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Active other worlds in the Solar System and beyond

François Forget
LMD, Institut Pierre Simon Laplace, UPMC BP99, 4 place Jussieu 75005 Paris, France (forget@lmd.jussieu.fr)

Over the past decades, space exploration has moved planetology from the field of astronomy to the disciplines of geosciences. A fleet of spacecrafts have discovered and study tens of worlds in our solar system and beyond. Everywhere, we have been surprised by the diversity and the vigour of the geophysical activity, from volcanic eruptions to plasma waves...
Every scientists present at EGU could -and should- be interested in the extraterrestrial processes that are discovered and analyzed elsewhere. In our solar system, a variety of clouds and fluid dynamical phenomena can be studied in six terrestrial atmospheres and on four giant planets. Active glaciers are found on Mars and Pluto. Rivers and lakes have sculpted the surface of Titan and Mars. Sometime, we can even study geophysical activity with no equivalent on our planet: ice caps made of frozen atmosphere that erupt in geysers, hazes formed by organic polymers which can completely shroud a moon, etc.
We study these active worlds because we are curious and wish to understand our universe and our origins. However, more than ever, two specific motivations drive solar system geosciences in 2016:
Firstly, as we become more and more familiar with the other worlds around us, we can use them to better understand our own planet. Throughout the solar system, we can access to data that are simply not available on the Earth, or study active processes that are subtle on Earth but of greater importance elsewhere, so that we can better understand them. Many geophysical concepts and tools developed for the Earth can also be tested on other planets. For instance the numerical Climate Models used to assess Earth's future climate change are applied to other planets. Much is learned from such experiments.
Secondly, the time has come to generalize the fundamental lessons that we have learned from the examples in the solar system (including the Earth) to address the countless scientific questions that are -and will be- raised by the study of planets around stars. Already, several geophysical sciences have been challenged by observations of exoplanets, and this is just the beginning. We know now that a large fraction of the stars in our galaxy have planetary systems containing Earth-size planets. How many may be suitable for life? Is the Earth exceptional? The answer lies in the geophysical activities that control the environment on these bodies, and their evolution.