

DAWN SCIENCE OBJECTIVES

To achieve the overall goal of the Dawn mission, a set of science objectives has been established that can be met by the instrument suite. These objectives are listed below.

The objectives primarily answered by the framing cameras are:

1. To determine the origin and evolution of Vesta and Ceres by mapping the extent of geologic processes on the asteroid surfaces, and by using the cratering record to establish a relative chronology of the crustal units and population of impactors in the early solar system
2. To map the shape, determine the spin state, and establish the degree of cratering of the asteroids visited
3. To map the topography of Vesta and Ceres
4. To search for dust and satellites in the environment of the asteroids visited

The framing cameras will also contribute to answering some of the broader objectives:

1. To provide a geologic, compositional, and geophysical context for the Howardite-Eucrite-Diogenite (HED) meteorites.
2. To provide an opportunity to identify Ceres-derived meteorites in their geologic context.

The visible and infrared spectrometer scientific objectives are:

1. To provide a geologic, compositional, and geophysical context for HED meteorites
2. To provide an opportunity to identify Ceres-derived meteorites in their geologic context
3. To map the thermophysical properties of Vesta and Ceres

4. To determine the origin and evolution of Vesta and Ceres by mapping the mineralogical composition and its spatial variation across the asteroidal surface

The gamma ray and neutron spectrometer scientific objectives are:

1. To map the major elemental composition of O, Si, Fe, Mg, Ti, Al, Ca, and H on Vesta and Ceres

2. To map the trace elements U, Th, K, Gd, and Sm on Vesta and Ceres

3. To provide a geologic, compositional, and geophysical context for the HED meteorites

The gravity science scientific objectives are:

1. To determine the masses of the asteroids visited

2. To measure the bulk density of Vesta and Ceres, in conjunction with topography, and determine heterogeneity

3. To determine the gravitational fields of Vesta and Ceres