



# PITHIA-NRF First Training School

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### **Coupling of the ionosphere with the lower atmosphere**

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The coupling between the ionosphere and the lower atmosphere via a) the electromagnetic phenomena and b) atmospheric waves will be discussed.

In the part a) coupling via the electromagnetic waves generated during thunderstorms, including lightning-generated whistlers that propagate in the inner magnetosphere and resonate with the electrons in radiation belts, causing them to precipitate in the upper atmosphere, will be described. A potential effect of changes in the global electric circuit on the ionosphere will also be mentioned.

In the part b), which is the main part of the presentation, atmospheric planetary waves, tides and acoustic gravity waves, including infrasound, will be discussed. The main focus will be on the gravity waves that transfer significant energy and momentum between the lower and upper atmosphere and change winds and temperature in the upper atmosphere and ionosphere. They are also responsible for a great part of medium scale traveling ionospheric disturbances that might affect propagation of electromagnetic waves, including signals from global navigation satellites and might provide seed perturbations for various ionospheric instabilities and irregularities.

Examples of observations and measurement techniques will be presented.



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