Lakes, delta and volcanism at the Martian dichotomy. The case of Nepenthes Mensae.

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Martian dichotomy is marked by an important topographic step and a clear lineal orientation, especially at the western hemisphere. Nepenthes Mensae occur in one of these regions where these characteristics are clearly visible. Origin, tectonics and hydrological implications of the dichotomy were widely discussed by several authors. However, observation of HRSC, THEMIS Visible and MOC narrow angle images of Martian dichotomy on Nepenthes Mensae has revealed the existence of an interesting site (centred at 121.43E, 2.16N) where tectonic, volcanic, sedimentary and fluvial features are related and could be indicative of the complex geologic history of the Martian dichotomy, almost in this region. This site is characterized by an important topographic scarp between highlands and lowlands marked by a lineal orientation SE-NW. A small elongated volcanic edifice and some linear narrow reliefs, that we interpret as dikes highlighted by erosive processes, show same orientation. This volcano, 8 kilometers long, 4 kilometers wide and about 500 meters high, lies in a depression bordering the dichotomy. Partially covering the volcanic edifice there are sedimentary materials forming delta features. They represent the termination of one of channels coming from Martian highlands. The most recent delta seems to be a Gilbert-type (about 3.5 kilometers extended and 350 meters thick). However, our coarse estimations of volume of materials of this delta show that other previous important fluvial events should happen in order to erode its channel. The existence of two different overlapping delta funs in this place could be indicative of these previous episodes. Finally, although gullies are not visible on MOC narrow angle images of this area, some water courses are excavated at the Gilbert-type delta, and its possible sedimentary deposits are located near the elongated volcano, marking the most recent fluvial event at this area. Northward of this region, other depressions are characterized by possible shorelines. Different levels of water are marked by several strandlines. HRSC-derived DTM agrees with the shorelines hypothesis. Radiance maps created from THEMIS infrared night images show the higher temperature of materials outcropping on the floor of this basin and other depressions bordering the dichotomy. These maps allow us to interpret different origins for those materials, including cemented deposits and lavas. All this features shows the complex interactions among water, tectonics and volcanism in this area of the Martian dichotomy at Nepenthes Mensae.