Brief Initial Review of "Impacts of tropical cyclones on the thermodynamic conditions in the tropical tropopause layer observed by A-train satellites", by authors Feng and Wang

General: The authors have chosen a topic, modification of the thermodynamic structure of the tropopause by organized convective systems, that is both timely and interesting. This is an important topic because an accurate understanding of diabatic convective processes at the tropopause in the tropics and subtropics could impact the modeling of climate response to increased convection caused by rising surface temperatures. The analysis uses retrievals of temperature and water vapor profiles from AIRS, combined with a Radar-Lidar estimation of cloud ice water content to address an old and on-going debate about whether overshooting convective plumes can hydrate the lowermost stratosphere. It is refreshing that the authors have provided an alternative to the very coarse-resolution MLS water vapor profiles to address this question, with the strong benefit of having a co-located retrieved temperature profile. The cyclone-centered coordinates are a welcome way to organize the observations. I am recommending that this paper be accepted with some minor changes that are listed below. In addition, vertical resolution around the tropopause for each data set/retrieval needs to be stated explicitly, some references ought to be consulted and updated to reflect the most current thinking and the development/uncertainty of satellite algorithms, for DARDAR-cloud and for the brightness temperatures. Uncertainties and potential sampling biases need to be discussed. Are the retrievals representative? How many AIRS-DARDAR combined profiles did not converge (I am only finding the number that did converge). What do the authors think about diurnal changes? Are these relevant to their results? The choice of 16 km as a threshold for "overshoots" seems arbitrary and creates awkwardness for the interpretation because it includes the cold point. Many tropical cyclones extend much higher than this at their cores, sometimes to 18 km. I'm not recommending that the authors redo the analysis, but acknowledgement that "overshoots" may instead be "cloud tops" ought to be included. Presentation of the new AIRS retrieval technique adds information and shows good promise, and it would be good to also see the authors present and understand limitations of this technique.

Specific suggestions:
The reference to Jensen 2007 should be updated to include more recent Ueyama et al. (2020) and Schoeberl et al. (2018) references in JGR.

The authors need to list version numbers for each of the data sources, including DARDAR. CloudSat does not observe small ice particles, and so cirrus cloud anvil edges with small effective particle size (< 40-50 microns) won't be included in the CloudSat data, but will be included in DARDAR.

17 km would likely be a better proxy for the tropopause at many locations in the tropics. Check Tseng and Fu (2017) in JGR, for example and also for a discussion of the positive relationship between tropopause height and deep convection. Cloud tops higher than 16 km are likely not

all really overshooting into the stratosphere, and in many places might include a local Ci maximum near the cold point tropopause.

Daytime and Nighttime differences in cloud top height for TTL CI in DARDAR could be substantial because of day/night differences in the Lidar observations. A large majority of TTL CI are only observed by the Lidar due to relatively small effective particle size. Do the authors mention whether they are analyzing daytime, nighttime or both?

To understand the difference between CI and MIX one needs to see Figure 4, so a recommendation is to reference this and to place it earlier in the paper. What is the anvil CI above DCC-NOT shown in this drawing? It appears to be part of the anvil, so would those profiles be CI or DCC-NOT?

Figures:
The Figure 1 caption is confusing. The sample density is for CALIPSO and CloudSat, both of which are used for DARDAR. If the sample density is measured at about 1x1 degree resolution (~ 100 km), how can it then be shown at higher resolutions? The text is more clear on this point, but a better caption would allow the figure to be understood better.

When discussing sampling it is appropriate to say CloudSat/CALIPSO because before 2015 they were both flying in formation in the A-Train, and both data sets are used in the DARDAR extinction retrieval and subsequent IWC estimation.

What is the vertical resolution of the combined AIRS-DARDAR temperature profile? What vertical resolution is the AIRS L2 and the MLS data converted to? It would be useful to know this in pressure, but also in equivalent geometric altitude.