Remote Sensing and Alternative Energy on the Moon

Mining Distributed Resources

As a non-profit educational association, the Geospatial Information & Technology Association (GITA) has a strong interest in exploring the leading edge of the future of geospatial technology. In this article, GITA reports on a possible application of remote sensing and geospatial technology way out into the future, out beyond the Earth itself.

By Mary Ann Stewart

Space

The National Aeronautics and Space Administration (NASA) has a renewed ambition to send astronauts back to the moon. Added to pending space research launches from Japan, Europe, India, and China, this draws a new wave of international attention to the potential for commercial development of space. Harrison Schmitt offers an "out of the box" financial, environmental, and national security solution with plans for fueling the Earth's energy hunger by mining distributed resources on the Moon.

NASA Astronaut

A former Apollo 17 astronaut, Schmitt is the last man and only geologist to have walked on the moon. He has been involved in the space program, space science, and space policy for more than 40 years. He also was a NASA astronaut, a U.S. senator, a consultant and businessman, a professor at the University of Wisconsin and participant in its Fusion Technology Institute, and an advocate for space-based private enterprise.

Schmitt tells us that he sees unique opportunities for the use of remote sensing in automated mining of helium on the Moon. In his just-released book, "Return to the Moon" (Praxis-Springer Science, New York, 2006) Schmitt argues that mining the Moon for a light isotope of helium called helium-3 would provide the economic foundation to sustain Earth's energy needs for the future. He says that low-cost lunar helium-3 is "the perfect fuel" for fusion energy generation, providing an environmentally benign means of meeting the Earth's anticipated eight-fold increase in energy demand by 2050.

Susan Ancel: "As the Geospatial Information & Technology Association's 2006 president, I am very excited about our new editorial partnership with GeoInformatics magazine. I believe this relationship will contribute to a global connection of geospatial issues, and I hope you enjoy reading GITA's perspective in every issue."

Risk Management Systems

Remote sensing and geospatial positioning applications would be used in the development of risk management systems to 1) automate the mining system; 2) build the architecture to fail to another system to keep the operation going; 3) finally fail to a manual (human) system.

Principal innovations and departures from traditional mining processes will be in optimization of human and robotic functions to minimize workers. There will be a need to mine around certain areas of complications, such as large rock fields, using visual reads, radar and sonar. It will also be essential to map crater characteristics and visible boulder distributions to optimize mining planning. There will be a need to position the robotic miner in space. Remote sensing data will be required and a lunar version of a GPS system would be helpful. For the GPS-like system, Schmitt would consider triangulation from Loran-type ground stations unless he could determine a good business case for deploying satellites.

Electric Energy

Schmitt presents detailed business case/ROI analysis, including capital cost estimates for building up to 15 fusion plans, building, launching and staffing 15 lunar mining settlements, and operational costs for the whole system. He reaches the conclusion that once the 15th set of facilities was completed, the helium-3 mining business could be close to competitive with electric energy from coal. Much of this analysis could be applied to any other commercial development on the Moon and as the analysis is quite detailed and thought-out, provides insights useful to anyone working with technology business case issues. Schmitt makes the case for the helium-3 approach providing easier access to capital markets due to lower startup costs and potentially earlier returns on investment than other "out of the box" energy proposals. This results in less need for government involvement than for other commercial endeavors.

Too Speculative?

Is this notion far-sighted or just far-fetched? Only time will tell. Critics claim that using the moon as a source of helium-3 is too speculative and expensive and that there are no adequate feasibility studies for full-scale power generation using helium-3. Proponents claims that the technology has been sufficiently demonstrated, that it will lead to faster development and lower cost than traditional scenarios, and that it is commercially competitive.

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