

EGU2020-19961

<https://doi.org/10.5194/egusphere-egu2020-19961>

EGU General Assembly 2020

© Author(s) 2022. This work is distributed under the Creative Commons Attribution 4.0 License.



## Planetary GIS – Review and the Road ahead

**Stephan van Gassel**<sup>1</sup> and **Andrea Nass**<sup>2</sup>

<sup>1</sup>National Chengchi University (NCCU), Taipei, Taiwan ([svg@nccu.edu.tw](mailto:svg@nccu.edu.tw))

<sup>2</sup>German Aerospace Center (DLR), Berlin, Germany ([andrea.nass@dlr.de](mailto:andrea.nass@dlr.de))

Since the mid 1990s, off-the-shelf Geographic Information Systems (GIS) have been increasingly accepted as essential tools for data management, data analysis and visualization in the planetary sciences, in particular in planetary surface studies.

With that advance, small homebrew and niche solutions have been slowly abandoned in favor of commercial off-the-shelf (COTS) and established free and open-source software (FOSS) which are capable of providing a wide range of generic analyses tools.

This transition has likely been facilitated by three contemporaneous developments:

- the integrability and provision of planetary spheroid specifications with arbitrary radii definitions,
- the possibility to ingest planetary data in their native formats or to be able to use tools exporting data into common formats,
- the need to be able to ingest and co-register data at medium low (>200 m) as well as highest resolution (<5 m) at the same time as well as the need to make extensive use of digital terrain model analyses. These needs resulted from the release of data with varying spatial and temporal resolution initiated in the course of the Mars Global Surveyor mission.

To no surprise, user demands have been increasing over the last two decades due to high data-volume returns from Mars, the Moon and from Saturn's satellites.

This particular development as well as an education which has been increasingly centered on spatial awareness helped shaping the landscape of spatial data management, data analysis and visualization supported by GIS technology. New challenges in these fields currently arise while other challenges just became more apparent and have been ghosting around for over 30 years without being solved thus far. Some of the new challenges evolve around the obvious need to be able to integrate large amounts of variable data, not only in terms of storing and managing, but also with respect to extracting meaningful information with purposeful tools as well as with respect to visualization. While the exponential data growth and the need for more sophisticated tools did certainly not come as a surprise, innovation and solutions to cope with such a demand lag far behind.

Open standards and stable interfaces allowing to extend functionalities have been demanded and discussed as essential challenge in GIS development for more than 30 years, and yet, “open data” has seemingly only recently become a market “vision”, and the future will show if interoperability will become bidirectional at the end. The relatively small planetary sciences community will need to come up (and has come up) with their own tools to extend GIS functionalities although that experience might be hampered by ever-changing interface specifications with new GIS releases rendering updates unsustainable on the long run. Other challenges, e.g., cartography of irregular bodies, cannot be addressed using additional tools as they target the very core of contemporary GIS tools.

In this presentation we will summarize and discuss recent challenges in Planetary GIS and focus on perspectives within a currently changing GIS landscape and try to address potential solutions and bypasses.