CHINA'S LUNAR EXPLORATION PROGRAMME. Q. Wang[1], and L. Xiao[2], [1]Lunar Exploration and Space Engineering Center, CNSA, Beijing, China (isabellaw_q@163.com). [2]China University of Geosciences, Wuhan, China (longxiao@cug.edu.cn),

Introduction: China has a long-term lunar exploration strategy. The first round of luanr exploration is named as Chang'E Lunar Exploration Programme. It includes three steps missions: orbiting, soft landing and sample return. China has succefully completed orbiting and soft landing missions to the Moon in the past 10 years. Lunar sample return mission will be launched soon. The second round of lunar exploration will target on the polar region and explore the potentail resources. The third round of luanr exploration aims to establish a research station.

Chang'E Lunar Exploration Programme: This three-step lunar exploration programme started from the first step of two orbiting missions named as Chang'E-1 launched in Oct. 2007 and Chang'E-2 launched in Oct. 2010. Chang'E-1 orbited the Moon for 494 days, carred out global and general survey by remote sensing, obtained lunar global image and elevation map with 120m in resolution, mapped the abundance and distribution of various chemical elements on the lunar surface. Chang'E-2 validated key technologies for moon landing and obtained obtained the map of entire lunar surface with resolution of 7m, high resolution (1.7m/pix) image of Sinus Iridium in preparation for Chang'E-3's soft landing, carried out extensive tests at Sun-Earth L2 point, and successfully conducted flyby detection of asteroid 4179 Toutatis in its extended mission. Chang'E-2 is now orbiting the Sun as an artificial satellite with a distance of more than 200 million km from Earth. Chang'E-3 mission, the second step exploration, was successfully soft landed and roved (Yutu Rover) on the designated area of norther Imbrium. It was the first soft landing on the Moon since the Soviet Union's Luna 24 mission in 1976. The Chang'E-3 spacecraft touched down on the northern Mare Imbrium of the lunar side, a region not directly sampled before. Yutu Rover drove 114 meters on the ejectoa blanket, detected the surface composition and subsurface geology. The lunar penetrating radar detection identified multilayered subsurface structure in landing region, suggesting that this region has experienced complex geological processes and is compositionally distinct from the Apollo and Luna landing sites [1][2][3]. Chang'E-4, the back-up spacecraft of Chang'E-3 will explore the farside of the Moon and will be launched in 2018. It includes a relay satellite, a lander and a rover. The third step sample return mission Chang'E-5 will be lanched soon once the Long March-5 rocket passed testing. The candidate landing and sample return region is located at the Mons Rumker region, northern Oceanus Procellarum. It plans to take up to 2000 grams lunar regolith from surface and subsurface by gripping device and drill. Chang'E-6 will probably to take samples return from the polar region once the Chang'E-5 succeed.

Lunar Polar Region Exploration: China Space Agency (CNSA) plans to carry out 3 missions to study the geological structure, mineral composition, volatile content in permanent shadow areas of polar regions before 2030. One of the missions will return samples.

Lunar Research Station: The far-reaching plan is to establish a long-term energy supply, autonomous controlled infrastructures. It could conduct robotic/manned scientific research and technology tests. In-situ resource utilization and the significant lunar science problems will be comprehensively studied.

International Cooperation Opportunities: China welcome international cooperations on its long-term lunar exploration strategy. All data from Chang'E-1 to Chang'E-3 have been released for scientific research and public outreach. Several payloads for Chang'E-4 mission will collaborate with Eruope counties. China is coordinating with ESA about future cooperation in lunar exploration, and the science of sample analysis. China and Russia are on track to sign a bilateral agreement on joint space exploration from 2018 to 2022, with an emphasis on future missions to the moon and other deep-space destinations. China's middle- to long-term lunar exploration provide extensive opportunities for international cooperations in different levels.

References:

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