Chemical & Physical Sciences
UNIVERSITY OF TORONTO
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Colloquium Seminar Series
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SEARCH FOR ANCIENT LIFE ON MARS: MARTIAN ROVERS AND ANALOG FIELD STUDIES ON EARTH

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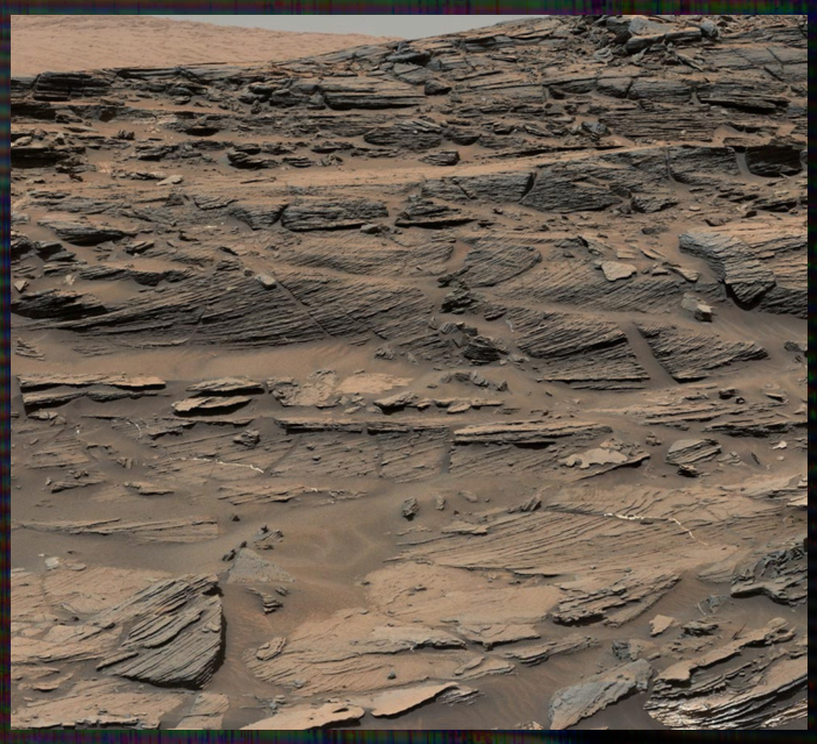

Credit: NASA/JPL-Caltech/MSSS

Whether there is life beyond Earth is one of the main questions in astrobiology and planetary exploration. Due to past and ongoing missions, we have gained a much better understanding of how Mars has evolved as a planet over the past 4 billion years. Although it is now very dry and cold, numerous geological clues point a wetter and warmer past. The Curiosity rover has been exploring Gale crater for over 12 years. It has found evidence for ancient rivers and lakes in the form of clastic sedimentary rocks, alteration minerals and textures, and landforms such as deltas. Some of the mudstone rocks contain a diversity of organic molecules and all the CHNOPS elements, along with various minerals that could have served as energy sources. In short, the environment in Gale crater was once habitable – life as we know if could have been sustained there. More recently, the Perseverance rover has been exploring Jezero crater in search of biosignatures. It has been exploring deltaic sediments and altered igneous rocks. In addition, it has been collecting small rock cores and atmospheric samples for an eventual return to Earth. Based on our knowledge of studying past life in ancient rocks on Earth, many believe that the detection of putative life would have to be done here on Earth with more powerful and diverse instruments. I will summarize key highlights of these two exciting rover missions, while showing what it is like to “work on Mars”. I will also summarize some relevant field-based studies in Mars analog environments, including a glacio-volcanic lake in Iceland and Arctic gossans.