

## News and Highlights

# Possible Water and Ice on the Moon Revealed by Discovery of a Congeliturbated Fan

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The nature of the Moon's surface has always been controversial. American scientists first suggested that there has been water and ice on the Moon (Watson et al., 1961), a hypothesis supported by some but not other researchers (Compiling Committee, 2006; Ouyang, 2005; Wang, 2010). So whether there has been or is any water on the Moon or not, is a matter of heated debate.

A detailed examination of satellite photographs of the Tycho Meteorite Crater shows what appears to be a congeliturbated fan. This fan occurs about 58 km from the center of Tycho at latitude 44.4036°S and longitude 8.9297°W (Figs. 1–2). The fan is roughly triangular, 4.3 km long from north to south, narrow, high and thick in the north and broad, low and thin in the south, 2.8 km at its widest, with a total area of approximately 12 sq. km (Fig. 3).

The fan has a strongly undulate surface (Figs. 3–4), which we interpret as being caused by the freeze–thaw congeliturbation process. The composition of the fan

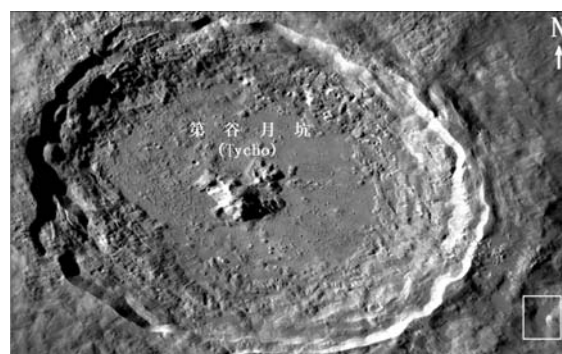


Fig. 2. Locality of the congeliturbated fan (box in right hand corner).

appears to be sediments of apparently gravel, sand and mud (data from <http://target.lroc.asu.edu/q3/#>).

This exciting discovery on the lunar surface seems to suggest that there has been recent water and ice on the Moon. However, further research needs to be carried out before this can be confirmed.

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## References

- Compiling Committee (eds), 2006. *Dictionary of Earth Sciences*. Beijing: Geological Publishing House, 62.
- Ouyang Ziyuan., 2005. *Introduction to Lunar Science*. Beijing: Space Navigation Press, 1–362.
- Wang, C.K., 2010. *The Chang'E-1 Topographic Atlas of the Moon*. Beijing: Sino Maps Press, 1–216.
- Watson, K., Murray, B.C., and Brown, H., 1961. The behavior of volatiles on the lunar surface. *J Geophys Res.*, 66: 3033.

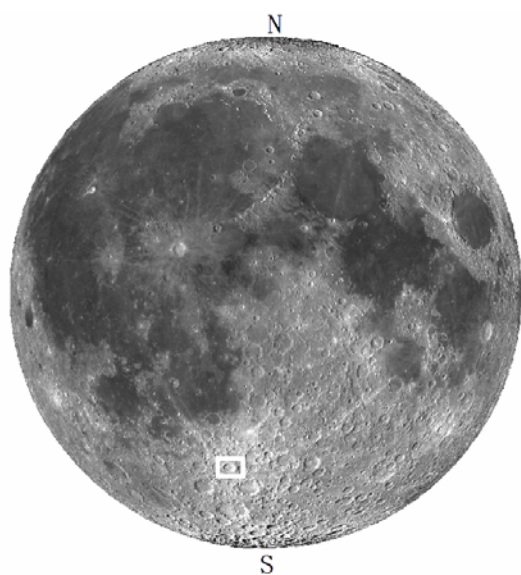


Fig. 1. Locality of the Tycho Meteorite Crater on the Moon.

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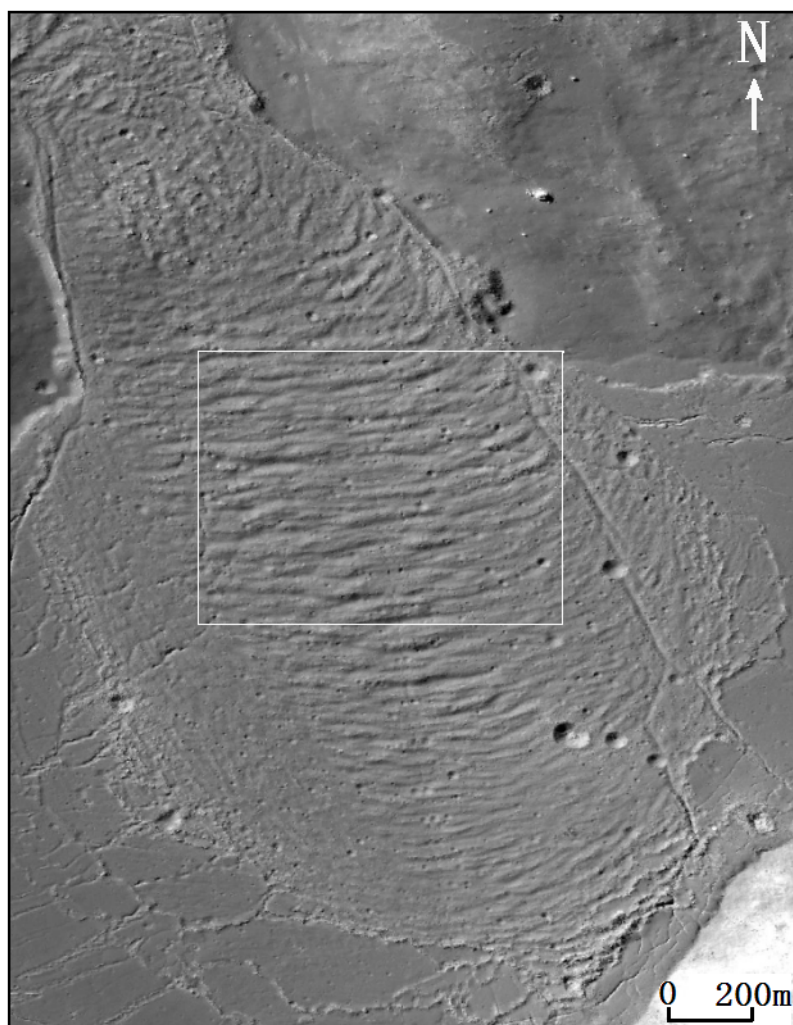


Fig. 3. The undulating surface of the congeliturbated fan. The area within the box is shown in more detail in Fig. 4.

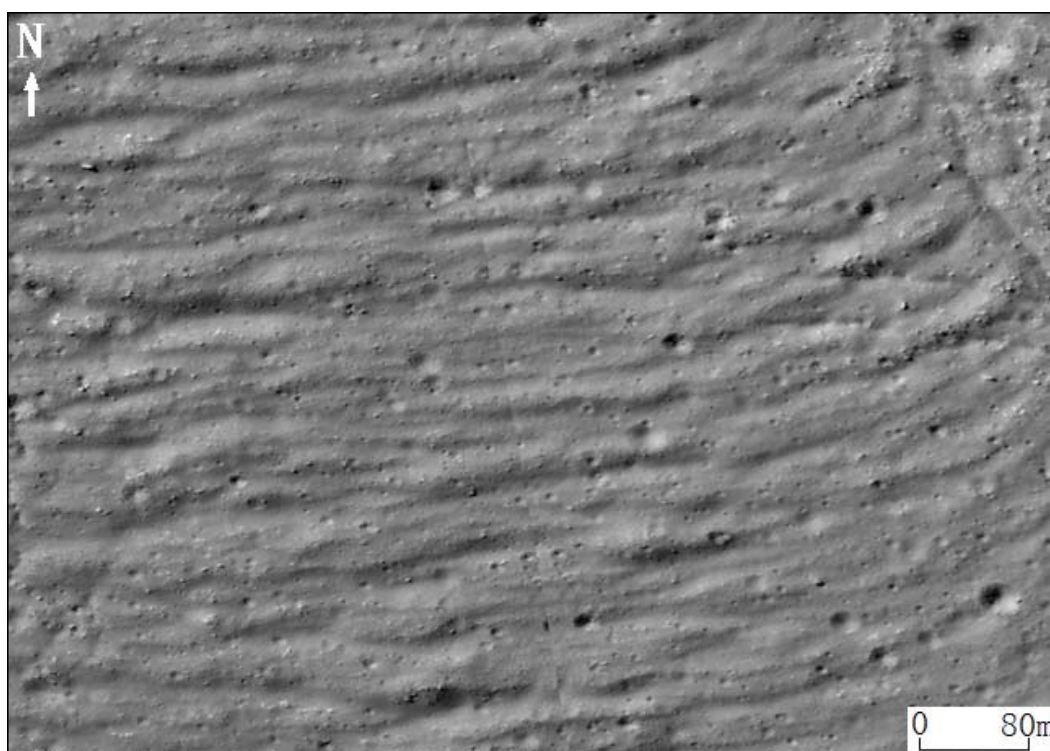


Fig. 4. Detail of the undulating surface.