

How big the Ship?

The Urth list — 1 messages, 1 voices, 31 Mar 1999

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m.driussi — 31 Mar 1999, 02:05

Today I finally found reason to try and calculate the size of the ship "Tzadkiel" by way of answering the question: if the miracle eclipse of the Sun by Apu Punchau was caused by the Ship's sails, then how big would it have to be, and how close to Earth, to cause a total eclipse?

=Angular Diameter=

The angular diameter of both Sun and Moon is around one-half a degree. The formula

$$S = 57.3 \times D/R$$

where D is diameter and R is distance from Earth.

Since the Ship is assumed to be in LEO (Low Earth Orbit), and LEO ranges from 150 to 2000 km, I just plugged in values to see what would happen. I also converted the diameter into leagues, since the league is the unit Severian uses for very big objects (wall of Nessus, the cliff in the mountains, etc.).

ORBIT SAIL DIAMETER DIAMETER IN LEAGUES

150 km 1.36 km 0.28

300 km 2.71 km 0.56

500 km 4.52 km 0.93

1000 km 9.04 km 1.87

2000 km 18.08 km 3.74

These sail diameters are all quite reasonable--in fact, by standards of solar sails, they are very modest, since solar sail designs range in diameter from 2 km to 400 km.

(FWIW, a sail diameter of 400 km can cause total eclipse at an orbit of 44,235 km.)

=mantis=