Idealized Greenland and Antarctic ice-sheet melting events are examined using the Australian Climate Ocean Model (AusCOM). AusCOM consists of the U.S. Geophysical Fluid Dynamics Laboratory Modular Ocean Model (MOM4p1), the U.S. Los Alamos National Laboratory CICE4 sea-ice model, and the French CERFACS OASIS3.2.5 coupling system. This study uses real freshwater fluxes at the ocean surface to simulate ice-sheet melting events, leading to explicit sea level rise in the model's free-surface, rather than using virtual salt-fluxes as in previous studies. All regions of the global ocean experience a significant barotropic sea-level rise (>0.1mm) within 8-9 days after an initial pulse of freshwater of 0.1 Sv. In both mass (non-Boussinesq) and volume (Boussinesq) conserving vertical coordinate systems, the World Ocean sea level rises by 7.5 (8.5) mm/yr and 8 (9) mm/yr for Greenland (Antarctica) in the two systems, respectively. These results are dynamically somewhat trivial, but for the purposes of climate adaption, such as in low lying coastal and island regions, it is critical that the barotropic signal is appropriately represented as it leads to a near immediate global sea level rise from ice-sheet contributions, rather than decadal delays as argued in previous publications. The barotropic response is absent in ocean models that represent melt events as virtual salt fluxes; such models are only able to capture the decadal to multi-decadal time-scale baroclinic response, independent of the vertical coordinate system used.