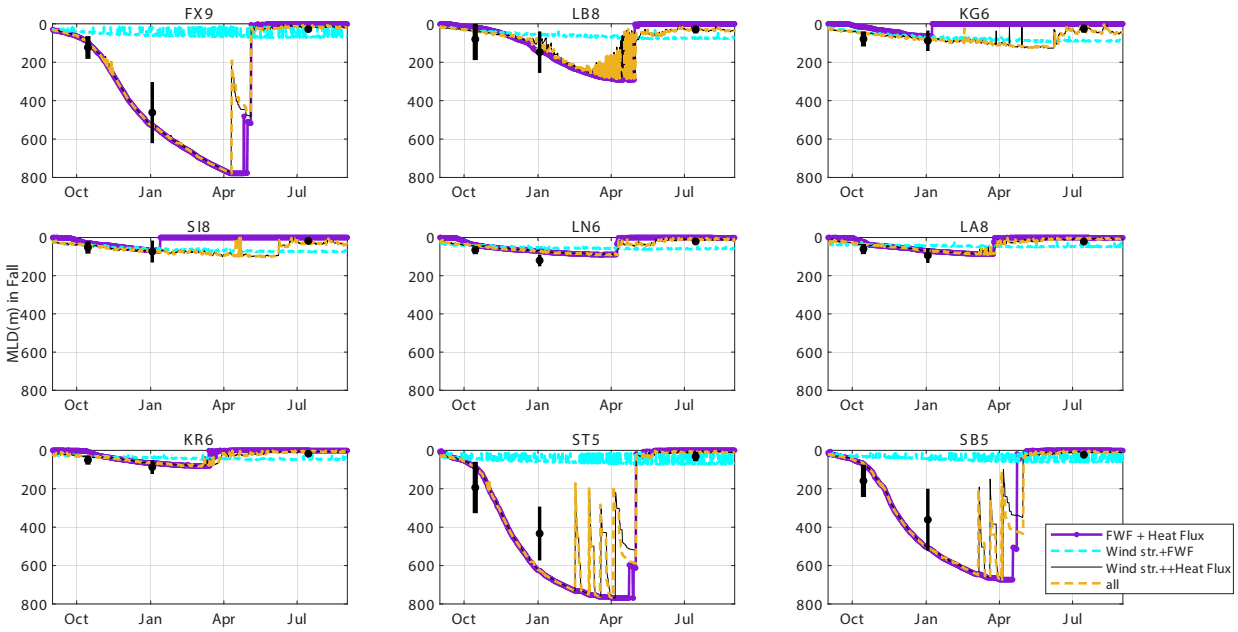

Figure S4: MLD driving mechanism decomposition estimated from the PWP 1-D model (Price et al. 1986) for each of the studied stations. MLD evolution is shown for outputs forced with freshwater + heat fluxes (purple), wind stress + freshwater fluxes (cyan), and wind-stress + heat fluxes (black) and all components together in yellow. The black dots represent the averaged fall, winter, and summer MLD with their corresponding standard deviations.