5. AMOC

The AMOC streamfunction can be decomposed into three dynamical components: the external mode, the geostrophic shear (or thermal wind), and the wind-driven Ekman transport

\[
\psi(c) = \psi_{GC}(c) + \psi_{FS}(c) + \psi_{KE}(c)
\]

where \(\psi_{GC}(c)\) can be calculated from the zonal difference in coastal densities along the North Atlantic (light gray shading in Fig. 3). \(Hirschi\) and \(Marotzke\), 2007). This methodology is the base of the current in-situ AMOC monitoring (e.g., \(Kanzow\) et al. 2007). In the last millennium simulation, the thermal-wind component reproduces well the spatial pattern of the simulated AMOC (Fig. 7, right) and very well its temporal variability above decadal time scales (Fig. 8, below). The other two terms play a minor role (not shown).

Fig. 7 (right) For the period 1000–1990 CE (a) AMOC (in Sv) and (b–c) thermal-wind transports, both calculated from zonal differences in coastal densities but applying different corrections to ensure mass conservation (Hirschi and Marotzke, 2007 for further details).