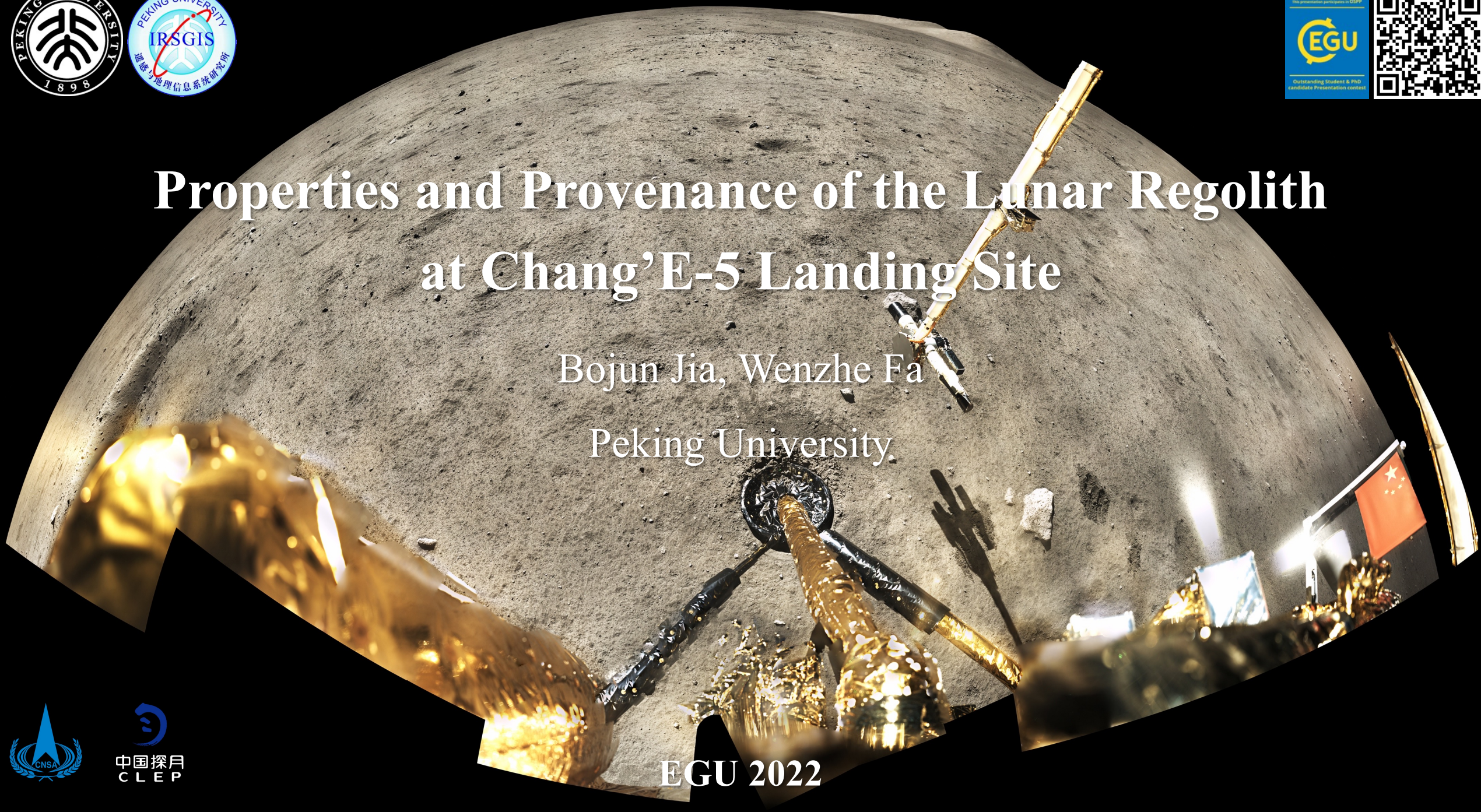

Properties and Provenance of the Lunar Regolith at Chang'E-5 Landing Site

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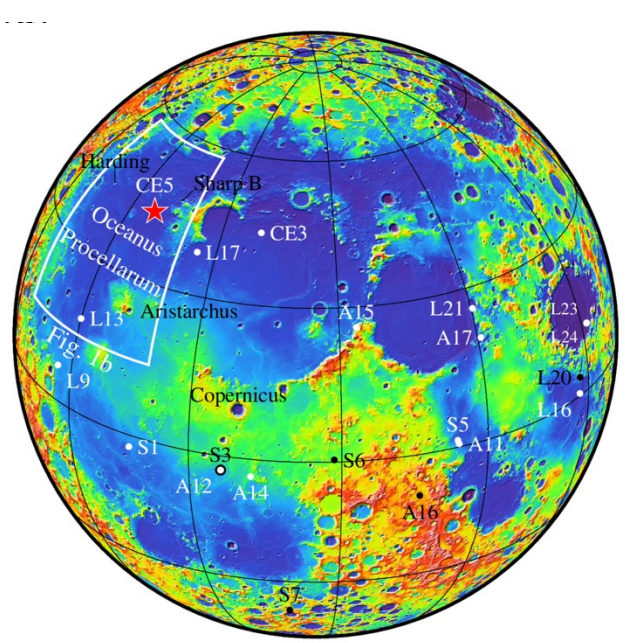
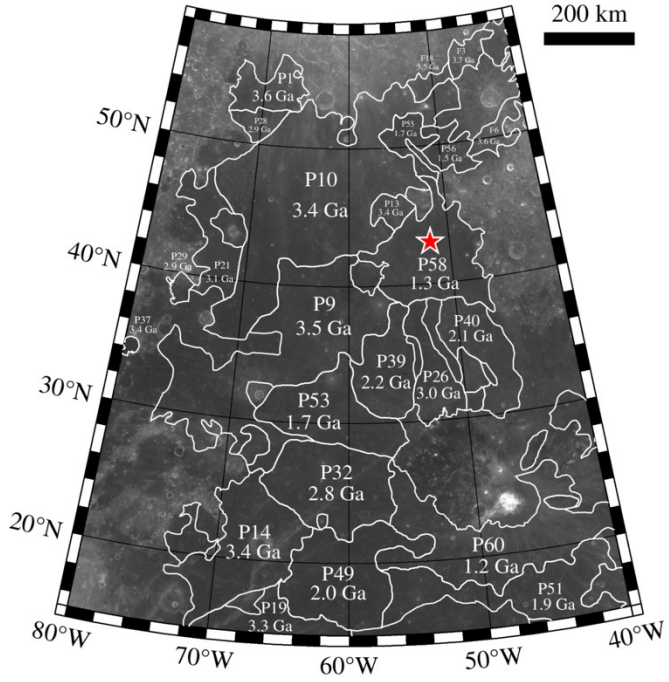
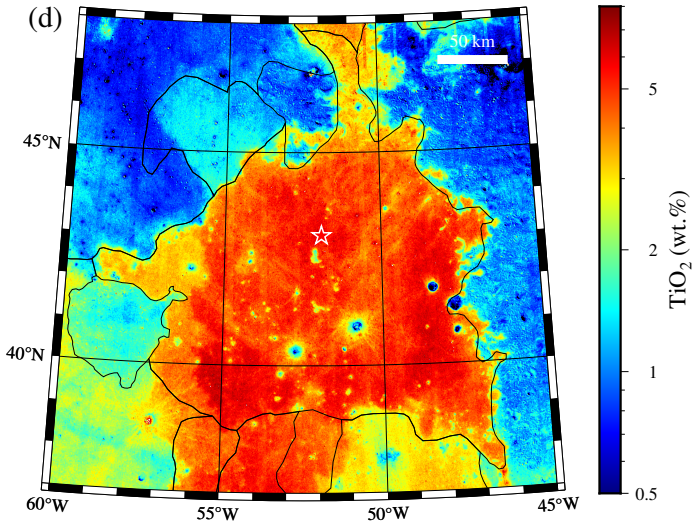
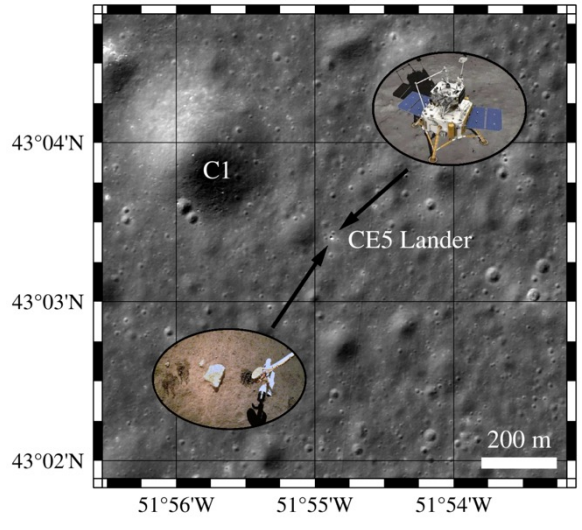
Geologic Setting

- Northern Oceanus Procellarum
  - Episodic volcanic activities: 3.6 – 1.2 Ga
- P58/EM4
  - Young: 2 Ga
  - High FeO/TiO_2 (16.7 wt.% / 4.6 wt.%)
  - Basalt thickness: ~15 – 50 m
- Landing site
  - FeO/TiO_2 17.4 wt.% / 5.9 wt.%
  - Xu Guangqi crater (C1)
  - Regolith thickness: ~1.5 – 8 m
  - Rock abundance: ~ 0.47% – 0.88%
    subsurface rocks → 10% – 20% blockage

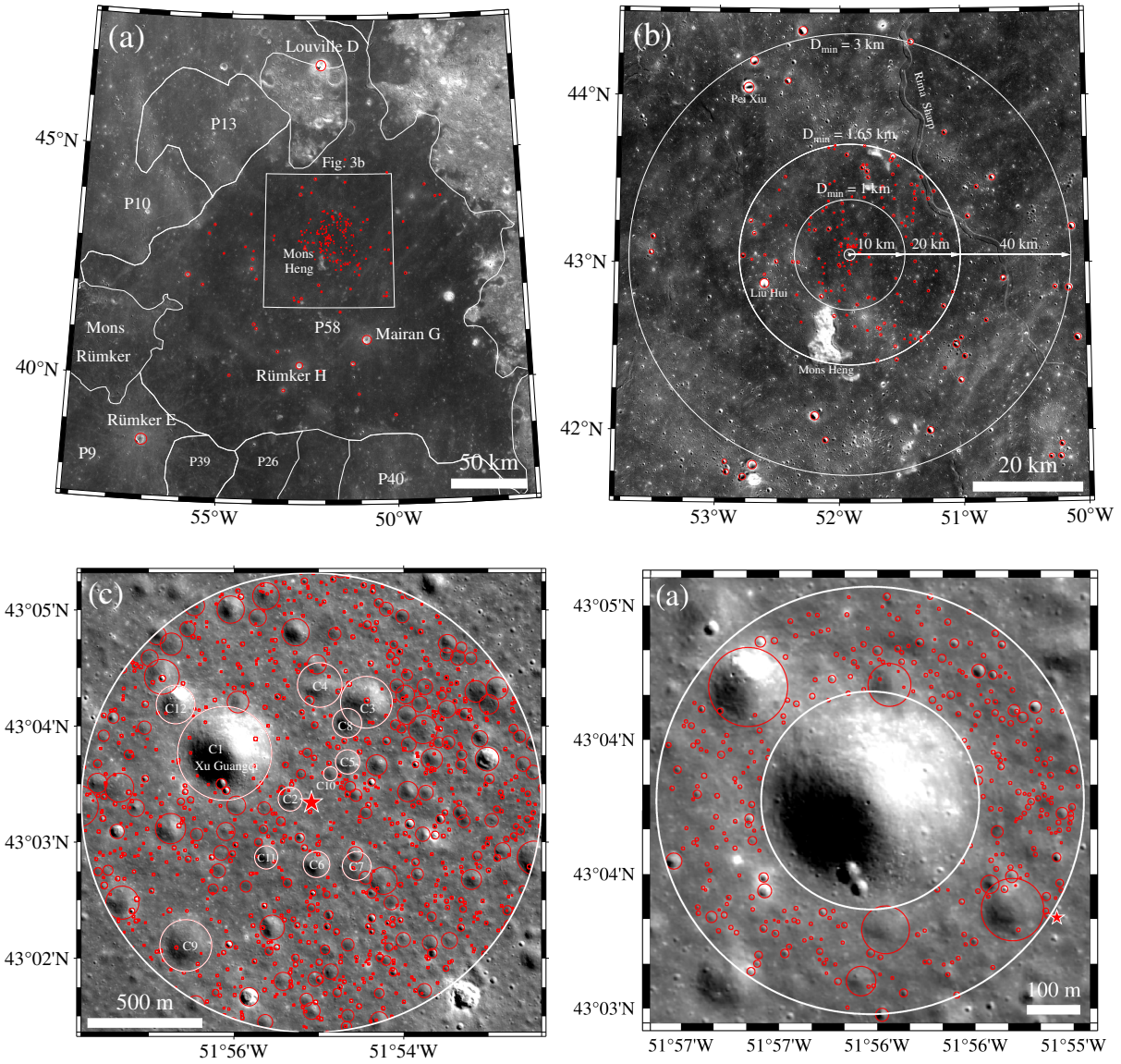








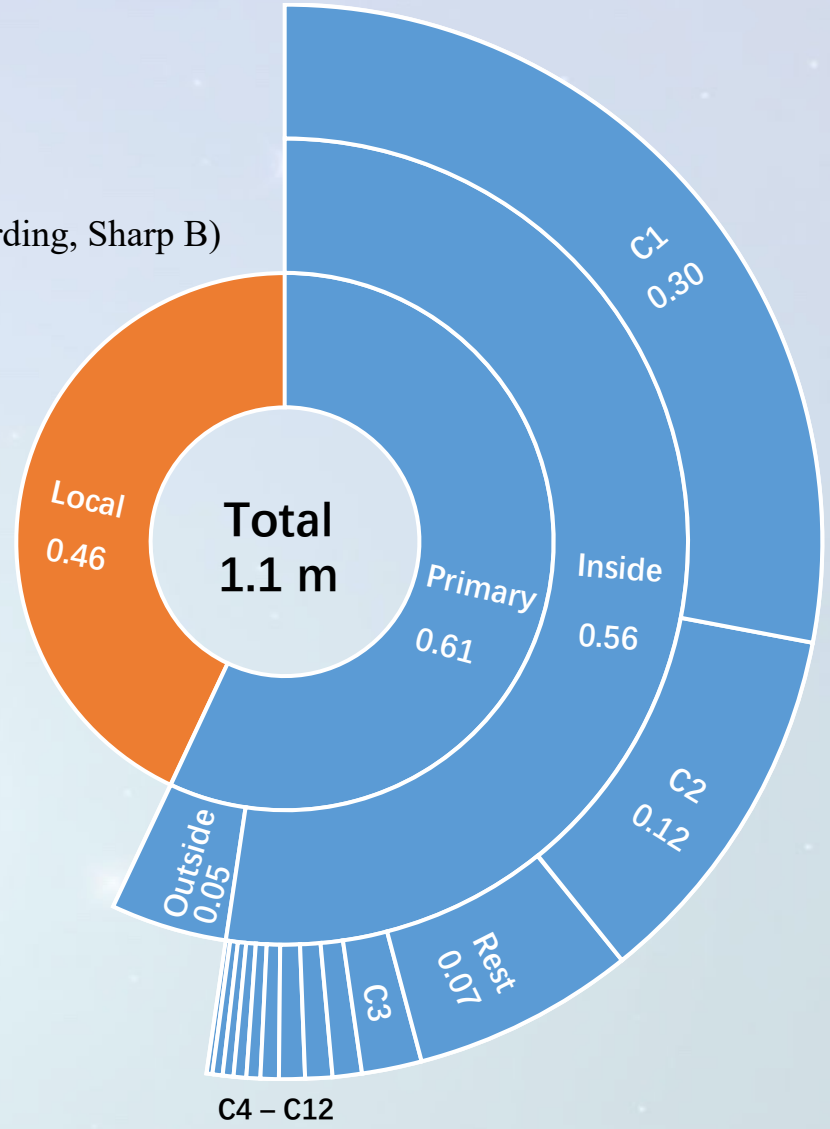
Provenance and Thickness



- 1892 inside +4 outside

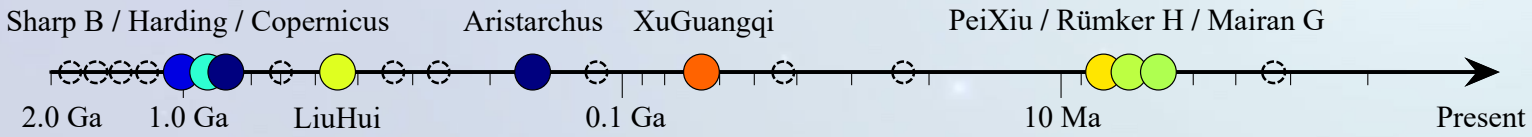
(Aristarchus, Copernicus, Harding, Sharp B)

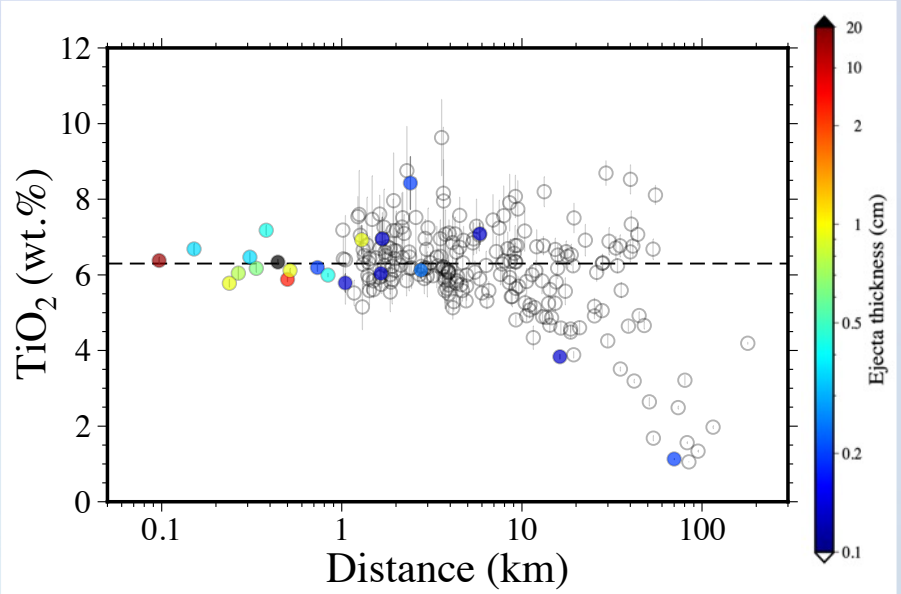
- Primary ejecta and excavated local material
- 12 major contributors
- Xu Guangqi C1 crater
  - <100 Ma
  - Local basalt

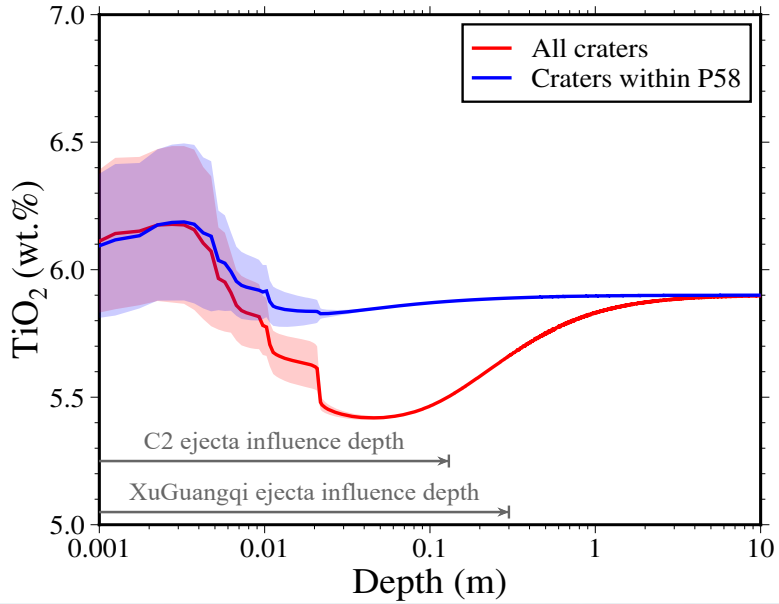


Composition and Modification

- Chemical composition of primary ejecta
  - Decrease with distance and diameter
- Stratigraphy
  - Uppermost: C1+C2+ low Ti ejecta, < 100 Ma exposure time
  - Underneath: mixture of ejecta deposits
  - Distant ejecta lower FeO/TiO_2 abundance
- Sample properties
  - Scooped samples – local basalt excavated by C1, C2
  - Drilled samples – complex mixture
  - Exotic materials other than local basalt can be identified from FeO/TiO_2 abundances







Summary

- Landing region P58/EM4 and Chang'E-5 landing site
  - A flat, young, intermediate titanium (4.6 wt.%) mare basalt unit
  - 15 – 50 m basalt thickness
  - 1.5 – 8 m regolith thickness
  - Subsurface RA ~0.47%–0.88%, lead to 10% – 20% blockage possibility
- Stratigraphy and sample provenance
  - Catalogue of 1896 craters, 1.1 m ejecta deposits in total, 50% of primary ejecta from Xu Guangqi crater
  - FeO/TiO_2 abundances of primary ejecta decrease with distance and diameter
  - Surface / scooped samples: Xu Guanqi + C2 + possible young low Ti materials
    Underlaid / drilled samples: mixture with complex deposition history
  - Distant primary ejecta lower FeO/TiO_2 abundance at CE-5 landing site,
    Possibly get sampled by CE-5, can be identified from composition

Thanks! & Questions?

Ejecta thickness of Xu Guangqi

- Relative difference ~10%
- Sharpton 2014 b: for complex crater

Model (m)	Present (408 m)	Fresh (333 m)
McGetchin 1973	0.370	0.173
Pike 1974	0.332	0.147
Sharpton 2014 a	0.300	0.133
Sharpton 2014 b	3.264	1.636