Reviewer report on the amt-2010-37 paper «Atmospheric influence on a laser beam observed on the OICETS – ARTEMIS communication demonstration link » by A. Löscher

The paper presents unique data on laser occultation experiment using the inter-satellite (ARTEMIS-OICETS) communication link. Due to uniqueness of the experiment and the data received, the paper certainly deserves publication in AMT.

The paper is well written. My main concern is the description and presentation of the analysis of the probability density function (see detailed comments below).

Another general comment is related to the statement "This kind of data, if available more frequently, could help to study atmospheric inhomogenities and the related scintillation phenomena with the potential to aid validation efforts of respective models." Although it is the first presentation of the experimental data, it would be good to enhance slightly the discussion: what kind of information about the structure of atmospheric irregularities the data could provide? Are/were there analogous measurements that provided such information? Were scintillation phenomena studied before? (references would be useful). What are the "respective models"? I understand that it is impossible to give a definite answer on potential usefulness of these data now, but outlining the potential applications and future work/ feasibility studies required would be advantageous for the paper, from my point of view. Overall, I rate that the paper should be published after minor revisions.

COMMENTS

1) Analysis of probability density function (in the order of appearance).
   - p.2042, line 10: "the class width w" – you mean probably "the bin width"?
   - Eqs. (2) and (3) are the same except the presentation of the numerical constant. I suggest keeping only Eq.(3) because the factors in Eq.(2) are not explained, or writing $w = 2 \cdot 3^{\frac{1}{3}} \pi^{\frac{1}{6}} \cdot \sigma n^{-\frac{1}{3}} = 3.49 \cdot \sigma n^{-\frac{1}{3}}$
   - What is *n* in Eqs. (2) and (3) ?
   - What are parameters *Skewness* in Eq.(4) and *Kurtosis* in Eq.(5)?
   - It seems that the Eqs.(4) and (5) are not used: it is written that only the sample skewness and kurtosis are computed. If this is true, then Eqs. (4) and (5) are not needed.
   - It is written in several places that a log-normal distribution is expected for scintillations. However, the fit by a normal distribution is applied ! Please be consistent.
   - It would be interesting to see the experimental histograms rather than their fit. I suggest showing <u>both</u> experimental histograms and their fit. They can be collected even into one figure containing 30 subplots (e.g., 6 rows and 5 columns), each showing the experimental histogram and its fit. They can be also divided into several figures. Please use scaling on the horizontal axis for better visibility.

2) It would be convenient to have also the dependence on altitude in Figures 3-6. Is it possible to add a second (altitude) axis into these figures (e.g., on the top)?

TECHNICAL CORRECTIONS
p.2041, line 6: “0.1”-> “0.1s ”
p.2042, line 16: “turbulence”