Supplements: The historical climate trend resulted in changed convective transport patterns in model simulations

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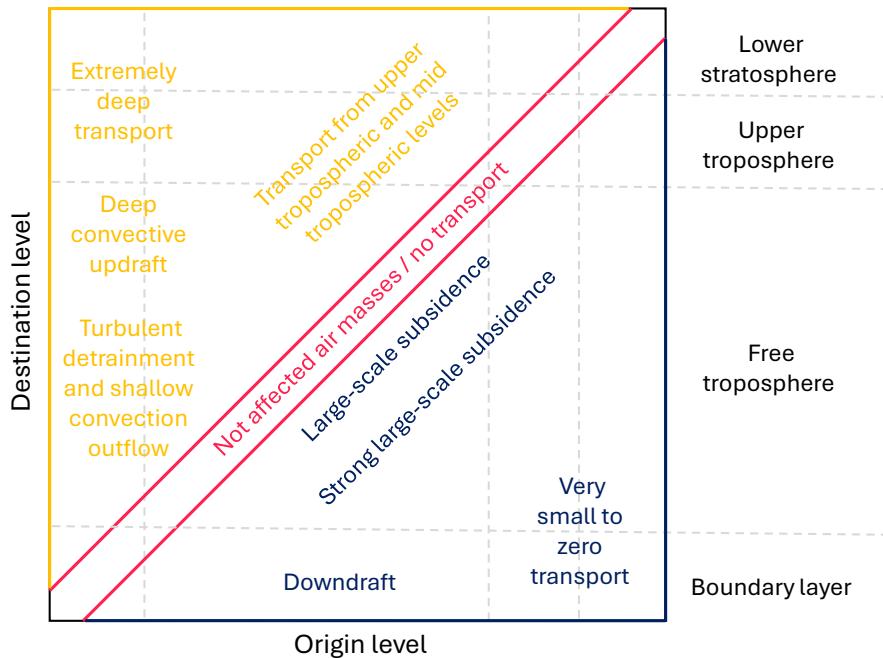
Figure S1: Illustration of the Convective Exchange Matrix. This sketch indicates with which processes certain ranges of the convective exchange matrix are related. Yellow denotes upward processes, red the main diagonal and blue the downward motion. This illustration is based on the interpretation for tropical convection. In the mid-latitudes, it must be taken into account for the interpretation that the tropopause height is lower.
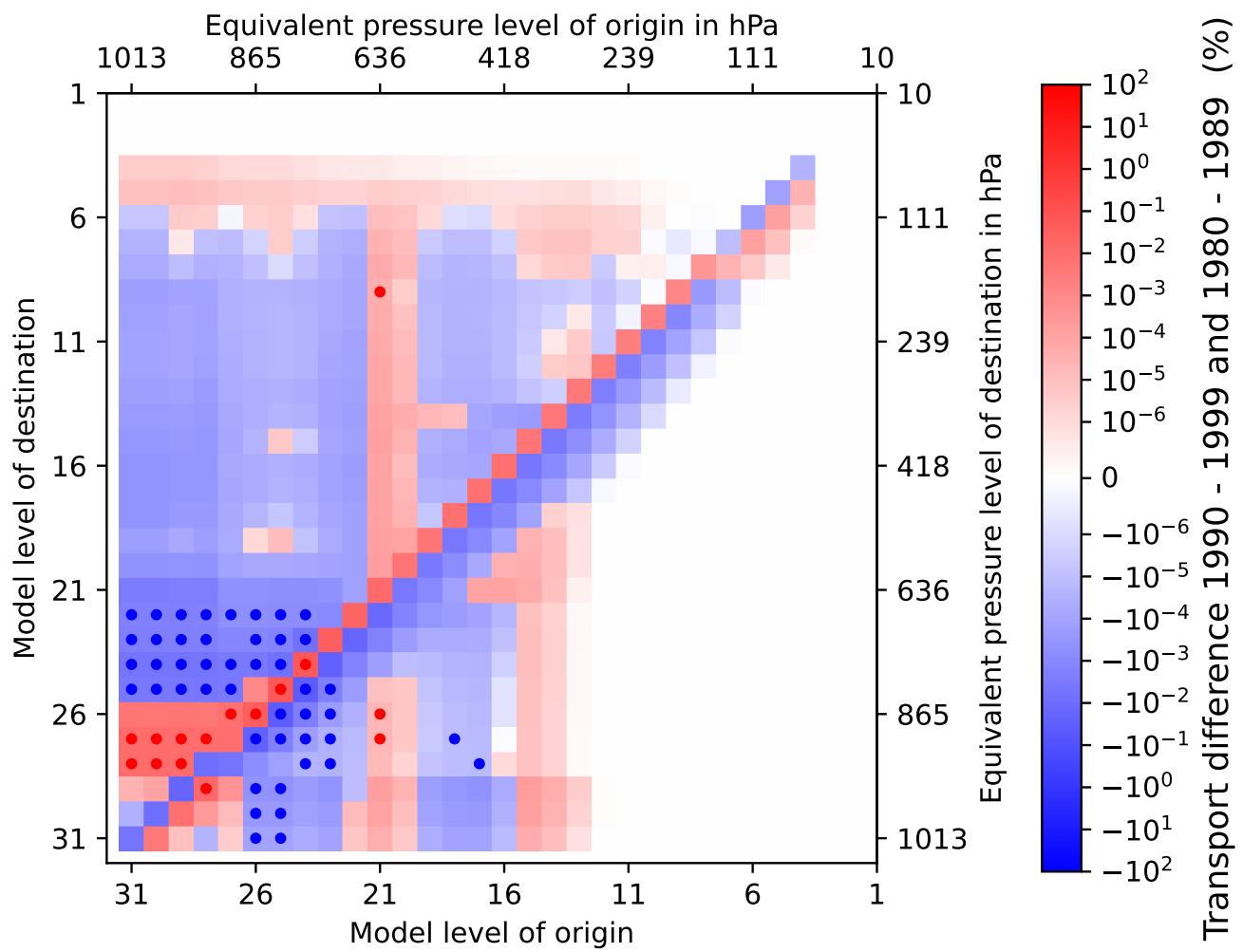
Figure S2: Changes in the convective mean transport between 60°S and 60°N. The temporal (ten year) and global (area weighted) convective exchange matrix is compared form 1990 to 1999 and from 1980 to 1989. Red colours denote that the values were higher in the period 1990 to 1999 and blue boxes show that the entry in the convective exchange matrix was higher from 1980 to 1989. A dot in a box indicates statistical significance. A two sided student t-test was used with a significance threshold of 1% for every side of the t-distribution.
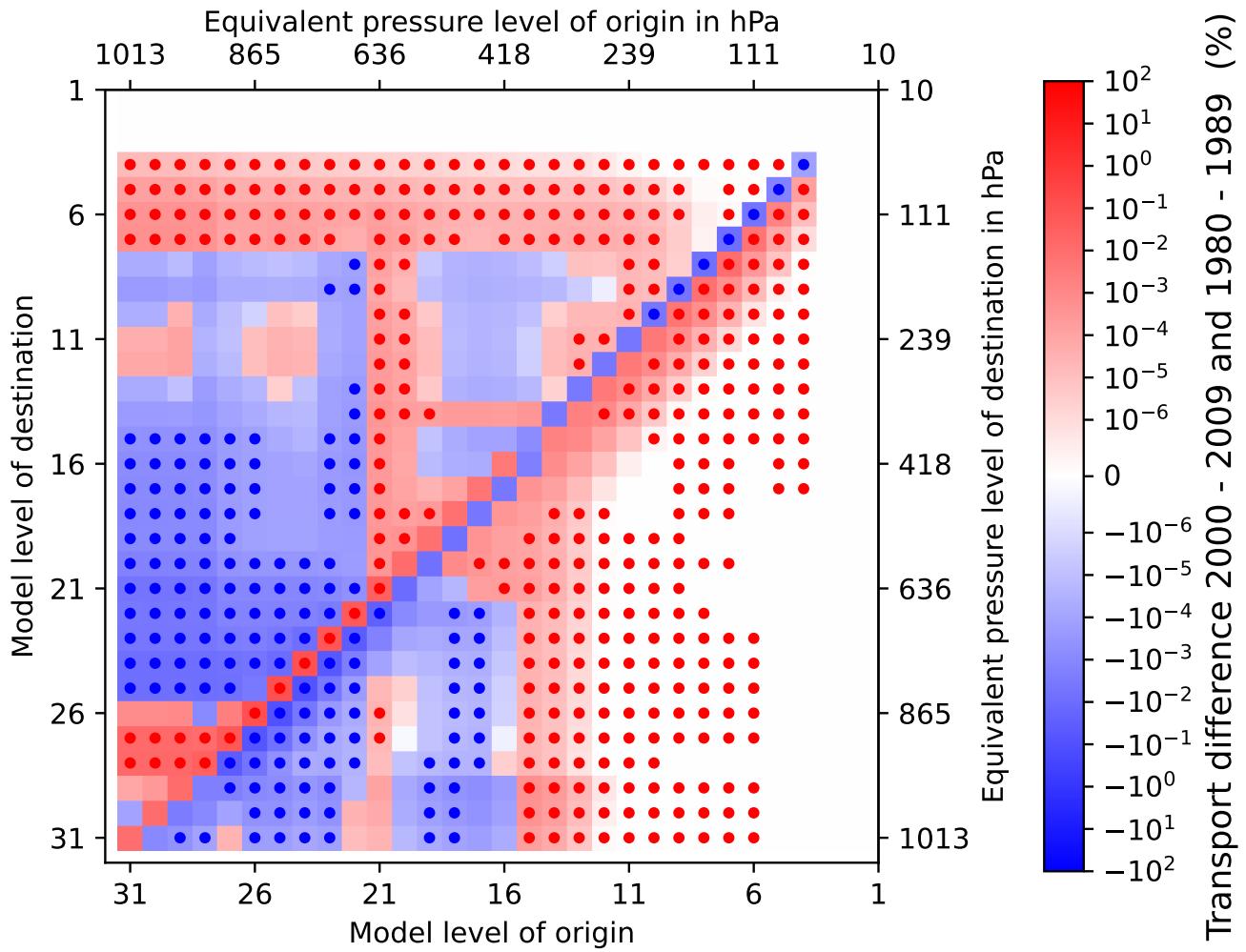
Figure S3: Changes in the convective mean transport between 60°S and 60°N. The temporal (ten year) and global (area weighted) convective exchange matrix is compared form 2000 to 2009 and from 1980 to 1989. Red colours denote that the values were higher in the period 2000 to 2009 and blue boxes show that the entry in the convective exchange matrix was higher from 1980 to 1989. A dot in a box indicates statistical significance. A two sided student t-test was used with a significance threshold of 1% for every side of the t-distribution.
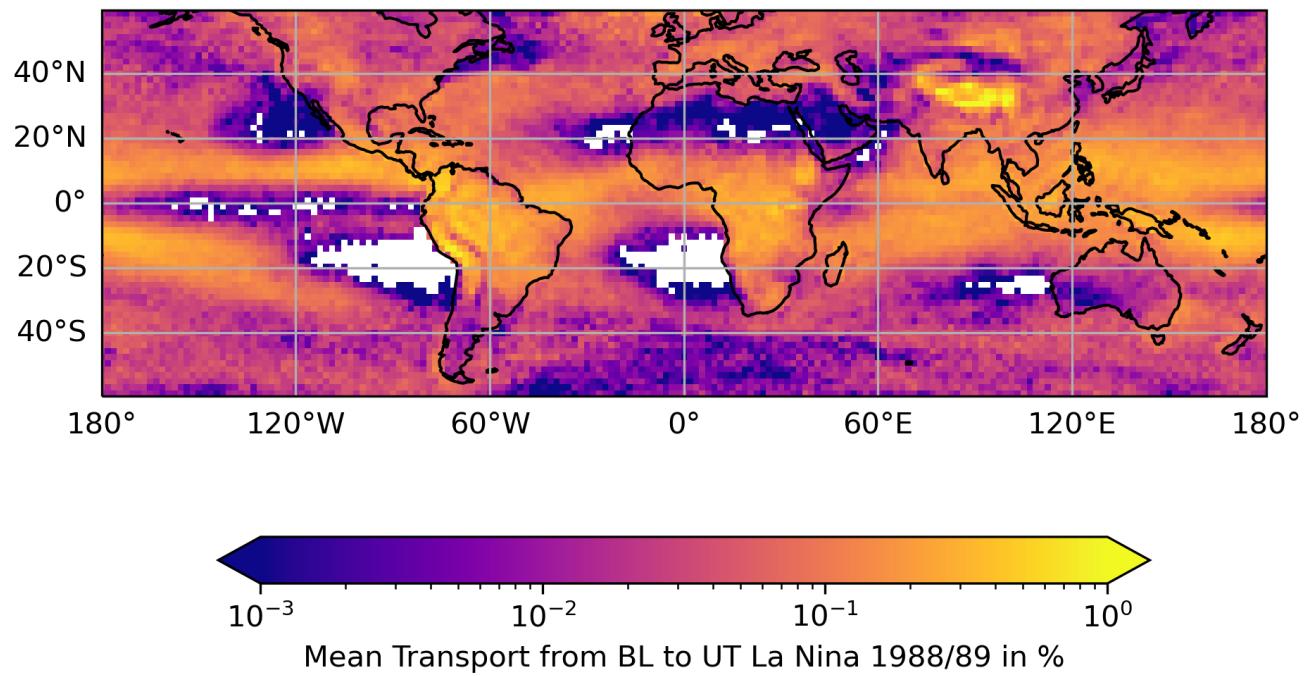
Figure S4: La Niña event 1988/89 convective mean transport from the planetary boundary layer height to upper troposphere within 12 min. The upper troposphere is defined as the region between the tropopause and the pressure height of tropopause plus 150 hPa.
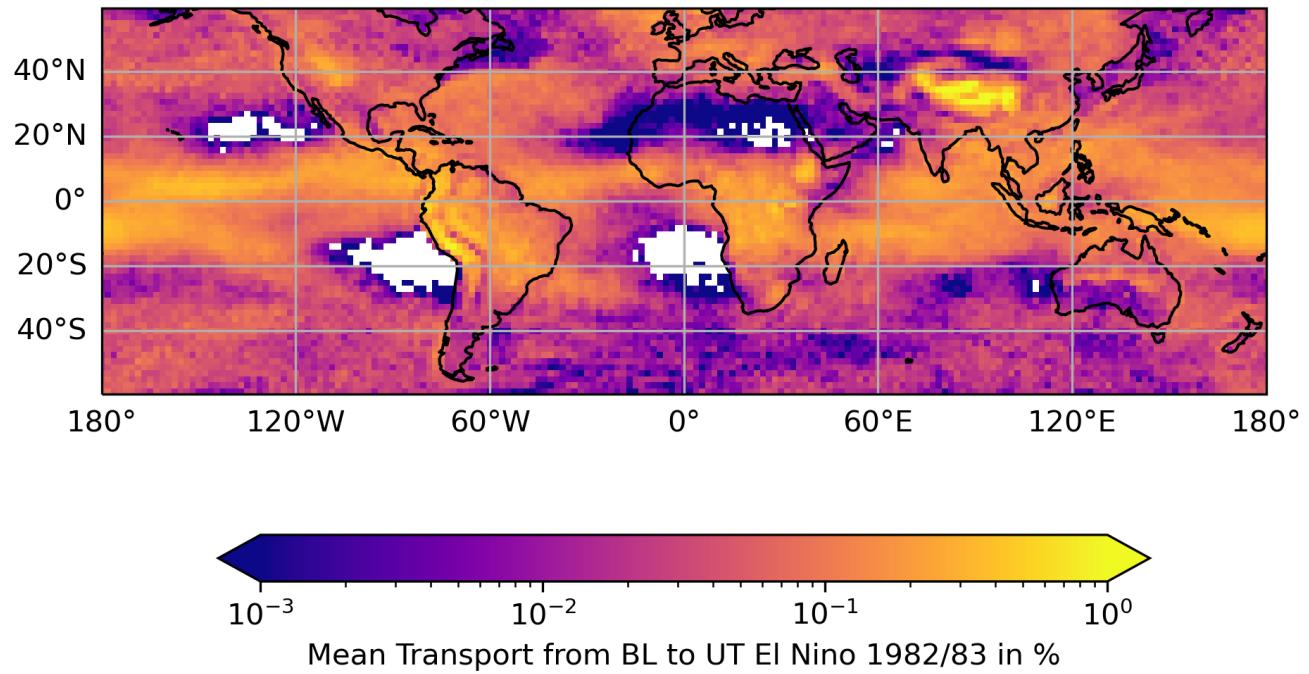
Figure S5: El Niño event 1982/83 convective mean transport from the planetary boundary layer height to upper troposphere within 12 min. The upper troposphere is defined as the region between the tropopause and the pressure height of tropopause plus 150 hPa.