

Opposition Date (1984)	Planet	B Mag
Oct 2	1273 Helma	15.7
Oct 4	886 Washingtonia	12.2
Oct 5	939 Isberga	14.4
Oct 6	1962 Dunant	16.3
Oct 7	337 Devosa	12.2
Oct 7	1765 Wrubel	14.4
Oct 8	1299 Mertona	15.8
Oct 8	1431 Luanda	14.8
Oct 9	554 Peraga	11.7
Oct 13	134 Sophrosyne	12.1
Oct 17	37 Fides	10.7
Oct 17	1671 Chaika	14.6
Oct 17	1986 1935 SV1	16.1
Oct 17	2099 Opik	15.8
Oct 8	8 Flora	8.8
Oct 19	112 Iphigenia	12.9
Oct 19	804 Hispania	12.0
Oct 23	882 Swetlana	14.3
Oct 25	650 Amalasuntha	15.2
Oct 28	959 Arne	14.9
Oct 28	1040 Klumpkea	14.4
Oct 31	295 Theresia	14.0
Nov 4	1236 Thais	14.3
Nov 5	735 Marghanna	12.3
Nov 6	144 Vibilia	11.0
Nov 6	262 Valda	14.5
Nov 6	958 Asplinda	16.1
Nov 8	97 Klotho	10.4
Nov 9	2667 1967 UO	17.0
Nov 12	364 Isara	12.3
Nov 14	1196 Sheba	14.0
Nov 17	568 Cheruskia	13.3
Nov 22	1529 Oterma	15.6
Nov 26	1689 Floris-Jan	14.5
Nov 27	200 Dynamene	12.1
Dec 3	751 Faïna	12.1
Dec 5	464 Megaira	13.5
Dec 6	2152 Hannibal	15.6
Dec 11	2360 Volgo-Don	15.7
Dec 14	7 Iris	8.1
Dec 16	351 Yrsa	13.1
Dec 18	1626 Sadeya	14.3
Dec 20	66 Maja	12.8
Dec 28	747 Winchester	10.9
Dec 28	2228 Soyuz-Apollo	15.7
Dec 29	1736 Floirac	14.8

Table III
Preliminary Ephemeris for 2101 Adonis

Date (0 hours UT)	R. A. (1950) h m	Dec. d m	B Mag.
1983 June 30	18 26.09	-34 45.8	15.6
July 2	18 04.03	-37 15.7	15.2
July 4	17 25.65	-40 39.1	14.8
July 6	16 10.56	-44 22.1	14.4
July 7	15 08.40	-44 57.3	14.4
July 8	13 49.61	-42 35.8	14.4
July 9	12 28.71	-35 59.9	14.7
July 10	11 22.37	-26 34.0	15.2
July 12	10 01.09	-09 32.7	16.3

EUROPEAN SATELLITE STUDIES OF MINOR PLANETS

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(Received: 16 May Revised: 30 August)

Three European Space Agency satellites capable of observing minor planets are reviewed. One, IRAS, has already been launched. The second, Hipparcos, is scheduled for launch in 1986, while the third, AGORA, is currently being considered.

IRAS

The Infrared Astronomy Satellite (IRAS) was launched on January 26, 1983 from the Western Test Range near Lompoc, California. According to Thomas (1983), the IRAS compares what it sees with a "Known Objects" catalog. If the observed and predicted detections match, the source is said to be "seconds confirming". The next stage in the analysis involves the "New Source Data Base". A source found to have the same position as a source observed on a previous scan is termed "hours confirming". This two-stage process is designed to enhance the reliability of detecting genuine sources, and to reject fast moving objects. Fast moving asteroids, particularly Mars and Earth crossers, will pass seconds confirmation, but will fail hours confirmation.

The first criteria to search among these rejects involves the IR fluxes. Sources too hot or too cold are eliminated. Next, only sources above a certain galactic latitude are accepted. The next step is to select pairs of sources if they are observed on different orbits of IRAS, and if their fluxes in each band agree to within certain tolerances. A listing of these pairs will be produced to be studied by project scientists.

IRAS will be capable of detecting 1800 of the numbered asteroids with known orbits. This includes nearly all objects larger than 3 km in diameter. The telescope measures IR radiation at 10, 25, 50, and 100 microns, and will determine the thermal fluxes of some 500 asteroids. These data can be used to estimate asteroidal diameters (Sky & Telescope 1980). The improved statistical base that IRAS will provide about the asteroids will give scientists a better understanding of the collisional history of the solar system. A major step towards such an understanding came in August, 1983, when it was announced that IRAS had detected a ring of particles, possibly including asteroids, orbiting the star Vega.

Hipparcos

Hipparcos, scheduled for launch in 1986, will be an astrometric satellite whose main task will be to establish the positions of 100,000 stars with great accuracy. It will also be able to search for binary asteroids by direct imaging. As detailed by Schober (1982), some 350 asteroids brighter than $B=13.0$ will be accessible to Hipparcos.

With Hipparcos, it will be possible to observe asteroids 100 km in diameter at a distance of 2 to 3 AU, corresponding to an apparent diameter of 0.05 arc second. A secondary component is expected to be more than 0.1 arc second from the primary. Periodic variations from a smooth orbit, or even direct observations of a faint secondary, are possible if the same asteroid is scanned several times. From the observed orbital rates and absolute distances within the binary system, masses and densities could be determined.

AGORA

Among the five proposals for new space science missions (ESA Bulletin) is AGORA, the Asteroidal Gravity, Optical and Radar Analysis mission. A description of the mission and model payload was provided by Marsden (1983). The baseline mission comprises a rendezvous with a main belt asteroid (diameter larger than 100 km, semi-major axis 2.5 AU or less), followed by at least two fly-by encounters of smaller objects. No choice of specific targets has been made, but previous studies by JPL have shown that a number of interesting missions exist for the AGORA launch time frame (1990-94).

The model payload consists of a wide-angle camera (150 mm focal length), a high-resolution camera (1500 mm focal length), an infrared spectrophotograph (0.8 - 3.4 microns), a radar altimeter/microwave radiometer, and a gamma-ray spectrometer, together with a complement of instruments for measuring the interplanetary plasma environment during the cruise phases. In addition, the spacecraft will carry a number of small ejectable test masses, one of which will be released one or two days prior to each fly-by encounter. The trajectory of the test mass will pass between the spacecraft and the asteroid, allowing the relative perturbation due to the latter to be measured and thereby enabling the asteroid's mass to be estimated. Nominal fly-by distance will be 500 km with a relative velocity of 5 km/sec.

The AGORA craft will be rather complex, requiring 3-axis stabilization, a large steerable solar array, a deployable science instrument scan platform possessing 2 degrees of freedom, and possibly a steerable high gain antenna dish. Two propulsion systems are being considered. The first involves a chemical motor plus a single Mars gravity assist. The alternative is electric propulsion based on European ion drive technology. In either case, AGORA is constrained to launch using an Ariane rocket.

AGORA is a revised version of the Asterex probe, which was rejected by the Science Program Committee of ESA in 1981 (Thomson 1982). The proposed craft had a weight of 750 kg and was also 3-axis stabilized. Designed to carry an imaging camera, infrared spectrometer, and radar altimeter, Asterex would have had a three year lifetime.

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ASTEROIDS TARGETED FOR ARECIBO RADAR OBSERVATIONS IN 1984

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(Received: 20 October)

A list of radar targets currently planned for Arecibo observations in 1984 is presented to encourage observers to obtain supporting physical observations. Photoelectric lightcurves are especially needed to fully interpret the radar data.

The table below lists asteroids for which radar observations are currently planned using the National Astronomy and Ionosphere Center's Arecibo Observatory in Puerto Rico. The number and name of each target is given along with the UT dates on which observations will be attempted. S is the expected single-night signal-to-noise ratio. The final two columns give the opposition date and the opposition B magnitude of the asteroid.

This table is presented to encourage observers to make supporting physical observations of these asteroids, especially near simultaneous photoelectric lightcurve observations. These data can greatly enhance the interpretation of the radar observations for reasons described by Ostro (1983) (MPB 10, 10-11).

1984 Arecibo Radar Targets

Target	Observation Dates	S	Opp'n Date	Opp'n B Mag
60 Echo	Feb 26-Mar 3	5	Feb 9	11.6
9 Metis	Mar 13-Mar 18	5	Mar 22	10.5
27 Euterpe		5	Mar 9	10.5
2101 Adonis	Jul 13-Jul 18	150	Jun 29	15.6
554 Peraga	Oct 29-Nov 3	7	Oct 9	11.7
144 Vibia		9	Nov 6	11.0
7 Iris	Dec 11-Dec 17	30	Dec 14	8.1