THE FATE OF CHANNEL DEPOSITS UNDER SHIFTING CLIMATE CONDITIONS ON EARTH AND MARS. Ted A. Maxwell and Rossman Irwin III, Center for Earth and Planetary Studies, National Air & Space Museum, Smithsonian Institution, Washington, D.C. 20013 (tmaxwell@nasm.si.edu).

Introduction: Since Mariner 9, the origin of Mars channels has been debated, with one of the key unknowns being the fate of the massive amounts of eroded material that should have emanated from the mouths of both the outflow channels, and highland valleys. Since these sedimentary deposits should record geologic evidence for prior climates as well as the potential for being prime prospecting locations for fossil life, it is important to recognize the presence of such deposits, as well as key locations where they are absent. Based on topographic data in association with highland channels, we have noted several areas that likely were depocenters for highland fluvial and lacustrine deposits, but where MOC images suggest instead that the floors of the internally drained basins consist of highly cratered terrain. Terrestrial experience in the northeast Sahara where climate has oscillated over the past half million years suggests that meters of unconsolidated sediments are easily eroded under conditions of wetting and drying. Here we compare common valley network terminations and basin floors on Mars with arid zone playas in Egypt, where aeolian processes inhibit development of deltas and maintain enclosed basins through deflation.

Highland Drainage “Deposits” In Margaritifer Sinus and Iapygia, small patches of fretted and fractured hummocky terrain a few km's to 10's of km's across appeared to be depositional, based on their occurrence in interior drained basins [1,2] and within areas whose crater age relations suggested a sedimentary origin [3,4,5]. In these areas, what was once mapped as fretted terrain due to large scale fracturing of friable material, now appears to consist of ancient cratered terrain exposed through, and surrounded by plains units.

In an example drainage basin in Margaritifer Sinus (17°S, 10°W, Fig. 1), an ancient, highly degraded impact basin of ~300 km diameter received drainage from westward-sloping dissected terrain to the east. An anastomosing stem valley exits the basin to the north and debouches to the much larger Margaritifer basin, which contains the source for Ares Vallis. With inflowing and outflowing valleys, the 300 km impact basin floor is a possible site for transient ponded water, but no deltas are evident at the termini of these inflowing valley networks. The floor of this basin contains extensive smooth plains with smaller groups of knobs (Fig. 2), which may represent deflated materials or eroded remnants of underlying materials that protrude through the basin plains.

In other areas, the probably lacustrine deposits targeted by the MOC team display a high resolution view that is inconsistent with deposition from a standing body of water. The lowest parts of several areas of internal drainage in Margaritifer Sinus show a highly cratered surface surrounded by plains deposits, with only a few exposures of horizontally bedded materials.

Martian valley terminations and basin plains: A 50 km impact crater is located along the southern rim of the 300 km basin (Fig. 3). This crater contains a central depression in its floor, surrounded by higher-standing knobby plains. With heavily dissected interior walls, this crater may have contained a central playa, which has been subsequently deflated by wind. To the south of this basin, Parana Basin contains larger units of chaotic or knobby terrain, which are located between the termination of Parana Valles...
drained basins. If a similar process was active during the Hesperian on Mars, such an analog suggests that ancient lacustrine remnants may be present near topographic obstacles to the wind, and that the depocenters of such basins would be poor locations to look for the sedimentary record of past life on the planet.