Short term variability of Jupiter’s extended sodium nebula

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Extended sodium nebula around Jupiter spreding over a few hundreds Jovian radii has its origin in Io’s volcanoes.Sodium atoms have to pocess an initial velocity that exceeds the escape velocity from Jovian gravitational field.Two mechanisms which can produce such fast sodium atoms are proposed;one is pick up of sodium-bearing molecular ions(NaX+) around Io by Jupiter’s corotating magnetic field and the following dissociative recombnation in Io-plasma torus.The another is simple charge exchange between sodium ions in Io-plasma torus corotating with Jupiter and sodium atoms in Io’s atmosphere.Both of thses two mechanisms can prodice sufficiently sodium atoms to escape from Io.In many previous observation and modeling studies,debates are still continuingas to which is the main source that produces high speed sodium atoms based on the brightness and structure of sodium nebula.We had also carried out observation of the sodium nebula at Haleakala in Hawaii with a wide field imager for 10 days in December,2000.Our wide field imager covers 300 Jovian radii(˜2 deg) centered on Jupiter.During this period,the nebula was small and dim.Attention was focused daily variation of sodium nebula with respecet to the position of Io.The ratio of sodium brightness in the eastern side to that in the western side showed a sinusoidal variation with a function of Io-phase angle.Phase and amplitude of this sinusoidal change in dependent on distance from Jupiter and mechanisms which produce fast sodium atoms from Io.We will discuss the most possible sodium escape mechanism based on this observation.