Daphnis wanderings

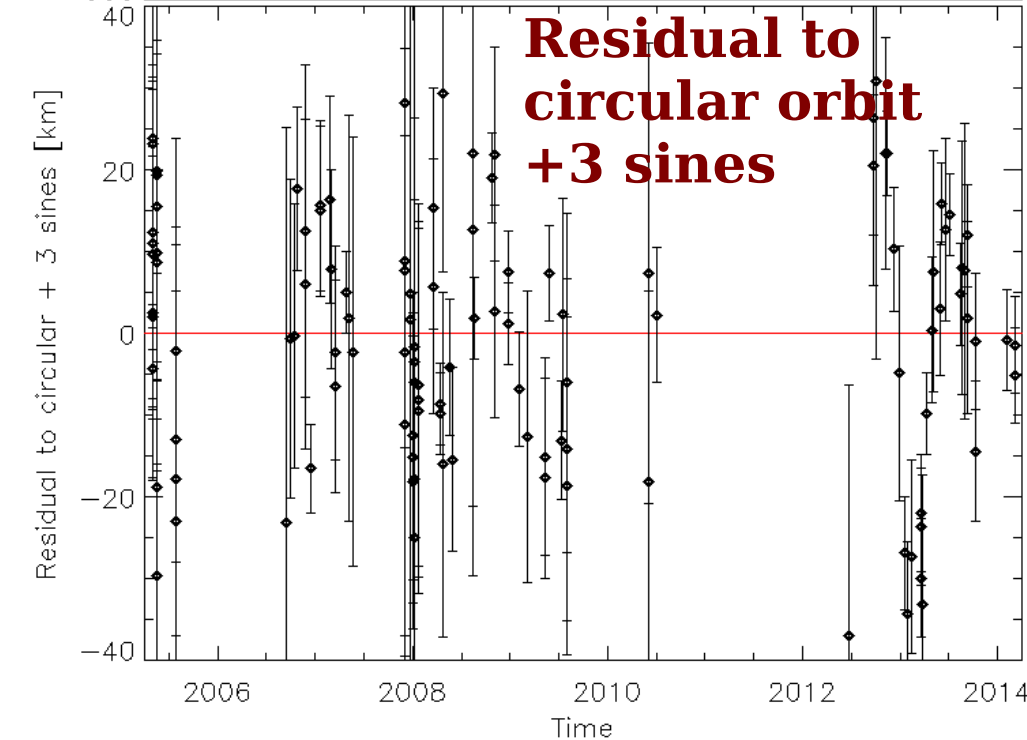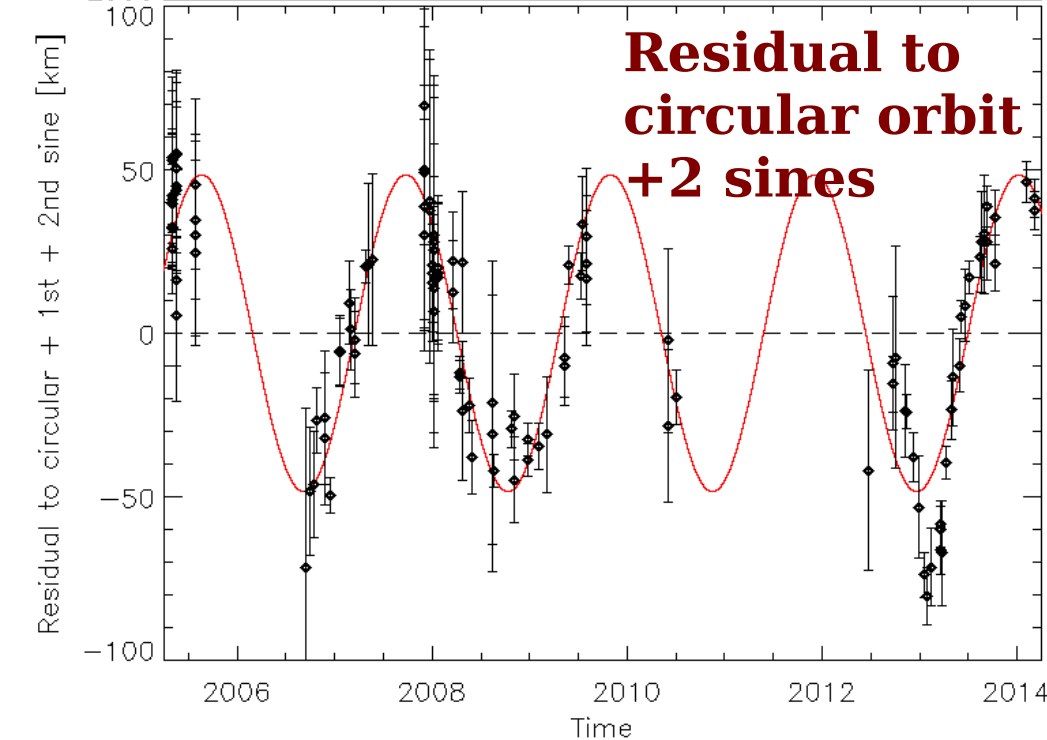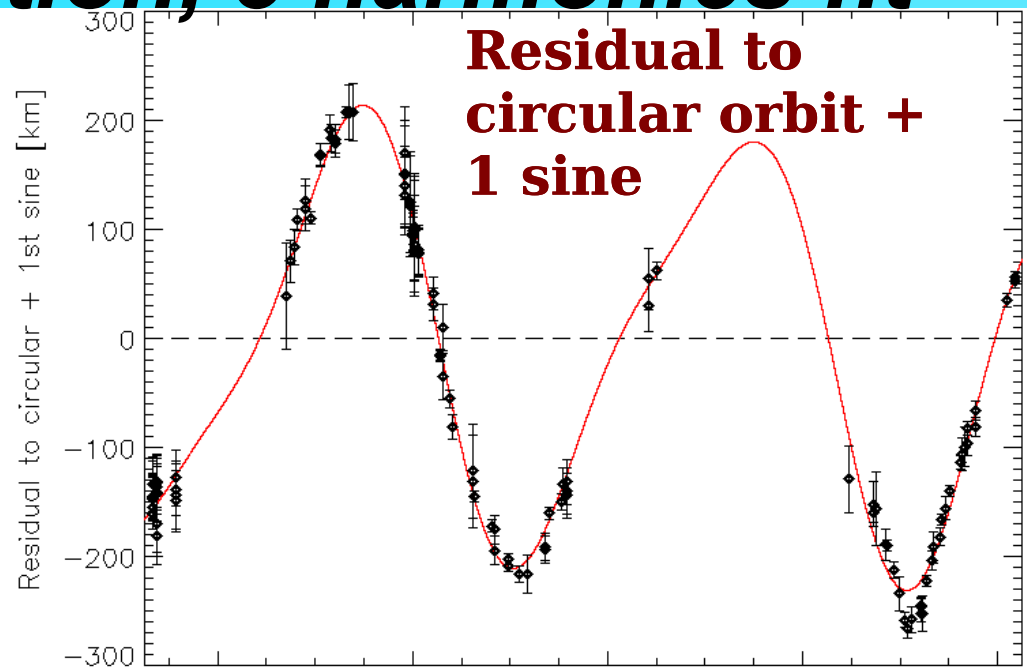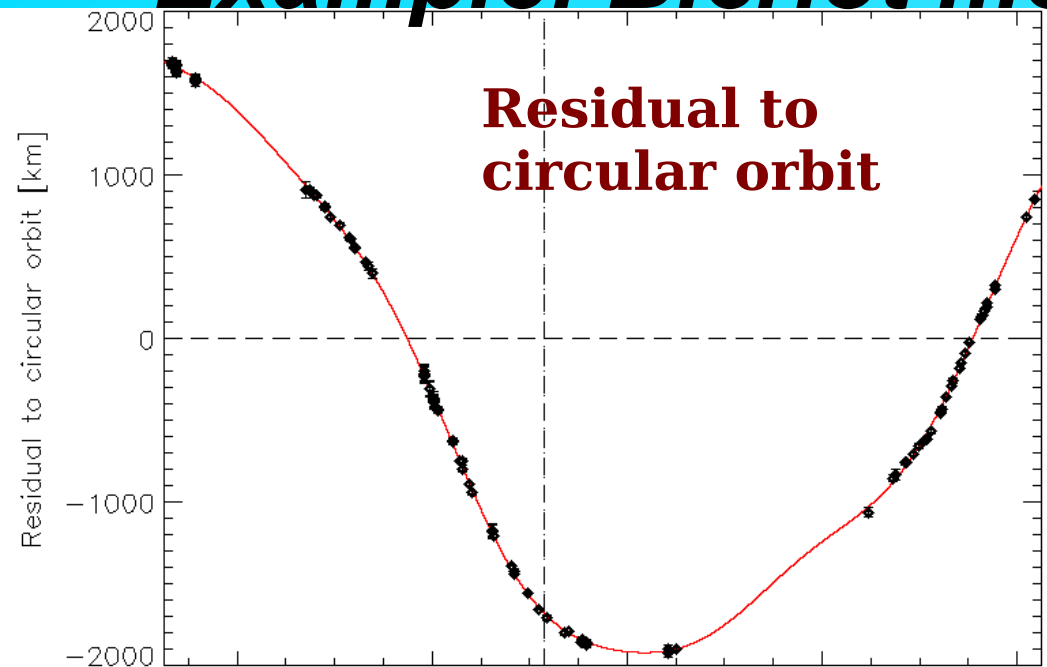**M. Sremčević**

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Motivation / hypotheses

• Daphnis is largest propeller and exhibits similar orbit wanderings?

• There are > dozen propellers at Keeler gap edge. They are kicked by Daphnis and Daphnis gets kicked?

• Are reported e and i maybe bit too large, and Daphnis is instead partially doing sine-like wandering like propellers?

• Instead of piece-wise linear fits maybe a total fit with 2-3 harmonics works for Daphnis?

Example: Bleriot motion, 3 harmonics fit

Residual to circular orbit

Residual to circular orbit + 1 sine

Residual to circular orbit +2 sines

Residual to circular orbit +3 sines

Caveats for Daphnis data
(also attached as txt)

• "Residual to circular orbit" means that eccentricity and inclination are ignored. They should show as an additional scatter.
• Phase angle and corresponding offset
  of Daphnis ignored.
• Error bars not too serious.
• Mix of navigation methods, kernels, possible parallax.

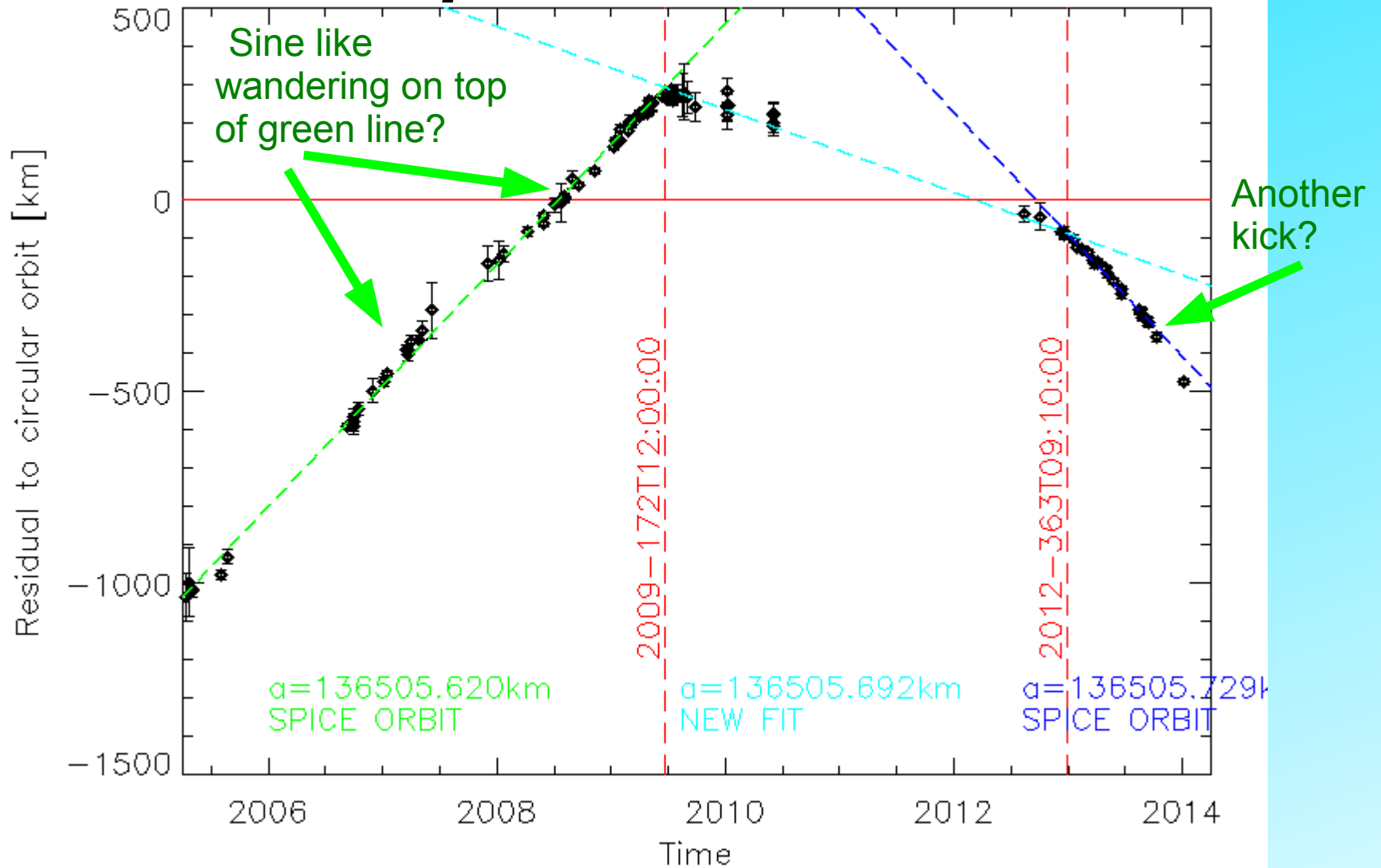# Extracting position from low res imgs
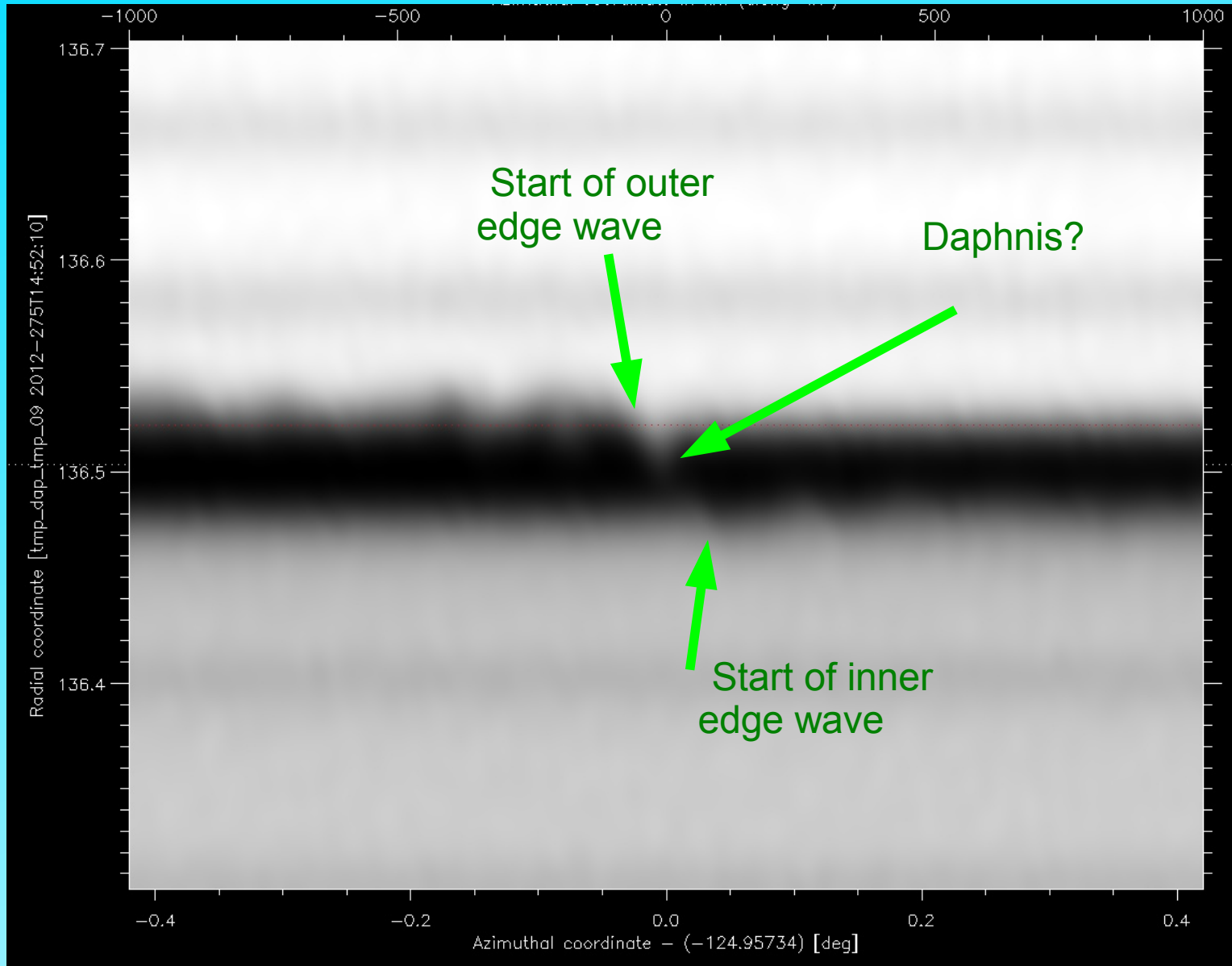
Coadding reprojected images (here: N1727798124 N1727797518
N1727796912 N1727796306).

Extracting position from low res imgs
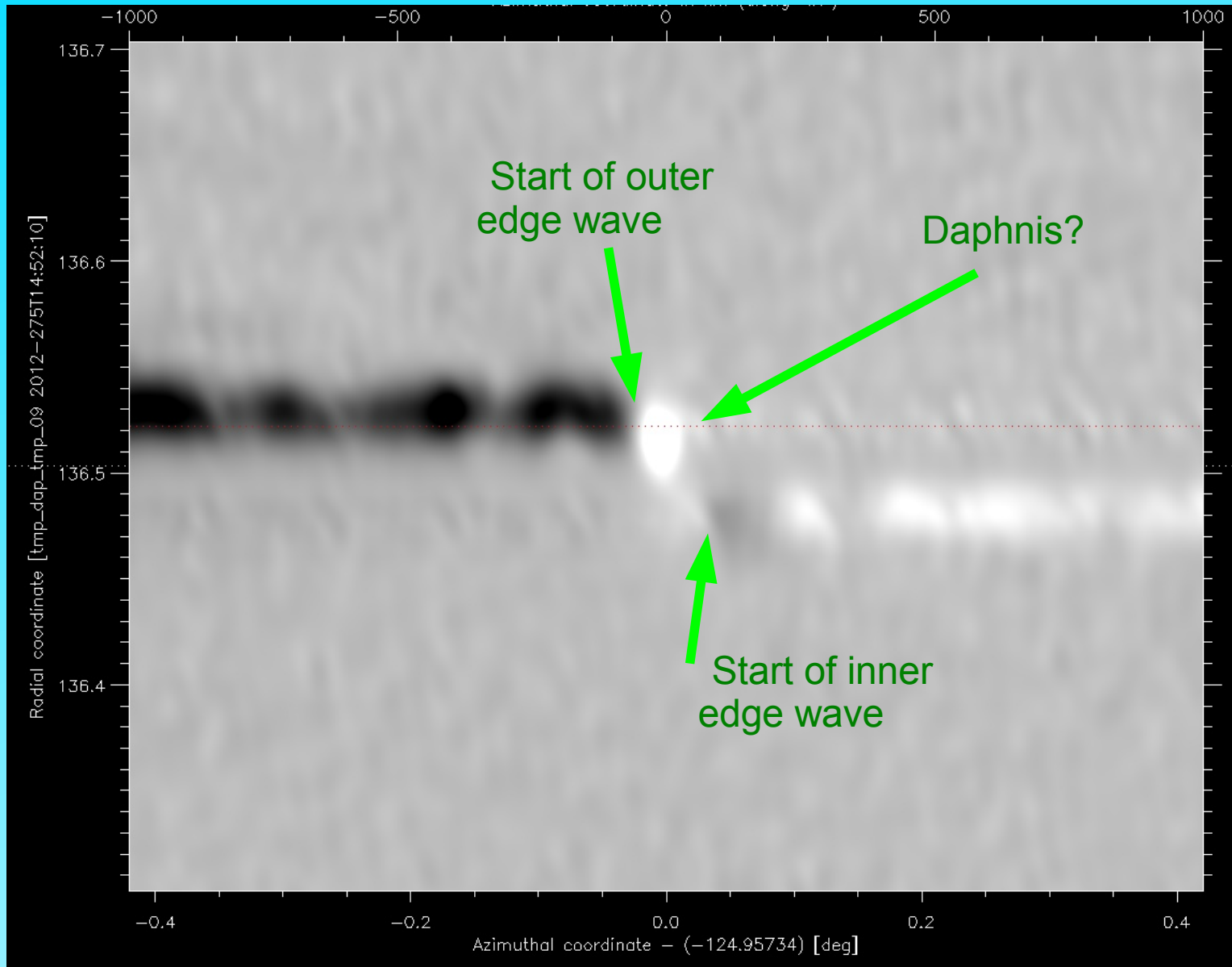
Subtract mean radial profile (from previous coadded image).
Even if Daphnis is not the white blob in the image, the start of outer
and inner edge waves bracket possible error.

Daphnis motion

Sine like wandering on top of green line?

Another kick?

2009-172T12:00:00

2012-363T09:10:00

a=136505.620km SPICE ORBIT

a=136505.692km NEW FIT

a=136505.729km SPICE ORBIT

Residual to circular orbit [km]

Time

My interpretation: semi-major axes a1, a2 and a3 change by only 50-70m in each kick!

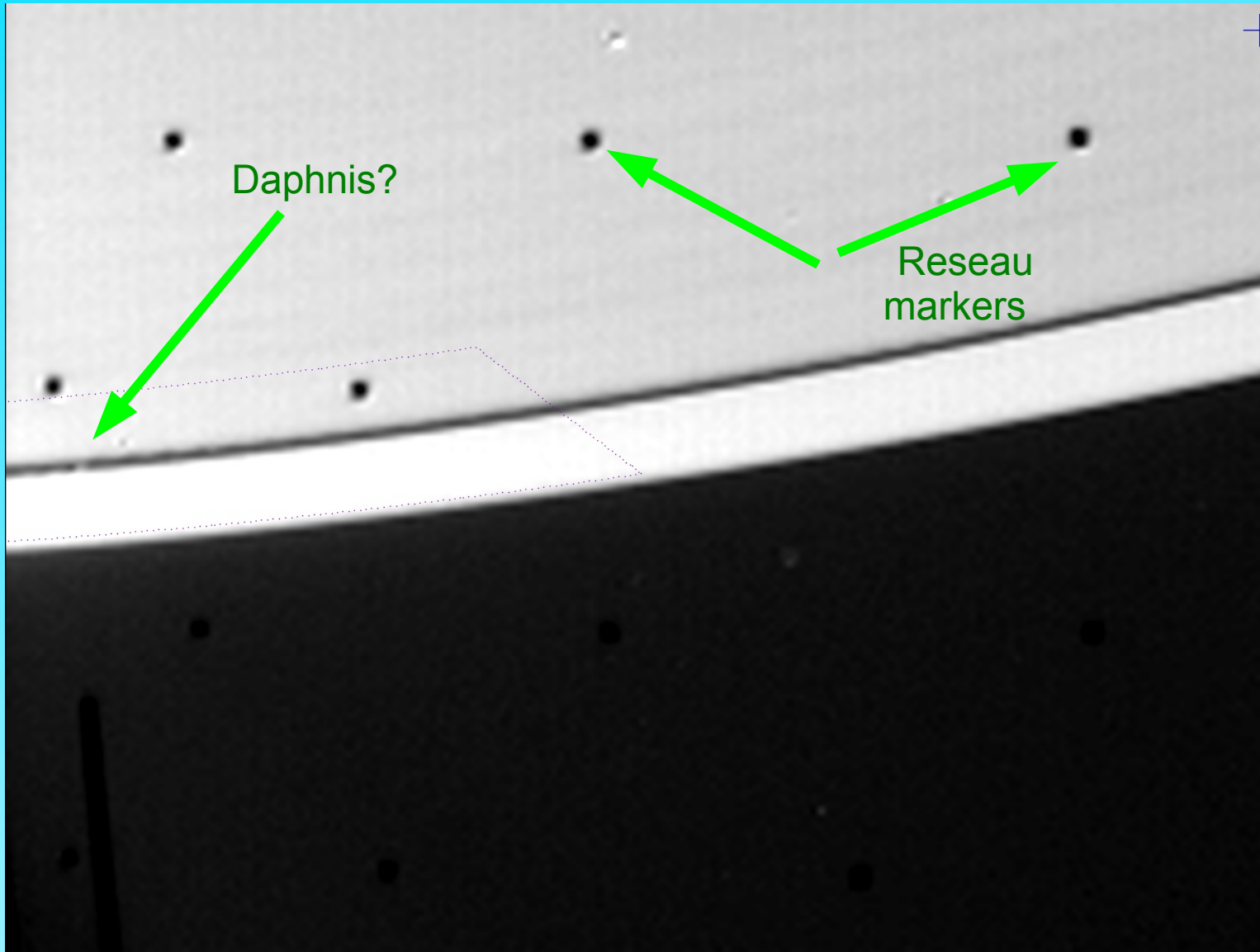## 2009-172 ... 2012-363 new fit

a = 136505.692 km
mean motion = 605.978667985 deg/day
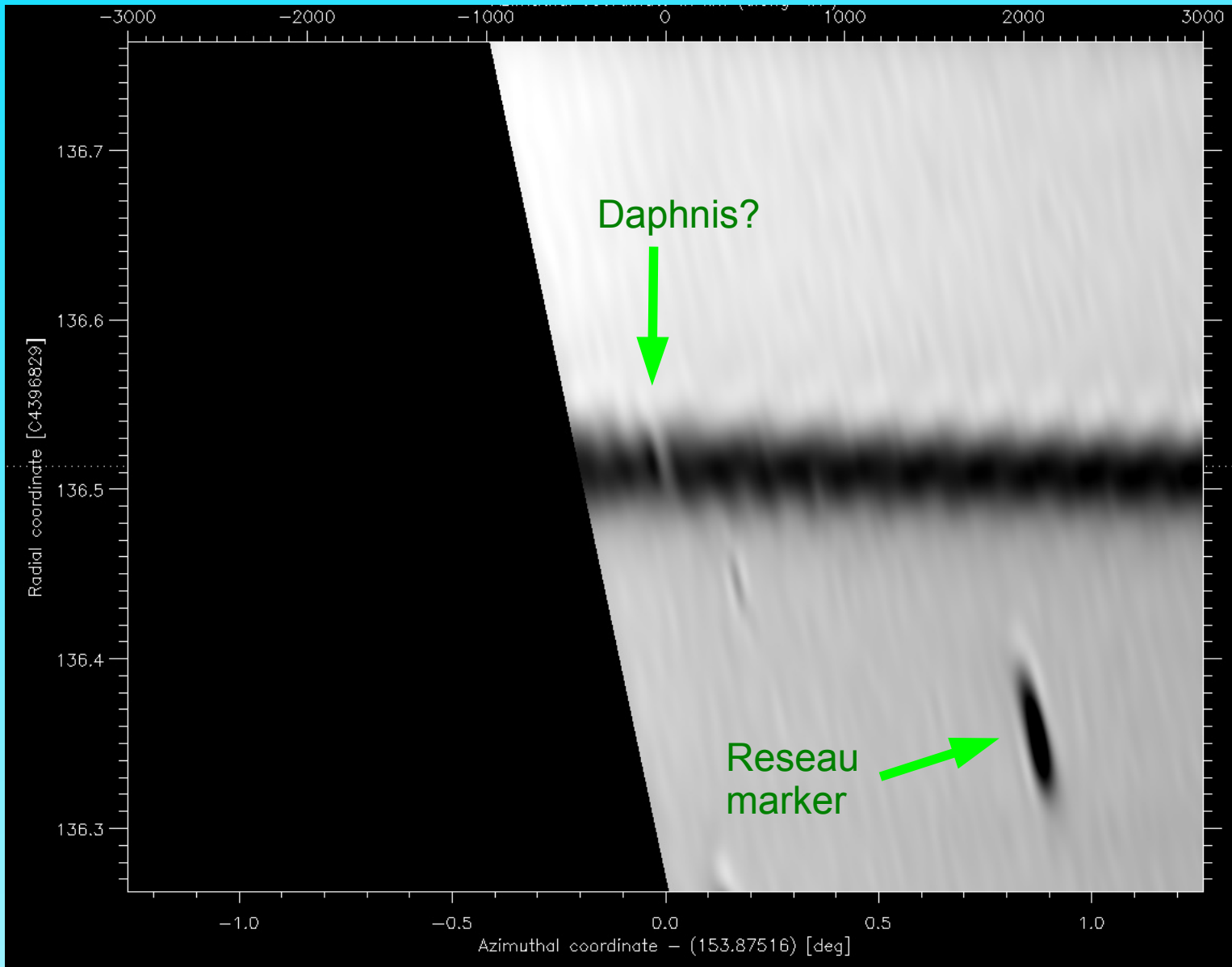epoch ET0 = 168213379.968
longitude0 = 223.687266

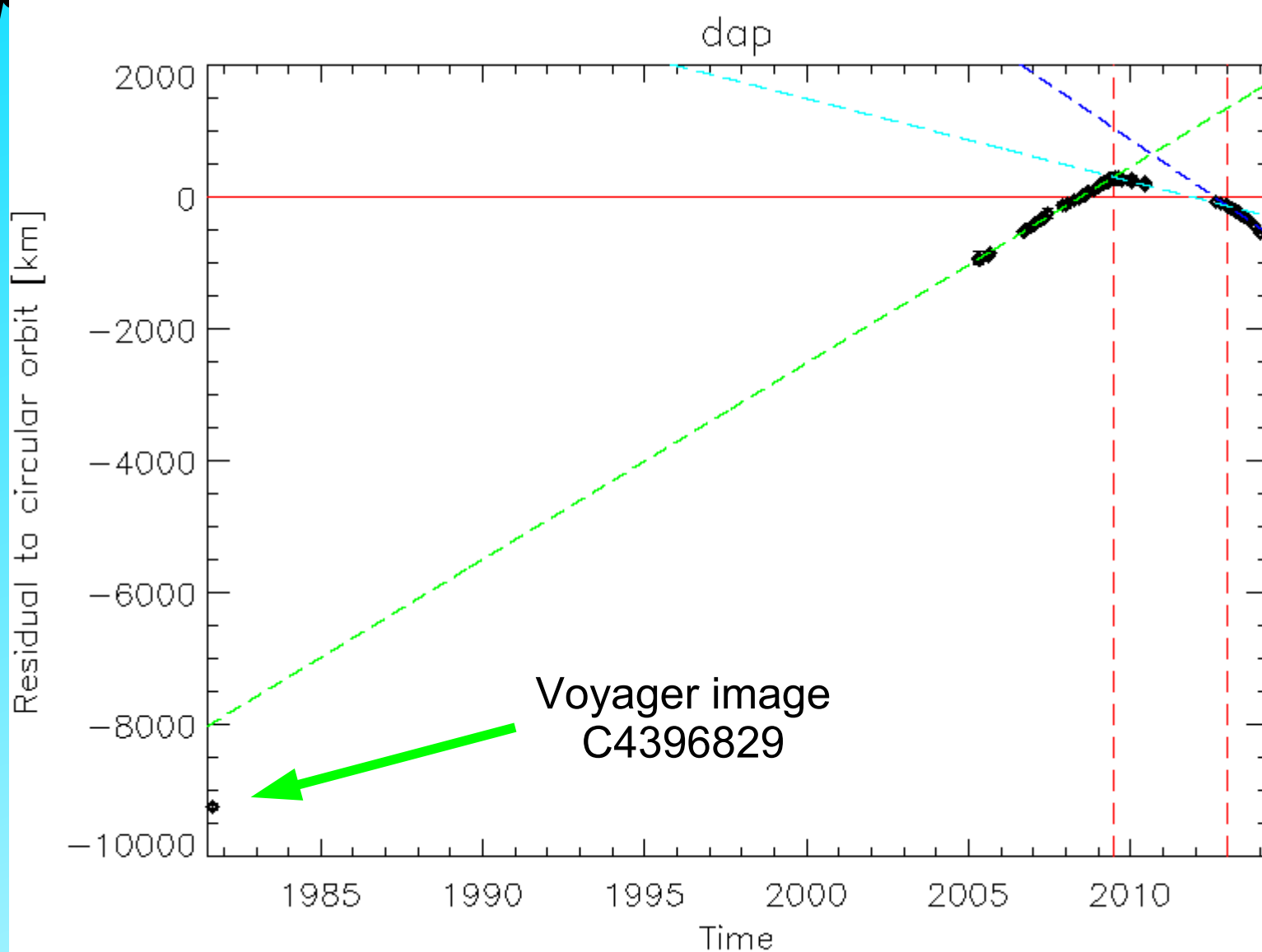# Daphnis detection in Voyager image C4396829?

Daphnis?

Reseau markers

This is non-rectified image!
The rectification (from reseau markers) and reprojection (800x800 →
1000x1000) tends to blur the image and decrease the resolution.

Daphnis detection in Voyager image C4396829?

Daphnis motion including possible detection in Voyager image

Voyager image
C4396829

But this is a single Voyager 2 image and
the white blob in the image may not be Daphnis.