Supplemental materials

Fig. S.1 shows the sea level and temperature forcing for the coupled model simulations (van de Wal et al., 2011). This forcing is also used in previous simulations of de Boer et al. (2013).

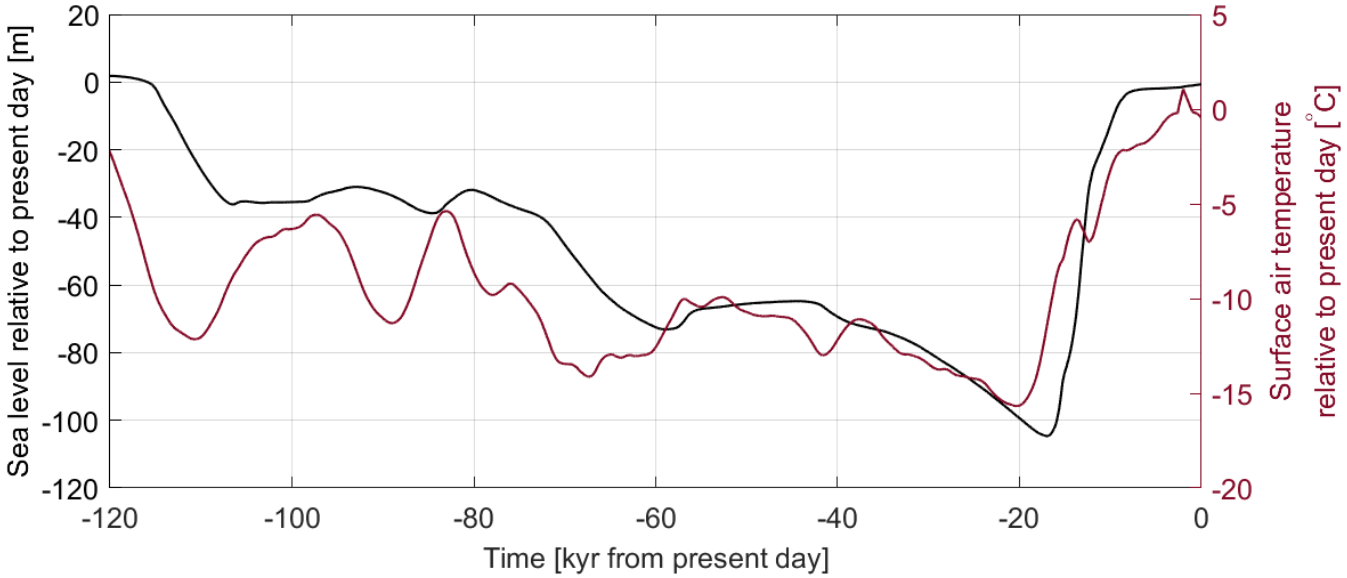

Figure S.1: Atmospheric temperature (black) and eustatic sea level relative to present-day (red). Both are shown over time, starting 120 kyears before present. Data from Laskar et al. (2004).

Fig. S.2 shows the results of the tests performed to determine the resolution of the GIA model with the best trade-off between accuracy in deformation and the computation time. A 1D viscosity of 10^{20} Pa·s is used. The tests are performed using ice loading in the shape of a paraboloid of 1500 meter thick that is linearly applied to the GIA model over a time step of 1000 years. The near field resolution is varied between 15, 30, 55 and 70 km, shown on the horizontal axis, and the far field resolution is varied between 100 and 200 km, shown as dashed and solid lines respectively. For each test, we measured the computation time, shown on the left vertical axis, and we computed the maximum deformation of each simulation, shown on the right vertical axis. As expected, the dashed black line, referring to the runtime of the test with a far field resolution of 100 km, lies much higher than the solid black line, which refers to the runtime of the test with a far field resolution of 200 km. Following the red lines, the maximum difference in deformation with the coarsest resolution (70 km near field-200 km far field resolution) and the finest resolution is 11 cm (15 km near field-100 km far field resolution). However, the computation time is three times as long for the 30 km near field-100 km far field resolution compared to the 30 km near field-200 km far field resolution, while the difference with the higher resolution test is only 5 cm on a total deformation of 171 meter. Also, when considering far field resolution of 200 km, the near field resolution test of 15 km takes twice as long as the near field resolution test of 30 km

whereas the difference in deformation is only 2 cm over 1000 years. We therefore chose a far field resolution of 200 km and a near field resolution of 30 km.

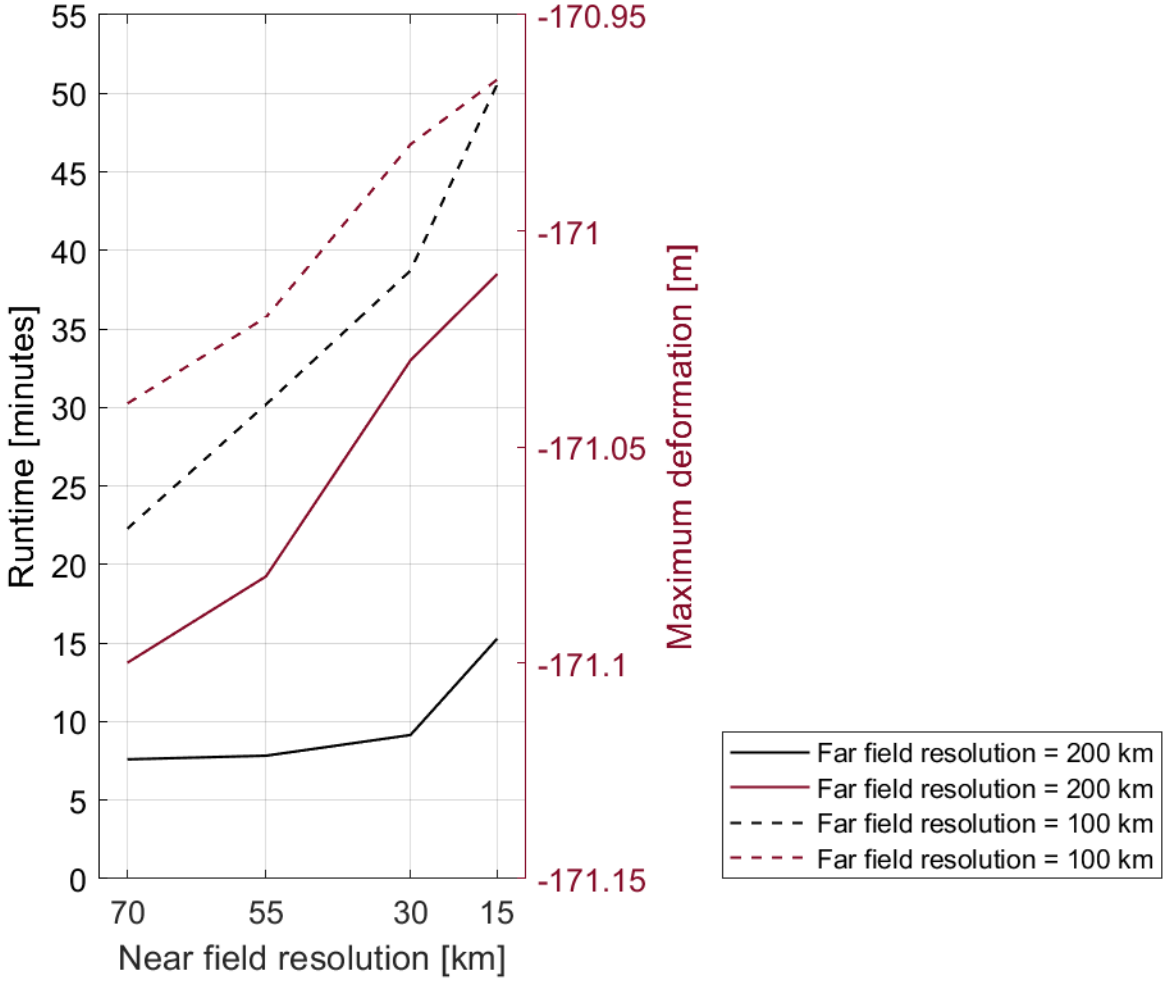

Figure S.2: The test simulations of 1000 years were conducted using a paraboloid ice load of 1500 meter thick. The x axis shows the near field resolution around Antarctica, the solid lines correspond to a far field resolution of 200 km and the dashed lines to a far field resolution of 100 km.

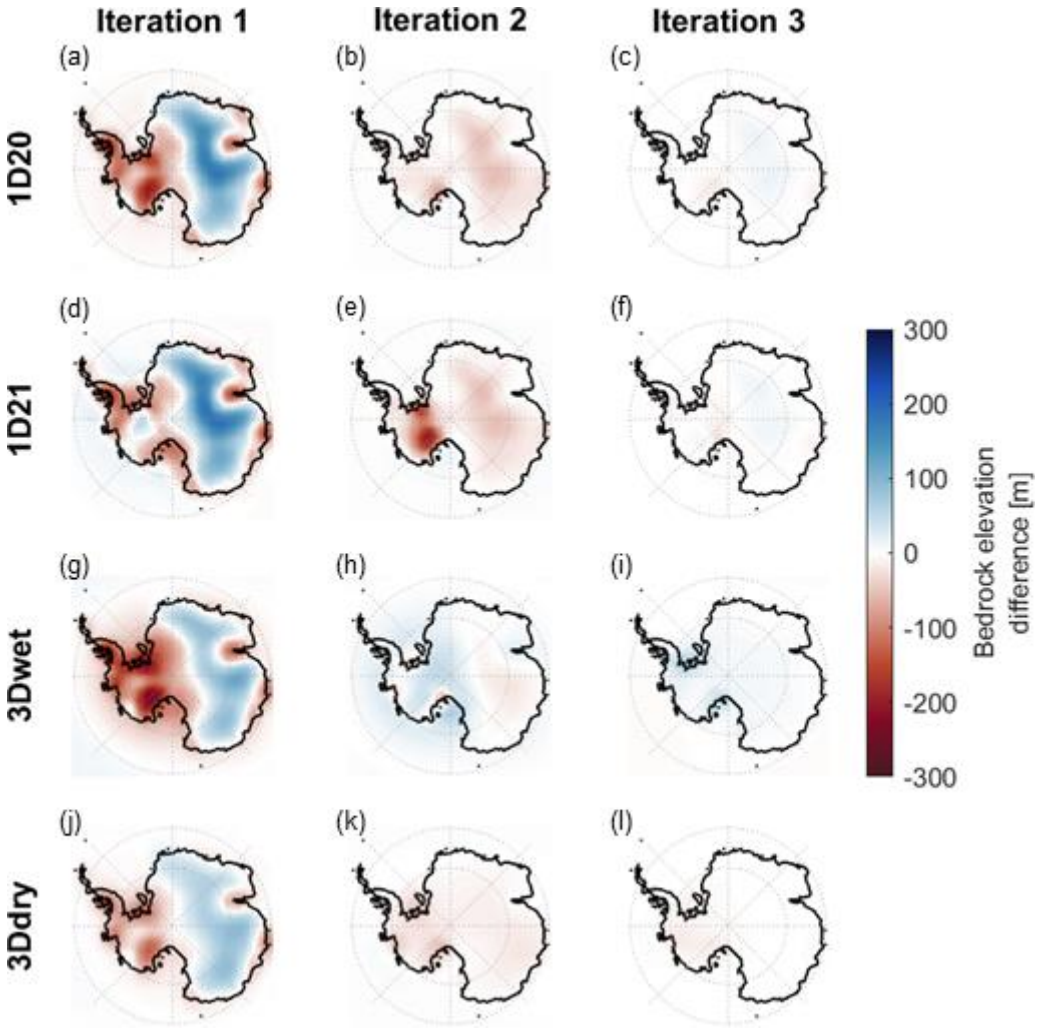

Figure S.3: Difference in bedrock elevation between topography at the final time step of the simulation and the observed present-day topography for the first three iterations over the glacial cycle using four different Earth structures (i.e. 1D20, 1D21, 3Dwet and 3Ddry).