Update on the South Pole-Aitken Geomorphological Map. C. M. Poehler[1], M. A. Ivanov[2], C. H. van der Bogert[1], H. Hiesinger[1], and J. W. Head[3], [1]Institut für Planetologie, Westfälische Wilhelms-Universität, Wilhelm-Klemm-Str. 10, 48149, Münster, Germany, c.poehler@uni-muenster.de, [2]Vernadsky Inst., RAS, Russia, [3]Department of Earth, Environmental and Planetary Sciences, Brown University, Providence, RI 02912 USA.

Introduction: The lunar South Pole-Aitken Basin region is an area of high interest for future and ongoing space missions. Several regions located within the SPA are possible destinations for robotic and human missions [e.g. 1–4]. Therefore, detailed studies of the geological background and setting of the region are necessary. The SPA, located on the lunar farside, centered at ~53° S, 191° E, is the largest and probably oldest lunar basin [5,6]. The entire region is widely influenced by rays of the young Orientale basin [7]. The age and extent of SPA makes it a prime target for scientific as well as commercial missions.

In this study, we have mapped the full extent of the SPA basin, covering the South Pole, and extending the map eastward to include part of Orientale basin. Here, we present updates and improvements to the maps since [8]. Altogether, this provides a comprehensive overview of the geology of the region (***Fig. 1***).

Methods: Extending the map of the Apollo basin [9], this map is part of the PLANetary MAPping (PLANMAP - H2020 n°776276) project. We performed most of the mapping on Lunar Reconnaissance Orbiter (LRO) Wide-Angle Camera images (WAC) (100 m/pixel). In some cases we took the more detailed, images of the Narrow-Angle Camera (NAC; 0.5 m/pixel) [10] and Kaguya (10 m/pixel) data with different incidence angles to look at smaller areas and details. We also used Lunar Orbiter Laser Altimeter (LOLA) digital elevation models (DEMs) and a LOLA/Kaguya merged DEM with a resolution of 59 m/pixel [11] for identifying topographic features. As this map covers partly and permanently shadowed regions in the southernmost latitudes, we produced hillshade maps with various illumination conditions to determine the morphology there. A hillshade image also provides the basemap of the final map. We used PLANMAP mapping standards [12], an extension of USGS standards [13].

We identified geomorphological units on the basis of morphological appearance, albedo contrast and topographic expression. In addition to relative dating of geologic units, we performed crater size-frequency distribution (CSFD) measurements and from these determined absolute model ages (AMAs) using the production and chronology functions of [14]. The final stratigraphic correlation chart uses the morphological relations of units as well as absolute model ages to anchor the stratigraphy to the global geologic history.

Geology: A general description of the geological units and mapping process is given by [8]. Here, we present the improvements and updates done to the map since it was last presented.

The most significant update to the map has been an increase in number of units. We have been able to add several new units due to additional crater size-frequency measurements we made over the mapping area, further subdividing the previous geological units. This provides a more detailed look at the stratigraphy and how the area evolved over geological history. The newly added geological units mostly are Eratosthenian in age making for a more well-defined and diverse recent history than previously described.

As this map covers a signifiant part of the Moon (stretching over the pole and extending more northward on the farside), it presents some challenges to traditional display approaches: we therefore increased the map area and made it more symmetrical, now covering the farside up to 10°S and the nearside up to 60°S.

We also updated and added four geological cross-sections (South Pole, Schroedinger Basin, Apollo Basin and a N-S Profile Leibnitz to Poincaré craters) in order to provide a more comprehensive and representative interpretation of the geology of the SPA Basin.

Minor changes included color changes of units to enhance comparison to other lunar maps and an increase of detail in some areas, as well as reassessment and updates of some contacts.

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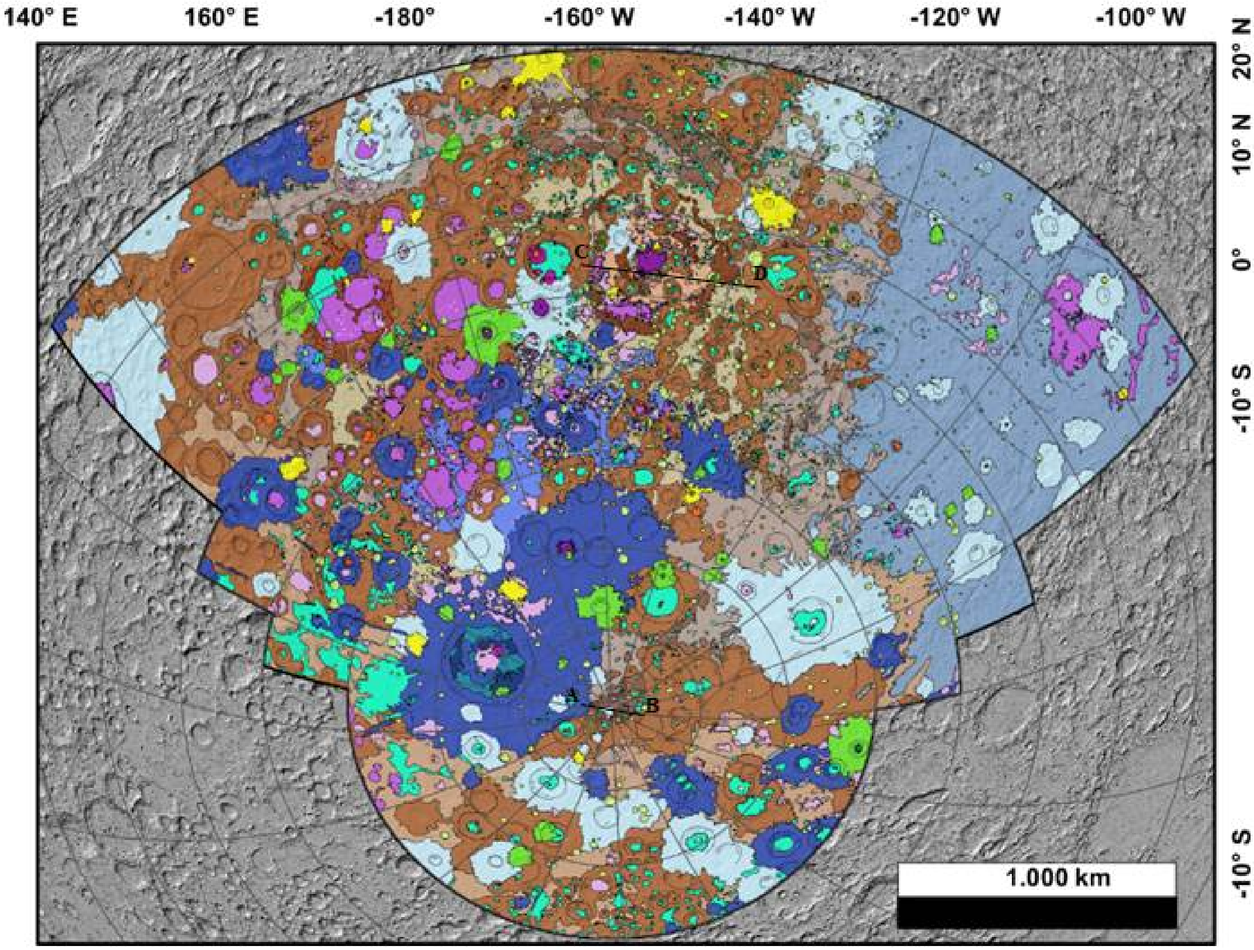

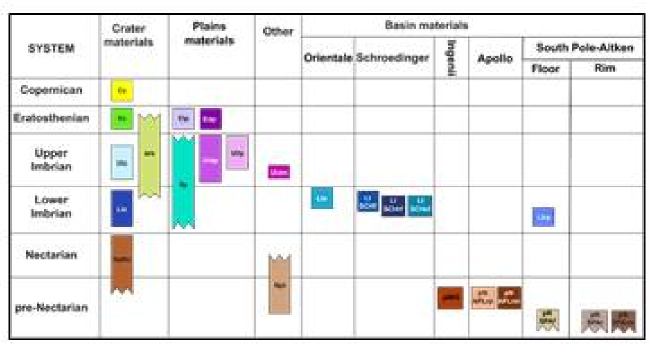

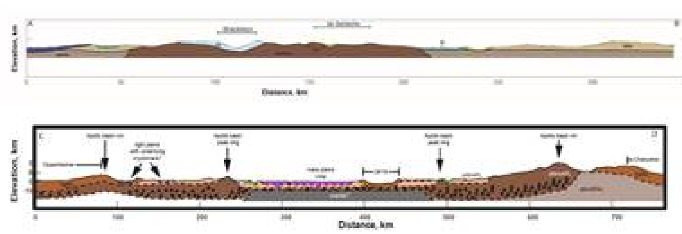

Fig. 1. Updated Geomorphological Map of the Lunar South Pole-Aitken Basin Region with stratigraphic correlation chart of the units and geological profiles of the South Pole and the Apollo Basin.