THE SPLITTING OF DOUBLE-COMPONENT ACTIVE ASTEROID P/2016 J1 (PANSTARRS)

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We present deep imaging observations, orbital dynamics, and dust-tail model analyses of the double-component asteroid P/2016 J1 (J1-A and J1-B) [1]. The observations were acquired at the Gran Telescopio Canarias (GTC) and the Canada–France–Hawaii Telescope (CFHT) from mid-March to late July of 2016. Fig. 1 displays the evolution of the asteroid dust tails at the different observation dates.

A statistical analysis of backward-in-time integrations of the orbits of a large sample of clone objects of P/2016 J1-A and J1-B shows that the minimum separation between them occurred most likely ~2300 days prior to the current perihelion passage, i.e., during the previous orbit near perihelion. This closest approach was probably linked to a fragmentation event of their parent body. Monte Carlo dust-tail models show that those two components became active simultaneously ~250 days before the current perihelion, with comparable maximum loss rates of ~0.7 and ~0.5 kg s^{-1}, and total ejected masses of 8×10^6 and 6×10^6 kg for fragments J1-A and J1-B, respectively. Consequently, the fragmentation event and the present dust activity are unrelated. The simultaneous activation times of the two components and the fact that the activity lasted of the order of 6 to 9 months or even longer, strongly indicate ice sublimation as the most likely mechanism involved in the dust emission process.

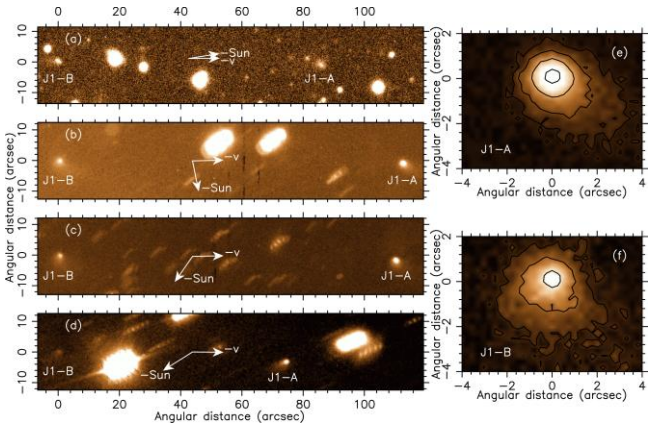

Fig. 1. Images of P/2016 J1-A and J1-B obtained with MegaCam on the 3.6 m Canada–France–Hawaii-Telescope on 2016 March 17 (a), and with OSIRIS at the 10.4 m Gran Telescopio Canarias on 2016 May 15, 29, and July 31 (b, c, d). In panels (a), (b), (c), and (d), the physical dimensions are 170982×33925, 133788×26545, 135616×26908, and 184964×36699 km^2, respectively. Close-up views of J1-A and J1-B on 2016 May 15 are shown in panels (e) and (f), respectively. The innermost isophotes in panels (e) and (f) correspond to 22.5 and 23.5 mag $arcsec^{-2}$ in the *r'* band, respectively. Isophotes increase in steps of one magnitude outward. North is up, and east is to the left in all panels. In panels (a) to (d), the projected directions opposite to the Sun and the negative of the orbital velocity vectors are shown.

REFERENCES:[1] Moreno, F., Pozuelos, F., Novakovic, B., Licandro, J., Cabrera-Lavers, A., et al. 2017, ApJ, 837, L3