

# Detailed morphology and the forming mechanism of the small-sized tributary channels on Mars

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On the surface of Mars we can see many channels, which are generally understood as the results of liquid water activity. The channels have wide variation in size, in the types and in the formation ages. Among various channels, there exist peculiar type of small-sized tributary channels flowing into the Hesperian channels (20-30km wide, up to 1km deep) at Shalbatana Vallis, Ares Vallis, and Maja Vallis. They exhibit fresh morphology, which means recent formation.

Under the present Martian environment, liquid water is unstable because of low-temperature and low-pressure condition. It has been considered that the low discharge rate river would be frozen in a short time and can't form channels. In this context, the formation mechanism of the small channel is very important to know the behavior of liquid water, the ground properties and the surface environment at the time the channel was formed.

In the previous studies, several mechanisms were proposed for the small to mid size channels in the southern highland like Valley networks (about 3-5km wide and 200m-1km deep). They are categorized in the ground water sapping, the ground water seepage and the rainfall. However, there are no detail descriptions about the small-size tributary channel morphologies.

In this study, we investigate the small channels flowing into the Hesperian mid-size channels. Particularly we focus on their variation of the cross-sectional shapes with the altitude using the data from Mars Global Surveyor (MGS) Mars Orbiter Laser Altimeter (MOLA). Also their depositional areas and headstream areas are investigated using meter scaled high resolution images from MGS Mars Orbiter Camera (MOC) and Mars Odyssey Thermal Emission Imaging System (THEMIS). In this presentation, we describe the details of the small tributary channel properties, and suggest the formation mechanisms.