

NEWS AND NOTES

Celestial Search for Water – S. Das, Bangalore (Email: gsocind@gmail.com)

Since Galileo's discovery of telescope in the sixteenth century A.D., man has always fancied about the existence of water and life on Moon, Mars, Venus and other planets or satellites, both far and near. It is since sixties in the twentieth century that the search for celestial water gained momentum with the launching of space missions. Early images sent by the Satellites of NASA and European Union for MARS, and the Moon missions spurred speculation about existence of water on the celestial bodies. More recently, Mars missions, the planet long thought to be watery and the least inhabitable, chanced upon crucial evidences of water which once flowed over its surface, leaving piece meal imprints, or of ice caps surrounding the polar regions. Here is a summary of recent media coverage on this important topic.

Peter Gleick in his now famous book "World's Water" (the Biennial Report on Freshwater Resources, Island Press, 2006) has given a crisp account of Mars missions. Photographs and high resolution laser topography sent by Mars Global Surveyor and Mars Orbital Camera of NASA in 2000 were suggestive of the existence of flood gullies, channels and tributaries, sediment flows on sloping terrain, melting or permafrost movement. In 2003 European Space Agency's Mars mission further confirmed these observations with evidences of catastrophic floods, and large channels carved by water in its northern plains suggesting ancient ocean in the northern hemisphere and a network of valleys in the southern hemisphere. The thermal emission imaging system on Mars Odyssey further observed surface water ice in the southern hemisphere near and around perennially frozen carbon dioxide cap. Analysis of the data on northern hemisphere sent by high energy neutron detector on Odyssey also indicates occurrence of a layer of water ice under drier soils, which may contain 50-75% of water by weight. According to the findings of the rover Opportunity that landed on Mars, the planet had water on its surface for very long

periods of time. However, significant amounts of water have long disappeared from its surface. Despite this, Mars is likely to retain substantial amounts of water in the form of surface and subsurface ice near the polar regions with water vapor in the atmosphere.

A major breakthrough came, as the Space Mission Chandrayan -1 of ISRO (Indian Space Research Organisation) achieved a pioneering success in the discovery of water on the Moon's surface. In November 2009 the water molecules were found by an indigenously developed instrument called Hyper Spectral Imager and NASA's Moon Mineralogy Mapper on the Moon impact probe released from Chandrayan-1. This has been further corroborated from the impacts made by NASA's satellite, LCROSS (Lunar Crater Observation and Sensing Satellite) which slammed into a crater near the Moon's south pole and carved a hole, 60-100 feet wide kicking up at least 24 gallons of water. According to Chandrayan-1 Project Director, the water molecules were generated on the moon itself. It is thought that solar wind carrying charged particles from the sun could interact with the lunar soil to produce water. (Source: M. Annadurai, Project Director, TOI, Sep 26, 2009, p 8). On first March 2010, at the 41st Lunar and Planetary Science Congress, organized by Houston based Lunar and Planetary Institute (USA), the ISRO Charirman, Madhavan Nair, announced



Sun glints from other planets as indications of water or ice (*The Hindu*, 7 Jan. 2010, p.13)

Chandrayan-1 Mission's latest finding of more than 40 small craters with water-ice in the polar regions, the size of the craters being 1-9 miles. The discovery was made by a NASA payload aboard Chandrayan, called MINI SAR. A conservative estimate suggests water-ice up to 600 million tons. This discovery throws possibilities of Moon turning into human colonies, and a base for future planetary explorations, manned or unmanned. The ice could be melted to drinking water, or be split into oxygen and hydrogen to provide breathing air to sustain life, and rocket fuel for launching inter-planetary missions from the moon (*TOI*, March 3, 2010, p. 1 & 51).

Reportedly, researchers of the University of Heidelberg, while scanning the data from Cassini space craft's Cosmic Dust Analyzer, detected salt particles in the volcanic vapor-and-ice jets or geysers on Saturn's Moon Enceladus that shoot hundreds of kilometers into space strongly indicating the presence of a liquid ocean under the moon's icy crust.

Latest in the news is NASA's discovery of a steamy planet, described as 'water world', six times bigger than the Earth, and 40 light years away with 75% water. It has earth like atmosphere, but too hot to sustain earth like life (*Times of India*, Dec 1, 2009, p.21). New videos from NASA's Deep Impact Space craft prompted scientists to infer that 'sun glints' are capable of signaling large bodies of water as on earth and also of life on extra solar planets in future (*The Hindu*, Jan. 7, 2009, p.13).

Thus, scientists across the globe have been striving hard in their search missions for water on other planets to unravel the form of its occurrence, its distribution, properties and exploitability, origin of water and life, the mystery of creation. The discoveries of water vapor and water-ice on Mars and Moon make production of breathable oxygen and hydrogen fuel for future manned missions a distinct possibility. "As new instruments and observations are put in place, new answers will emerge." (Gleick 2006).