Review Fluctuations of radio occultation signals in sounding the Earth's atmosphere

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General impression

The Author applied a statistical model and theory derived for analysis of the stellar occultation data to analysis of the GPS/MET radio occultation (RO) measurements. The statistical model present a medium as consisting of anisotropic irregularities – a set of pancake-like disks of small thickness, but of large diameter, immersed in a spherically symmetric atmosphere of the Earth. The Authors believe that these inhomogeneities arise from the effect of internal gravity waves (IGW) that are important for the transfer of the kinetic momentum and energy in the atmosphere. In addition, the medium contains isotropic spherical inhomogeneities, their spatial spectrum is described by Kolmogorov's formula. The Authors by use of Rytov approximation and phase screen method connected statistical characteristics of the eikonal and amplitude of the radio occultation (RO) signal variations with spatial spectra of the Kolmogorov's and IGW turbulence. The Authors found that theoretical and experimental results indicate a dominant role of saturated IGWs in forming the variances and spectra of amplitude and phase fluctuation of RO signal in the stratosphere and upper troposphere, at altitudes above 4–5 km in middle and polar latitudes, and above 7–8 km in the tropics.
The Authors stated that IGW parameters and RO signal fluctuations may serve as a basis for the global monitoring of IGW parameters and activity from RO amplitude and phase observations in the stratosphere and upper troposphere.

The Figures support conclusions made by the Authors.
Therefore the article is of significant interest to the audience of the AMT journal.

Some shortcoming:
1. It is known that IGWs have horizontal anisotropy, their fronts are extended along horizontal lines. Therefore, the RO method as compared with stellar occultation has a selectivity that depends on the orientation of the radio beam relative to the IGW wave front.
2. Significant variations of the RO amplitude can be associated not only with multiple propagation, but also with the influence of monochromatic IGWs not described by statistical theory.
3. The discussion on page 4 about the critical anisotropy is indistinct and requires a modification.

Some tautological errors
Page 4 line 5 the anisotropy coefficient *characterized* the ratio of the *characteristic* horizontal and vertical scales,
Page 6 … the measured *variances* and 1D *spectra* of RO signal *fluctuations* with 3D *spectra* of atmospheric refractivity *fluctuation*s for IGW and turbulence *model*s, as well as the *model* profiles of *variances* of 5 RO signal *fluctuations*.

The paper may be published after minor revisions.