A dry lunar mantle reservoir for young mare basalts of Chang’e-5

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Supplementary information

Supplementary figures.
Fig. S1. Petrography of CE5 ilmenite-hosted melt inclusions.
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Table S5. Summary of water abundances and hydrogen isotope compositions of apatite and melt inclusions from Apollo samples in the literature.

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Figure S1 | Occurrences of the ilmenite-hosted melt inclusions from CE5 basalt clasts. Phase abbreviation is identical to Figure 1 in the main text.
Figure S2 | Occurrences of apatite from CE5 basalt clasts. Phase abbreviation is identical to Figure 1 in the main text.
Figure S2 | continued.
Figure S2 | continued.
Figure S3 | Pyroxene quadrilateral diagram of the CE5 basalt clasts compared with those of other CE5 basalt clasts reported by ref. 1 (grey hatched region).
Figure S4 | Ternary diagram of plagioclase and the variation of the Fa-contents of olivine from CE5 basalt clasts.
Figure S5 | Major-element compositions of the melt inclusions in ilmenite from the CE5 basalt clasts, comparing with those enclosed in olivine and pyroxene from Apollo mare basalts \cite{2,4}. 
Figure S6 | The ternary atomic plot of apatite from CE5 basalt clasts (Table S2). Cl and F were measured with EPMA, and OH was calculated based on the stoichiometry of apatite. Fields for apatite composition from Apollo mare basalts and highlands are from literatures\textsuperscript{5-10}.
References

1. Tian, H.-C., et al. A non-KREEP origin for the Chang’E-5 basalts in the Procellarum KREEP Terrane. *Submitted to Nature* (2021).

2. Stephant, A., et al. The hydrogen isotopic composition of lunar melt inclusions: An interplay of complex magmatic and secondary processes. *Geochim Cosmochim Ac* 284,196-221 (2020).

3. Hauri, E.H., et al. Water in the Moon’s interior: Truth and consequences. *Earth Planet Sc Lett* 409,252-264 (2015).

4. Hauri, E.H., et al. High pre-eruptive water contents preserved in lunar melt inclusions. *Science* 333,213-5 (2011).

5. Tartèse, R., et al. The abundance, distribution, and isotopic composition of Hydrogen in the Moon as revealed by basaltic lunar samples: Implications for the volatile inventory of the Moon. *Geochim Cosmochim Ac* 122,58-74 (2013).

6. Tartese, R., et al. H and Cl isotope systematics of apatite in brecciated lunar meteorites Northwest Africa 4472, Northwest Africa 773, Sayh al Uhaymir 169, and Kalahari 009. *Meteorit Planet Sci* 49,2266-2289 (2014).

7. McCubbin, F.M., et al. Nominally hydrous magmatism on the Moon. *Proc Natl Acad Sci U S A* 107,11223-8 (2010).

8. Barnes, J.J., et al. The origin of water in the primitive Moon as revealed by the lunar highlands samples. *Earth Planet Sc Lett* 390,244-252 (2014).

9. Barnes, J.J., et al. Multiple reservoirs of volatiles in the Moon revealed by the isotopic composition of chlorine in lunar basalts. *Geochim Cosmochim Ac* 266,144-162 (2019).

10. Boyce, J.W., et al. The chlorine isotope fingerprint of the lunar magma ocean. *Sci Adv* 1,e1500380 (2015).

11. Barnes, J.J., et al. Accurate and precise measurements of the D/H ratio and hydroxyl content in lunar apatites using NanoSIMS. *Chem Geol* 337,48-55 (2013).

12. Treiman, A.H., et al. D-poor hydrogen in lunar mare basalts assimilated from lunar regolith. *Am Mineral* 101,1596-1603 (2016).

13. Greenwood, J.P., et al. Hydrogen isotope ratios in lunar rocks indicate delivery of cometary water to the Moon. *Nat Geosci* 4,79-82 (2011).

14. Singer, J.A., et al. Evidence for the solar wind in lunar magmas: A study of slowly cooled samples of the Apollo 12 olivine basalt suite. *Geochem J* 51,95-104 (2017).

15. Pernet-Fisher, J.F., et al. Estimating the lunar mantle water budget from phosphates: Complications associated with silicate-liquid-immiscibility. *Geochim Cosmochim Ac* 144,326-341 (2014).

16. Tartèse, R., et al. Apatites in lunar KREEP basalts: The missing link to understanding the H isotope systematics of the Moon. *Geology* 42,363-366 (2014).