Short-term variability of Jupiter's extended sodium nebula

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Ground-based optical observations of D1 and D2 emissions from Jupiter's sodium nebula, which extends over several hundreds Jovian radii, were carried out at Mt. Haleakala, Maui, Hawaii in December 20-31, 2000. Daily variations were clearly identified in these observations. First of all, the size of nebula was decreasing during the period of observation. This may be attributed to decrease of volcanic activity on Io. Secondly, changes of D1 + D2 intensity with respect to position of Io were obtained. As a general trend, the nebula was always brighter in the eastern side of Jupiter than in the western side. However, ratio of D1 + D2 brightness on Jupiter's eastern side to that on the western side showed sinusoidal variation with respect to Io phase angle. In addition, the variation of D1 + D2 intensity on the western side was closely related to the S+ emission intensity in the Io plasma torus on the eastern side. These observational results may be explained by condition of solar UV illumination on Io's ionosphere. It is expected that there are more abundant ionospheric ions like NaX+ in Io's dayside hemisphere than in the nightside. When Io's leading hemisphere is illuminated by the Sun, it is also expected that more abundant NaX+ ionospheric ions are picked up by Jovian corotating magnetic field, and they will produce more abundant fast sodium atoms through dissociative recombination process. Using our 2 dimensional model, we are trying to estimate the contribution of solar radiation to abundance of ionospheric NaX+ ions and NaX+ pick-up ions. Simulation results will be shown in the presentation.