

# Present-day Uninhabited Habitats on Mars

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Habitability and the presence of life are not necessarily coupled, despite the observation that most habitable places on the Earth contain life. If life exists on present-day Mars, a lack of a productive photosynthetic biosphere to generate organic carbon and oxygen (as a redox couple) and/or a lack of connectivity between potential habitats could result in the existence of uninhabited habitats on Mars. Alternatively, the discovery of uninhabited habitats on Mars without a discovery of life could also suggest that there was never an origin of life on Mars (or a transfer of life to Mars) or that there was an ancient extinction of all life in the past, but that habitable environments exist today. Uninhabited habitats could exist on present-day Mars in regions of transient melted permafrost, brine seeps, gullies and local regions of volcanic activity. Uninhabited habitats would be significant since they would provide control habitats to investigate the role of biology in planetary-scale geochemical processes on the Earth. The hypothesis that uninhabited habitats exist on Mars is experimentally testable by finding environments where the elements required for life, an energy source and liquid water exist, but there is no active life.

Cockell CS, Balme M, Bridges JC, Davila A, Schwenzer SP. 2012. Uninhabited habitats on Mars *Icarus* 217, 184-193.

Cockell CS. 2011. Vacant habitats in the Universe. *Trends in Ecology and Evolution* 26, 73-80.