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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Meteorological effects in the lower ionosphere as based on VLF/LF signal observations" *by* A. Rozhnoi et al.

Anonymous Referee #3

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"General comments" The research paper "Meteorological effects in the lower ionosphere as based on VLF/LF signal observations" by A. Rozhnoi, M. Solovieva, B. Levin, M. Hayakawa, and V. Fedun concerns with the problem of influence of large scaled meteorological phenomena on the lower ionosphere parameters. The problem is conditioned by strong stratospheric and mesospheric winds that can prevent any atmospheric forcing from the lower atmospheric layers. This problem is still poorly studied and it presents an interest for elaboration of mechanisms of such influence and, in practical use, for remote detection of cyclones and typhoons by ground based instruments. From the other side, the study of meteorological effects in the lower ionosphere will help to select possible seismogenic ionospheric perturbations detected by VLF/LF sounding technique that is widely discussed and developed last decades. The au-

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thors have found a correlation between variations in the signals of VLF/LF transmitters, measured at three Far East observation stations and local changes of meteorological parameters, related to passing winter cyclones through the observation points. For the first time in the case studies for several strong tropical cyclones the authors discovered anomalous changes up to 20 dB in the radio signals when propagation paths of length from about 2000 till 9300 km were crossed by the cyclones. As a mechanism of transferring energy from the troposphere to the lower ionosphere the acoustic-gravity atmospheric waves are considered that is confirmed by the spectral content of the VLF/LF signal variations. The paper clearly presents new results of experimental data analysis concerned with the troposphere – lower ionosphere forcing and can be interesting to the wide circle of researchers in the fields of meteorology, radio physics, geophysics, seismology and related areas.

"Specific comments" The paper can be accepted "as is" but to the consideration of the authors I would like to address comments on some details that could clarify technical methodology of the study to a reader. 1. What component of VLF/LF transmitted electromagnetic field was measured? 2. When studying the correlation with local meteorological parameters it would be useful to bring some considerations and/or discussion about possible influence of them directly onto the physical properties of a field sensor (such as leakage resistance, effective height, vibrations in the fair weather electric field for an electric antenna or in the geomagnetic field for a magnetic sensor) that can affect the registered signal, to separate ionospheric effects. 3. Figure 2 and corresponding text in the paper: Please explain what is shown really in the graph because there is a difference in normalization the covariance function and the cross-correlation coefficient.

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 2, 2789, 2014.