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Earth System Dynamics
Discussions

Interactive comment on "Tropical and mid-latitude teleconnections interacting with the Indian summer monsoon rainfall: A Theory-Guided Causal Effect Network approach" *by* Giorgia Di Capua et al.

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Short response to reviewer #1 We thank the anonymous reviewer for his/her comments and suggestions to improve the readability of the manuscript. We will modify the manuscript accordingly to the reviewer's suggestions and we provide here a short response to the main comments together with how we intend to address them in the revised version of the manuscript. 1 - The manuscript is really hard to read because of too many and complex acronyms. I think the authors need to find a way to simplify the reading using nick-names for the tools applied instead of rude acronyms difficult

to remember; Answer - We thank the reviewer for his/her feedback on the readability of the main text. We will work to simplify the acronyms used. 2 - The list of the new findings using these tools should be clearly highlighted in the manuscript, as well as the different weights of the different precursors considered. These capabilities of the tools used are claimed also in the abstract but the results are not clearly extrapolated and summarized in the text; Answer - The new findings of this work are composed of two aspects: first, we prove the hypothesis from D&W2005 from a causal point of view, showing that the expected relationships between the analyzed variables are detected in a causal framework. Second, we quantify the relative importance of the mid-latitude circulation (via CGTI and EOF2), the internal dynamics of the convection cell and Madden and Julia oscillation (MJO) on the Indian summer monsoon (ISM) subseasonal variability (see Figure 7 and table S1 in the SI). We agree that these finding are not as clearly highlighted in the manuscript as it could be. We will rewrite the introduction and discussion to ensure that these main findings are clearly communicated. 3 - Fig 2e,f: how do you explain the propagation in t2m and precipitation? What about winds? Answer - Figures 2e,f do not show the propagation of the signal but only help the reader to visualize the T2m and rainfall anomalies that are linked to high and low circumglobal teleconnection pattern index (CGTI) states. We will clarify this information in the main text. We thank the reviewer for his/her suggestion to show winds anomalies and we will provide the related plot in the revised version of the manuscript. 4 - Figs 3,5,6 and 7: in these type of figures arrows indicate the intensity of the beta coefficients, while the color of the circle the auto-correlations: how are these information combined in interpreting the results? Also what is the real meaning of the intensity of the beta coefficient. It seems in most of the case quite small, thus indicating a very small relationship (?), and it is large only in the case of linking W1 to MT rain (Fig 7) and in MJO2 linking W1 (Fig 7). How are these measures able to weight for the different factors influencing MT rainfall? Answer - We thank the reviewer for pointing out that the definition of beta coefficient is hard to find in the text. Moreover, both terms "beta coefficient" and "path coefficient" refer to the same variable, creating additional confusion. In the revised ver-

sion of the manuscript, we will move the definition of path coefficient (currently found in lines 266-269) to the method section, and stick to that wording throughout. For clarity, a path coefficient of 0.5 means that a change in the causal parent (e.g. W1) of 1 standard deviation corresponds to a change in 0.5 standard deviation in the response variable (e.g. the MT rainfall). It is correct that the path coefficient between W1 and MJO and the MT rainfall are largest with values of $\sim$0.5 but the path coefficients of the other links are of the same order of magnitude ($\sim$0.2-3) and thus cannot be neglected.

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