**FLUCTUS AND VIRGAE OF TITAN.** C. A. Wood[1], E.R. Stofan[2], F. Paganelli[2] and R.D. Lorenz[3]. [1]Planetary Science Institute, Tucson, AZ and Wheeling Jesuit University, Wheeling, WV (chuckwood@cet.edu), [2]Proxemy Research, Laytonsville, MD, [3]Johns Hopkins University Applied Physics Lab., Laurel, MD.

**Introduction:** Mountains, channels, dunes, lakes and even a few impact craters are familiar landforms discovered in Cassini Radar images of Titan. There are also many other features that are not as well understood – here we describe two types – flows and virgae – that both may be associated with tectonism.

**Flows:** The Latin word flutus (meaning flow terrain) has been used to name four features on Titan. Two – Rohe and Ara – appear to be lava flows contained within channels and extending from calderas (Rosaly ref). The feature named Winia Fluctus (Fig. 1)

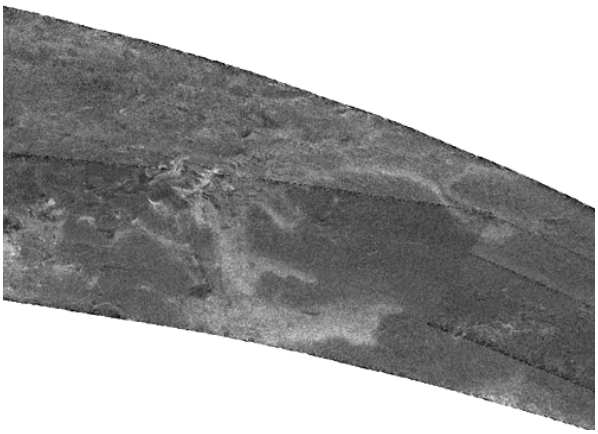

*Fig. 1: Winia Fluctus*

is a different kind of structure. It is part of a larger area extending north onto an adjacent Radar swath that wasn't available when the name Winia was given. The flows are somewhat bright, which means they are rough textured at Radar's 2 cm wavelength. The flows issue from a dozen are more bright points and triangular shaped fans along a line about 200 km long. Some flows travel ten kilometers or so as narrow features before becoming part of a broad flow. The flows are three to five times as long as they are wide and have featureless bodies with diffuse edges and lobe morphologies. The structure named Winia is about 150 km long, and another flow to the north is narrower but longer (200 km).

Leilah Fluctus appears to be a different type of flow feature. It is a bright area seemingly stemming from major drainages – if it were in Arizona it would be considered a playa. But the triangular bright fans that feed Leilah are very similar to the Vee-shaped sources at Winia. Perhaps the lack of long, lobate morphology is because these flows are topographically bounded by the dark terrain to the east.

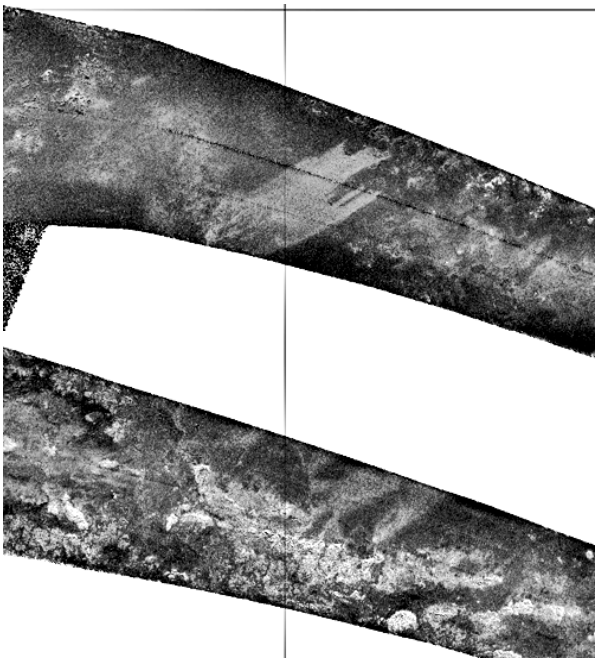

*Fig. 2: Unnamed fluctus in Dilmun. Radar swaths T43 above and T44 below.*

A more dramatic, but so-far unnamed, fluctus is shown (Fig. 2) on Radar swath T43 at 180°W, 25°N in Dilmun. The main part is about 200 km long and 75 km wide. Its surface is a featureless bright area, and its edges are somewhat sharper than at Winia. The ends of the flow are apparently blocked by topographically low bright hills. A nearby swath (T44) contains similar, but less well-defined flows coming from four or more sources along a bright curved mountain range.

Another similar flow structure is near 50°W, 40°N (Fig. 3) There are three or more narrow flows, up to about 85 km long, with similar lobate snouts and diffuse edges. These also issue from a line of slightly bright sources.

So far, few fluctus have been discovered on Titan. Their characteristics features suggest that they are cryovolcanic flows, as previously proposed for Winia [1]. A unique chracteristic is that they have sources that are aligned, implying eruption from fractures. Recognition of these possible fractures is important for there is very little evidence for the nature of Titan's tectonics. On the other hand, the Dilmun fluctus lacks

lobate margins and could conceivably be some form of mass wasting, although the volcanic origin seems to best fit the observations.

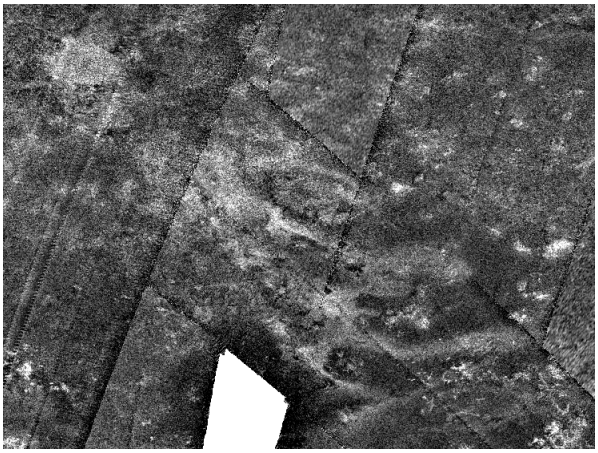

*Fig. 3: Possible flows near 50°W, 40°N on T23 and adjacent swaths.*

**Virgae:** This Latin word, meaning a streak or stripe of color, has been given to five features seen in ISS images. Shiwanni Virgae, one of the most prominent at at 25°S, 32°W, is composed of three or four parallel, narrow, dark stripes, with some clumpiness and quasi-perpendicular lines, especially along its eastern half. Its long (1400 km) straight length is consistent with it being a tectonic structure [2], but little additional morphologic information is available from ISS images.

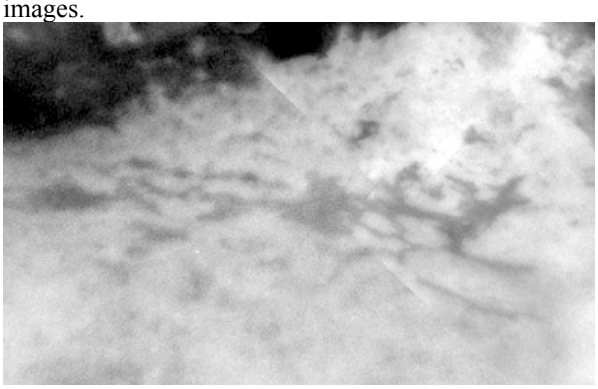

*Fig. 4: ISS view (ref-Ciclops site) of Shiwanni Virgae.*

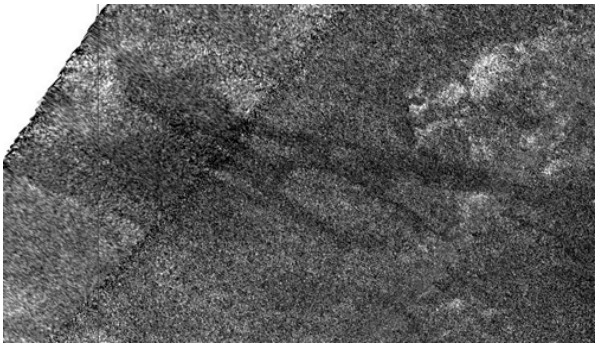

*Fig. 5: Radar view of eastern half of Shiwanni Virgae. Width about 250 km.*

Radar imaged the eastern half of Shiwanni Virgae with T36 HiSAR, which is less than Radar's normal full resolution; the diagonal dark line is an artifact. The dark streaks and clumps of Shiwannie show no structure, looking very much like typical dark dunes, as occur 250 km to the west in Aztlan. The streaks curve around pre-exiting lighter-hue terrains, just as dunes do.

If the Shiwanni Virgae are dunes they are not tectonic structures, but the questions now are, why are these dunes linear and narrow? The narrowness may reflect both a limited dune material supply and the width of low spots between light-hued obstacles. The linearity may be due to the prevailing wind direction, or linear depressions in the underlying rocks. However, the Radar images show no evidence for the latter.

Most of the named virgae, and the extensive unnamed group near 320°W, 30°S, are near Senko, Shangri-La and Aztlan, all massive dune regions. Virgae appear to be narrow outliers of dunes trapped on bright terrain and supplied from nearby dune sources.

**References:**

[1] Lopes, R.M.C. et al. (2006) *Icarus, 186,* 395-412. [2] Turtle, E.P. et al. (2007) LPS XXXVIII Abstract #2322.