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# The Dawn Revolution: An Overview of the Changes in our Understanding of the Asteroid Belt as a Result of Dawn's Observations

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While studies of the Howardite-Eucrite-Diogenite meteorites prepared us well for the observations at Vesta, we were surprised on many fronts. The pitted terrain on the floors of several major craters together with gullies leading from the top of the crater walls to the floors was a signal that water was going to be more important in the asteroid belt than we had anticipated. The circular troughs associated with the large southern hemisphere impacts pointed to the resilience of this iron-cored small body. The dark deposits across the surface revealed the importance of impacts in distributing material across the asteroid belt. Arrival at Ceres revealed a body for which the meteorites had provided very few clues. The bright spots suggested the presence of hydrothermal systems in the not-too-distant past and their sodium carbonate composition indicated internal chemical evolution. While the earlier constrained average density of Ceres had implied that Ceres contained much water, it was not obvious how that water was incorporated in Ceres. Gravity studies revealed a very rigid but low density, 40 km external shell or crust. The existence of a small dense core is possible but not confirmable with the data obtained. Water made itself known on the surface in small ice patches. Solar proton events apparently could liberate water from the patches and the underlying crust to produce a transient exospheres that in a week's time were removed by the solar wind. The discovery of small patches of prebiotic organic molecules also beguiled the Dawn team, even if their source mechanism was elusive. Dawn's observations have shown the asteroid belt to be much more geochemically active than it had been thought to be and much wetter.