

Interactive comment on “The MATS Satellite Mission – Gravity Waves Studies by Mesospheric Airglow/Aerosol Tomography and Spectroscopy” by Jörg Gumbel et al.

Anonymous Referee #3

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Interactive comment on “The MATS Satellite Mission – Gravity Waves Studies by Mesospheric Airglow/Aerosol Tomography and Spectroscopy” by Jörg Gumbel et al. This manuscript describes a new Swedish satellite mission to study gravity waves in the MLT region by tomographic techniques, applied to airglow emission spectroscopy and scattered sunlight from NLC. This mission provides the possibility of imaging gravity waves in 3-D on a global basis, and has the potential to provide much-needed input to global models which currently rely on parameterization methods. This paper is well-written and lays out all technical and scientific aspects of the mission. I recommend publication after making minor revisions. The most important issue that I found lacking was that of handling the issue of polarization. Polarized light will undergo different

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effects depending upon the angle of incidence on metallic mirrors. In fact, on reflection circularly-polarization light will likely be produced. It is well-known that sunlight is highly polarized, so that any instrument that responds differently, based on the geometry, will be affected, and unless these effects are handled during calibration, would have significant effects on the received signal. Only once was the word polarization used. I am sure the authors are well aware of this effect, and am puzzled why this was not discussed in their paper. Other editing comments: Before line 15: relevant “to” (the last word is missing) Line 12 add the word “been” in between the words “have” and “retrieved” Line 15: “combing”-> “combining” Line 26: “limb imaging also opens”. Better to say “limb imaging also provides” Line 10, new section: “patters-> “patterns” Page 26, last sentence” “ration”-> “ratio” The axial ratio used by Lumpe et al in the T-matrix formulation of scattering was assumed to be 2, not 0.5.: from Lumpe et al: “The particles are assumed to be oblate spheroids with an axial ratio of 2” “explicitly simulate of GW’s -omit the word “of” Gravity waves have also been extracted from AIM SOFIE data (not in NLC), and are discussed in various references, e.g. the following: Gao, H., G. G. Shepherd, Y. Tang, L. Bu, Z. Wang (2017), Double-layer structure in polar mesospheric clouds observed from SOFIE/AIM, Ann. Geophys, 35, 295-309, doi:10.5194/angeo-35-295-2017.

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