

BE A CASSINI SCIENTIST FOR A DAY

Rhea has long been overlooked as one of the least interesting of Saturn's moons. It doesn't have Titan's Earth-like features, Enceladus' cryovolcanoes or Hyperion's Swiss-cheese texture, but seems to be a rather lifeless, dull world. However, surprising observations during Cassini's close flybys in 2005 and 2010 revealed a series of mysterious, fascinating questions that show: It is worth to examine Saturn's second largest moon closer!

Firstly, Rhea has some interesting geological features: Patterns in the heavily cratered surface of its leading hemisphere give rise to the suspicion that some major resurfacing event occurred during the moon's history, although today no geological activity can be observed anymore. In contrast, the moon's trailing side is covered with light, wispy grabens and canyons whose exact creation is still unknown. In addition to close-up images of the surface, the Cassini orbiter might use its Visible and Infrared Mapping Spectrometer and the Composite Infrared Spectrometer to learn more about Rhea's geological history and composition.

Another fascinating phenomenon is the occurrence of strange electromagnetic effects happening around the moon. During a close flyby in November 2005, Cassini's Magnetospheric Imaging Instrument witnessed a significant decline in the flux of electrons within Rhea's Hill sphere. Measurements with other instruments of the spacecraft had ruled out the possibility of an atmosphere around the moon – so, after several computer simulations and the detailed analysis of symmetrical patterns in the electron absorption, only one astonishing theory remained: Similar to his “parent” Saturn, Rhea has a system of three narrow rings orbiting around its equator! However, numerous images taken by Cassini with various techniques and from different angles never showed evidence for rings around the moon, so the exact cause for the unique electromagnetic effects around Rhea is still unknown. Detailed close-up images with Cassini's Narrow Angle Camera could bring new light into this thrilling mystery and might prove that rings can not only exist around planets!

Very recently discovered and also really interesting is the exchange of materials between Saturn's icy moons, the E-ring and the planet's magnetic environment, creating colourful patterns on the satellite's surfaces. On Dione, Tethys and Rhea reddish areas were found that are thought to be caused by tiny particle strikes by circulating plasma. Even more fascinating, Cassini's cameras revealed a unique chain of bluish splotches around Rhea's equator. This phenomenon does not seem related to icy material erupted from Enceladus' cryovolcanoes but appears to result from surface disruption, exposing fresh, blue ice on old crater rims. A possible cause for this unique feature could be the crash of orbiting material into the moon's surface in the not-too-distant past – evidence for a former or maybe still existing ring system around Rhea?

All in all, a close-up image of Rhea taken with Cassini's Narrow Angle Camera has the highest scientific value. Supported with measurements by other instruments of the spacecraft, it can provide valuable information about the moon's geological history, the various colourful patterns on its surface and the possible existence of a ring system around it.