daytime vertical E×B drift velocity at the longitude corresponding density peaks may indicate that the vertical E×B drifts are responsible for the longitudinal density difference. The SAMI2 model simulations are conducted in order to identify the role of the E×B drifts for the formation of the longitudinal density structure. The model ionosphere produced with the input of the empirical model E×B drifts does not show the observed longitudinal density difference. The model simulations conducted with the input of the ROCSAT-1 E×B drifts averaged for each 10 degree bin for the longitude show the significant enhancement of plasma density at the longitude where the corresponding peak densities occurred in the wave 4 structure. We conclude that the observed longitudinal density structure can be explained by the effect of the daytime E×B drifts if the effects of other factors such as neutral winds and composition are ignored.

[VI-2-2] 적도 밤 영역에서 중성입자들에 의한 대기광 효과

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밤 영역 대기광의 주원인으로는 태양의 영향을 받는 낮 지역에서 solar extreme ultraviolet(EUV)으로 이온화된 전자와 대기층의 이온들이 밤 영역 쪽에서 radiative recombination으로 방사광을 형성하는 것이라고 잘 알려져 왔다. 이와 함께 ring current에 있는 neutral particle의 precipitation에 의한 영향이 밤 대기광의 한 요인으로 대두되어 왔다. 이에 이번 연구에서는 과학위성 1호의 주 탑재체인 FIMS의 밤 영역 적도 지역 관측 결과를 이용하여 밤 영역 대기광의 원인이 되는 현상을 살펴보고자 한다. 대기광의 원인을 알아보기 위하여 선택한 방사광 선들은 밤 대기광의 주요 방사광선인 OI 1356Å, 1027Å, 989Å 그리고 911Å이다. 이들 방출선의 방출량의 변화를 살피고 이들 간의 비의 변화를 이용하여 밤 대기광의 원인으로 알려져 있는 radiative recombination과 energetic neutral particle의 영향이 각각 어느 정도인지에 대한 정량적인 분석을 하였다. 덧붙여 산소 원자 외의 관측 결과가 어떤지에 관하여 설명하도록 하자.

[VI-2-3] Eddy available energy budget in the high-latitude lower thermosphere

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The only part of the energy density of the thermospheric gas is available for driving dynamics. This eddy available energy (EAE) is composed of an eddy kinetic energy (EKE) and an eddy available potential energy (EAPE). In the high-latitude thermosphere EKE is generated primarily where the ion-drag force associated with plasma convection accelerates the neutral gas, and is destroyed primarily where the ion-drag force opposes the wind. EAPE is generated primarily where Joule heat is deposited in regions of elevated temperatures, and is destroyed where the heat is deposited in regions of reduced temperatures. We have evaluated the budgets of EAE production, transport, and loss under steady-state forcing of the high-latitude lower thermosphere, using the NCAR Thermosphere-Ionosphere-Electrodynamics General- Circulation Model. In the high-latitude thermosphere, in general, ion-drag forcing is a larger contributor to both the production and destruction (depending on location) of EAE than is Joule heating for steady-state conditions, although Joule heating can play a more significant role for impulsive forcing. Transport of EAE by horizontal and vertical winds is a significant component of the EAE budget. Conversion of EAPE to EKE, and of EKE to EAPE, constitutes an important part of the budgets of these two components of EAE.

[VI-2-4] Science Topics Related with STSAT-1, SPP Data

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The first Korean scientific satellite, STSAT-1 was launched into the 680 km polar orbit in 2003. STSAT-1 instrumentation include four space physics instruments, Electro-Static Analyzer (ESA), Solid State Telescopes (SST), Langmuir Probe (LP) and Scientific Magnetometer (SM). These four instruments, SPP (Space Physics Package), are operated simultaneously in the auroral region and the three-axis stabilizing attitude control system allows aligning of detectors with respect to the Earth's magnetic field to obtain pitch-angle information with high time resolution. In this presentation, we will introduce what science topics can be addressed with SPP data. For example, SSTs measure energetic electron spectra with high time resolution of 50 msec. With SST data, we can study the fine structures of energetic electron precipitation like electron microburst. During space storm time, electrons in the radiation belt are accelerated to MeV electrons. While the acceleration processes are not known, SPP data shows electrons can be accelerated in the confined region during short time. In addition, SPP data shows very dynamic ionospheric structures. We appeal to Korean scientists and students to have interest in SPP data.