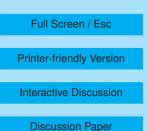**Atmospheric
Chemistry
and Physics
Discussions**

Interactive
Comment

Interactive comment on "The detection of post-monsoon tropospheric ozone variability over south Asia using IASI data" *by* B. Barret et al.

Anonymous Referee #1

Received and published: 20 May 2011

General: Satellite remote sensing of tropospheric ozone can provide new information on spatio-temporal variation in tropospheric ozone, which is important to air quality and climate studies. In this paper, the authors examined how IASI instrument detects the variability of tropospheric ozone in south Asia during the post-monsoon season in November 2008. The first part of the paper compared IASI ozone data with the global ozonesonde profile data. The results convincingly showed the high caliber of IASI in detecting tropospheric ozone columns. The bias in the ozone vertical profiles is clearly characterized. In the second part, the authors presented an interesting case of IASI-detected variation of tropospheric ozone in south Asia during the season. Overall, the subject is important and appropriate for ACP. The paper is well written. The work is a solid contribution to our understanding of the subject matter.

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Interactive Discussion

Discussion Paper

I recommend publication of the paper with minor revisions as follows.

I agree with the authors that IASI can capture fast variability of tropospheric ozone on daily scale as illustrated in Figure 7, However, the authors may also point out that IASI failed to capture low ozone abundance during the study period (also shown in Figure 7) in the abstract and the conclusions. The reason for such failure requires more investigation. The a priori biased towards mid-latitudes may only be one of the reasons.

The first part of the paper is solid and convincing. In the second part, the authors illustrated that IASI can capture fast variability of tropospheric ozone at Hyderabdad when comparing with the MOZAIC data, although IASI failed to capture low ozone abundance in several cases. They attribute the rapid decrease in tropospheric ozone to two storm events. This is an interesting case. However, this part needs to be further elucidated. The proposed underlying mechanisms are not clearly presented. To improve this part, I suggest the following.

Explain the Flexpart simulation and the output clearly (associated with Figures 9 and 10). The term, unit, and magnitude in Figures 9 and 10 are confusing (see Specific).

As the variation in tropospheric ozone in south Asia is influenced by chemistry, transport, and interaction between them, the role of chemistry needs to be addressed. The authors limited their discussion only on transport.

The authors may take more ozonesonde data from other stations in India in addition to Hyderabad so that a more complete picture can be drawn.

It would be helpful to present the meteorological fields near the surface and at the mid-troposphere separately. Ozone maps at low and middle troposphere would also be helpful, if IASI have some sensitivity to ozone in the low troposphere.

Specific: Throughout the paper, the authors used the term "radiosonde data" for ozone data. The ozone data used for the validation are from an ozonesonde. The authors

may really mean "ozonesonde" throughout.

Table 2: add sampling number (N) for each case. Or add N in Figure 4.

Figure 2: for the Arabian Sea, please give domain in lat/lon.

Figure 3: for Figures 3b, 3c, 3e, and 3d, is each profile a mean of (IASA-RS)/RS, where (IASA-RS)/RS is calculated individually?

Figure 5, are white areas for missing data? Is the vertical velocity also a mean from 500-650 hPa?

Figure 6, "3" should be in subscript. Unit of ozone is ppbv. Overlaying IASI vertical profiles for the same region and period would be helpful. Although the bars are understandable, please indicate how many standard deviations the length of the bars stands for.

Figure 7, "3" should be in subscript in both x-axis and y-axis. Although the bars are understandable, please indicate how many standard deviations the length of the bars stands for.

Figures 9 and 10, unit is missing. If the unit is second, the magnitude seems wrong. The authors claimed a simulation of Flexpart for 10 days. Then the magnitude is way beyond 10 days. For 1011, the trajectory takes too long and it would not be reliable. Is "m.a.g.l." meters above the ground level? What is the physical meaning of the retroplume residence times?

Figure 11, are white areas for missing data?

P10032, L6, "Level 1 IASI data". The authors may really mean IASI Level 2 ozone data. Level 1 data usually refer to radiance data.

P10035, where is the source of IASI ozone data? Are IASI data publicly available? A web link would be helpful.

P10038, are there any difference in ozone retrieval between this work and Boynard et al. (2009, ACP, 9, 6255-6271)? If so, please state them.

P10046, L6, it is not clear if the anticyclone is near the surface.

P10047, L16, missing a "?" after "DU".

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 10031, 2011.