[박SS-07] The Far-ultraviolet Spectrum Study of Comet C/2001 Q4 (NEAT)

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We present the results of far-ultraviolet (FUV) observations of comet C/2001 Q4 (NEAT) obtained with Far-ultraviolet Imaging Spectrograph (FIMS) on board the Korean microsatellite STSAT-1, which operated at an altitude of 700 km in a sun-synchronous orbit. FIMS is a dual channel imaging spectrograph (S-channel 900-1150 Å, L-channel 1350-1710 Å, and $\lambda/\triangle\lambda$ ~ 550 for both channels) with large image fields of view (S-channel 4.0°×4.6′, L-channel 7.5°×4.3′, and angular resolution ~ 5-10′) optimized for the observation of diffuse emission of astrophysical radiation. Comet C/2001 Q4 (NEAT) were made in two campaigns during its perihelion approach between May 8 and 15, 2004. Based on the scanning mode observations in the wavelength band of 1400-1700 Å, we have constructed an image of the comet with an angular size of 5°×5°, which corresponds to the central coma region. Several important fluorescence emission lines were detected including S I multiplets at 1429 and 1479 Å, C I multiplets at 1561 and 1657 Å, and the CO $A^1\Pi-X^1\Sigma^+$ Fourth Positive system; we have estimated the production rates of the corresponding species from the fluxes of these emission lines. The estimated production rate of CO was $Q_{CO}=(2.65\pm0.63)\times10^{28}s^{-1}$, which is 6.2-7.4% of the water production rate and is consistent with earlier predictions. The average carbon production rate was estimated to be $Q_C=\sim1.59\times10^{28}s^{-1}$, which is ~60% of the CO production rate. However, the observed carbon profile was steeper than that predicted using the two-component Haser model in the inner coma region, while it was consistent with the model in the outer region. The average sulfur production rate was $Q_S=(4.03\pm1.03)\times10^{27}s^{-1}$, which corresponds to ~1% of the water production rate.

[구SS-08] Optical property and the Origin of the Zodiacal light

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내행성계의 행성간 공간에는 행성간 티끌이 편재하고 있다. 이 행성간 티끌의 산란이나 열복사로 인하여 황도광이 관측된다. 그러나 빛에 의한 끌림힘이나 행성의 중력적 섭동으로 인하여 행성간 공간의 티끌은 수백만 ~ 수천만 년 이내에 사라질 수 밖에 없다. 따라서 행성간 공간에 티끌을 공급하는 티끌의 공급원이 지속적으로, 또는 최근에 존재하였음이 확실하다.

본 연구에서는 행성간 티끌의 공급원을 밝히기 위하여 황도광의 광학적 특성을 이용하였다. 우리는 혜성, C형 소행성, S형 소행성, X형 소행성의 반사도와 스펙트럼을 합성하여 4600Å에서 측정된 황도광의 반사도, 연속 스펙트럼과 비교하였다. 큰 비중의 티끌이 혜성에서 기인하고 나머지가 C형 소행성과 S형 소행성에서 기인한 모형을 통하여 황도광의 광학적 특성을 설명할 수 있었다. 우리의 모형은 독립적으로 측정된 기존의 황도광 분광 관측 결과와 상합한다.