Curso Introdutório em Tecnologia de Satélites

Exemplos de Satélites Artificiais e Sondas Interplanetárias

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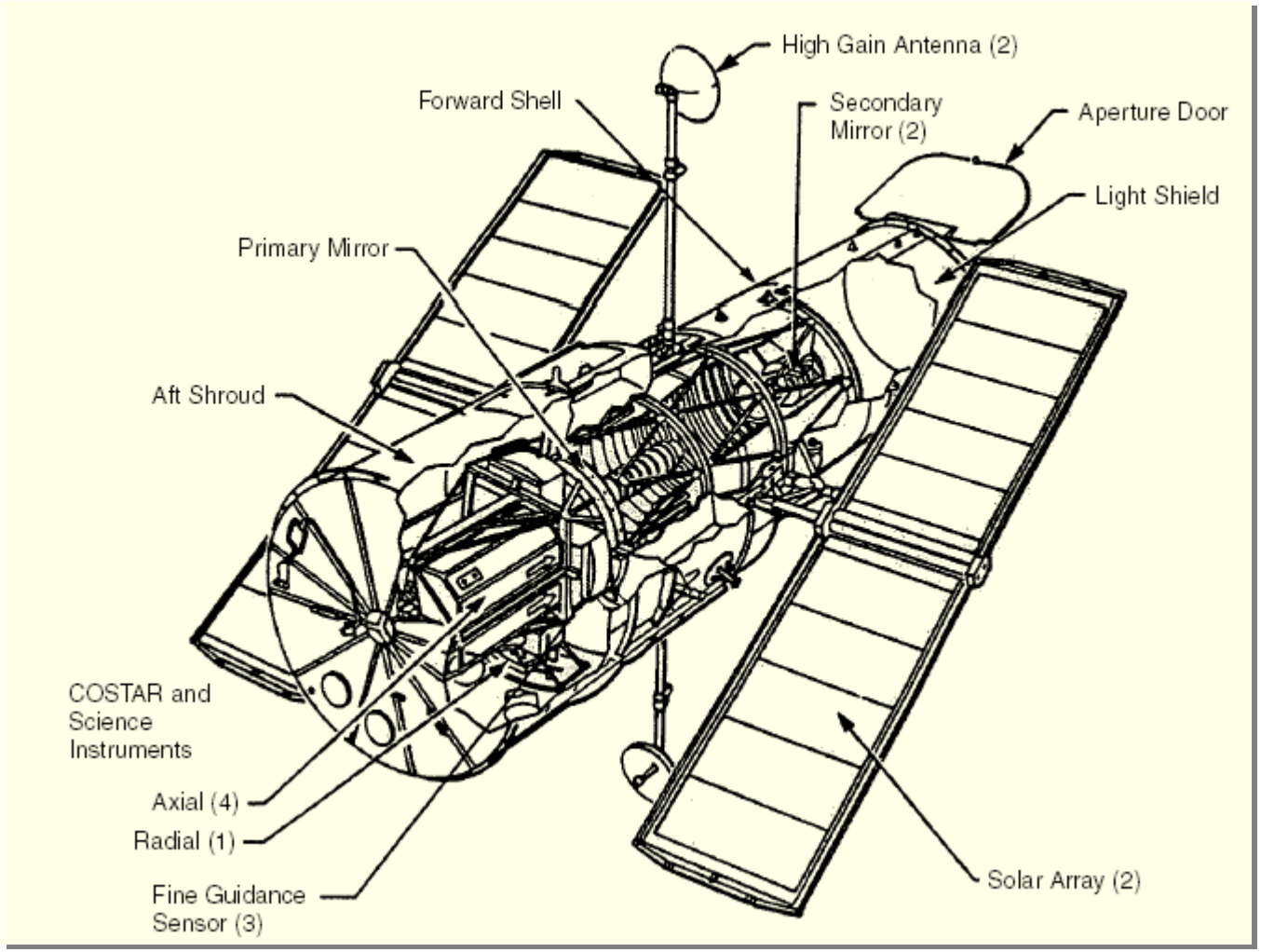
1.1 – Satélites artificiais ou sondas interplanetárias: Definições

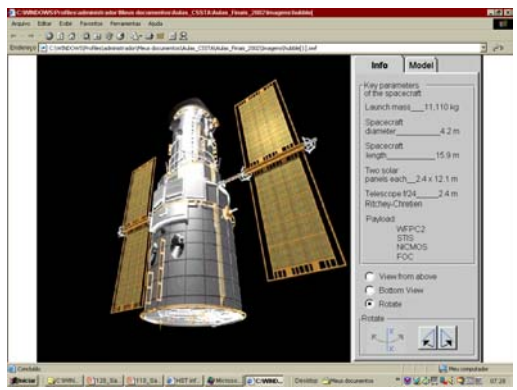
- Satélites e sondas são a parte mais visível de um conjunto de sistemas concebidos com o propósito de explorar o espaço exterior com uma finalidade específica.
- Satélites e sondas são concebidos tendo em mente exclusivamente sua função e o ambiente onde deverão operar (em seu projeto não são considerados aspectos de estilo ou moda). Desta forma, dependendo da finalidade, sua aparência mudará totalmente de uma missão para outra.
- Satélites e sondas são conceitualmente divididos em duas partes: a **carga útil** (“payload”) e o **corpo básico** (“bus”):
  - A carga útil não é necessariamente única. Ex: Um satélite de telecomunicações pode contar com vários transmissores. Um satélite científico pode contar com vários experimentos.
  - O corpo básico conta com as partes necessárias para suportar o lançamento e sustentar a operação da carga útil.

1.1 – Satélites artificiais e sondas interplanetárias: Exemplos

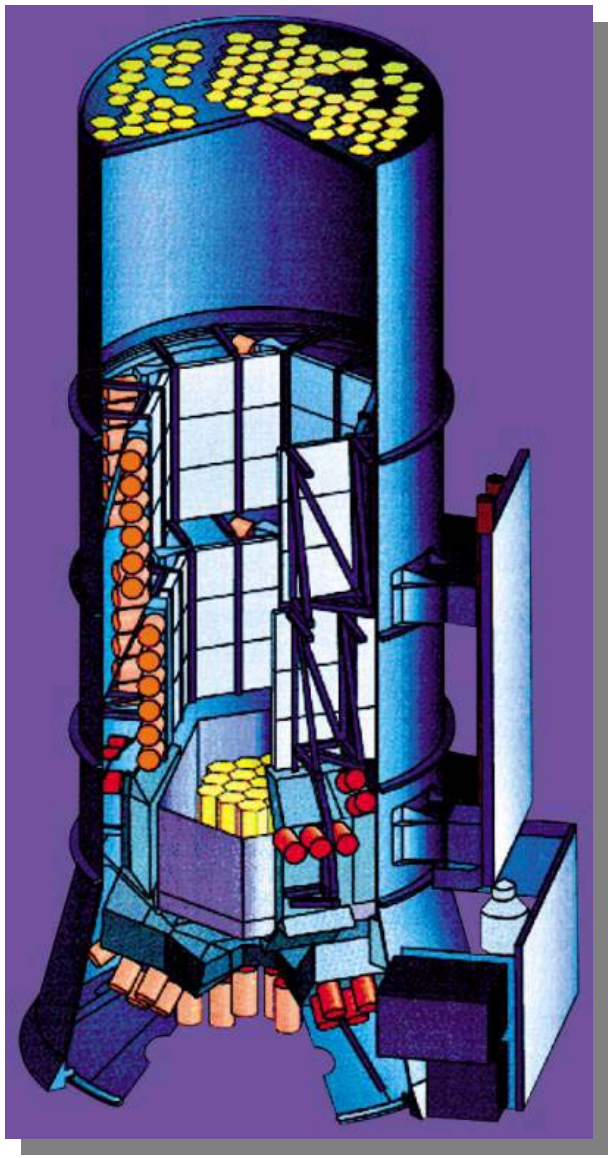
- Telescópios espaciais
  - Hubble Space Telescope
  - INTEGRAL
  - XMM-Newton
- Satélite de sensoriamento remoto
  - Topex/Poseidon
- Satélite de telecomunicações
  - A2100
- Sondas interplanetárias
  - SOHO
  - Rosetta
  - Ulysses
  - Cluster
  - SMART
  - Mars Express
  - Cassini/Huygens
  - Voyager 1 e 2
  - Magellan
  - Galileo Orbiter

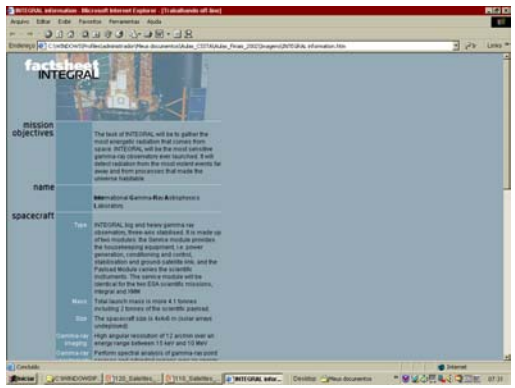
1.1 – Satélite artificial: Hubble Space Telescope, [31, 28]

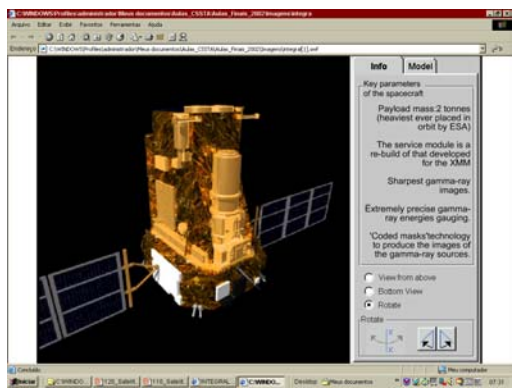




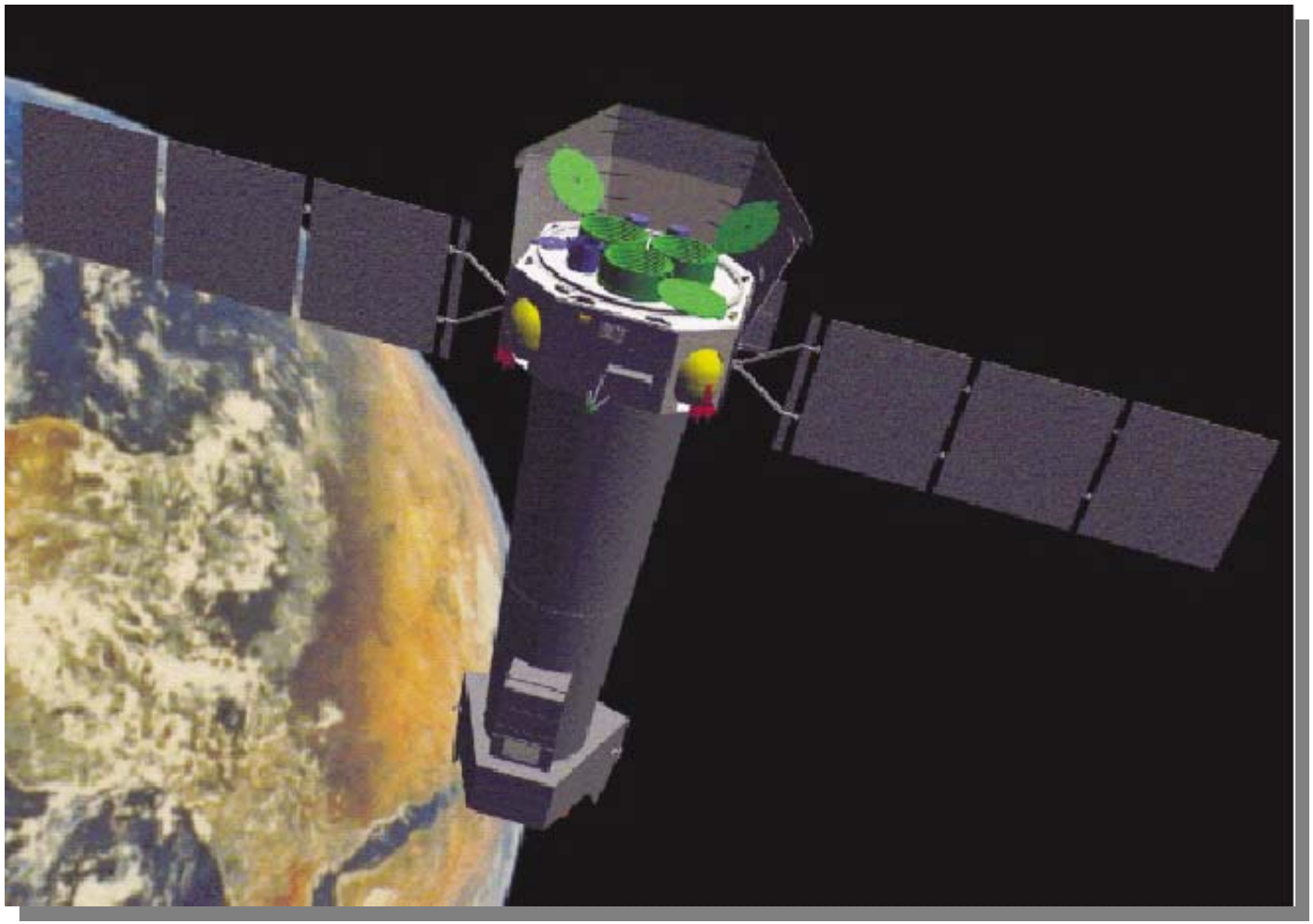
1.1 – Satélite artificial: INTEGRAL, [31]

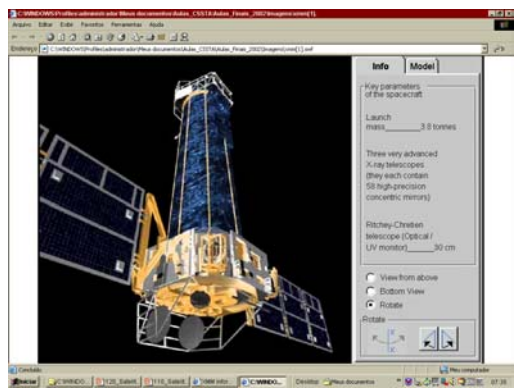




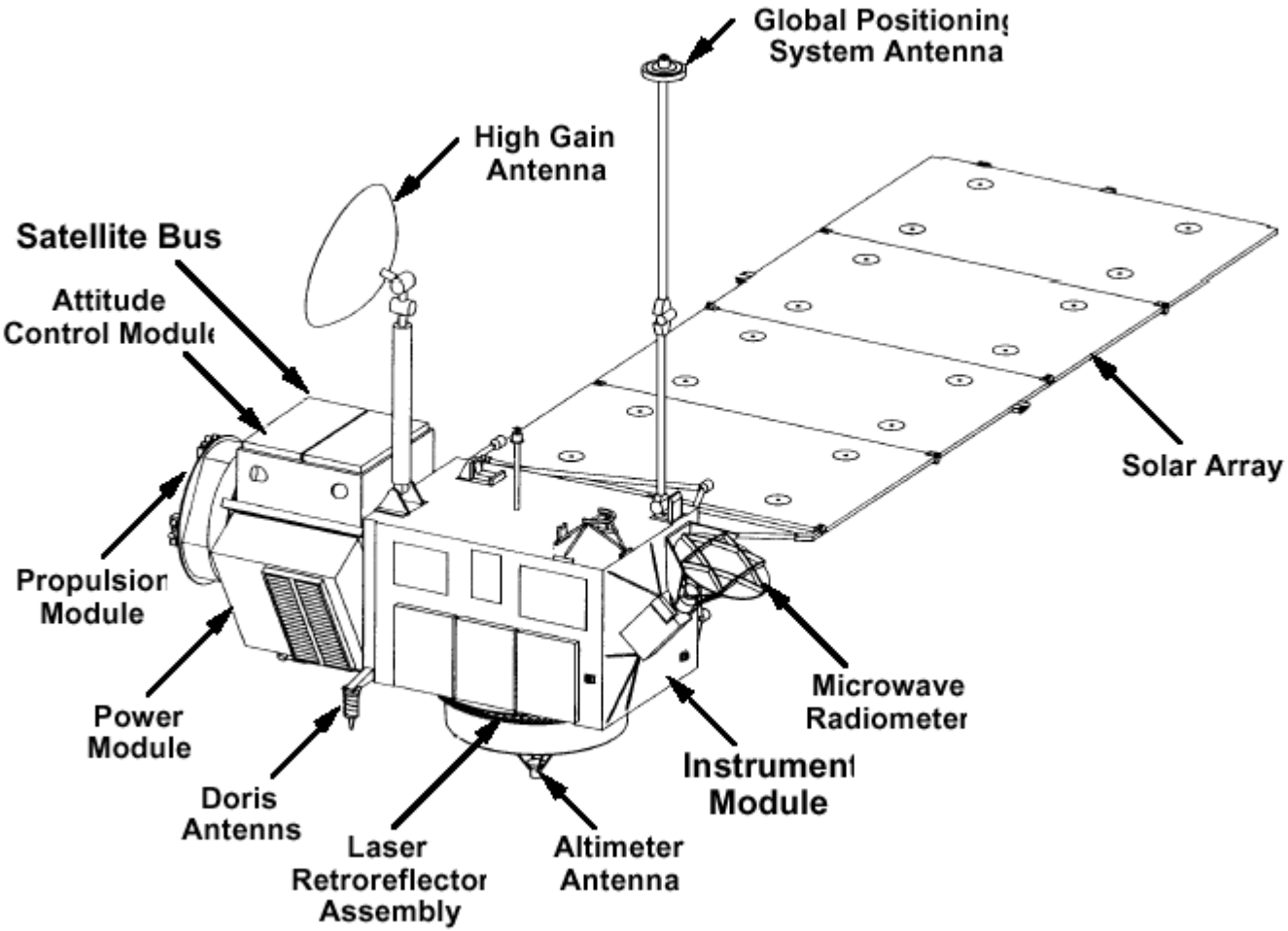


1.1 – Satélite artificial: XMM-Newton, [31]





1.1 – Satélite artificial: Topex/Poseidon, [2]



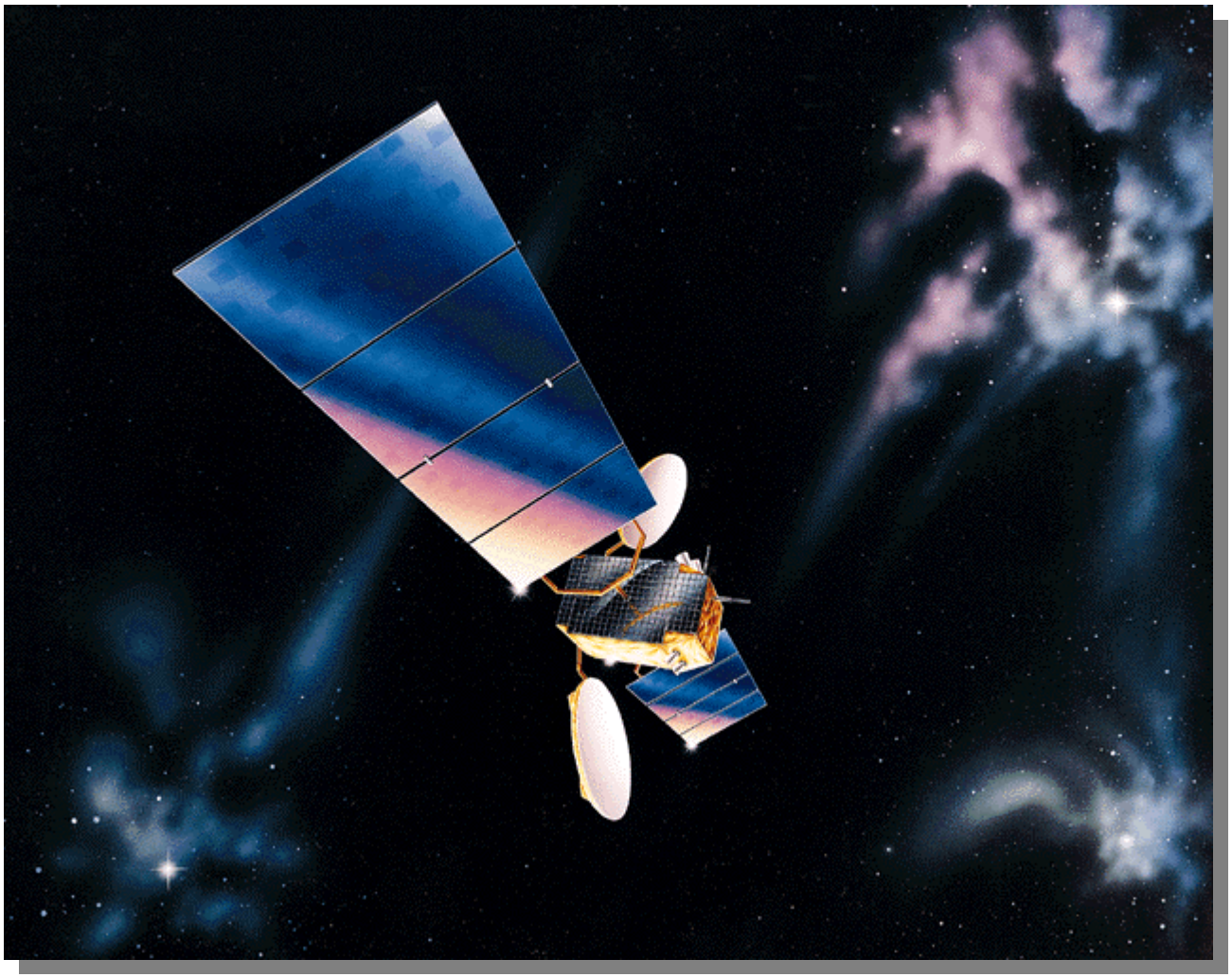
Classification: Orbiter spacecraft.

Mission: Global view of Earth's oceans.

Features: Topex/Poseidon is a joint project between NASA and Centre National d'Études Spatiales (CNES) launched in mid 1992 aboard an Ariane 4. The spacecraft occupies a 1336-km-high Earth orbit inclined 66°. Revealing minute differences in the oceans' heights, Topex/Poseidon's data should lead to improved understanding of oceanic circulation and forecasting of global environment.

Stabilization: Three-axis stabilized via reaction wheels and thrusters.

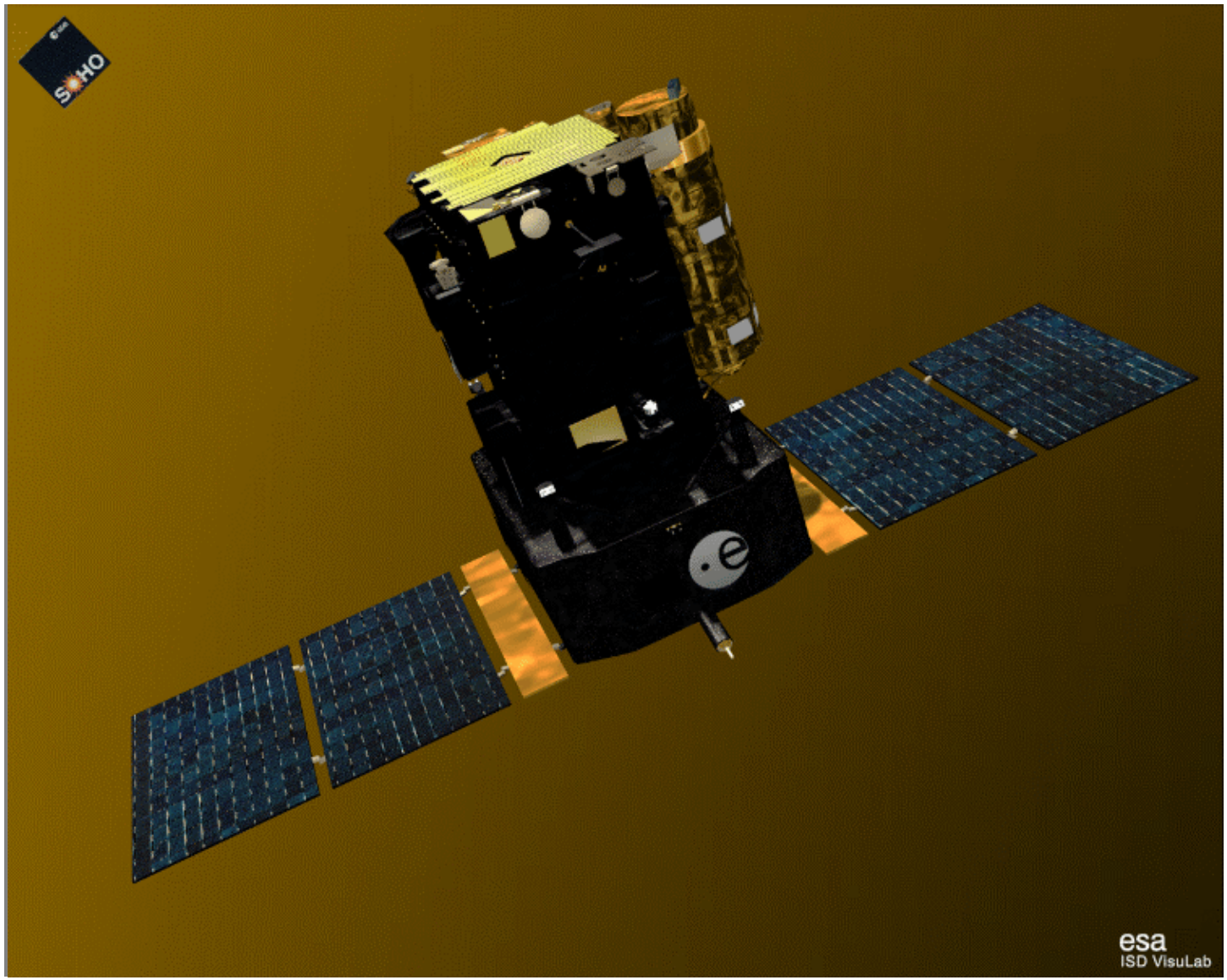
1.1 – Satélite artificial: Satélite de Telecomunicações

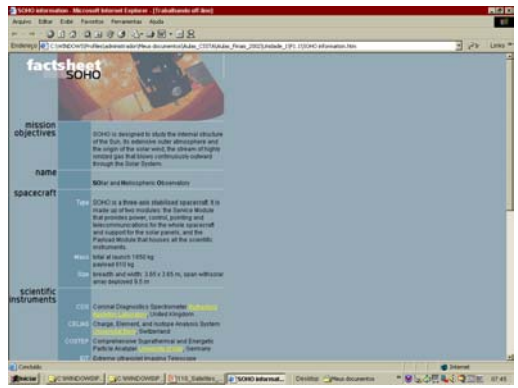


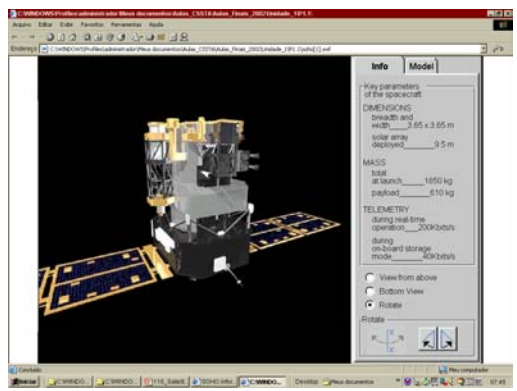
Product: A2100

Company: Lockheed Martin Telecommunications

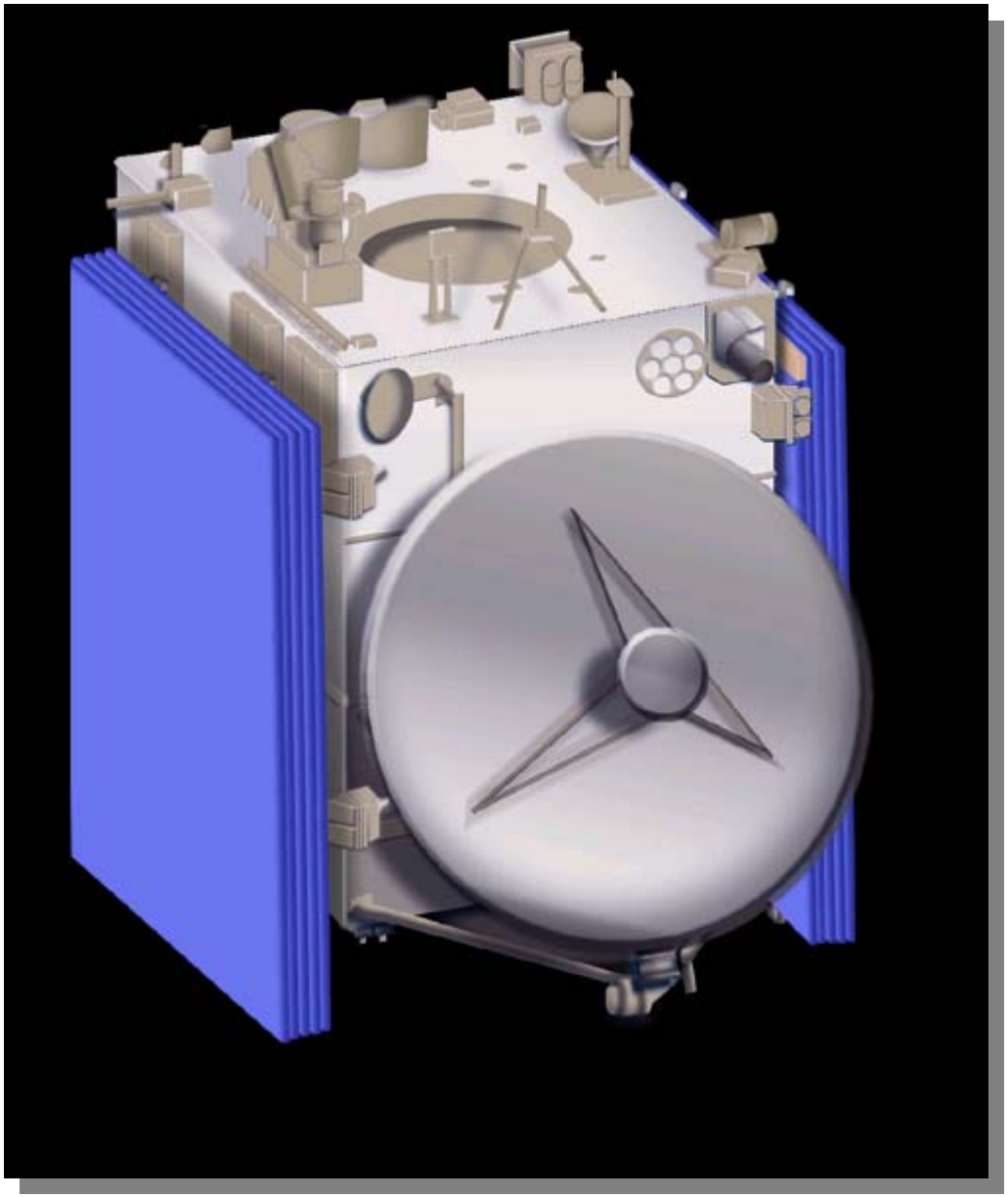
1.1 – Sonda interplanetária: SOHO, [31]

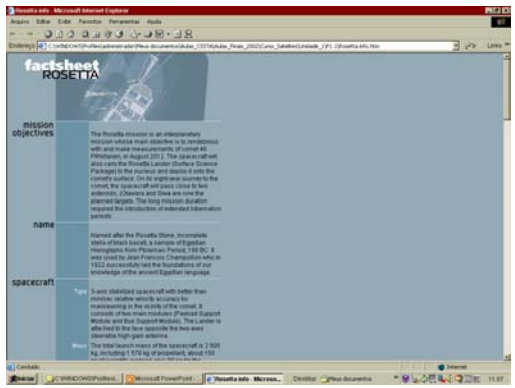


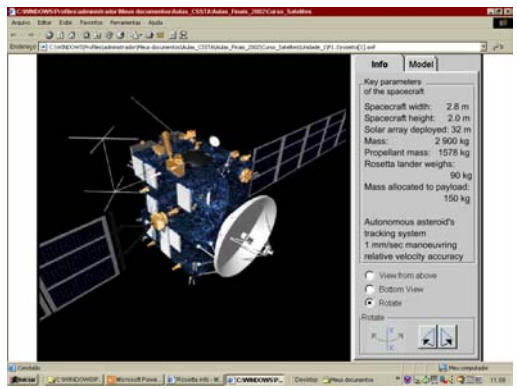




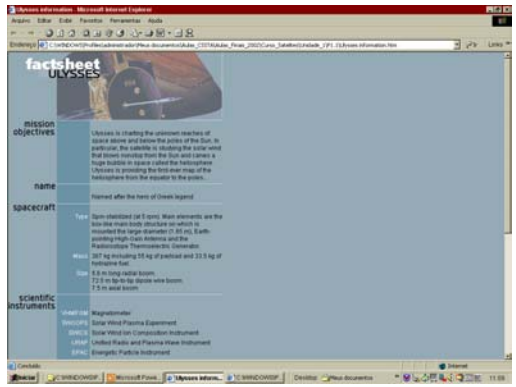
1.1 – Sonda interplanetária: Rosetta, [31]

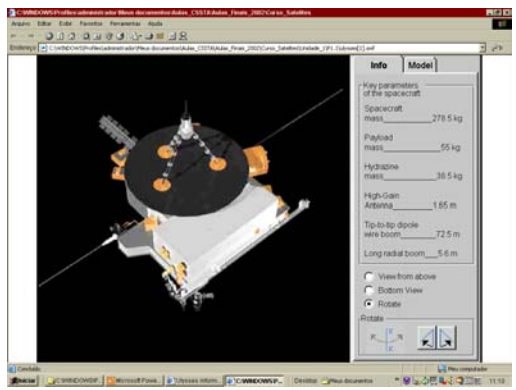




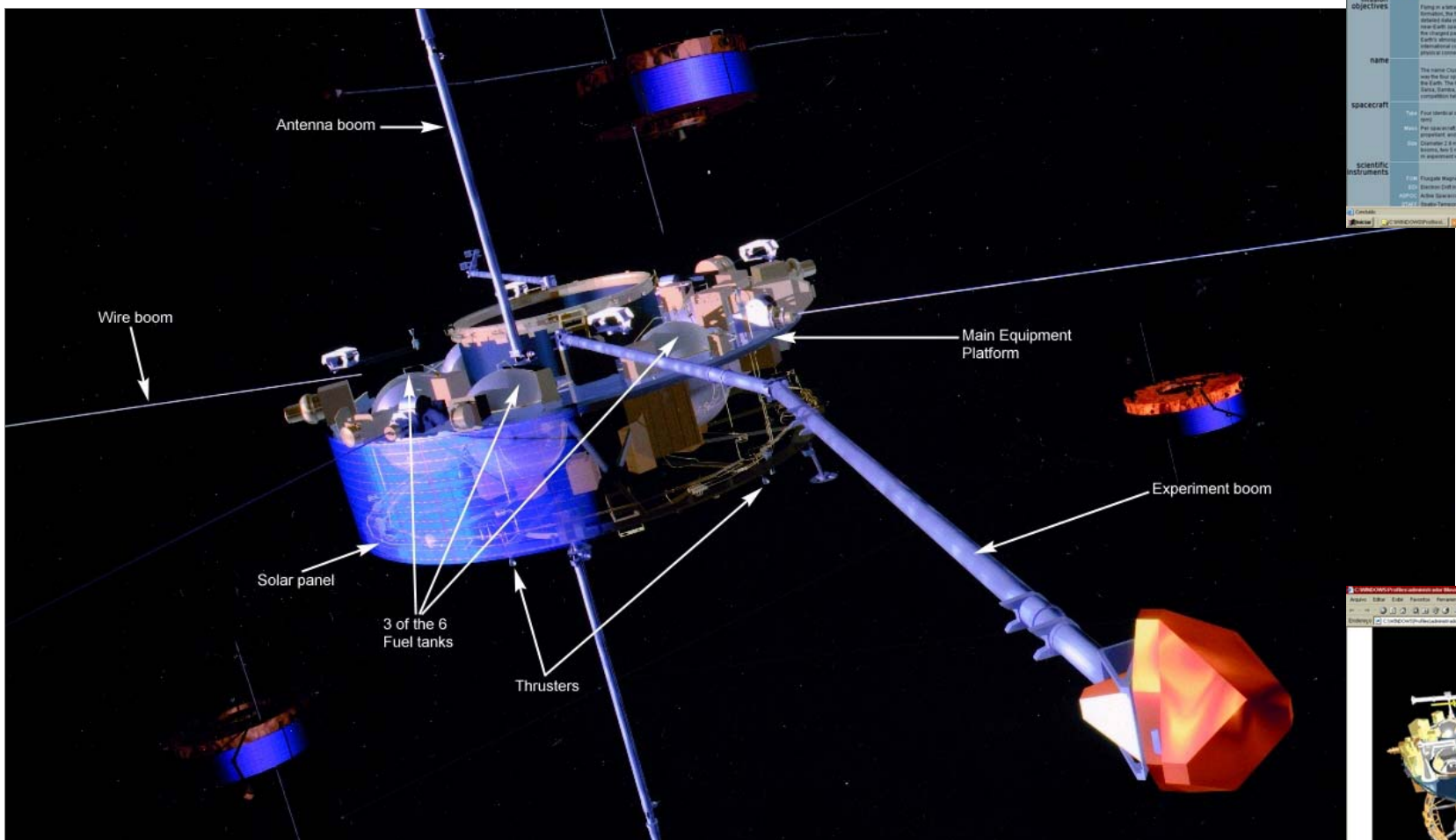


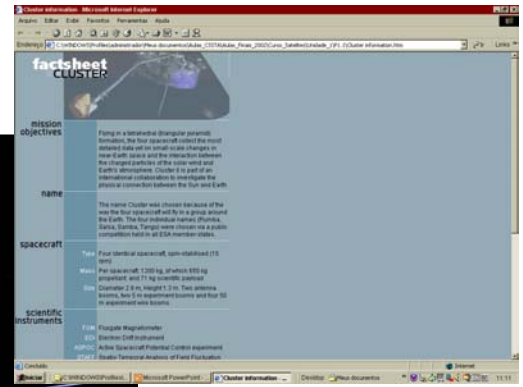
1.1 – Sonda interplanetária: Ulysses, [31]

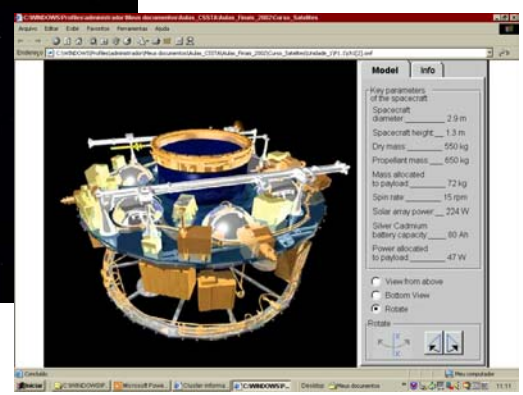




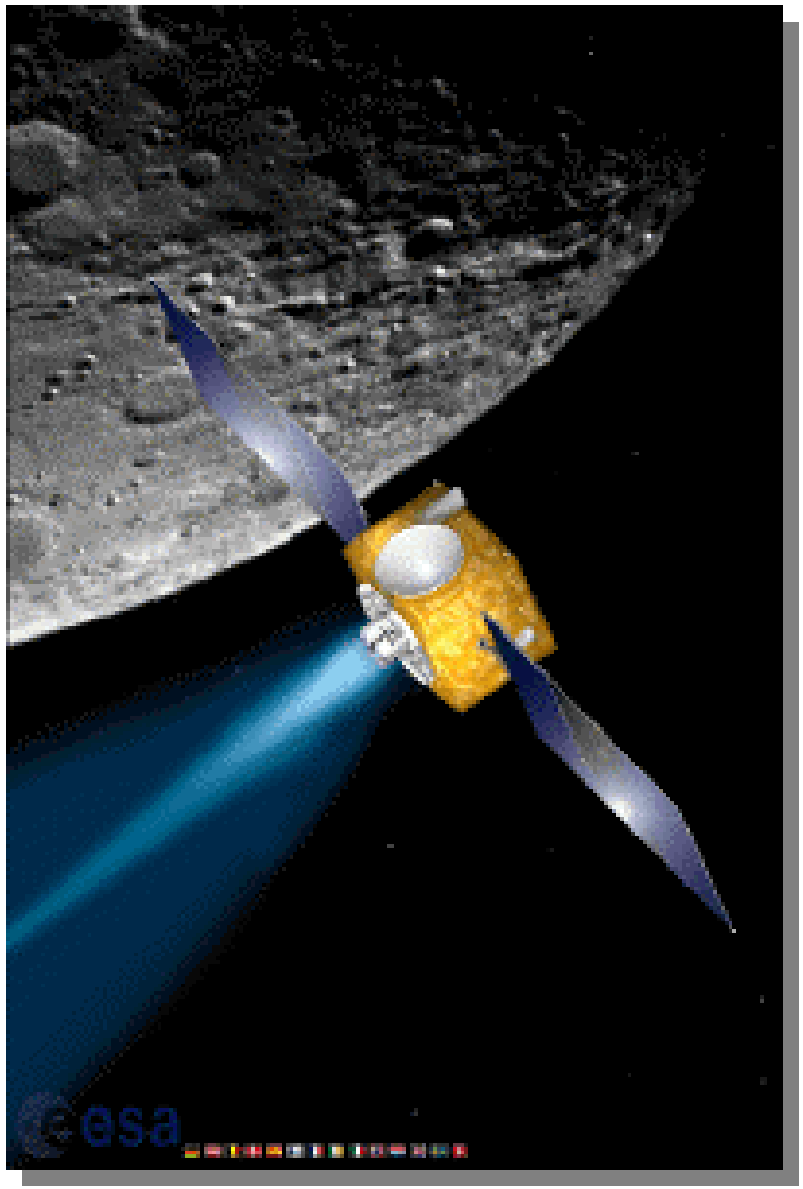
1.1 – Sonda interplanetária: Cluster, [31]

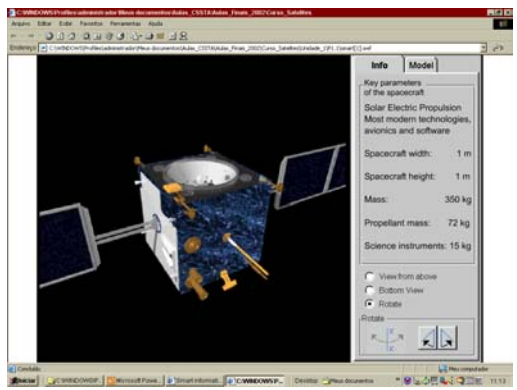




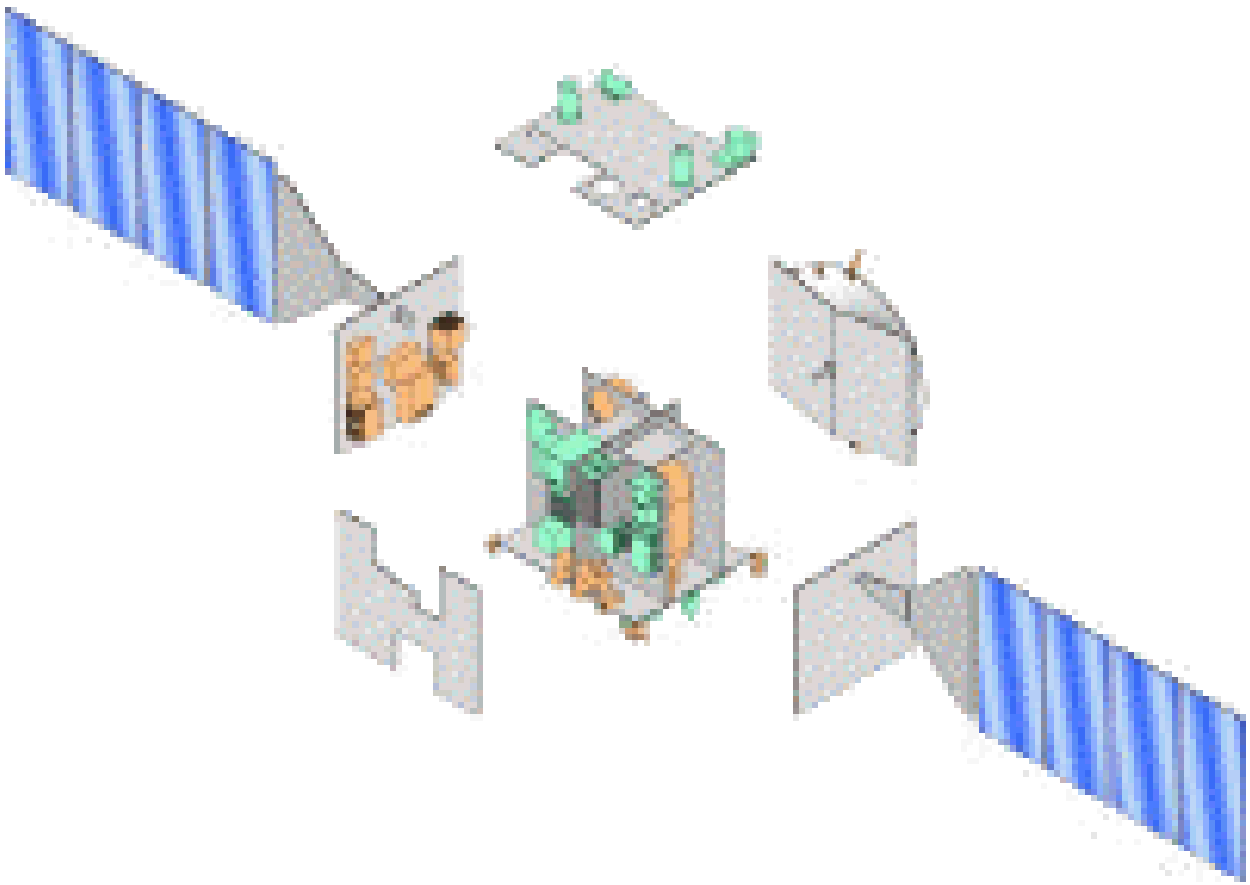


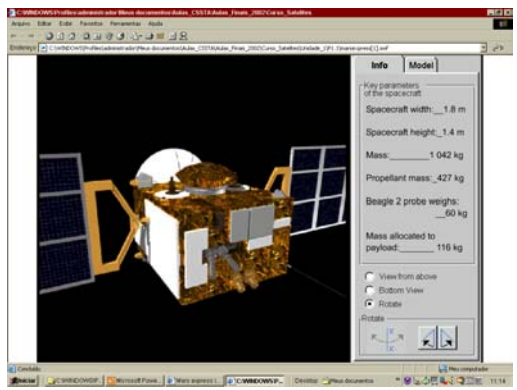
1.1 – Satélite experimental: SMART, [31]



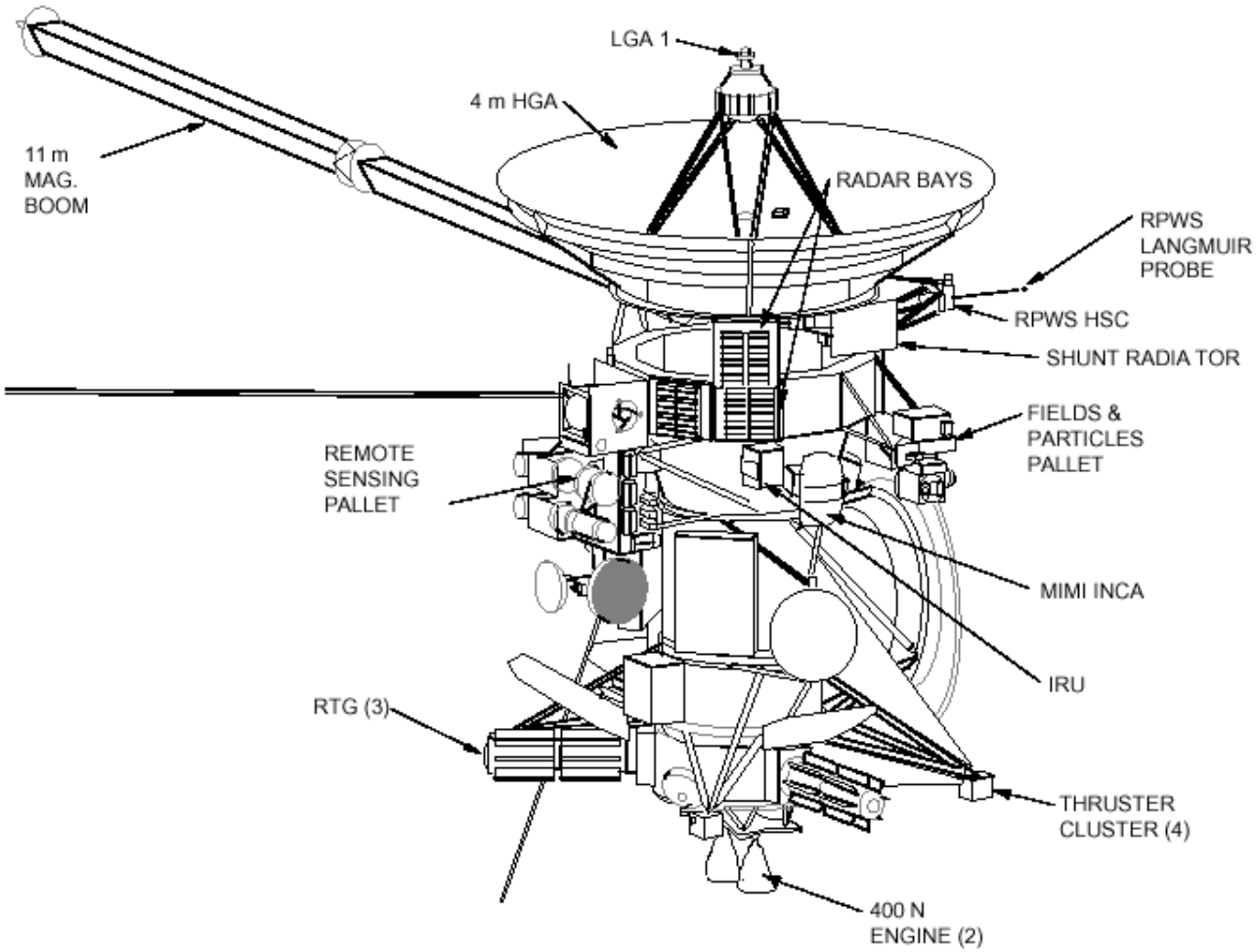


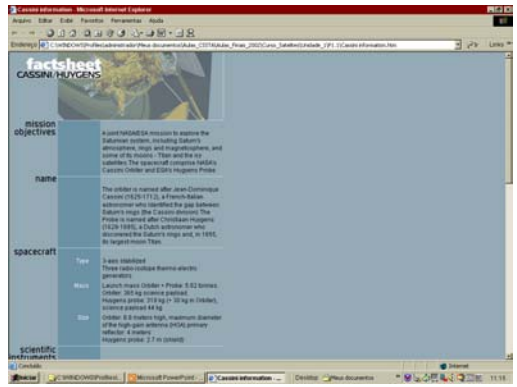
1.1 – Sonda interplanetária: Mars Express, [31]

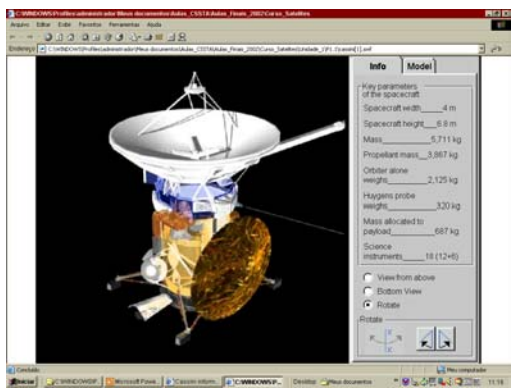




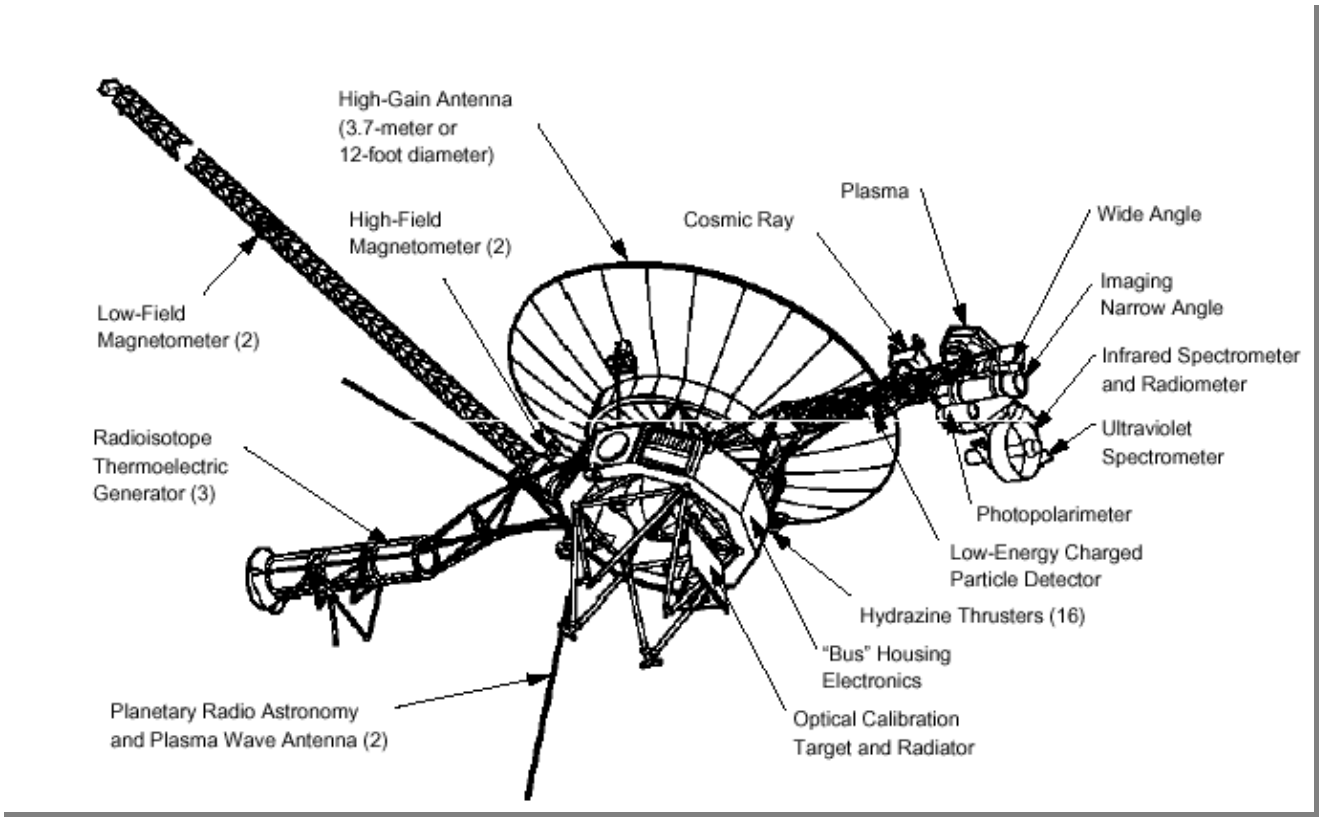
1.1 – Sonda interplanetária: Cassini/Huygens, [2, 31]







1.1 – Sonda interplanetária: Voyager 1 e 2, [2]



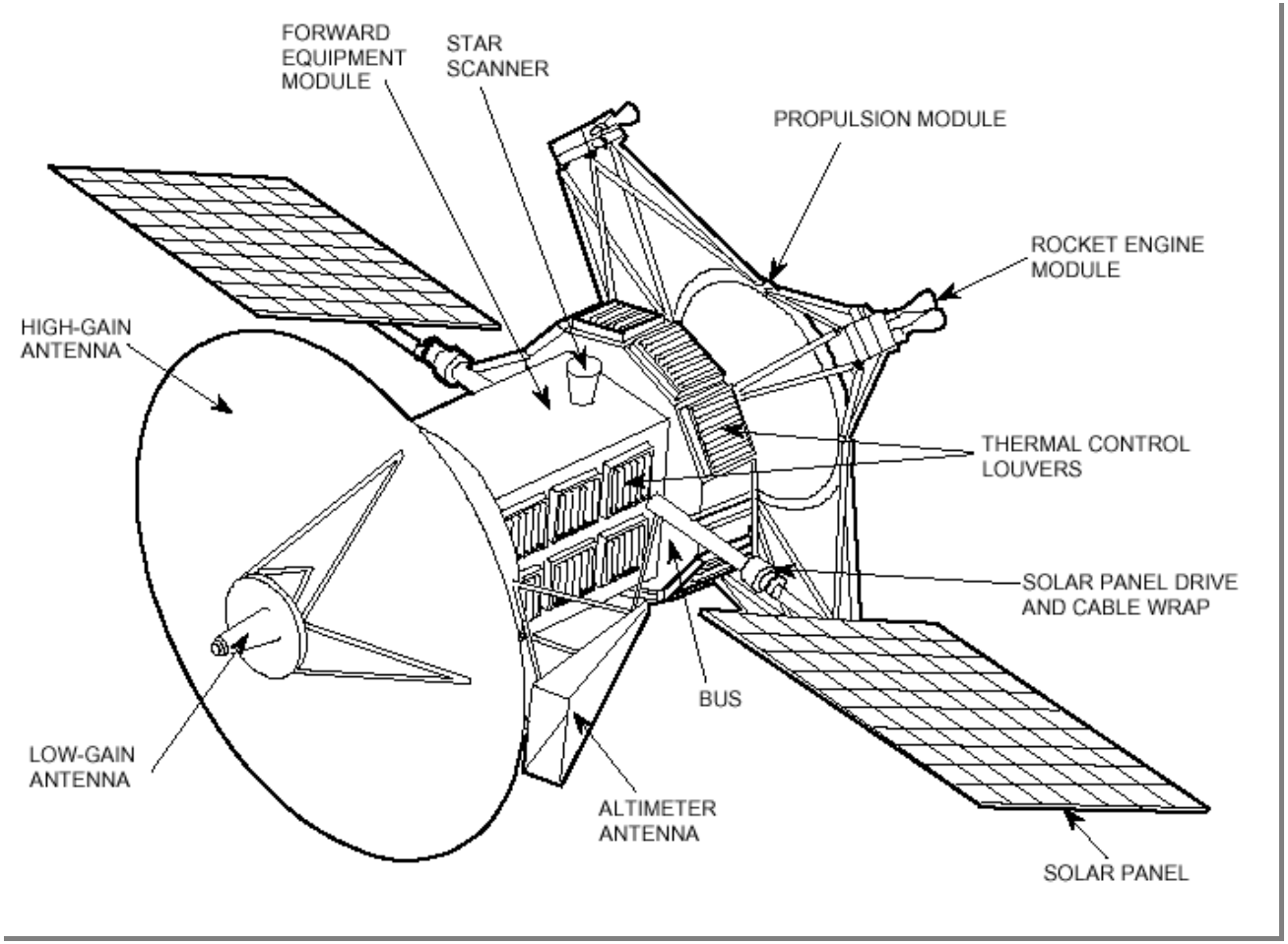
Classification: Flyby spacecraft.

Mission: Jovian planets and interstellar space.

Features: The Voyager 1 and Voyager 2 spacecraft were launched in late 1977 aboard Titan III launch vehicles with Centaur upper stages. They completed highly successful prime mission flybys of Jupiter in 1979 and Saturn in 1980 and 1981. Voyager 2's extended mission succeeded with flybys of Uranus in 1986 and Neptune in 1989. Both spacecraft were still healthy in 1995, and were conducting studies of interplanetary space enroute to interstellar space. Voyager 1 and Voyager 2 recently identified low frequency radio emissions from the heliopause, estimated to be about 50 AU away from the spacecraft. Science data return is expected to continue well into the XXI century.

Stabilization: Three-axis stabilized via thrusters.

1.1 – Sonda interplanetária: Magellan, [2]



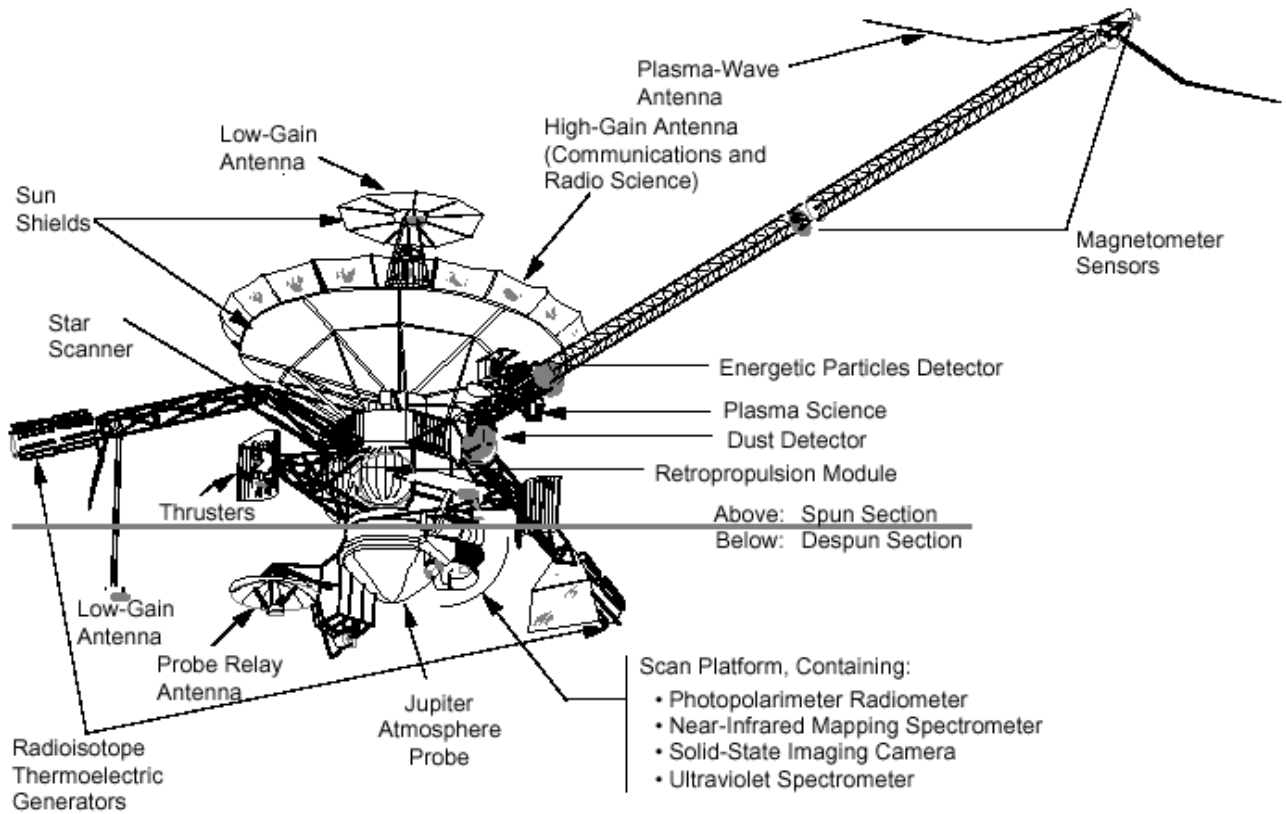
Classification: Orbiter spacecraft.

Mission: Venus mapping.

Features: The Magellan spacecraft was launched in early 1989 via the Space Shuttle Atlantis and an IUS upper stage. By the end of its fourth Venus-rotation cycle (243 days each) four years after launch, Magellan had mapped 98% the surface of Venus with imaging, altimetry, and radiometry, performed several radio science experiments, and had surveyed the gravity field at low latitudes all the way around the planet. The imaging resolution was about 100 m, close enough to discern the various geologic processes for the first time. Magellan's periapsis was lowered into Venus's atmosphere for a thousand orbits, aerobraking into a nearly circular orbit. Magellan's periapsis was then raised out of the atmosphere, and it completed high-resolution mapping of the planet's gravity field from low circular orbit. Magellan was then intentionally flown to its destruction in Venus's atmosphere in October 1994, all the while carrying out additional experiments.

Stabilization: Three-axis stabilized via reaction wheels and thrusters.

1.1 – Sonda interplanetária: Galileo Orbiter, [2]



Classification: Orbiter spacecraft.

Mission: Investigate Jupiter's atmosphere, magnetosphere, and satellites.

Features: Galileo was launched aboard the Space Shuttle in October 1989. It executed science observations during gravity-assist flybys of Venus and Earth, as well as during two asteroid flybys. It observed Comet Shoemaker-Levy 9's impact with Jupiter in July 1994. Galileo entered Jovian orbit December 1995 shortly after receiving the data from its atmospheric probe, which entered Jupiter's atmosphere.

Stabilization: Spin stabilized.