RIFTING AND CORONA FORMATION IN EASTERN APHRODITE TERRA, VENUS.
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Overview. The relationship between coronae and rifting is important to understanding the process of corona formation. Eleven coronae in Diana and Dali Chasmata were examined in this study, seven of which began forming prior to rifting and continued to develop while early rifting was taking place. The remaining four coronae appear to have originated during early rifting, and did not develop further after the cessation of rifting. These results are in agreement with other workers' findings of corona–rift zone relationships.

Introduction. Coronae and corona-like features are circular, elliptical, or irregularly shaped and are typically distinguished by an annulus of circumferential tectonic structures [1]. They are inferred to be associated with mantle upwelling or diapirism [1,2]. First revealed in Venera 15/16 imagery, over 360 coronae have been identified in Magellan radar images—many of these on or near zones of probable extension. Coronae and rifting are certainly interrelated, but it is unclear whether corona formation actively drives lithospheric extension or is only locally encouraged by rifting. The first step to understanding this relationship is to determine the temporal sequence of rifting and corona development.

Data and Methods. The area of study (Figure) is covered by C1-MIDRs 15s129, 15s146, 15s163, and 15s180. Where available, full-resolution F-MIDRs were used to complement the compressed mosaics. All three image cycles, cycles 1 and 3 stereo pairs, and synthetic MIDR-resolution shaded relief images [3] were examined in this study. Cross-cutting relationships of fractures and topography were considered independently as temporal markers. Curvilinear and high-relief features were inspected from both left- and right-looking images to reveal potential image foreshortening. All other things being equal, a brighter fracture was usually taken to be a more recent fracture; in most cases, more than one example of cross-cutting was sought before a generalization was drawn. In some circumstances, it was deemed more reasonable to consider lineaments and fractures separately from topographic relief when determining age relationships.

Results. The findings of this study are summarized in Table I. Three of the eleven "coronae" have not yet been classified as such [1]. A confidence value between 1 and 10 was assigned to the inferred tectonic sequence, with a value of at least seven representing a high reliability. Seven of the eleven coronae show physical expression prior to the initiation of rifting, and continued to develop during extension (class A). The four others began forming during rifting, and ceased developing before the end of rifting (class B). This sequence agrees with observations of northern Lada Terra, where no coronae were found to have been active following extension [4]. In nine of the eleven cases examined, large topographic change came late in corona and rift development.

Discussion. Corona-related fractures that form in a regional stress field will curve parallel to the regional structural trend [5]. This characteristic is noted for each corona in Table I. Early fractures at four coronae appear to deflect into the regional trend; significantly, these four coronae seem to predate any expression of rifting. This correlation suggests that the coronae formed within a zone of weak extension, providing a site for later rifting to nucleate. The presence of rift zones with few or no coronae in eastern Aphrodite Terra indicates that spatial variations in the amount of extension and/or the strength of the lithosphere controlled the association of coronae with rifting.

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References. [1] Stofan E.R. *et al.* (1992) *JGR, 97,* 13,347. [2] Squyres S.W. *et al.* (1992) *JGR, 97,* 13,611. [3] Kirk R.L. (1993) *LPS, 24,* 803. [4] Baer *et al.* (1994) *JGR, 99,* 8355. [5] Cyr K.E. & Melosh H.J. (1993) *Icarus, 102,* 175.

Table I. Corona–rift tectonic sequences in eastern Aphrodite Terra

Location **id** (name)	Class	Fracture/topographic sequence	Conf. (1–10)	Fractures bend?
13°S 134°E **a**	B	Tessera; embayment; rift-parallel fractures; corona radial fractures; topographic troughs; limited volcanism.	9	no
11°S 173°E **b**	A	Corona fine radial fractures; volcanism & embayment; rift-parallel fractures; corona circumferential fractures & topographic uplift; large radial troughs	9	yes
16°S 188°E **c**	B	WNW-trending fractures & grabens; annulus/ circumferential ridge; NE- & E-trending lineaments.	8	n/a
14°S 154°E **d**	A	Corona radial fractures; corona circumferential fractures & circumferential trough to N; Diana Chasma to S.	8	yes
14°S 164°E **e** (Miralaidji)	A	Corona fine radial fractures & central volcanism; bright, lobate flows from borders of Diana Chasma & corona, and early circumferential/rift-edge fracturing; further circumferential fracturing & rift-edge grabens; NW-trending fractures.	7	n/a
12°S 145°E **f**	A	Corona radial fractures; rift-parallel fractures & corona circumferential fractures; large topographic troughs.	7	slightly
12°S 186°E **g**	B	Grooved/ridged terrain; volcanism & embayment; early rifting (large grabens, overlapping with volcanism); fine rift lineaments; topographic shifting (NE & SW corners, overlaps with fine rift lineaments).	7	n/a
20°S 171°E **h**	A	Corona fine radial fractures; limited volcanism & embayment; southern topographic trough; rift-parallel & NE-trending fractures; further radial fractures (to N); northern topographic trough (Dali Chasma).	6	yes
11°S 177°E **i** (Sith)	A	Corona fine curvilinear/radial fractures; rift-parallel fractures; volcanism/embayment; topographic shifting in W; wrinkle ridges to E.	6	yes
16°S 152°E **j** (Ceres)	A	Corona radial fractures, E & W sides; corona circumferential fractures; rift-parallel fractures; limited volcanism; large topographic dips.	5	W: no E: yes
17°S 129°E **k**	B	Unclear—rift-parallel fractures; corona circumferential fractures; N–S fractures.	4	unclear

id: corona identifier; see Figure
Name: provisional, not IAU-approved
Class: A—corona forms before rifting, B—rifting precedes corona
Conf. (Confidence): ≥7 signifies high confidence