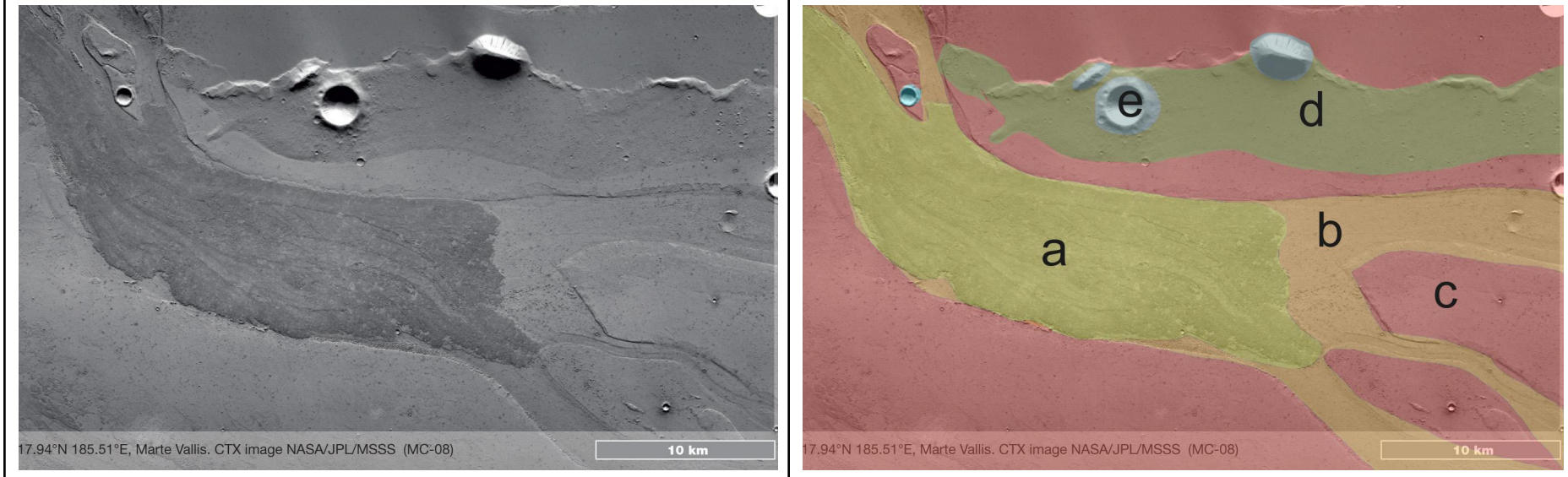
IMAGE 1: Marte Vallis, Mars, East of Elysium Mons. Age of lava flow: 20 million years.

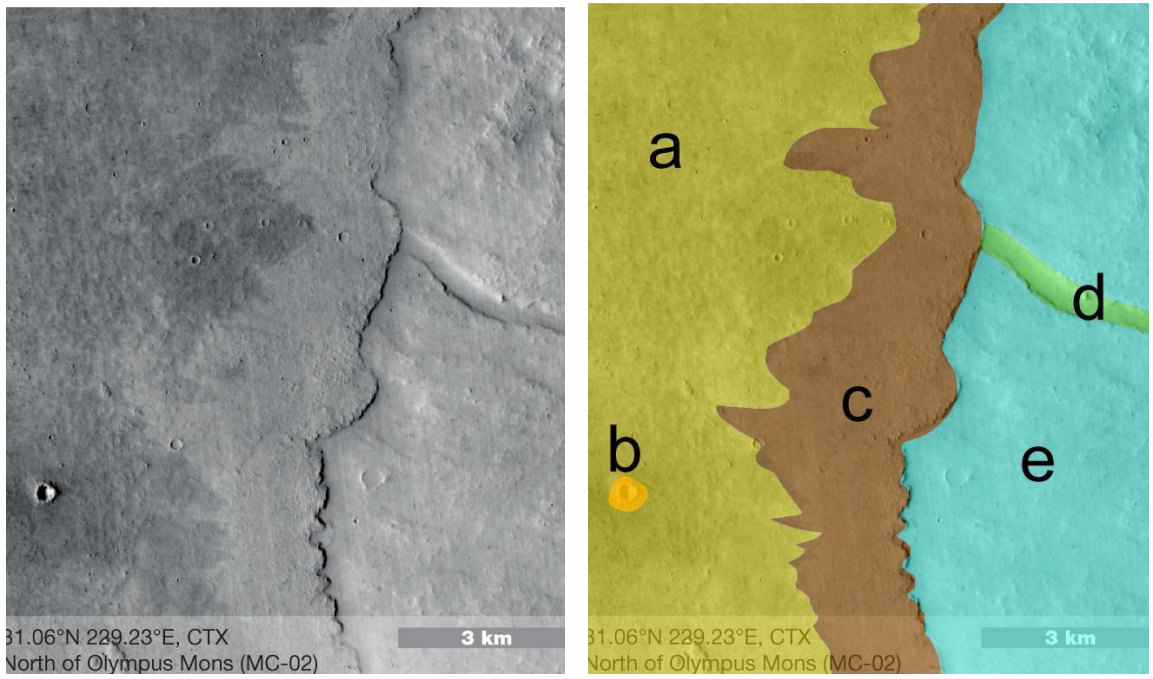


On this image lava flows into a floodwater channel. In the lava flow there are only very few craters. It suggests that the flow is very young. The lava (a) flows onto the channel bed (b): the channel is older. The channel cut into a plain, whose material was preserved in streamlined islands (c) and the overbank region (c). A large crater (e) and a hill stands on a higher level. The hill and the large craters are probably the oldest features in this image but it is difficult to determine their ages. If you observe closely (at the lava flow margins, see image on the right→), you can see that the dark tone of the lava flow is the tone of the top surface deposit: the bulk of the lava is not dark, only its very top layer. Usually the brighter regions are covered with fine-grained dust.

a - lava flow b - channel bed c- islands and overbank (pre-channel surface)

d: unit that may be flooded by the channel material? e - impact crater and hills (age undetermined)

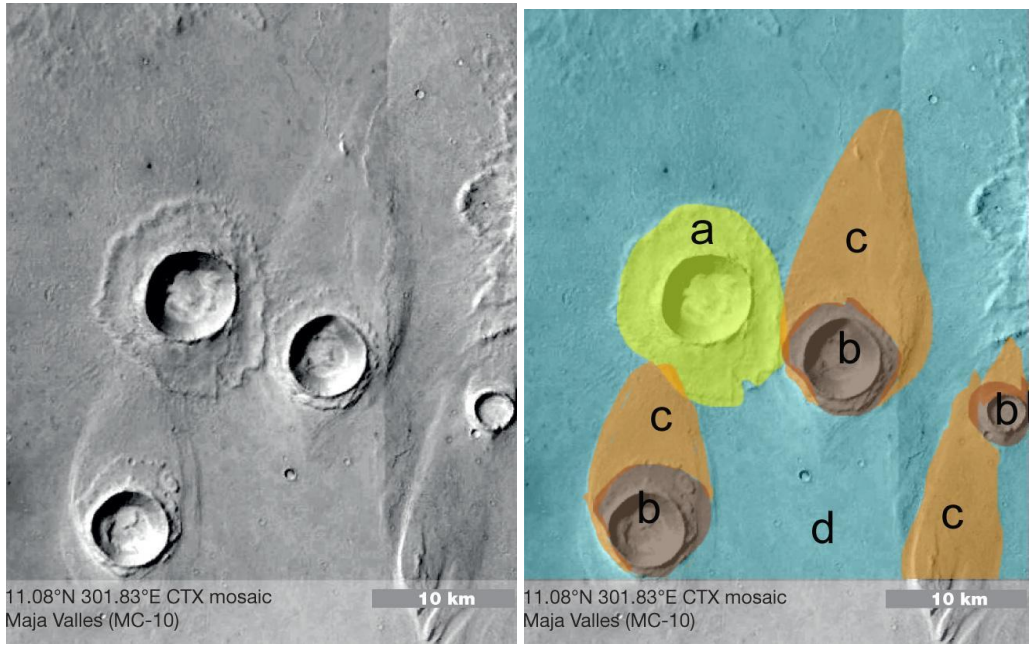
IMAGE 2: North of Olympus Mons, Mars. Age of lava flooding: 100 million years.



There are three levels on this scene. The lowest one is the channel floor (d), the middle one is the channel's overbank (e), and the highest one is the material on the left side (c). The channel (d) cut into (e) so the channel is younger than (e). Deposit (e) was flooded from the left side by a thick layer of new material. Its lobate margin is typical of lava flows. The channel (d) is cut into a previous lava flow: probably it is a lava channel, cut by hot lava! It continued and is now hidden under the new lava flow that covered it. A small, 300 m diameter impact crater (b) in this new lava flow likely impacted into the young lava flow. The youngest feature is the dark marking (a) on the top of the lava flow. This dark layer is the result of recent winds that cleared dust from that area.

a - wind-cleared lava b - crater c- dusty lava d - channel e- pre-channel surface (probably older lava)

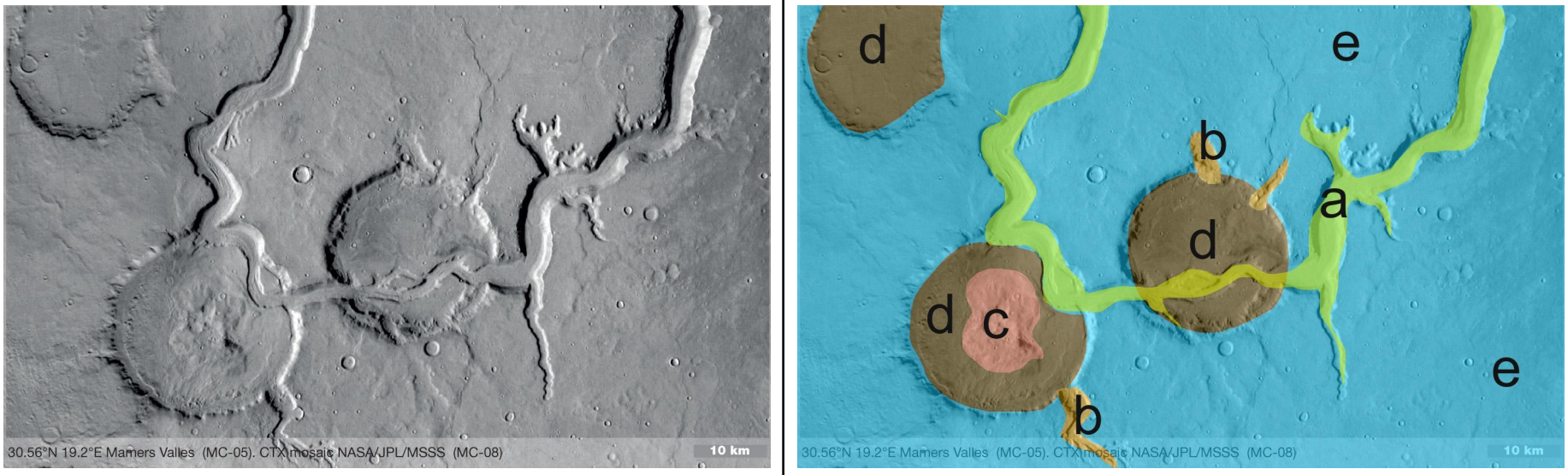
IMAGE 3: Maja Valles, Mars, North of Valles Marineris. Age: 2–3.5 billon years.



This scene is within and in the middle of a very large outflow channel. The image shows three large craters and deposits around them. One has an almost circular deposit (a), the others' deposits are streamlined but small circular deposit remnants are also visible. The streamlined deposits are covered by the circular one (b), so the lower, streamlined **material** is older, – but the streamlined **form** is younger ! After the older two craters formed, on the top of a layered material, the region was flooded by fast-flowing flood water that eroded away most of their ejecta, and also a thick layer of the underlying surface (c) into which the craters impacted. Some of this surface was preserved in the "shadow" of the water current (behind the craters), and was cut into a streamlined shape by the flood (c). In other parts, the flood completely eroded away this lower layer (d). The youngest crater (a) was not exposed to the flood, it formed afterwards, because it was not affected by a flood and preserved its complete ejecta that was thrown onto the top of all other forms.

a - new crater b - old crater c - streamlined island in current shadow d - eroded flood channel surface

IMAGE 4: Mamers Valles, Mars, in North Arabia Terra. Age of channel: 3.6 billion years.



One long and deep channel (a) is making its way through older, eroded craters (d). The channels have short branches and amphitheatre-like heads that may form by seepage from groundwater-springs. The old craters are filled with some deposit (d, e). The left side crater has hills (c) in it, suggesting that some deposit may have completely filled it in the past. The channels in this region are called fretted channels. They were formed by water floods. Later they were filled with and enlarged by ice, which may still be there. There are two sets of channels: one ends at the bottom level of the craters (b). This suggests that they carried water or ice and sediments into the craters. The other (a) is eroded deeply into the craters: this channel form and the deposit within the channel are the youngest features. How could this channel cut through the high crater walls? Probably by incision, cutting itself ever deeper into an eroded surface.

a – deep channel b - shallow channel c - intracrater hill d - filled crater floor e - original surface