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Configuration and evaluation of a global unstructured mesh atmospheric model (GRIST-A20.9) based on the variable-resolution approach

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Table S1 A list of typical values of reference length and hyperviscosity coefficient.

Reference length (m)	Reference hyperviscosity coefficient ($m^4.s^{-1}$)
120 000	2e14
60 000	2e13
40 000	8e12
30 000	2e12
15 000	2e11
7 500	2e10

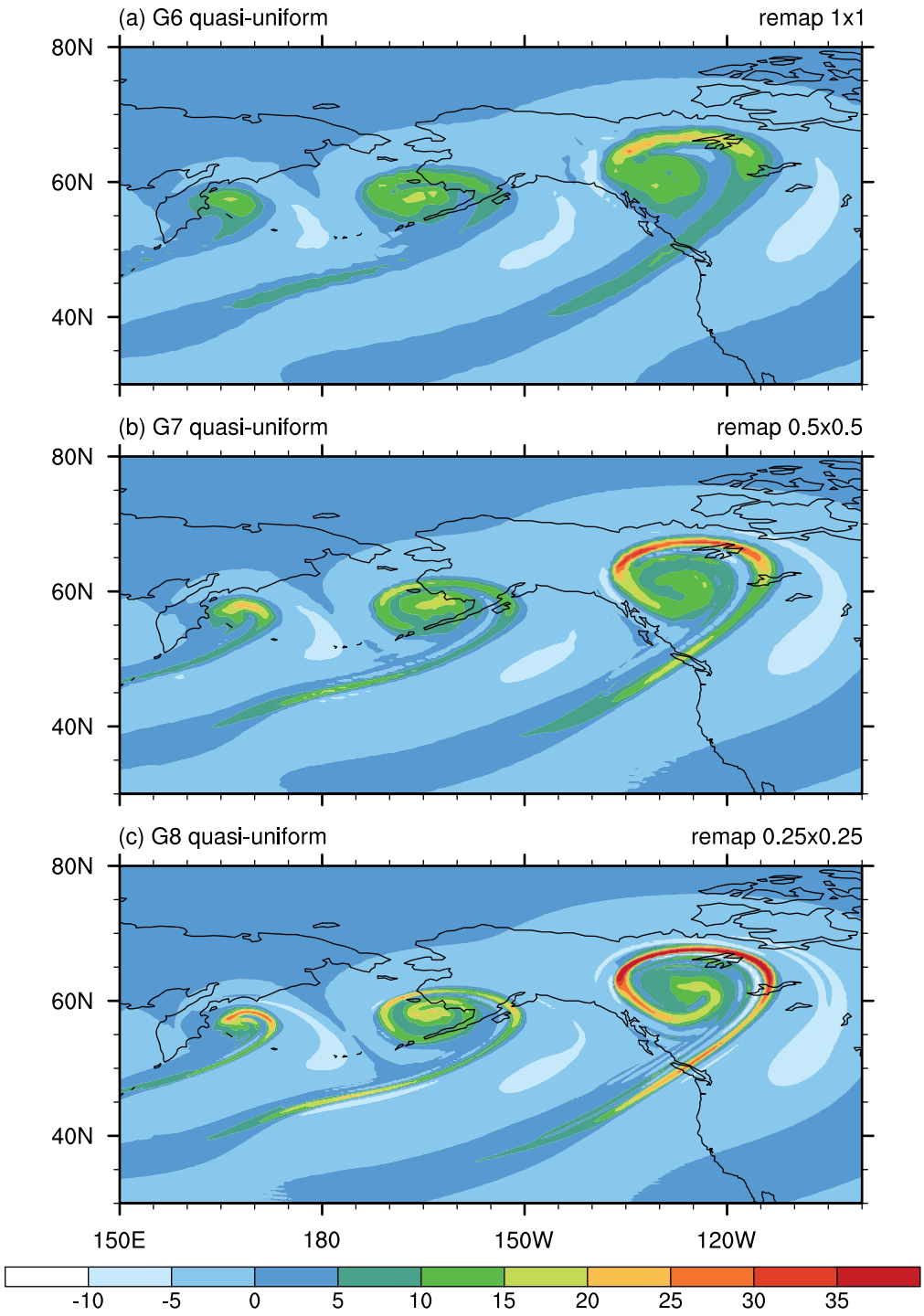

Figure S1: Same as Figure 3 (a)-(c) in the main text, but for the simulations from three QU runs remapped to regular latitude-longitude grids.

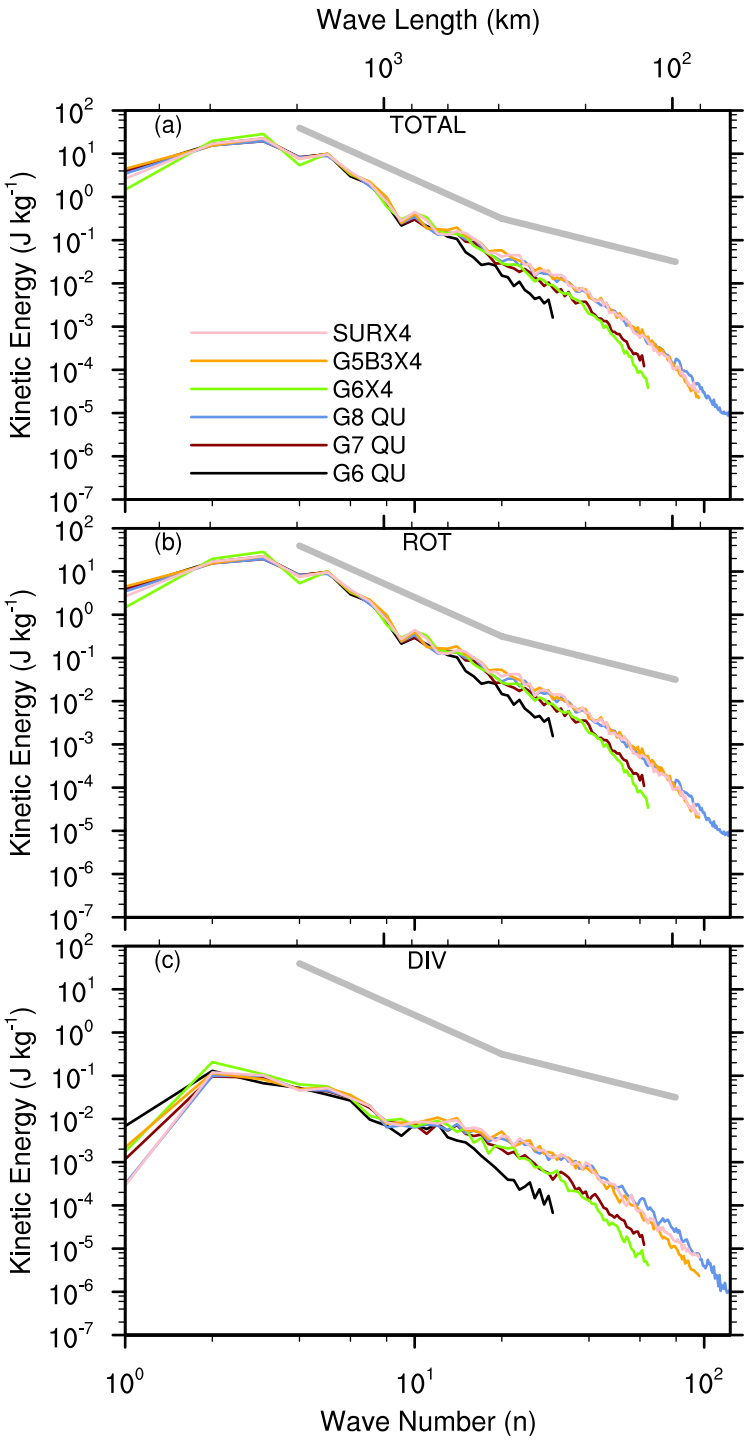

Figure S2: Same as Figure 4 (a)-(c) in the main text, but for the results from the hydrostatic core.

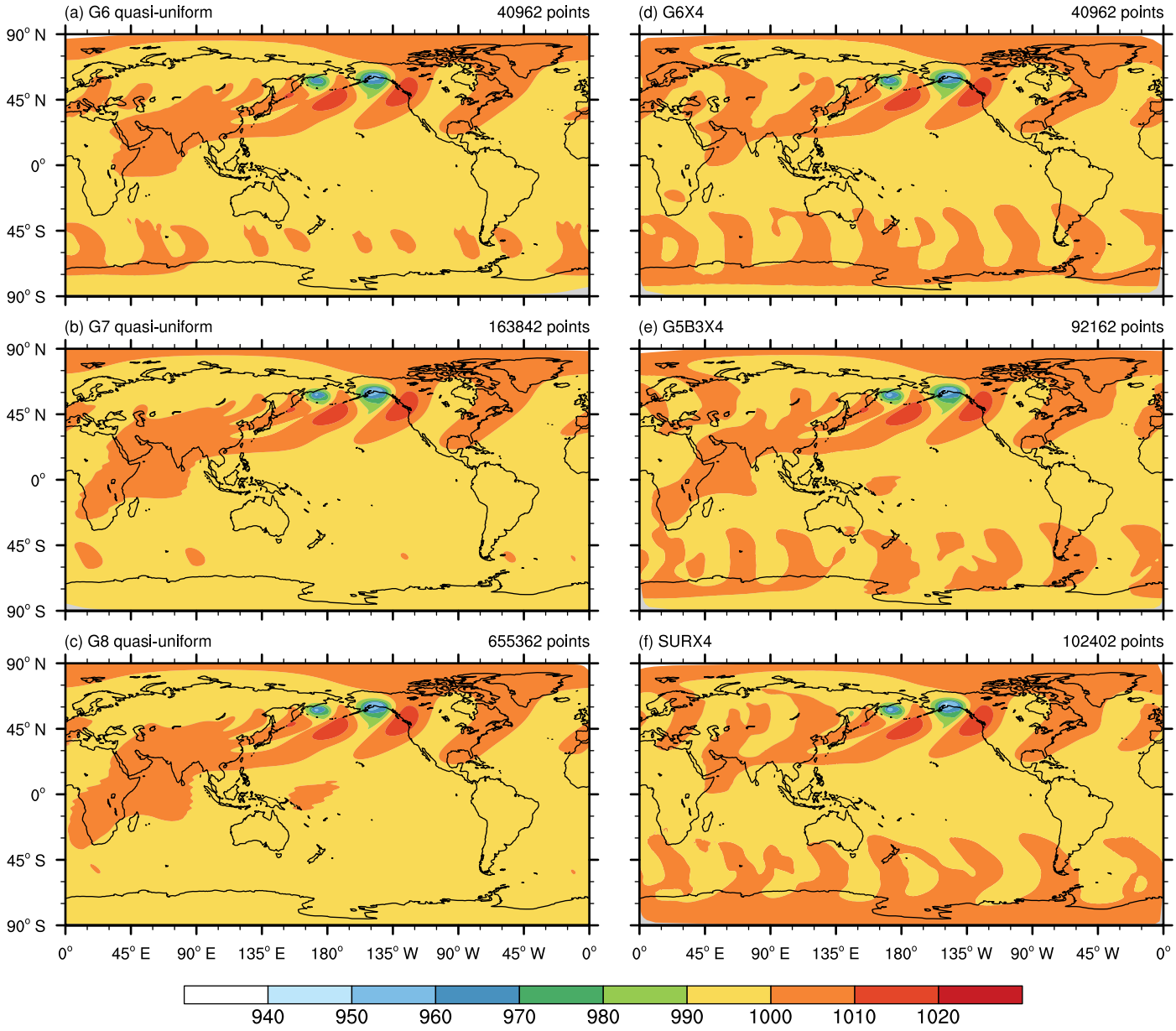

Figure S3: Baroclinic wave test: surface pressure (unit: hPa) at day 9 simulated by the nonhydrostatic model with (a-c) quasi-uniform and (d-f) variable-resolution meshes.

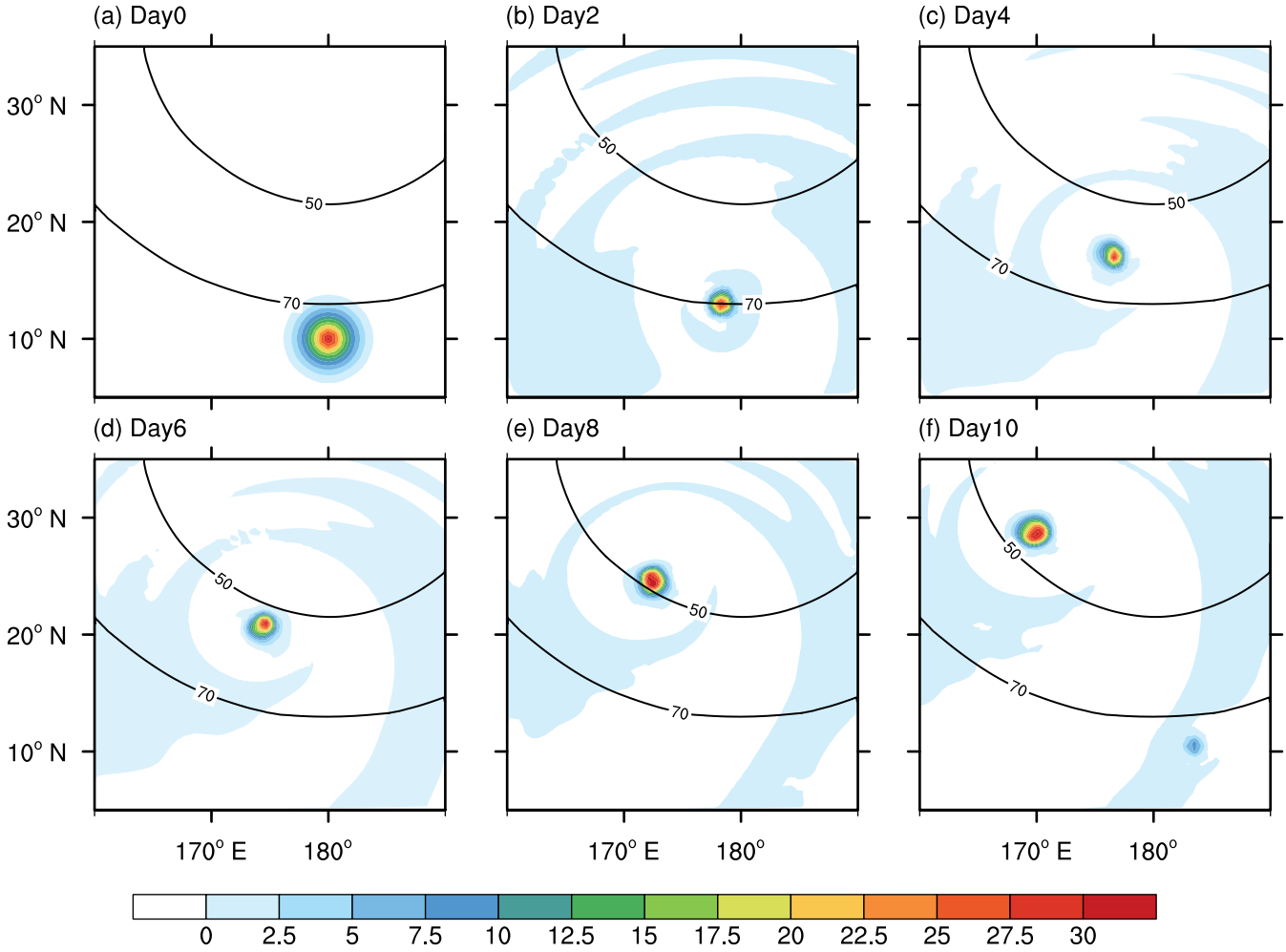

Figure S4: Corresponding to the control run in Figure 10 of the main text, while showing the relative vorticity field.

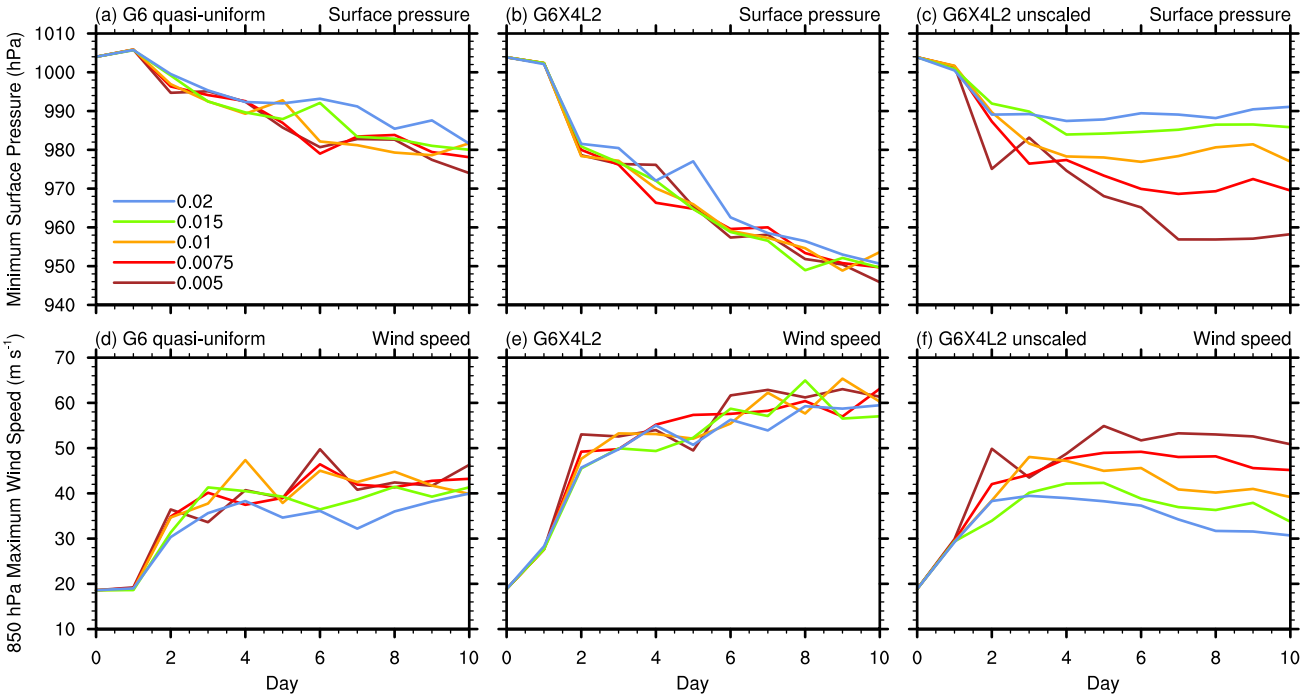

Figure S5: Tropical cyclone tests using simple physics: varying the square of the Smagorinsky coefficient in G6, G6X4L2, and an unscaled Smagorinsky formulation in G6X4L2. (a)-(c) minimum surface pressure (hPa), (d)-(f) maximum wind speed at 850 hPa. Hyperdiffusion is activated for two VR groups but not for the QU group.