UFO UpDates Mailing List

BBC: Best Site For Moonbase Revealed

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By BBC News Online Science Editor Dr David Whitehouse

The most detailed analysis ever of the Moon's mysterious polar regions has pinpointed the place best suited for a future human base.

The site is on the rim of a crater called Shackleton and meets two essential requirements. There is plenty of sunlight around to generate solar energy and it is very close to a permanently-shaded region, where ice is likely to be stored in deep freeze.

Ice would not only satisfy the thirst of settlers but could be used to generate fuel for spacecraft.

Permanently-shaded patches sit in craters at the Moon's south pole. Ice was discovered at the Moon's north and south poles just over a year ago by the Lunar Prospector spacecraft. It was hailed as a major discovery and has transformed plans to colonise the Moon.

>From its orbit, Lunar Prospector was able to detect ice in the polar regions but not pinpoint the exact position of the frozen water. Its orbit has been lowered in the past few weeks to enable it to make more precise observations.

But the new information on the location of the ice has come from data from a previous lunar mission - the highly successful Clementine mission that observed the Moon for 71 days in 1994.

Clementine took images of the south pole every 10 hours for about two lunar days. Dr Ben Bussey of the European Space Agency used the data to produce maps showing the percentage of time that a point on the surface is illuminated during a lunar day.

The maps reveal that no part of the south pole is in constant sunlight but there are some areas that are almost in the permanent glare of the Sun.

The rim of the Shackleton crater is a particularly interesting place because it is illuminated more than 80% of the time. Nearby there are two other places, only 10 km apart, which collectively receive illumination more than 98% of the time.

Also not far away, down in the crater itself, are regions of permanent shadow where ice could remain unmelted by the Sun.

This is the area to put the first Moonbase.
Electricity-producing solar arrays could be placed in the bright areas and connected by a microwave or cable link. Then the Shackleton crater site would receive near constant solar energy, as well as having easy access to the lunar ice resources. The Moon's north pole is a smoother place than the south pole, but early estimates suggest that there could be up to 13,000 square kilometres of permanent shade there.

Clementine was put into a polar orbit from where it provided the first digital images of the Moon's poles. The earlier Apollo missions were in an equatorial orbit to make it easier to get the astronauts back to Earth in an emergency.

The Moon's axis of rotation, unlike the Earth's, is not markedly tilted compared to its orbit around the Sun. This means that the Moon does not have strongly different seasons and that the Sun never rises very far up in the polar skies.

If you stood at the lunar poles for a whole year the Sun would only move up or down about 1.5 degrees. This means that low places close to the pole, such as the floors of craters, may never see the Sun at all.

Scientists believe that any regions of permanent shadow are prime candidates for the location of ice deposits. They would act as cold traps for water molecules deposited billions of years ago by impacting comets. A sizeable amount of ice may have built up over the four billion year history of the Moon.

This latest analysis of the lunar poles has highlighted their importance. Astronomers are now eagerly awaiting the new results from the Lunar Prospector spacecraft.

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