

Modeling of the polar E region ionosphere with use of the EISCAT Svalbard radar data

Hitoshi Fujiwara^{1*}, Yasunobu Miyoshi², Satonori Nozawa³, Yasunobu Ogawa⁴, Sawako Maeda⁵

¹Tohoku University, ²Kyushu University, ³STEL/Nagoya University, ⁴National Institute of Polar Research, ⁵Kyoto Women's University

The polar thermosphere and ionosphere show significant variations due to energy inputs from the magnetosphere. In order to understand dynamics and energetics in the thermosphere and ionosphere, some research groups in U.S.A. and Europe have developed numerical models more than 30 years. These models have successfully described global responses of the thermosphere and ionosphere to changes in solar and geomagnetic activities. However, there are some unsolved problems: for example, thermospheric and ionospheric variations in the local regions. In particular, energetics in the polar cap region seems to be one of the most important issues. Based on our past modeling and simulation studies, we can develop a new method for studying the polar cap thermosphere and ionosphere with use of the EISCAT Svalbard radar (ESR) data. In this study, we develop a model of the polar E region ionosphere. We will obtain ion profiles from the observed electrons taking into account the photo-chemical and ionization processes due to precipitating auroral particles. In the future, some photo-chemical processes will be included in our GCM. Auroral and airglow emissions will be also estimated for specific events.

Keywords: IS radar, ionosphere, thermosphere, numerical model, high latitude