

Fragmentation of Atlas 5 Centaur upper stage 2009-047B (SSN #35816)

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Atlas 5 Centaur 2009-047B

- Launch on Sep 8, 2009 to place PAN (USA-207) satellite in GTO, the launch declared as successful
- Atlas V (AV-018) in configuration V401 was used
- No official orbital information for Centaur upper stage was provided to the date at SpaceTrack
- **2009-047B presumably is identical to 2014-055B exploded on Aug 30, 2018**



Centaur with a single RL-10A-4-2 engine
Length 12.68 m
Diameter 3.05 m
Dry mass 2243 kg

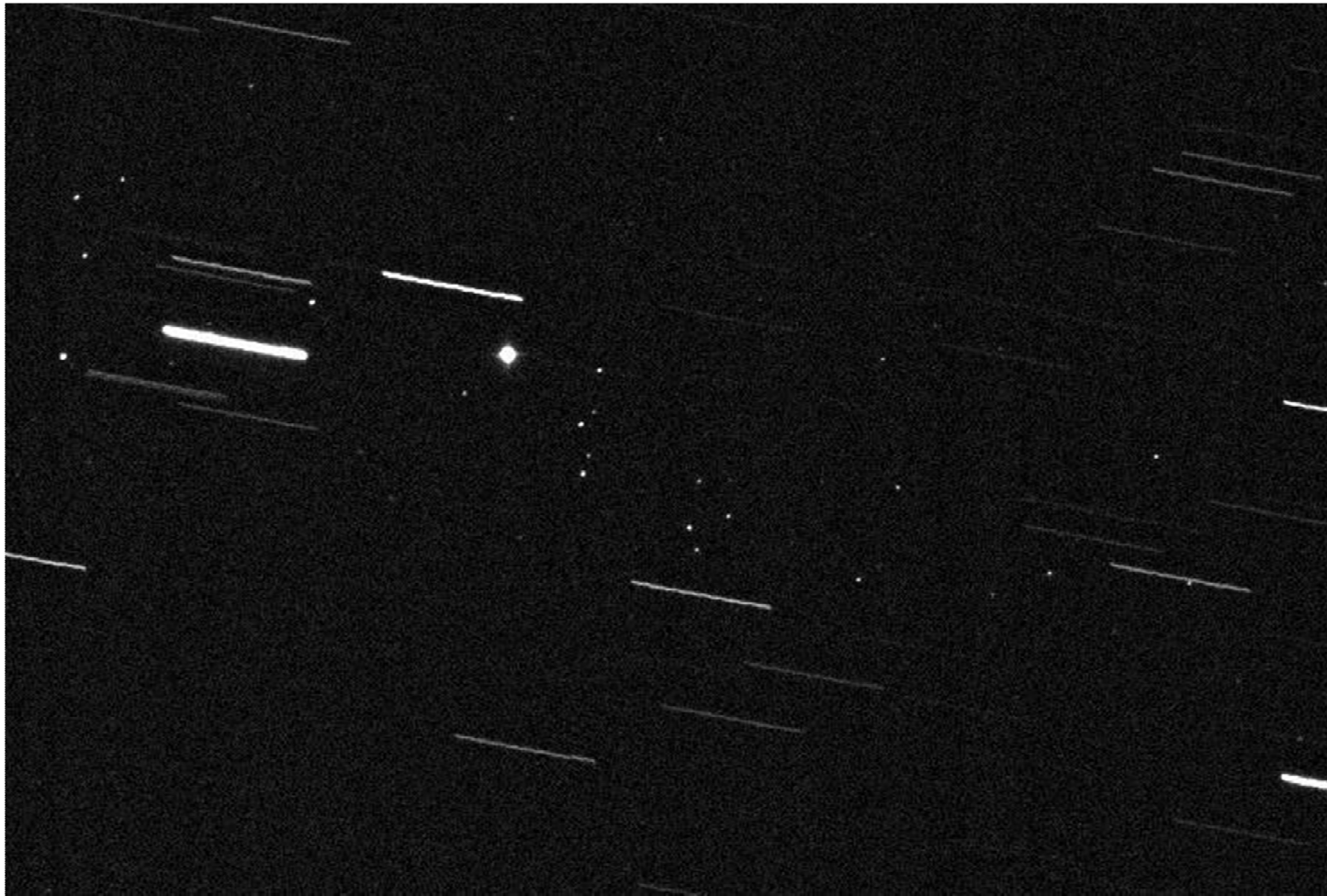
2009-047B routine observations

- Performed by telescopes of ASPOS OKP, Astronomical Scientific Center and ISON on a regular basis (nearly every night) in a follow-up mode
- Orbital parameters derived from the OD on Mar 20th, 2019 (J2000 frame, WGS84 ellipsoid):
 - nodal period – 738.66 min
 - inclination – 23.27°
 - RAAN – 123.104°
 - argument of perigee – 123.744°
 - apogee – 34708.9 km
 - perigee – 6675.6 km

2009-047B orbital motion anomaly and fragments detection

- First observation that lead to the detection an anomaly in orbital motion
– Mar 25 at 2223 UT
- Nearly 60 previously unseen objects were detected in the same frame with 2009-047B and nearby frames
- Visual magnitude of detected objects varied between 14.5 and 18.5
- Objects were dispersed along the 2009-047B orbit at the distance equivalent to -64...+20 s of time
- Starting Mar 26 dedicated surveys are scheduled

2009-047B fragments detection



ISON Terskol observatory, 80 cm telescope, 25.03.2019

2014-055B fragmentation update

- 577 fragments are tracked at present
- A few more dozens of fragments were detected but no follow-up procedure was established yet
- The near-apogee 'pinch point' moved back to the nighttime early of Mar but phase angles are still quite large to observe faint fragments

2014-055B fragments near-apogee pinch point evolution as seen from geocenter

