

# COMPARISON OF ENHANCED MARINER 9 AND VIKING IMAGERY OF MARS FOR ANALYSIS OF SHORT TERM GEOLOGICAL PHENOMENON

(Letter to the Editor)

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**Abstract.** Enhanced Mariner 9 imagery of Mars, which has been used in short term phenomenon study with Viking imagery, does not have a resolution useful for analysis of short term geological phenomenon such as slump formation.

Herkenhoff *et al.* (1988) reported that newly enhanced Mariner 9 imagery of Mars could be used in comparison studies with Viking Orbiter imagery in the analysis of short term phenomenon. They applied the method to the study of the south polar cap. The author has attempted to apply this method in the detection of recent gravitational transport activity on Mars.

Gravitational transport, which results in the formation of slumps, is a common geological occurrence on Mars. It occurs most frequently in the interiors of impact craters, Valles Marineris (Gooding 1987; Lucchitta, 1987), and is thought to be a possible origin for the Olympus Mons' escarpment (Tanaka, 1988). The comparison of enhanced Mariner 9 A-Frame images with Viking mosaics was utilized in the study. The A-Frame images selected were from a group with the highest resolution of contiguous coverage of the planet.

The comparative resolutions can be seen in Figures 1-6. Figures 1 and 2 show comparative resolutions of Olympus Mons, Figures 3 and 4 show comparative resolutions of the impact crater Becquerel, and Figures 5 and 6 show comparative resolutions of sections of Valles Marineris. The enhanced Mariner 9 A-Frame imagery does not have a resolution which allows geomorphological definition comparable to that in the Viking imagery. It is clear that for the study of short-term geological phenomenon such as gravitational transport, comparison of enhanced Mariner 9 and Viking imagery is not practical.

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MTC - MTVS

MARINER 9 PLYBK P148  
 ORBIT ,SET  
 TIME FROM PERIAPSIS 0.26.28  
 SLANT RANGE 2811 KM  
 VIEWING ANGLE 17.799 DEG  
 PHASE ANGLE 83.879 DEG  
 LIGHTING ANGLE 69.241 DEG  
 LATITUDE-W LONGITUDE  
 R1(UL) 26.240, 137.481  
 R3(UR) 24.865 125.183  
 R5(Center) 21.357, 131.831  
 R7(LL) 16.951, 138.916  
 R9(LR) 15.951, 126.623  
 16.951, 138.916 2  
 PICTURE 54 27 03.45.15.916  
 CAMERA A DAS 06895738  
 FILTER-15 DSN 14  
 POLAR 60 RATE 16.2KBPS  
 EXPOSURE-04 PN ERRORS 18  
 48MSEC PIX SPIRES 1429  
 F700/P000/M000  
 BLEMISHES REMOVED  
 VERTICAL AGC 80  
 STRETCH CONTROL - AUTO -CS  
 LOW 157=00 HI 335=77  
 TRANSLATION - 773  
 FRAME 4177-75 27 JAN 72

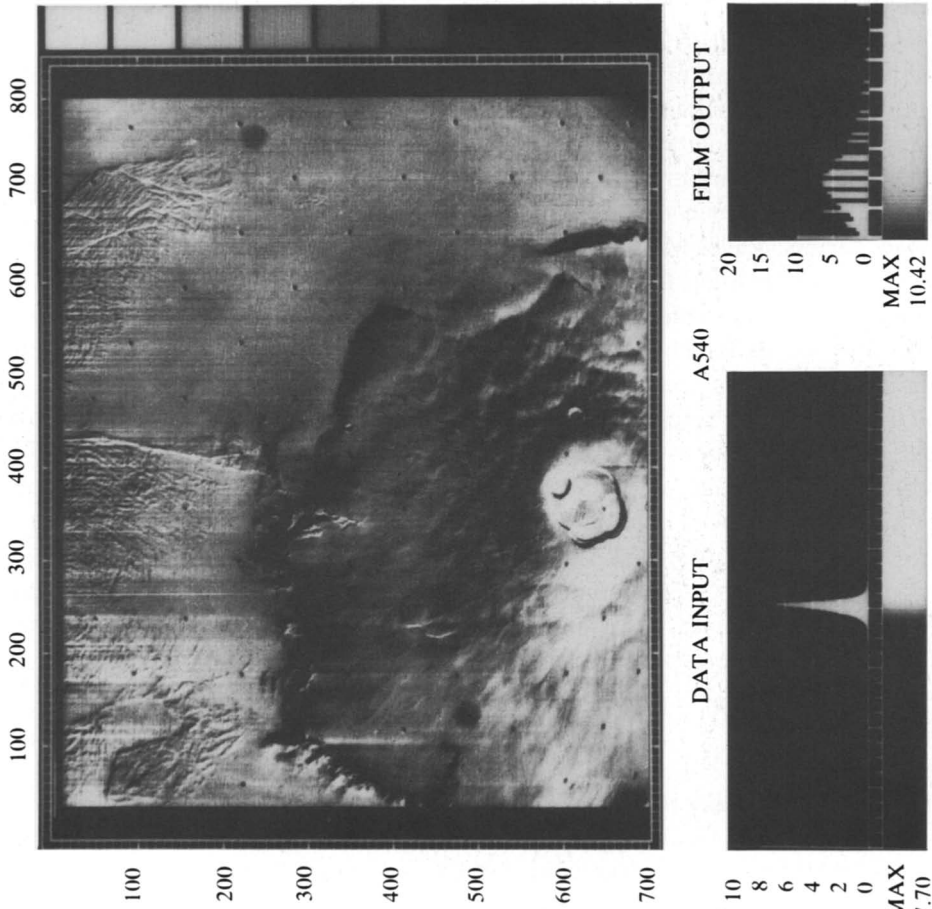


Fig. 1. Enhanced Mariner 9 A-Frame of Olympus Mons (No. 6895733).

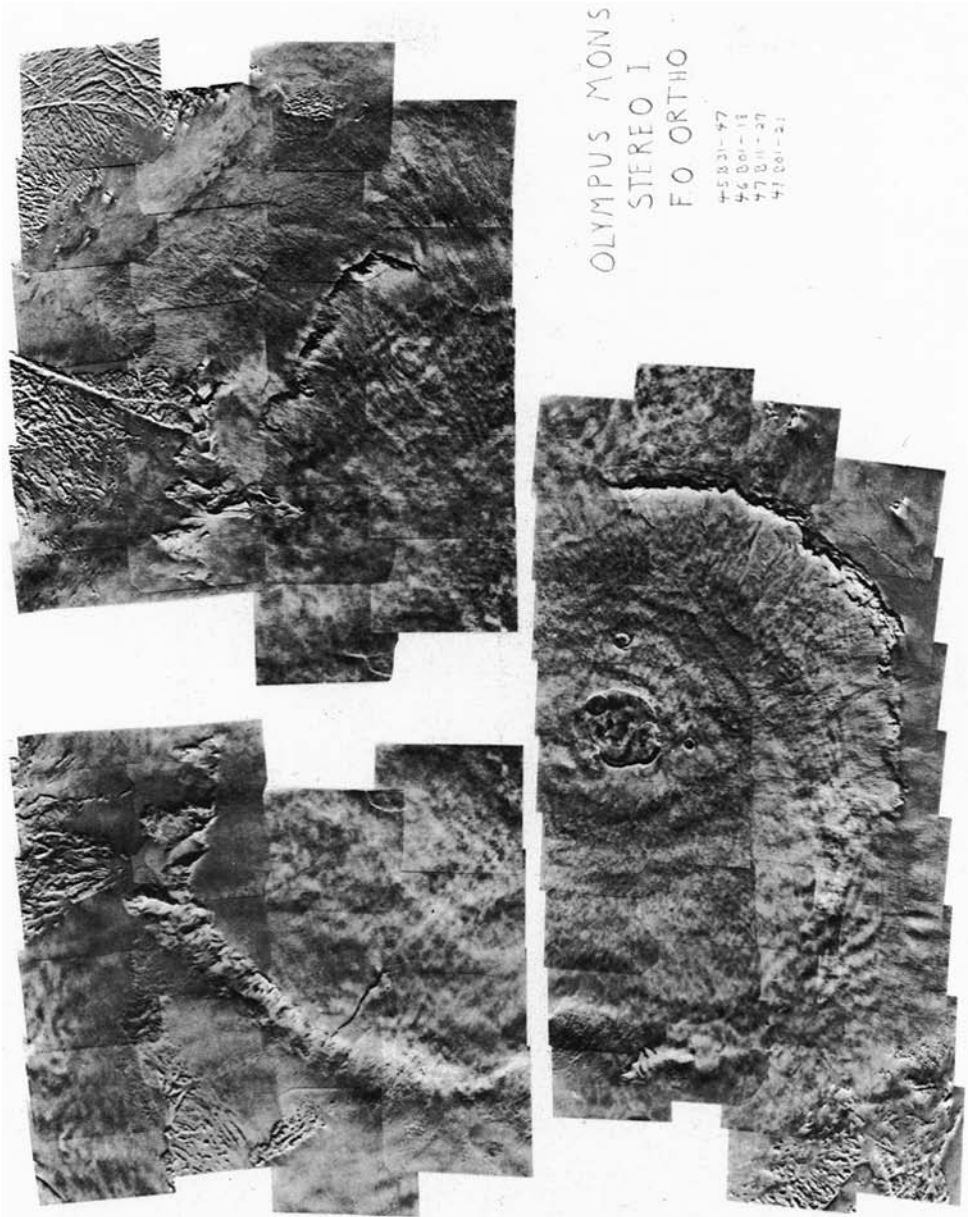


Fig. 2. Viking mosaic of Olympus Mons (No. 211-5345).

MTC - MTVS  
 MARINER 9 PLYBK P174  
 ORBIT SET  
 TIME FROM PERIAPSIS 0.2653  
 SLANT RANGE 2827 KM  
 VIEWING ANGLE 15.993 DEG  
 PHASE ANGLE 75.079 DEG  
 LIGHTING ANGLE 61.710 DEG  
 LATITUDE-W LONGITUDE  
 R1(UL) 27.114, 17.771  
 R3(UR) 26.313, 5.186  
 R5(CENTER) 22.494, 11.731  
 R7(LL) 17.815, 18.578  
 R9(LR) 17.370, 6.164  
 17.815, 18.578 2  
 PICTURE 00 2  
 CAMERA A 40 03:44.10.455  
 FILTER-15 DAS 07831148  
 DSN 14  
 POLAR 60 RATE 16.2KBPS  
 EXPOSURE-04 PN ERRORS 100  
 48MSEC PIX SPIKES 7622  
 F684/P000/M016  
 BLEMISHES REMOVED  
 VERTICAL AGC 80  
 STRETCH CONTROL - AUTO -CS  
 LOW 340=00 HI 422=77  
 TRANSLATION - 773  
 FRAME 4206-93 09 FEB 72

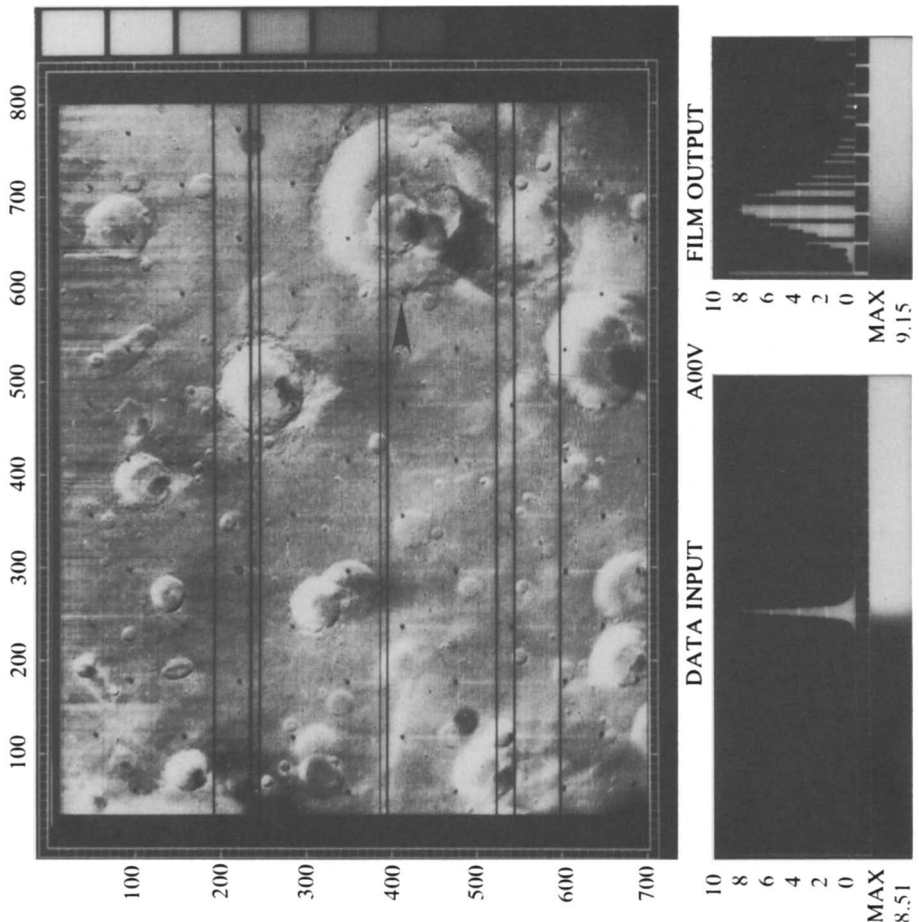


Fig. 3. Enhanced Mariner 9 A-Frame of Becquerel Crater indicated by arrow (No. 78311 43).

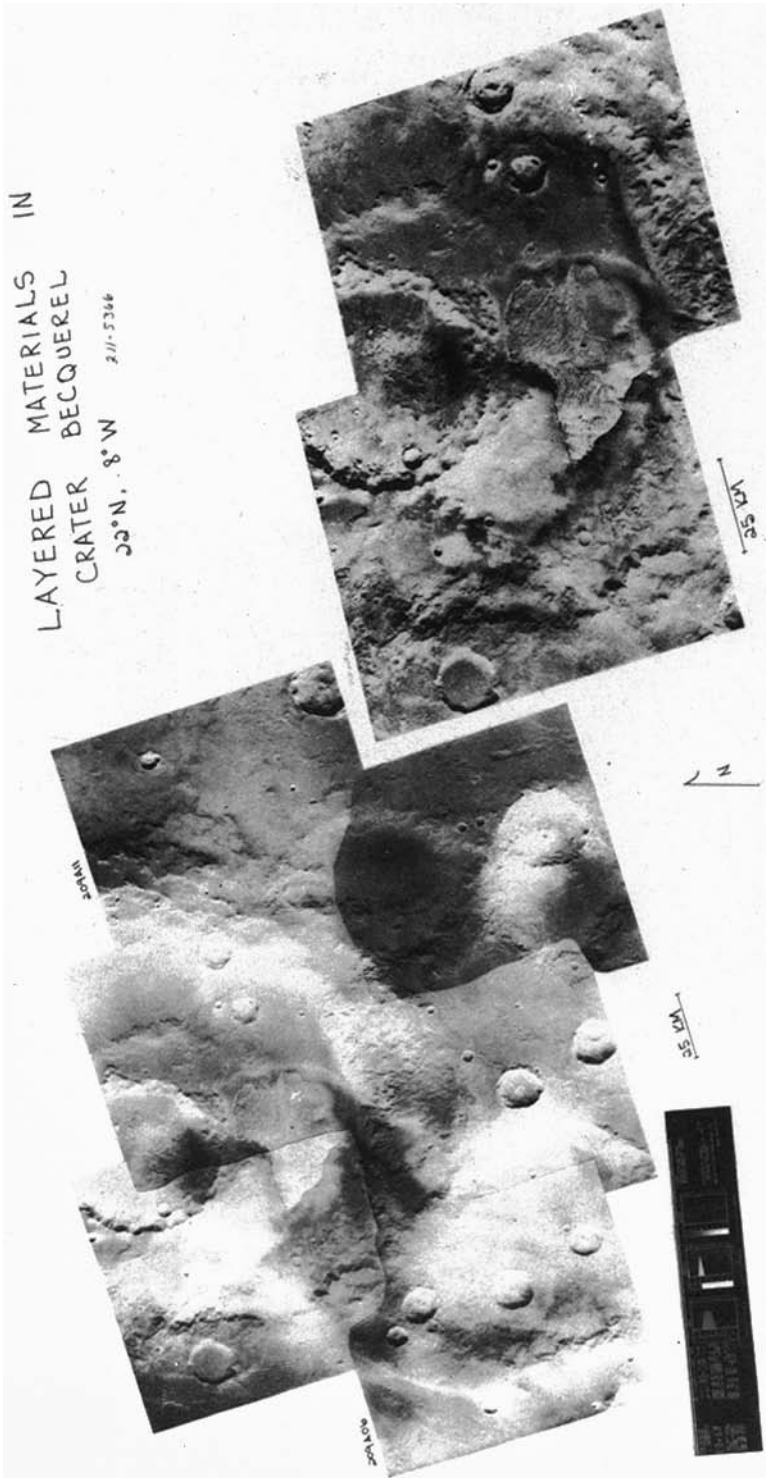


Fig. 4. Viking mosaics of Bequerel Crater (No. 211-5366).

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MARINER 9 PLYBK P205  
 ORBIT SET  
 TIME FROM PERIAPSIS 0. 3.19  
 SLANT RANGE 1715 KM  
 VIEWING ANGLE 16.196 DEG  
 PHASE ANGLE 36.492 DEG  
 LIGHTING ANGLE 24.983 DEG  
 LATITUDE-W LONGITUDE  
 R1(UL) -6.797, 64.429  
 R3(UR) -13.388, 61.415  
 R5(CENTER) -11.436, 65.326  
 R7(LL) -9.201, 69.470  
 R9(LR) -15.643, 66.220  
 -9.201, 69.470 -1

PICTURE 02 55 19.46.06.257  
 CAMERA A DAS 08945344  
 FILTER-15 DSN 14  
 POLAR 60 RATE 8.1 KBPS  
 EXPOSURE-04 PN ERRORS 23  
 48MSEC PIX SPIKES 1550  
 F700/P000/M000

BLEMISHES REMOVED  
 VERTICAL AGC 80

STRETCH CONTROL - AUTO -CS  
 LOW 324=00 HI 431=77  
 TRANSLATION - 773  
 MTC 4239-35 24 FEB 72

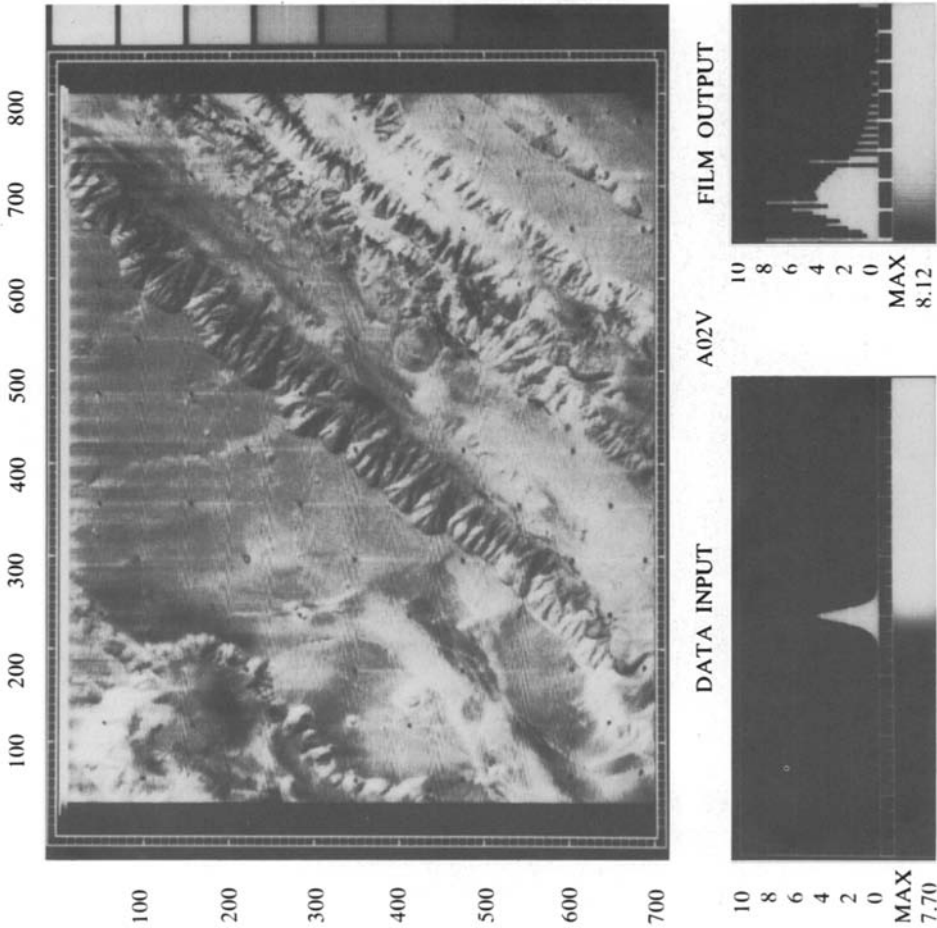


Fig. 5. Enhanced Mariner 9 A-Frame of Valles Marineris (No. 8945339).

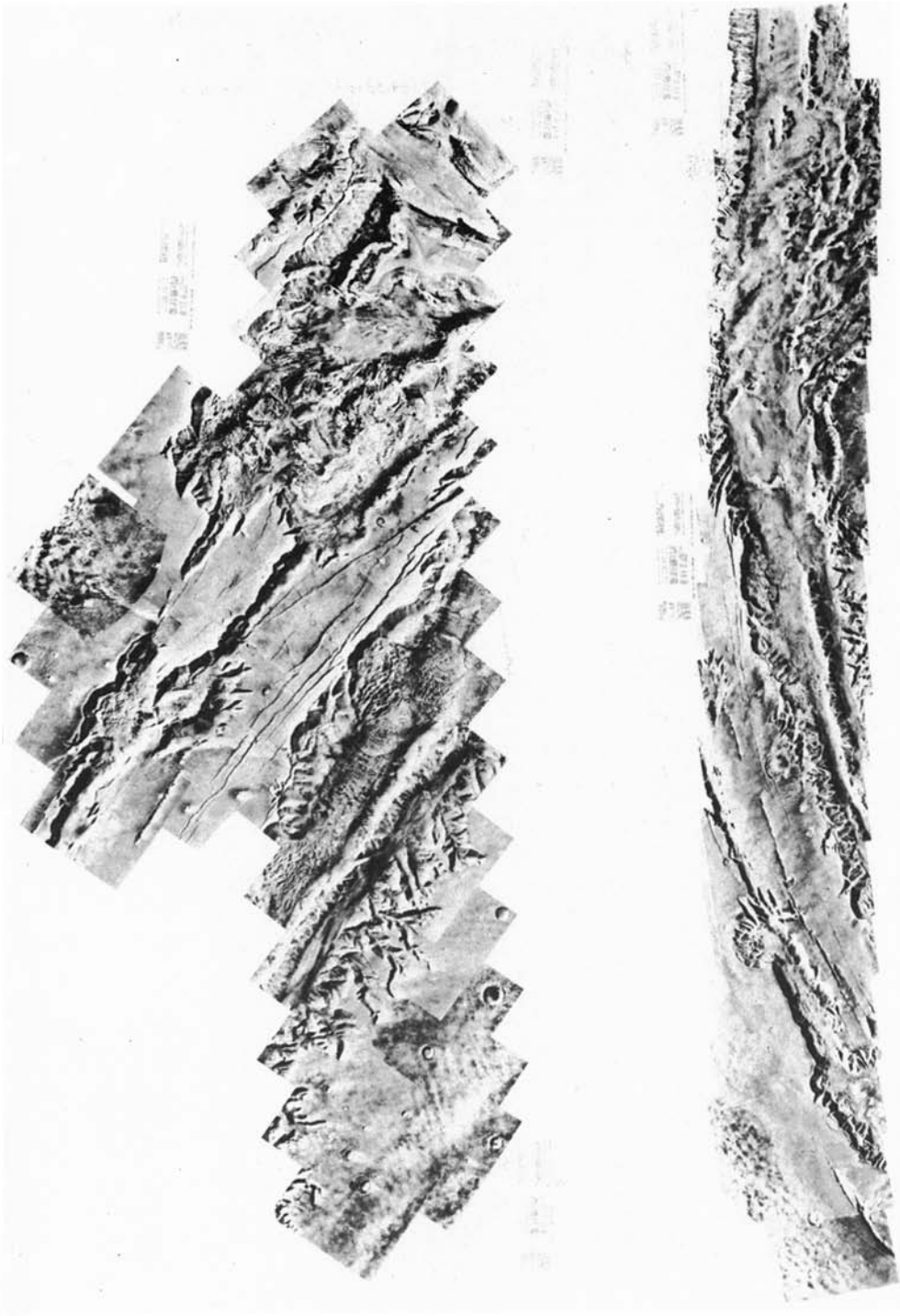


Fig. 6. Viking mosaic of Valles Marineris (No. 211-5160).

Space Science Data Center for supplying the Viking mosaics compiled under the direction of Viking team leader Dr. Michael H. Carr.

### References

Gooding, J. L.: 1987, *Icarus* **72**, 519-527.

Herkenhoff, K. E., Soderblom, L. A., Murray, B. C., and Danielson, G. E.: 1988, *Icarus* **75**, 133-145.

Lucchitta, B. L.: 1987, *Icarus* **72**, 411-429.

Tanaka, K. L.: 1985, *Icarus* **62**, 191-206.