THE OCCULTATION OF 14 PISCIUM BY ASTEROID (51) NEMAUSA - SEPTEMBER 11, 1983. H. Povenmire, Florida Institute of Technology, 215 Osage Dr. Indian Harbour Bch. FL 32937, cpovenmire@cfl.rr.com

Introduction: On January 22, 1858, A. Laurent discovered a bright asteroid, (51) Nemausa, at Nimes, France. The class of this asteroid is S or silicate. The albedo is estimated at 0.062. The diameter was estimated at 156 km.

On September 11, 1983, at about 7:45 UT, (51) Nemausa was predicted to occult the star 14 Piscium over the southeastern United States under favorable conditions.

Occultation predictions: The path ran from the northeast to the southwest from Massachusetts to Texas and Mexico at an azimuth of approximately 239º. The maximum duration was predicted to be approximately 13.0 seconds. The weather was mostly favorable, and the Moon was not in the sky.

The star, 14 Piscium, is also known as HIP 116323, SAO 146780, HD 221675, HR 8944, FK5 3890, BD -02 5986, AGK3 –1 2850, PPM 181656, TYC 25251-00961-1 and ZC 3474. This star is of V magnitude +5.926 and spectral class A2m and is not a known binary. The ecliptic runs just south of 14 Piscium, so it can be occulted by the Moon. The coordinates of 14 Piscium are R.A. 23h 34m 09.02s, Dec. -01º 14' 51.2" (2000.0).

Data reduction: Approximately 40 chords were recorded by visual, photoelectric photometer and videocamera. There were also many Miss observations, which indicated that no secondary events or minor satellites were recorded. There is no indication that 14 Piscium is a binary.

The 6 photoelectric photometry station data has been reduced and implies that Nemausa is elongated, with a major axis of approximately 169.8 km and a minor axis of 123.0 km. The position angle of the major axis is approximately 29.1º east of north to the sky plane. It was found that the orientation of Nemausa was narrow end forward. It was also found that although an elliptical fit was fairly good, there were obvious limb irregularities, which provided multiple events along the southern limb [1].

Conclusions: When the majority of the visual chords were added, it was found that the minor axis was somewhat greater. The reduction of the photoelectric chords was fairly straightforward. The reduction of the visual chords was more difficult due to interpretation of reaction times. The "Startle Effect" can easily cause reaction times of nearly 1.0 second even by experienced observers. Since an error of only 0.25 seconds can cause an error in diameter of 2 percent, these results have to be carefully interpreted. These results were not published.

In 2002, when this data was reviewed, it was also found that at least 10 critical chords were not included. These were especially valuable in confirming the northern limit. There was an approximate one half path width prediction error which produced a strong south shift. There were also cloud problems in the southern part of the path. This caused many Miss observations and important areas which could have been observed were not. This final solution will be referred to as the Florida Tech solution. These data give the following solution.

This solution showed a circular fit with the major and minor axis of approximately 167.1 km. This solution is greatly different from the earlier solution. Since it uses all the data it is probably more accurate.

This asteroid-stellar occultation was the second best observed for 19 years.

I wish to acknowledge K.I. Povenmire for the financial support and observation, Larry Wasserman of Lowell Observatory, T. Bowell, R. Millis, L. K. Kristensen, G. E. Taylor, A .K. Klemola, and D.W. Dunham of IOTA, the astrometrist, and the many observers who contributed observations.

References: [1] Dunham E. W. et al. (1984) Results From the Occultation Of 14 Piscium by (51) Nemausa *AJ, 89,* 1755-1758. [2] Povenmire, H. (1980) The Graze Observers Handbook 2nd Ed. JSB Publications Indian Harbour Bch., FL