

Interactive comment on “Role of radiatively forced temperature changes in enhanced semi-arid warming over East Asia” by X. Guan et al.

Anonymous Referee #2

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This is an interesting study. The authors investigated the surface temperature change over East Asia using a new technique that can identify and separate the dynamically induced temperature (DIT) and radiatively forced temperature (RFT) changes. They show evidences that the DIT and RFT make 43.7 and 56.3% contributions to the SAT over East Asia, respectively. The DIT changes connected to the North Atlantic Oscillation (NAO), Pacific Decadal Oscillation (PDO), and Atlantic Multi-decadal Oscillation (AMO) are investigated. The radiatively forced SAT changes are responsible for the regional scale enhanced semi-arid warming (ESAW). Such enhanced warming is also found in radiatively forced daily maximum and minimum SAT. The results are helpful to our understanding of regional climate change. The manuscript is generally well written and I recommend accepting it for publication after a moderate revision.

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Specific comments (based on page sequence): 1. While the manuscript has provided an excellent statistical analysis of surface temperature changes associated with internal atmospheric modes such as NAO, PDO, and AMO, the authors should acknowledge that the relationships are mainly based on statistical analysis, and the underlying dynamical and physical mechanisms deserve further studies. 2. The authors said they focus on the area between 30 and 50N, but actually they talked about a larger domain from 20 to 53N. 3. The authors do not mention how the relative contributions (the percentage) for DIT and RFT are calculated. Please clarify this in the method description. 4. The authors do not provide the information of CMIP5 models used in the study. They claimed that the ensemble of CMIP5 model reflects the GHG forcing. Actually many models includes the anthropogenic aerosols, even land use. Taking this into consideration, authors should rethink their explanation for the peak of RFT. The authors should also list the models they used in the analysis by a table. 5. The authors should provide the information of effective sample number for the significance test in Figure 11. Low-pass filtering (11-yr running mean) was used for the NAO index (may also for the AMO and PDO indices) in this study. This may substantially reduce the independent sample number. So the “significant” signal in Figure 11 may be questionable. 6. How do you explain the increasing/decreasing in the DIT/RFT in the heavy-rain regions (larger than 1000 mm/yr)?

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