CHINA'S CHANG'E-5 LANDING SITE: AN OVERVIEW. Yuqi Qian[1,2], Long Xiao[1*], James W. Head[2*], Carolyn H. van der Bogert[3], Harald Hiesinger[3], and Lionel Wilson[4], [1]Planetary Science Institute, School of Earth Sciences, China University of Geosciences, Wuhan 430074, China (longxiao@cug.edu.cn), [2]Department of Earth, Environmental, and Planetary Sciences, Brown University, Providence 02912, USA (James_Head@brown.edu), [3]Institut für Planetologie, Westälische Wilhelms-Universität Münster, Münster 48149, Germany, [4]Lancaster Environment Centre, Lancaster University, Lancaster LA1 4YQ, UK

Introduction: The Chang'e-5 (CE-5) mission is China's first lunar sample return mission. CE-5 landed on Dec. 1, 2020 at 43.06°N, 51.92°W in Northern Oceanus Procellarum [1], collected 1731 g of lunar samples. The CE-5 landing site is ~170 km ENE of Mons Rümker, within the Procellarum KREEP Terrane, characterized by young lunar mare basalts [2-4]. This study describes the geology of the landing site to provide context for ongoing sample analysis.

Young Mare Basalts: The Em4/P58 mare unit, on which CE-5 landed, is one of the youngest mare basalts on the Moon [3]. Various researchers acquired different CSFD results; however, most of them point to an Eratosthenian age for Em4/P85 (1.21 Ga [2], 1.33 Ga [4], 1.53 Ga [3], 1.91 Ga [5], 2.07 Ga [6], 3.0 Ga [7]; different AMAs may be due to the different counting areas [3]), and there are minor age variations across Em4/P58 [3]. Specially, [8] dated the surrounding area of the CE-5 landing site, obtaining an AMA of ~1.6-1.7 Ga, which may dominate the age of the CE-5 basaltic samples.

Em4/P58 mare basalts have intermediate-Ti, relatively high-olivine and high-Th abundances (at least in the overlying regolith), while clinopyroxene is the most abundant mineral type [3]. Em4/P58 mare basalts cover an area of ~37,000 km^2, with a mean thickness of ~51 m and volume of ~1450-2350 km^3 [3]. No specific source vents (e.g., fissures, cones, domes) were found within the unit, and Rima Sharp is the most likely source region for the Em4/P58 mare basalts [9].

Scientific Significance of the Returned Samples: Young mare basalts have enormous potential for improving our understanding of the recent thermal evolution and impact history of the Moon [10]. The scientific significance of the young mare basalts is summarized in our previous studies [2, 3]. In [3], we have summarized the 27 fundamental questions that may be answered by the returned CE-5 samples, including questions about chronology, petrogenesis, regional setting, geodynamic & thermal evolution, and regolith formation (**Tab. 1** in [3]), especially calibrating the lunar chronology function, constraining the lunar dynamo status, unraveling the deep mantle properties, and assessing the Procellarum KREEP Terrain structures and significance.

Provenance of Materials: The returned CE-5 samples consist of two types of materials based on remote sensing analysis, i.e., local materials and exotic materials [8]. Local materials dominate the overall regolith composition (~91%) of the CE-5 landing site according to the ejecta thickness & mixing model [8]. An ~4-7 m thick regolith layer [11], developed by post-mare impact bombardment, overlies the Em4/P58 basalts and contains admixed impact ejecta from distant sources, especially Harpalus (~6%), Copernicus (~2%), and Aristarchus craters (1%) [9]. The identification of ejecta materials is crucial to lunar chronology studies [11].

Except for the distal ejecta, three other types of exotic materials also have high scientific significance [8], i.e., highland, silica-rich, and meteorite materials. Highland materials were transported by lateral mixing [12], and may be mainly from the SPA, Imbrium, and Serenitatis basins [13]. Silica-rich materials have been found in many Apollo samples [14], which may reveal the petrogenesis of this special volcanic endmember.

References: [1] Wang et al. (2021) *Remote Sens.*, 13, 590. [2] Qian et al (2018) *JGR*, 123, 1407–1430. [3] Qian et al. (2021) *EPSL*, 555, 116702. [4] Hiesinger et al. (2011) *Geol. Soc. Am.*, 477, 1–51. [5] Morota et al. (2011) *EPSL*, 302, 255–266. [6] Jia et al. (2020) *EPSL*, 541, 116272. [7] Giguere et al. (2021) *52nd LPSC*, Abstract #1091. [8] Qian et al. (2021) *EPSL*, 561, 116855. [9] Qian et al. (2021) *52nd LPSC*, Abstract #2492. [10] National Research Council (2007) *The Scientific Context for Exploration of the Moon*. [11] Hiesinger et al. (2020) *51st LPSC*, Abstract #2045. [12] Liu et al. (2021) *Icarus*, 358, 114206. [13] Liu et al. (2021) *52nd LPSC*, Abstract #2548. [14] Barra et al. (2006) *GCA*, 70, 6016-6031.

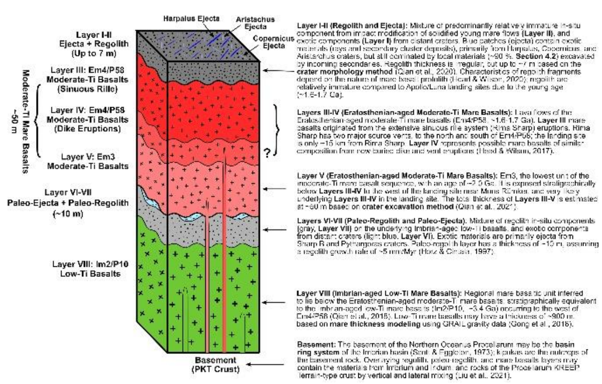

Fig. 1. Stratigraphy of the CE-5 landing site [8].