Thanks to the Reviewer for insightful and helpful comments to improve the paper.

This paper is an attempt to relate Microwave Limb Sounder (MLS) observations of upper tropospheric water vapor and ice water content (IWC), and sea surface temperature (SST), to the spatial and temporal behavior of the Indian Ocean dipole observed in SST variability. The manuscript is short and sparse on physical interpretations of the various correlations found between water vapor, IWC, and SST, and are not placed well in the context of previous works. Overall, the manuscript is not organized well and is a difficult read. This is especially true of the abstract. It is very difficult to assess the scientific purpose and salient results from the body of the paper, let alone the abstract. The other impression the reviewer has is that this work could have made an interesting paper if the authors spent more time being clear in their purpose, complete in the literature review, clear in the methods, results, and conclusions. In its present form, this manuscript is not acceptable for publication in ACP. Perhaps there is an interesting nugget of gold that the reviewer was not able to deduce in this ACPD version.

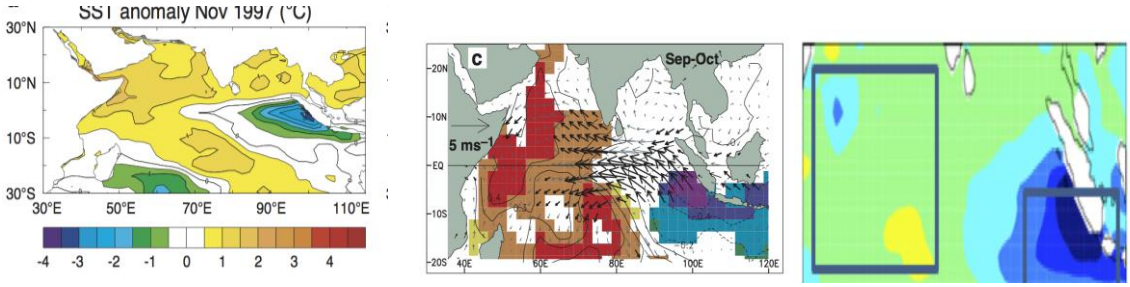
Following your suggestions the introduction and other sections have been revised to clearly state our objectives. We have elaborated the methods, results and summary sections.

Some additional concerns include the following.

Q) In Section 3.1, how is the reader supposed to observe the dipole in Fig. 1? The oscillatory 'behavior' is hard to observe in the maps, and they do not look consistent (upon visual inspection) between the three quantities (IWC, water vapor and SST), although some of this behavior is implied in the correlations presented in Fig. 4. Does this oscillatory behavior resemble previous works? Why is there no clear periodic oscillation during DJF and MAM? Is this expected or not?

ANS) The dipole pattern observed in the present work is in agreement with the IOD modes that were discovered before. The IOD mode is manifest predominantly during September, October and November (SON) and not during any other season of the year. IOD is initiated by an anomalous upwelling along the Sumatra-Java coast at the start of the normal upwelling season in May-June. This enhances cooling of SST in the EIO, which couples with a westward wind anomaly along the equator and drives rapid growth of IOD. The wind anomaly and associated Ekman pumping generate off-equatorial Rossby waves that travel westward, deepen the thermocline, and warm SST in the WIO, causing the peak of an IOD event a few months after it begins. The decay of an IOD event is characterized by a slow eastward propagation of warm anomaly along the equator, with warm SST leading deepened thermocline depth. The deepened thermocline arrives at the eastern boundary and reduces the rate of cooling during the next upwelling season (Feng et, al 2001, 2003; Saji et al., 1999; Webster et al., 1999; Vinaychandran et al., 2007). Thus SON months are considered the months when we find this dipole mode at its peak. During JJA this dipole mode is weak and in its starting phase. We do not observe any periodic oscillation during DJF and MAM. Also, the two boxes indicated in figure 1 in the SST

plots are the region in which this dipole oscillates. These boxes are used in the previous studies (Saji et al., 1999; Webster et al., 1999).



a. b. c.

Figure 1. Ideal SST variability pattern observed in Sep,Oct,Nov, during IOD (a) from Webster et al., Nature 1999; (b) from Saji et al., Nature 1999 and (c) from the present paper for 2006, indicating the IOD pattern.

Q) In Section 3.4, top of p. 21775, are all of the correlations (r^2) really that good? For the 100 hPa layer, it looks like there is no correlation between SST and IWC. Perhaps the values need to be plotted on different scales for the different layers?

ANS) The correlations were good, as they exceed 95% significance level. For the 100hPa layer we have plotted the values on different scale and the figure is added in the revised version of manuscript.

Q) Lastly, in the Summary Section, the authors present as an afterthought a conceptual diagram of atmospheric connections between the Indian and Pacific Ocean basins that arise out of interactions between the Indian Ocean dipole and the Pacific Ocean ENSO. What is the 'atmospheric bridge'? What is the diagram supposed to tell the reader? Also, how does one conclude that the dipole and ENSO interact with each other when the EOF analyses are limited to the Indian Ocean only? The reviewer was not able to understand the flow of the scientific logic that led the authors to the schematic of Fig. 5.

ANS) Many studies (Abram,et al., 2007; Takeshi, Feb 2010) have established the fact that though the IOD is an intrinsic mode of variability of the Indian Ocean, it has a tendency to occur synchronously with ENSO. We attempt to understand how Nino 3.4 SST is attributed to the dipole mode present in the Indian Ocean. The "atmospheric bridge" refers to the teleconnection where ENSO has an effect on variability in the Indian Ocean through changes in atmospheric circulation [Zhong et al. 2005; Su et al 2001; Alexander et al. 1992].

The schematic diagram summarizes the effect of the local SST and Nino 3.4 SST on the upper tropospheric (UT) clouds and water vapor. We intend to show the physical processes that govern the variabilities in UT H_2O and IWC over the Indian Ocean. From our results, we found that the primary driver for this UT IWC and H_2O dipole modes is the local Indian Ocean SST (shown by solid lines). Apart from this local SST, ENSO also influences the UT dipole mode (shown by dashed lines through teleconnection) though with a weaker role.

We have extended our EOF analysis to the tropics as shown in figure below and included in the revised version of the manuscript. We find from the first EOF mode that explains 12% of variance and exhibits a dipole mode in the Indian Ocean. Although IOD is an intrinsic mode of the Indian Ocean, ENSO also has an influence on the Indian Ocean variabilities. During some years ENSO and IOD are in phase while other years they are not. Information added in the section 3.2.

All the references enlisted here are included in the revised main manuscript.