

SPACE TOURISM: FROM EARTH ORBIT TO THE MOON

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Travel to and from the lunar surface has been known to be feasible since it was first achieved 34 years ago. Since that time there has been enormous progress in related engineering fields such as rocket propulsion, materials and avionics, and about \$1 billion has been spent on lunar science and engineering research. Consequently there are no fundamental technical problems facing the development of lunar tourism - only business and investment problems. The outstanding problem is to reduce the cost of launch to low Earth orbit.

Recently there has been major progress towards overturning the myth that launch costs are high because of physical limits. Several "X Prize" competitor vehicles currently in test-flight are expected to be able to perform sub-orbital flights at approximately 1/1,000 of the cost of Alan Shepard's similar flight in 1961. This activity could have started 30 years ago if space agencies had had economic rather than political objectives.

A further encouraging factor is that the demand for space tourism seems potentially limitless. Starting with sub-orbital flights and growing through orbital activities, travel to the Moon will offer further unique attractions. In every human culture there is immense interest in the Moon arising from millennia of myths. In addition, bird-like flying sports, first described by Robert Heinlein, will become another powerful demand factor. Roundtrips of 1 to 2 weeks are very convenient for travel companies; and the radiation environment will permit visitors several days of surface activity without significant health risks.

The paper also discusses economic aspects of lunar tourism, including the benefits it will have for those on Earth. Lunar economic development based on tourism will have much in common with economic development on Earth based on tourism: starting from the fact that many people spontaneously wish to visit popular places, companies in the tourism industry invest to sell a growing range of services to ever more customers, thereby creating a major new hubs of economic activity and wealth. In the same way as trade with the "New World" enriched the "Old World" of Europe as well as emigrants themselves, the contribution of tourism to the economic development of the Moon will also create wealth on Earth, and open numerous opportunities for innovation.