

SPACE EXPLORATION SYMPOSIUM (A3)
Small Bodies Missions and Technologies (4)

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DAWN'S OPERATIONS IN CRUISE FROM VESTA TO CERES

Abstract

On 5 September 2012, Dawn concluded its successful exploration of Vesta, the second most massive object in the main asteroid belt. The spacecraft departed after 14 months in orbit and is now using its ion propulsion system to travel to dwarf planet Ceres, the most massive main-belt asteroid. The principal activity now is thrusting with the ion propulsion system to provide the 3.3 km/s required to rendezvous with Ceres. The current best estimate for arrival is April 2015, with the dominant uncertainty being the spacecraft power profile and hence the thrust magnitude. Because two of the four reaction wheels have experienced faults and are likely unrecoverable, a substantial effort has been invested in preparing for Ceres operations with alternate attitude control methods. A hybrid mode that uses two wheels in combination with the hydrazine-based reaction control system was installed on the spacecraft in 2011 in case it was needed at Vesta, and it will be flight tested this year. In addition, the project has engaged in an intensive campaign to reduce hydrazine expenditures, which has resulted in a significant increase in the hydrazine expected to be available for Ceres. Based on this work, studies provide good confidence that the required activities at Ceres can be completed. This paper will describe post-Vesta operations, including measures taken to conserve hydrazine as well as other preparations for Ceres.