We represent the quantities or in the response of the can be expected to feature much more Bódai (difference from the Fig. 3. (left) Time The Clim like climate change, while finite We, therefore, for the first time, study the leads typically to very significant false trends. Clearly, we cannot analyse observed data, because we have only one Earth realisation, but we use ensemble generated by two Earth System Models (ESM); see Fig. 1.

Methodology and Results
- We represent the Indian monsoon by the JJA total precipitation P over North India (the box spanned by (31° N, 76° E), (31° N, 88° E), (17° N, 76° E), (17° N, 88° E)), and the ENSO by the JJA average pressure difference \( p_{\text{diff}} \) between Tahiti and Darwin (or: the Nino 3.4 index \( T \) based on sea surface temperature). We define the teleconnection as the Pearson's correlation coefficient; e.g.,

\[
\tau = \frac{\langle (x_i - \langle x \rangle)(y_i - \langle y \rangle) \rangle}{\sqrt{\langle (x_i - \langle x \rangle)^2 \rangle \langle (y_i - \langle y \rangle)^2 \rangle}}
\]

but we average over the ensemble members instead of time.

- Results for the forcings seen in Fig. 1 are shown in Fig. 2.

- Fig. 2. (left) ENSO-IM \((p_{\text{IM}}) vs \( E \)) teleconnection strength for different forcings and ESMs.

Table 1. (below) \( p \)-values of statistical tests to detect nonstationarity in the response of the ENSO-IM \((p_{\text{IM}}) vs \( E \)) teleconnection.

- We find (Table 1) that nonstationarity cannot be detected by detecting nonnormality of the marginal distribution via the KS tests \((p_{\text{KS}})\). The \( p \)-test \((p_{\text{pt12}})\) and the alternative MK test \((p_{\text{MK}})\), however, could detect nonstationarity in MPI-ESM-HE, but not in any other data set. This is surprising because the historical forcing is the weakest, and hints at the possibility that \( Q \) is not a dynamical forcing.

- Furthermore, further KS tests \((p_{\text{KS2}}) p_{\text{MK}}\) results not shown allow us to conclude that \( r \) increases from the first (1) to the second (2) half of the data set/XX century. This is a finding seemingly opposing the scientific consensus that the strength of the ENSO-IM teleconnection was decreasing in the XX century [12-16].

- We also confirm (Fig. 3) that temporal, as opposed to ensemble-wise, averaging in evaluating \( r \) leads typically to very significant false trends.

Robustness wrt. four factors
- Model: CESM, MPI-ESM (Table 1, Fig. 2)

CESM doesn’t even see much of a teleconnection, and shows no nonstationarity either even in the 20ªC.

- Time window for MK test (Fig. 4).

- Quantity to represent ENSO: SOL \((p_{\text{SOL}})\) or Nino3.4 (7) (Fig. 4).

Both seem to indicate a nonmonotonic nonstationarity, but there is a disagreement wrt. the timing of the change.

- Accounting for changes in patterns: via Canonical Corr’ Analysis (CCA).

The correlations and their (PC1) changes are stronger.