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Earth System Dynamics
Discussions

Interactive comment on "Observationally based analysis of land–atmosphere coupling" *by* F. Catalano et al.

Anonymous Referee #2

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The manuscript "Observationally based analysis of land–atmosphere coupling" by Catalano et al. has analysed the covariation between satellite derived observationally based monthly precipitation, soil moisture, evapotranspiration and leaf area index using the coupled manifold technique, which considers both the local and remote forcing of one field to the other. This generalized linear method is used to assess the reciprocal forcing of seasonal mean land surface variables and precipitation anomalies over land.

This is an interesting study providing new insights on the understanding of the land surface atmosphere feedbacks by quantifying the linear coupling between the land surface variables and the climate. The finding that 19% of the inter-annual variability of the precipitation over continental areas is forced by the SM variation is useful new

information. The analysis also reveals that the dominant components of the SM forced precipitation variability are the volcanic eruptions and ENSO.

However the finding using the stratospheric AOD estimates that the aerosol emitted during the volcanic eruptions has the effect of reducing the intensity of precipitation over areas of wet climate is not well supported by the cited references, for example, the statement on page 1948, line 6 referring to Alessandri et al., (2012) and the discussion in page 1948, line 6 "the negative signal over India may indicate a suppression of the monsoon linked to the effects of the aerosol released during major eruptions according to Iles et al. (2013)" contradicts Iles et al. finding that HadCM3 precipitation response to volcanic eruptions exhibit drying in monsoon regions except India. The finding that the second dominant component of the precipitation variability forced by SM indicates positive precipitation anomalies over South India related to the positive phase of ENSO also need to be clarified as most of the previous research has found reduced precipitation over India during ENSO years.

The data gaps in the satellite derived SM and LAI are replaced at many grid points with climatological values for applying the CM technique. Figure 1 shows that the seasonal cycle of the percentage of number of grid points replaced globally for SM ranges from 28 to 48%. It is suggested that a figure can be added with the grid point locations using climatological SM values marked so that how much the missing SM data has influenced the major findings of this study can be discussed and highlighted in the abstract.

Overall the paper is well written, structured and referenced. The abstract reflect the content of the paper and provide a clear and complete summary. I recommend its publication after the minor issues mentioned above are addressed.

Minor comments:

P1947;L13: Please provide details of the stratospheric AOD dataset with relevant references in the Dataset section.

P1948;L1 and P1949;L12: Replace “horizontal” with “spatial”.

P1948;L26: The description of the HadISST dataset may be moved to the Dataset section.

Interactive comment on Earth Syst. Dynam. Discuss., 6, 1939, 2015.