



## **Spatial distribution and characteristics of rampart craters on Mars using multi-spacecraft observational data**

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Some Martian craters filled with water ice and CO<sub>2</sub> ice on their bottom at northern polar region (upper than 65°N). Areas of ice filled regions of craters change during seasons. One of the special types of impact craters are rampart craters which only exist on Mars. It is considered to indicate ice or liquid water buried beneath the surface of Mars at the time of impact. We use four instruments - HRSC (High Resolution Stereo Camera, Mars Express), MOC (Mars Orbiter Camera, Mars Global Surveyor), THEMIS (Thermal, Emission Imaging System, Mars Odyssey) and HiRISE (High Resolution Imaging Science Experiment, Mars Reconnaissance Orbiter) – in order to characterize the physical properties of ice-bottomed craters. We systematically investigate the relationships between morphology, crater diameter vs. ice cap diameter and depth of craters. These results show that craters which have ice caps inside the cavity happened at higher latitude and the depth of the ice-rich layer may be very shallow. The presence of ice shows that there is much water-ice on and beneath the surface of the Martian polar region.