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Supplement of

The seasonal relationship between intraseasonal tropical variability and ENSO in CMIP5

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Supplementary material: Analysis of the decadal modulation of the seasonal ENSO/ITV relationship

We provide here material for assessing the decadal modulation of the ENSO/ITV relationship both in the Reanalysis data (Figure S1) and in one of the model that exhibits some skill in simulating realistically the ITV (Figure S2). The method consists in calculating the lag correlation between an index of the ITV activity and the ENSO indices at the peak ENSO phase (approximated to Jan (0)) over 11-year running time windows. This method follows Gushchina and Dewitte (2018).

In order to derive the indices of ITV in the model, we use the same regions than in the Reanalysis data for averaging the MJO and ER running variance (Gushchina and Dewitte 2011): western Pacific (120°-180°E; 5°S-5°N) for MJO and central Pacific (140°E-160°W; 5°S-5°N) for Rossby waves. These indices are further referred as MJO and ER activity indices. We recognize that the maximum of ITV/ENSO relationship in the models may differ from the observations. However, we have checked that the results are not sensitive to slight shifts in the longitudinal boundaries of these regions.

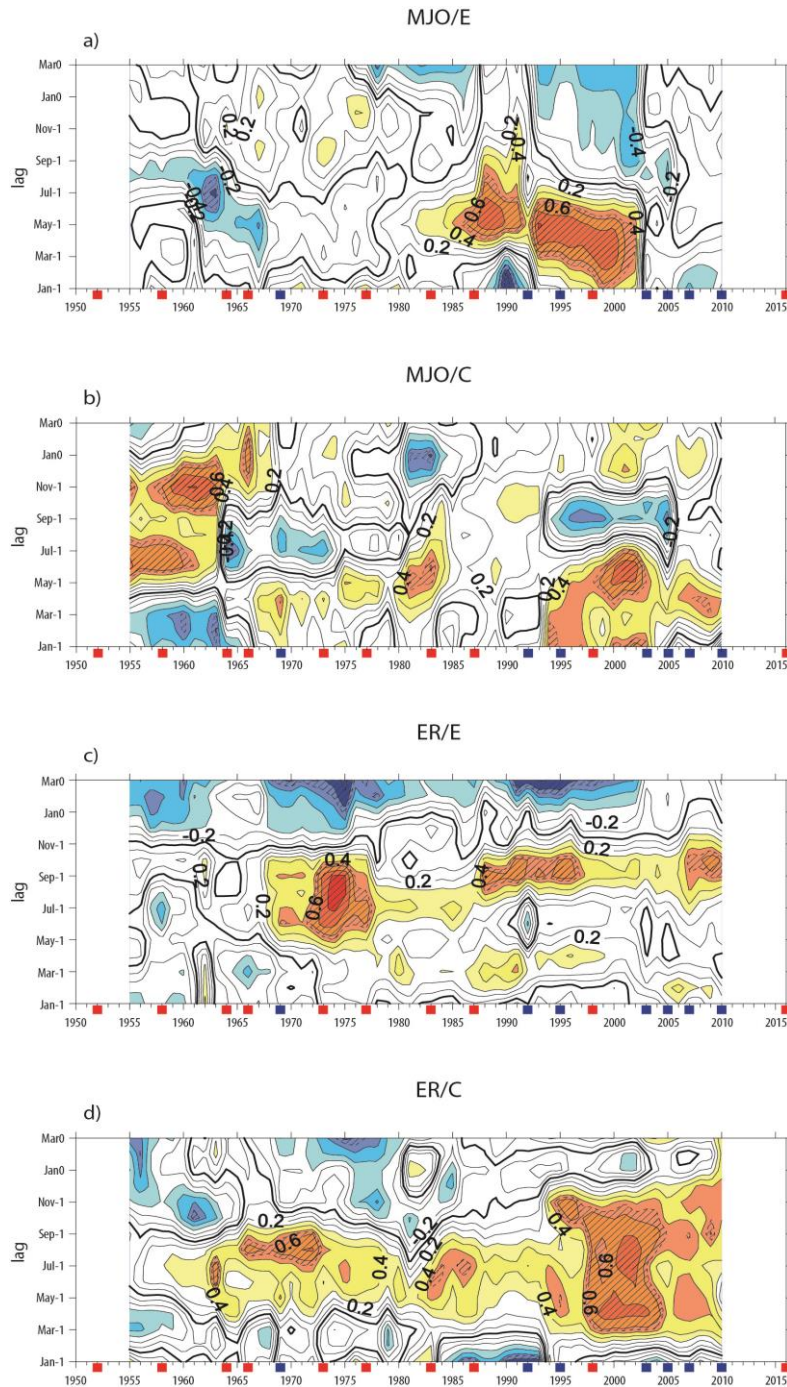


Figure S1: 11-year running mean of the lagged correlation between the MJO (a, b) and the ER (c, d) activity indices and the E (a, c) and C (b, d) indices in January (i.e. Jan(0) corresponding to the approximate calendar month of the El Niño peak). Contour interval is 0.1. Colored shading is for correlation values higher (smaller) than 0.3 (-0.3). Correlation significant at the 90% confidence level (based on Student's t-test) is hatched. The El Niño years are indicated on the time axis as squares with the blue (red) ones indicating the CP (EP) El Niño events, which provide the number of El Niño years involved in the statistics. For example the correlation coefficient at year 1985 is calculated over the period 1980-1990 and thus encompasses two CP El Niño events and the 1989 EP El Niño event. Data are from NCEP/NCAR Reanalysis. (Adapted from Gushchina and Dewitte (2018))

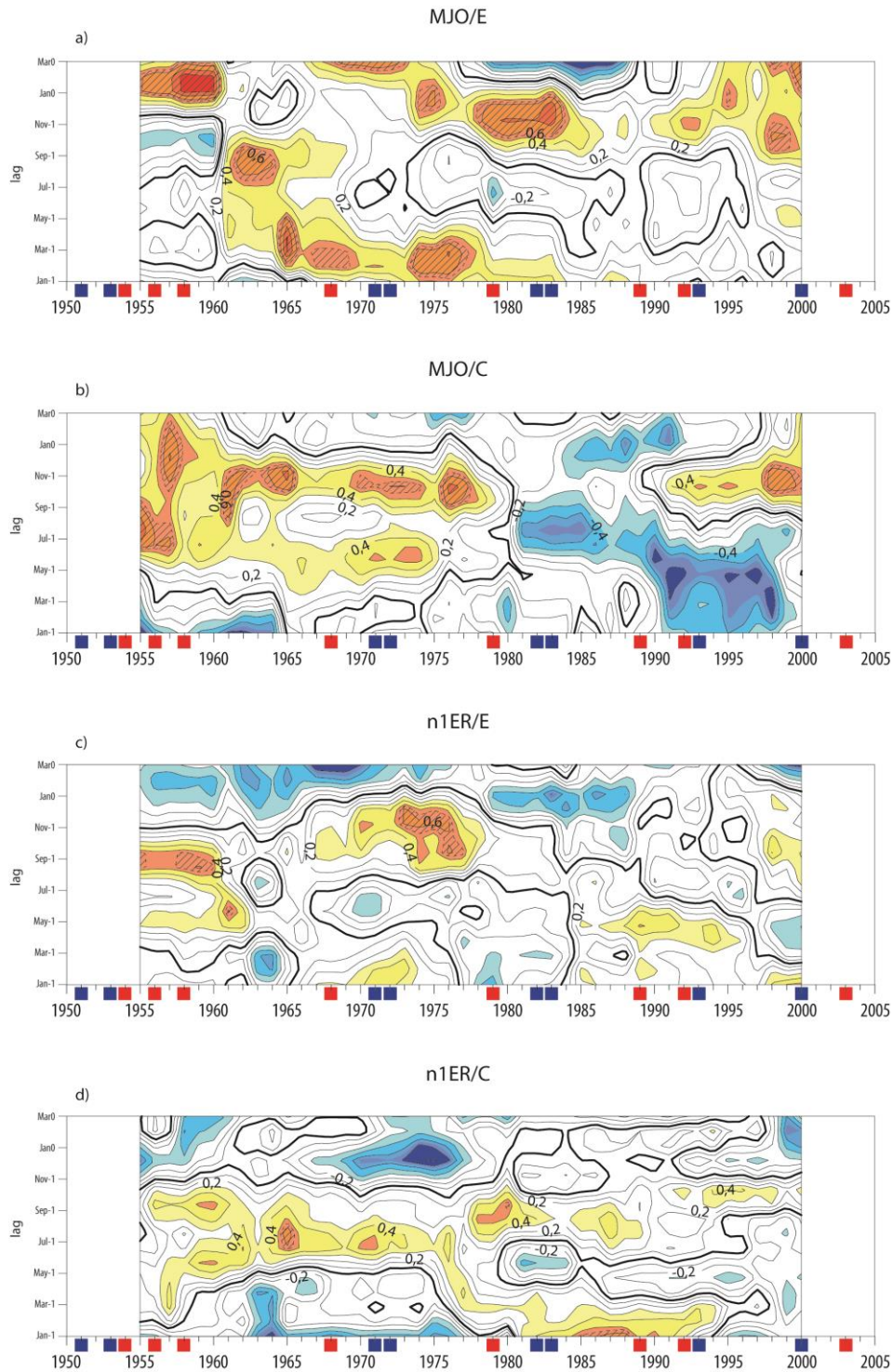


Figure S2: The same as Figure S1 but for the CMCC-CM model

Figure S2 clearly illustrates the low-frequency modulation of the ITV/ENSO relationship in this particular model with, for instance, the period 1961-1976, 1955-1978, 1955-1974 and 1955-1980 being characterized by a stronger MJO/E, MJO/C, ER/E and ER/C respectively relationship than over the other periods. Note that these periods do not necessarily correspond to the ones of the Reanalysis (see Table 5).

References:

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