

## FORMOSAT-2/ISUAL によって観測された 630nm 大気光の高度・緯度分布 : プラズマ密度観測との比較

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### Altitude-latitude distribution of 630-nm airglow observed with the FORMOSAT-2/ISUAL: A comparison with plasma density measurements

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The altitude-latitude structures of the F-region ionosphere are discussed based on the satellite measurements of 630-nm airglow and plasma density. While the airglow images were obtained by FORMOSAT-2/ISUAL limb observations, the plasma density data were derived from CHAMP in-situ measurements and FORMOSAT-3/COSMIC occultation measurements. Comparisons between the ISUAL airglow data and the CHAMP and COSMIC plasma data enable us to discuss the neutral and plasma distributions in the F-region ionosphere.

The ISUAL payload on FORMOSAT-2 satellite observes various types of optical phenomena such as lightning, TLEs (sprites etc), airglow, and aurora, while flying northward on a sun-synchronous (09:30 to 21:30 LT) polar-orbit at a height of ~891 km. The airglow measurements were carried out by the ISUAL imager with an exposure time of 999 ms, a repetition rate of ~20 s, and a wavelength range of 628-635 nm. While the ISUAL observed the wide latitude range along ~130 E for 2 days in December 2006 and for 6 days in May-June 2007, it observed along ~110 E for 6 days in April-May 2008.

On each night, two to five bright airglow regions were found, which sometimes drastically changed their latitudinal locations especially in the geomagnetic active phase. By assuming that the airglow layer was vertically-Gaussian and horizontally-uniform, the altitude profile of 630-nm airglow was derived. The estimated peak altitudes were in the range of 220-280 km, which roughly supports theoretical expectation that is derived from the MSIS and IRI empirical models. The altitude-latitude distributions of 630-nm airglow were compared with the plasma data obtained from CHAMP and FORMOSAT-3/COSMIC measurements. On 11 June 2007, satellite measurements of ISUAL, CHAMP, and COSMIC were simultaneously carried out in the range of 120-140 E longitude and 45 S-25 N latitude during the local midnight of 14:00-16:00 UT. In both the 630-nm airglow data and plasma density data, significant enhancements were found at 30 S, 0, and 30-60 N geographical latitudes. The peak altitudes of 630-nm airglow and plasma density were found to be ~280 km and ~310 km, respectively. Given the fact that the luminosity of 630-nm airglow is a function of neutral density and plasma density and that the neutral density is higher at lower altitude, it is qualitatively reasonable that the peak height of the airglow was lower than that of plasma density. In the presentation, by combining the satellite measurement data with the IRI and MSIS empirical models, neutral and plasma distributions in the F-region ionosphere will be quantitatively discussed.