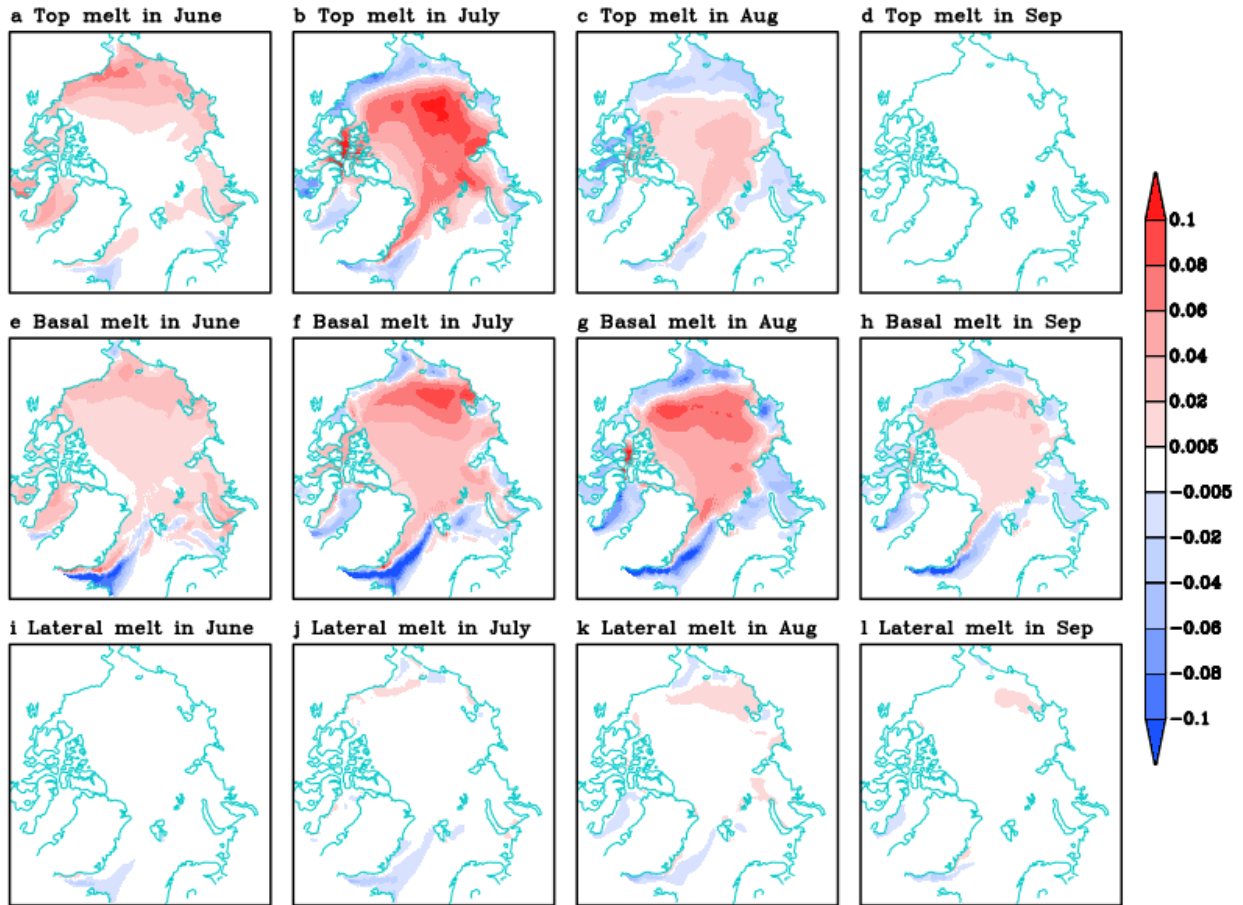
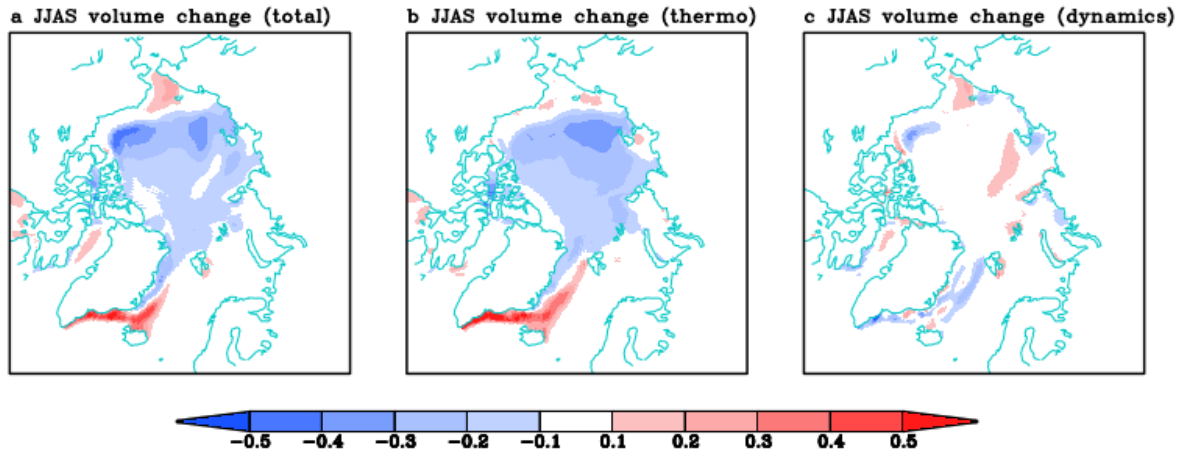


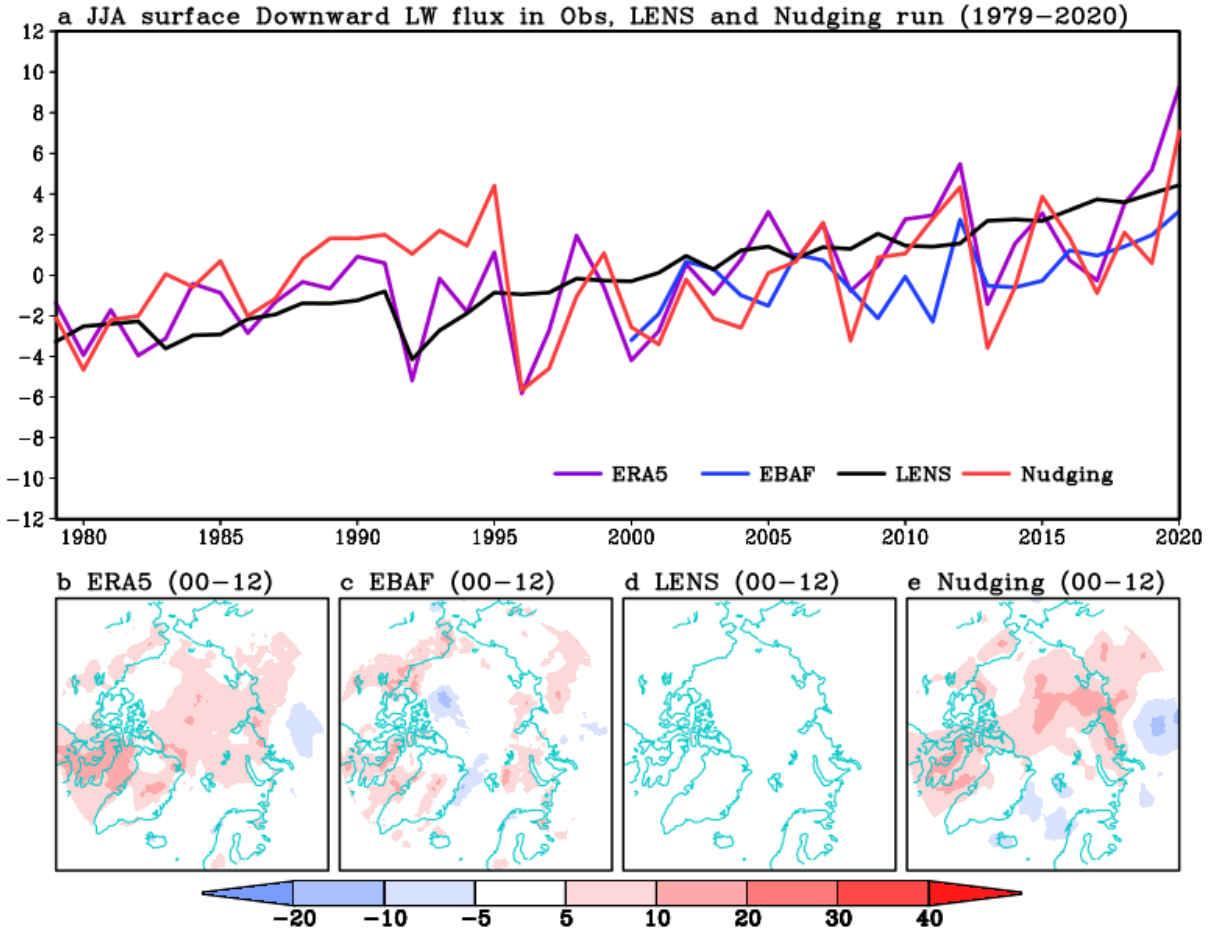
Supplementary Fig. 1. a) September total sea ice area (million square km²), b) Anomalous JJA Arctic mean (70-90°N) net radiation fluxes (W/m²) at the TOA and surface, c) Anomalous JJA global mean net radiation fluxes (W/m²) at the TOA and surface in the 150-yr spin-up run. At the surface, sensible and latent heat fluxes are not considered in the calculation.



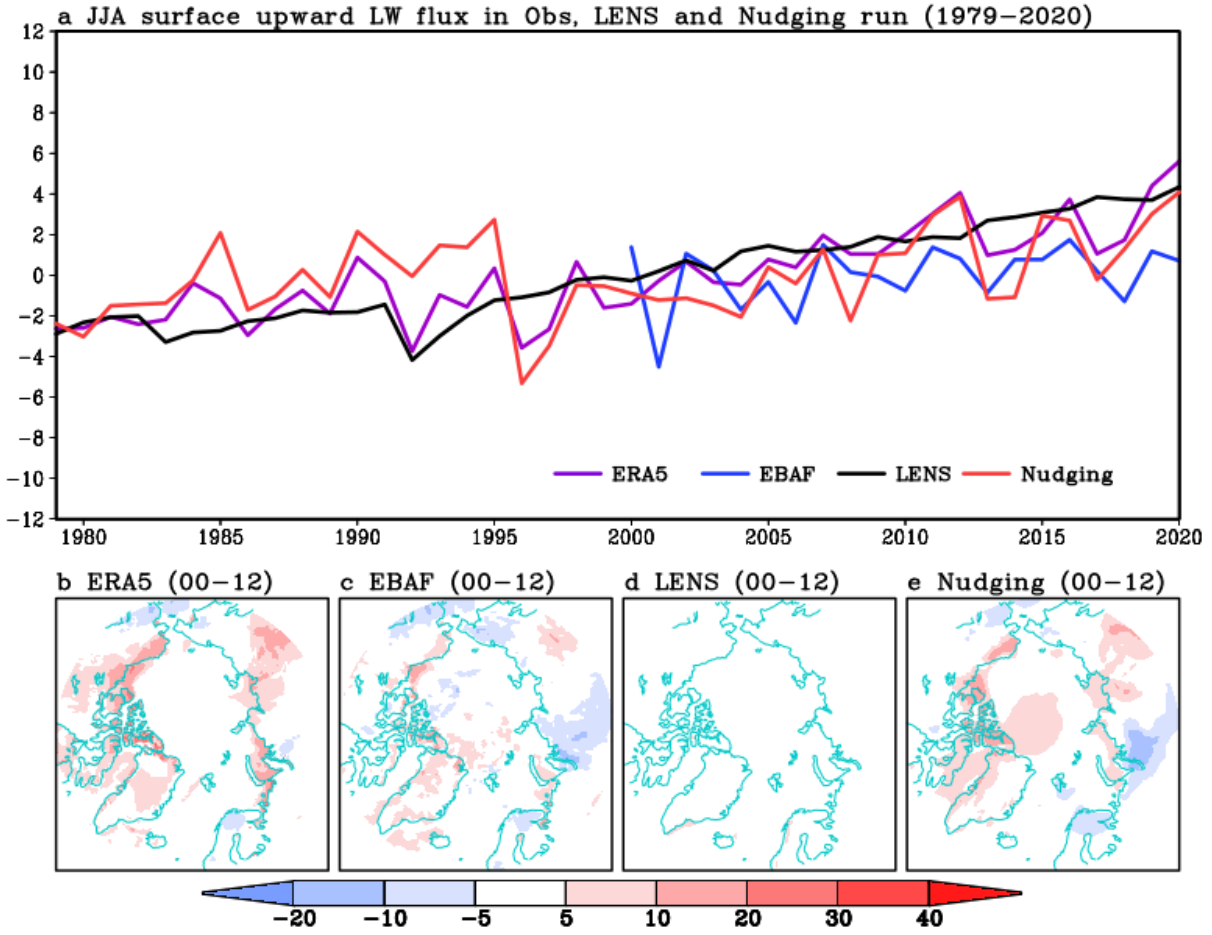
Supplementary Fig. 2: Linear trends of different type melting processes (shading, m/month/decade) from June to September derived from 13 years (2000-2012) of the 40-member mean of CESM-LENS.



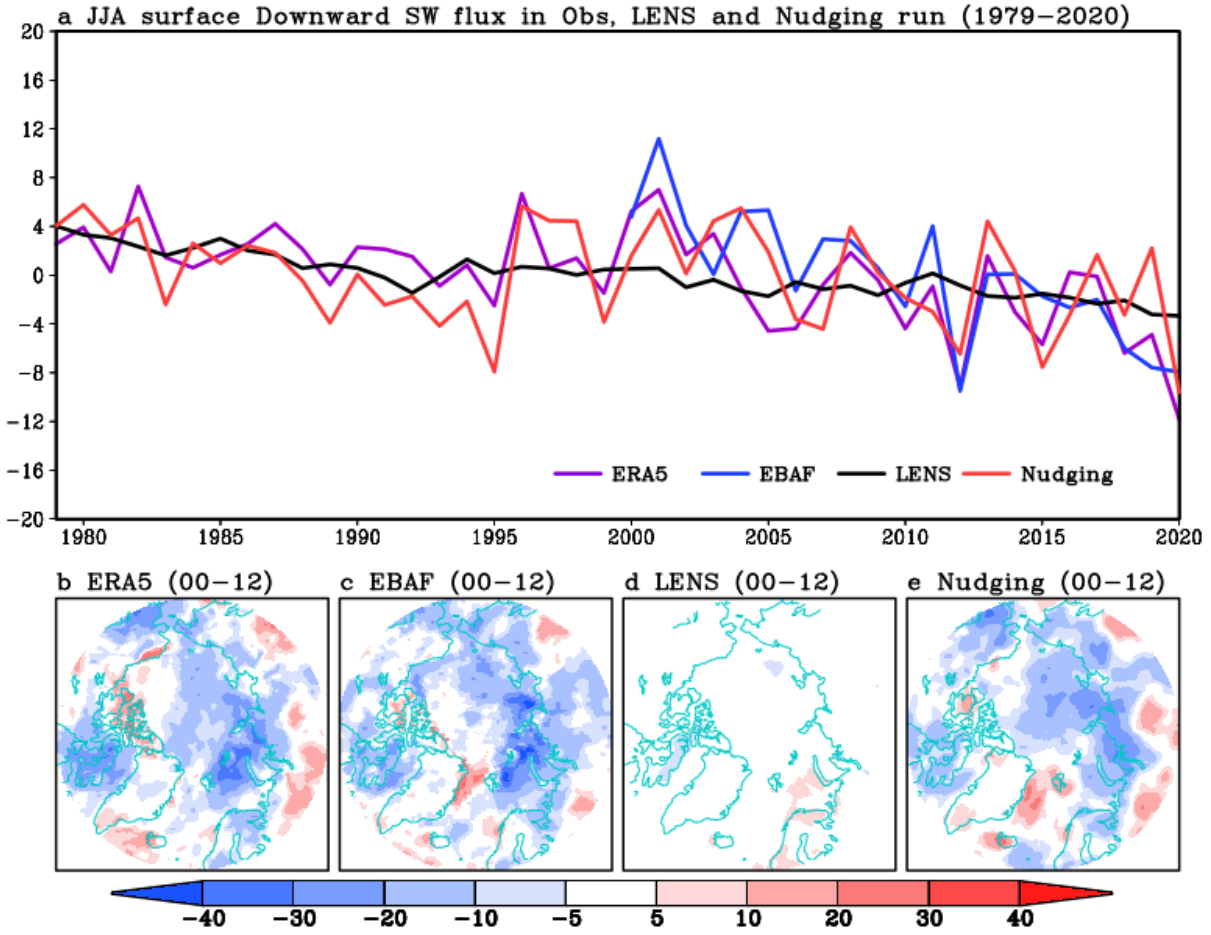
Supplementary Fig. 3: Linear trends of volume change during JJAS due to (a) the combined effect (m/decade) of thermodynamics and dynamics and (b&c) their respective contributions (m/decade) derived from 13 years (2000-2012) of the 40-member mean of CESM-LENS.



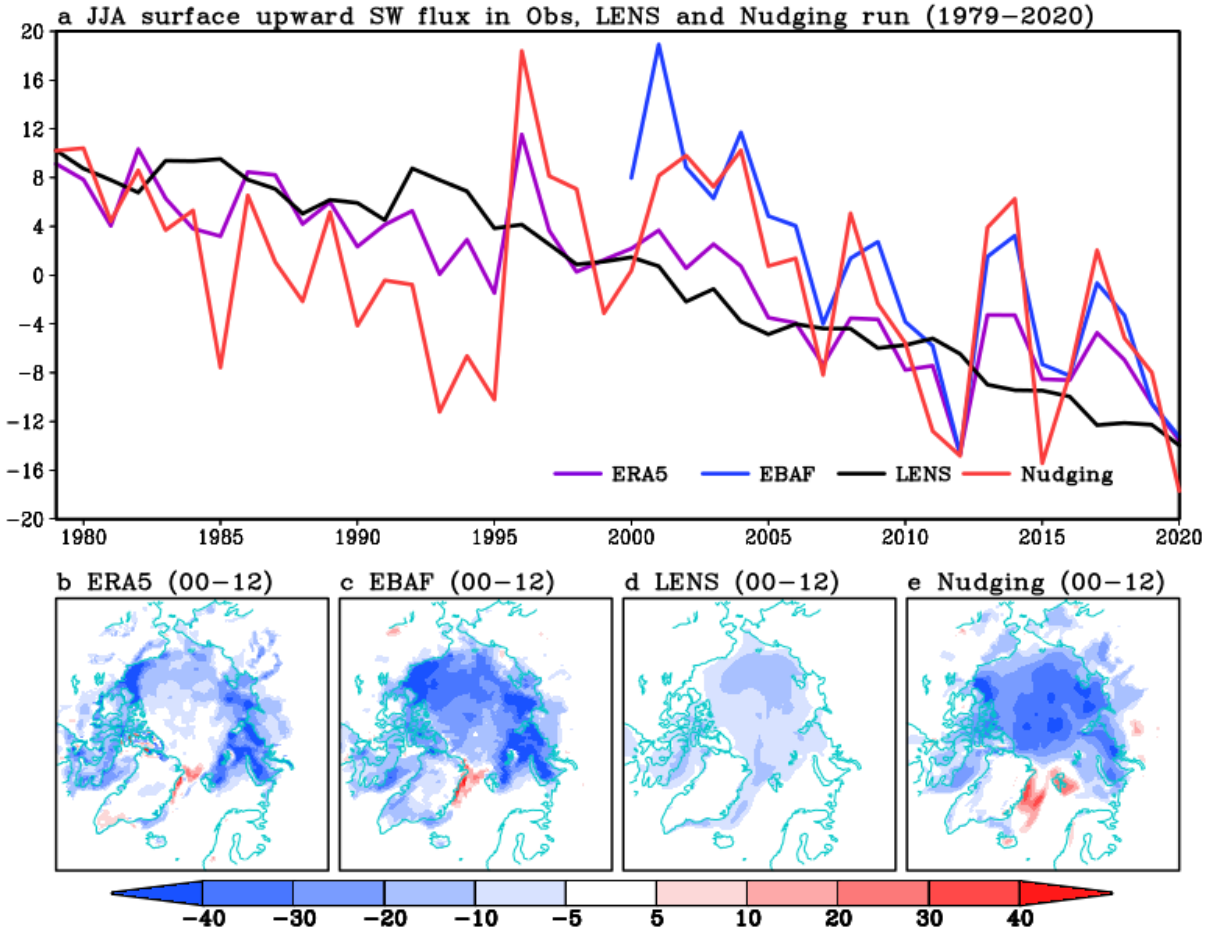
Supplementary Fig. 4. The same as Fig. 8 but for anomalous downwelling LW at the surface. Positive (downward) value indicates that the surface gains heat.



Supplementary Fig. 5. The same as Fig. 8 but for anomalous upwelling LW at the surface. Positive (upward) value indicates that the surface loses heat.



Supplementary Fig. 6. The same as Fig. 8 but for anomalous downwelling SW at the surface. Positive (downward) value indicates that the surface gains heat.



Supplementary Fig. 7. The same as Fig. 8 but for anomalous reflected SW at the surface. Positive (upward) value indicates that the surface loses heat.