Atmos. Meas. Tech. Discuss.,
doi:10.5194/amt-2018-241-RC1, 2018

Atmospheric Measurement Techniques Discussions

Interactive comment on "A new MesosphEO dataset of temperature profiles from 35 to 85 km using Rayleigh scattering at limb from GOMOS/ENVISAT daytime observations" *by* Alain Hauchecorne et al.

Anonymous Referee #1

Received and published: 8 October 2018

The paper presents a new comprehensive Rayleigh stratosphere/mesosphere temperature profile dataset derived from the ESA ENVISAT GOMOS instrument. Paper is thus relevant and appropriate for publication in EGU's open access journal Atmospheric Measurement Techniques. Initial validation and first scientific results of a monthly climatology as compared to a corresponding climatology of ECWMF and NRLMSISE-00 is provided. A comparison with LIDAR measurements is also provided. Systematic differences are observed – though the differences are not unreasonable given the nature of the measurements and this nature of the MSIS climatology. Several hypotheses

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Discussion paper

regarding systematic differences (biases) with respect to the differences with climatology are given and explored – with the most likely being differences in local-time for LIDAR measurements, as well as Mie scattering by aerosols for the lower altitudes. The GOMOS Rayleigh scatter measurements, basically fixed in local-time, also exhibit so-called mesosphere inversion layers that have been observed by other research with earlier datasets. The data processing technique, which is based on techniques applied to earlier missions (e.g. Solar Mesosphere Explorer - SME) is noted and references are provided. With the information provided it should be possible for other scientists to reproduce the level 2-3 data products described from the GOMOS level 1 data products. Sufficient references to earlier research, and credit to earlier developments of the basic technique is given, with the specific details for GOMOS dataset processing provided.

The title and abstract provide a good description and overview of the paper. The abstract includes an overall summary of the initial scientific results some the secondarily derived month mean global climatology as well. The paper's presentation along with the equations, figures, and captions are straightforward and clear. Although an additional article supplement is not provided, a URL for a well-organized and easily accessible ESA project data-service to access and utilize the new dataset (along with other pertinent and corroborating ENVISAT datasets) is given.

With 309,000 temperature profiles from 35 to 85 km spanning about 10 years from 2002 to 2012 GOMOS Rayleigh scatter measurements will be a valuable resource to the middle-atmosphere research community. While a zonal monthly mean upper stratosphere and mesosphere, and related issues including tidal aliasing of local time limited observations is nothing new, the power of the dataset is in the ability to provide improved coverage in conjunction with other observations such as ground-based LIDARS, NASA TIMED SABER, NASA MLS, and other ESA ENVISAT instruments which measured temperatures in the same altitude region over approximately same time intervals. Such independent measurements improve statistics to better under-

stand physical process in the region to better predict both day-to-day variability as well as seasonal and long-term behaviors of the region. With respect to the biases with respect to NRLMSISE-00 it will not surprising that the other recent ENVISAT and NASA SABER and MLS datasets show a similar result, indicating that NRLMSISE-00 probably needs to be updated.

The paper is basically acceptable for publication but as the authors may wish to add a few points of clarification for interested readers. First it might be worth mentioning in the paper that GOMOS had several other potentially independent means of making temperature profile measurements in the region as described in Bertaux et al., (2010), but that the Rayleigh scattering techniques seems the most reliable. Secondly, page 4 near line 30, the “et al., (2018a)” reference is missing. A comma is also missing on page 4 line 21.

Interactive comment on Atmos. Meas. Tech. Discuss., doi:10.5194/amt-2018-241, 2018.