We show evidence that stratospheric-troposphere interaction is important for accurate climate model simulation of surface climate anomalies on seasonal to centennial timescales. On seasonal timescales the occurrence of rapid deceleration of stratospheric winds during sudden warmings appears to affect the NAO/AO and associated surface climate anomalies. Low frequency variability from ENSO and the QBO are also associated with NAO-like patterns in the extratropics and there is evidence that the stratosphere is a key component of these teleconnections. On decadal timescales, changes in the extratropical stratosphere are strongly coupled to surface decadal changes. All of these connections apply mainly in Winter when the stratosphere is at its most dynamically active. On centennial timescales, we show how changes in stratospheric circulation could play a role in future climate change in the extratropics through an additional shift in the tropospheric circulation. The changes are consistent with changes in stratospheric winds inducing a change in the baroclinic eddy growth rate across the depth of the troposphere and an equatorward shift of the tropospheric storm tracks. Using the Atlantic storm track as an example, we show how this can double the predicted increase in extreme winter rainfall over Western and Central Europe compared to climate projections which do not properly account for stratospheric processes.