Optical to near-infrared color of the binary Edgeworth-Kuiper belt object 1998 WW31

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The Kuiper belt objects (KBOs) are thought to be remnants of solar system formation (Edgeworth1949, Kuiper1951). These bodies might have physical or chemical information about early stage of solar system. Recently, several KBOs are identified as binary systems (Veillet et al. 2002 and reference there in). We can derive the total mass of such system and put constraint on its density with assuming the albedo.

1998 WW31 is a first KBO identified as a binary system (except Pluto/Charon system) (Veillet2002). The orbit of the satellite is highly eccentric (e=0.82) and the period is long (P=574 days), which are not similar to that of Pluto/Charon system (e=0.0, P=6.4 days). However, obliquities are both large (1998 WW31 system: 65.2deg, Pluto/Charon system: 119.6deg (Tholen1997)).

The total mass derived from its orbit is 2.7x10^18 Kg (1/5000 of Pluto/Charon system) and the diameter of the primary and the satellite is estimated as 118-148 Km and 98-123 Km, respectively, assuming that those has same density of 2.0-1.0 g cm^-3 and same albedo.

The origin of the binary KBOs is not known. A giant impact scenario has been proposed for Pluto/Charon system (McKinnon1989, Stern1997). If this is the case for 1998 WW31 system, such impact might make fracture for small bodies and we could have a chance to see the inside of KBO.

We report the near-infrared photometry of the primary and the satellite of 1998 WW31 system, and discuss about the difference of the surface compositions. We have measured near-infrared colors of the binary Kuiper belt object 1998 WW31 taken with the Subaru telescope with adaptive optics. The satellite was detected near its perigee (0.18 arcsec apart from the primary). The primary and the satellite has similar normalized reflectivity at R, H, and K, but the normalized reflectivity of the satellite is lower at J. This indicates the existence of 1 um absorption band due to rock-forming minerals in the spectrum of the satellite. Combined with R band magnitudes previously published (Veillet2002), the color of the primary are similar to that of optically red KBOs.

We recently made additional observations of near-infrared and optical photometry with Suaru IRCS/AO and FOCAS in order to confirm the above result. We will also present those results.