VESTA’S “RIBBON”: EXPLORING POTENTIAL NON-RADIAL SYMMETRIC FLOW FEATURES NEAR SOSSIA. K. H. G. Hughson, C. T. Russell, and D. L. Buczkowski, 1 UCLA, Los Angeles, California, USA; 2 JHU-APL, Laurel, Maryland, USA.

Introduction: Geological mapping of the surface of Vesta by the examination of data collected by the Dawn spacecraft has resulted in several remarkable discoveries. One of these findings is that of an approximately 390km long quasi-continuous linear feature trending NW-SE on the Vestan surface. The feature, known colloquially as the ‘dark ribbon’ or simply the ‘ribbon’ [1,2], appears to start roughly 70km SE of the center of Minucia crater (219.0 °E, 10.0 °N), crosses Vestalia Terra (apparently cross-cutting several craters along the way), and terminates near Sossia crater (285.4 °E, -36.8 °N) (Fig. 1). The ribbon is characterized in clear filter images by its low albedo, and in Clementine colour ratio images [Red (750/430 nm): Green (750/920 nm): Blue (430/750 nm)] by a striking blue false colour (Fig. 2) [3].

Figure 1. From [2]. Framing camera color ratio data overlain on framing camera clear filter images of Vesta that includes the Av-9 region; Drusilla crater (D), Numisia crater (N) and the south pole of Vesta are all shown. Black arrows point to possible Drusilla ejecta. Arrows 1 and 2 bracket the dark ribbon in Av-9, while arrows 2 and 3 bracket the region shown in Figure 2. Arrow 3 also points to Sossia crater. The double headed black arrow points to dark material extending radially from Drusilla. White arrow points to location of ejecta scour features in dark ribbon that are radial to Drusilla not the most proximal crater (unnamed).

It has been postulated that the ribbon may be a fluidized ejecta flow caused by entrained gases generated during the impact that formed Drusilla crater [1,2]. This is supported by the fact that OH has been identified within Drusilla [4]. Basal glide caused by these trapped gases presents a possible mechanism for the transportation of ejecta from Drusilla to Sossia, and explains the geometry of the ribbon (Fig. 1) [2].

Figure 2. Clementine colour ratio image encompassing both Sossia (S) and Drusilla (D). The ribbon is clearly visible in blue starting near the NW rim of Sossia and extending toward Drusilla.

In this presentation we examine the ribbon’s southeast terminus near Sossia in detail using framing camera images collected by the Dawn spacecraft. Through the evaluation of panchromatic, multispectral, and topographic data we attempt to put constraints on the ribbon’s spatial extent, morphology, composition, and local depth in the vicinity of Sossia (Fig. 3) in order to evaluate the possibility that the ribbon was a fluidized flow.

Methods: This work predominantly uses clear filter and colour images and mosaics taken by Dawn’s framing camera from High Altitude Mapping Orbit (HAMO; ~70m/pixel) and Low Altitude Mapping Orbit (LAMO; ~20m/pixel) [5]. Analysis was completed
using Exelis Visual Information Solutions’ ENVI 5.1 software and JMARS for Vesta.

**Setting:** The region examined in this study was an approximately 60km by 60km rectangle centered near Sossia. This area lies in the NW corner of the Av-14 quadrangle on Vesta [6].

**Discussion:** In our region of interest the dark ribbon is seen trending NW away from Sossia along two main branches. Both branches are largely confined to regions of low topography (Fig. 3); this is consistent with the dark ribbon on Vestalia Terra filling a linear topographic low [2]. In this region the ribbon also appears to cross-cut numerous craters to the NW (Fig. 3). The crater walls of the large unnamed crater in the bottom right corner of Fig. 3 appear to expose dark material where it is cross-cut by the ribbon; this could be analogous to Numisia crater [2].

The south rim of the aforementioned unnamed crater and the north rim of Sossia exhibit anomalously smooth surfaces and gentle topography compared to their surroundings (Fig. 3). In both cases the slope of these regions is north facing. This supports emplacement from a south-to-north moving flow.

**Conclusions:** The morphology and distribution of the dark ribbon material near Sossia appears to be consistent with the fluidized ejecta flow hypothesis, but due to the potential southerly origin of the flow it seems unlikely that it originated from Drusilla as may be the case near Numisia [2].

Figure 3. 3D surface view looking down the ribbon towards Sossia (S). This view was generated from clear filter images taken by the framing camera (vertical relief is exaggerated by a factor of 7). The arrows ‘a’ bracket a clearly visible branch of the ribbon, the arrows ‘b’ bracket the other.