

## 2011年東北太平洋沖地震の震源領域直上における音波共鳴とプラズマ減少の観測

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### Observation of acoustic resonance and plasma depletion above the epicenter region of the 2011 Tohoku Earthquake

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Acoustic resonance and plasma depletion were observed by GPS receivers in the vicinity of the epicenter after the M9.0 Tohoku earthquake on March 11, 2011. Two-dimensional observation of total electron content (TEC) by GPS receiver network revealed that a short period oscillation of TEC continued for about four hours after the earthquake. The frequency of the dominant mode of the oscillation was 4.5mHz, 222 seconds of period, while there were minor oscillations whose frequency were 3.7mHz and 5.3mHz. These frequencies are consistent with those of the acoustic resonance between the ground surface and the lower thermosphere, predicted by numerical models. It is interpreted as follows: 1) The acoustic wave generated by the uplift of the sea surface caused by the earthquake propagated vertically up to the lower thermosphere. 2) The wave was reflected and made a resonance between the sea surface and the lower thermosphere. 3) A portion of the resonant wave leaked vertically, reached the F-region ionosphere, and modulated the surrounding plasma. This oscillation of TEC was accompanied by depletion of TEC whose amplitude was up to 5 TEC units. The area of this depletion was also limited to the vicinity of the epicenter. The increase of the recombination of plasma by the dense neutral atmosphere at the dense phase of the acoustic waves would cause the depletion of plasma in the ionosphere.