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Tectonic features on Rhea's trailing hemisphere: a first look at the Cassini ISS camera data from orbit 121, Nov. 21, 2009

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Introduction: The trailing hemisphere of Rhea, the second-largest satellite of Saturn (1528 km in diameter) is characterized by a network of linear to arcuate, bright wispy markings which were only poorly resolved by Voyager in the two flybys in 1980 and 1981. During the nominal mission of Cassini (2004 – 2008), ISS data have revealed that these bright markings represent tectonic features, mostly troughs and graben, with bright ice exposed along steep scarps being responsible for the bright albedo. Similar bright markings were also observed on the trailing hemisphere of Dione, Rhea's inner neighbour, and were shown to be tectonic in origin. **Observations:** New ISS data obtained during Cassini's Extended Mission in orbit 121 on Nov. 21, 2009, show this tectonized region at much higher resolution [140 – 160 m/pixel] and in stereo. At least two major sets of troughs trending approximately north-south are seen in these data, separated by an area showing less deformation. Observed graben widths range from several kilometers up to 30 km. Minor graben structures occur within major troughs and also in the area between major troughs. In some parts of the graben structures, avalanches of fine-grained material have created a thin deposit which subdues the topography underneath. Rhea's cratered plains show modifications of a kind also observed on Dione. Inter-crater plains between large craters, groups of large craters, and the floors of these craters appear smooth with a lower superimposed small crater frequency than in densely cratered plains. As on Dione, this variety of cratered plains is preferentially found in or near tectonized regions implying a resurfacing process connected to tectonism. **Stratigraphy:** Most of Rhea's surface is densely cratered indicating that it is very old, on the order of 4 billion years. Rhea's low state of differentiation implies that significant endogenic processes most likely ceased early in the satellite's history. However, tectonic structures in the region covered in this recent orbit 121 transect fresh craters with a low superimposed crater frequency, provide evidence that tectonic activity may have lasted for a much longer period of time, at least in this part of the trailing hemisphere.