Synergistic Use of Remote Sensing Data and In-Situ Investigations to Reveal the Hidden Secrets of the Moon

Papers are invited for a special topical issue of *Advances in Space Research* (ASR) entitled **"Synergistic Use of Remote Sensing Data and In-Situ Investigations to Reveal the Hidden Secrets of the Moon"**

Since ancient times, the Moon has been a subject of curiosity for humans because it is the closest planetary body to the Earth. To further their exploration, various countries have undertaken several missions and have also developed high-tech spaceborne sensors, which have revealed a variety of information for the lunar surface. The world's leading space agencies have conducted several manned and unmanned landing missions for in-situ investigations whose data have been used to describe geophysical properties by performing accurate information retrieval of the lunar surface. Generally, in-situ investigations cannot provide information over a wide area, because the data collection is done in a particular location or a small area. However, the information based on in-situ measurements is very accurate, which can be used to validate the output of remote sensing data for large-area mapping. The synergistic use of remote sensing data with in-situ measurements has successfully demonstrated its potential in mapping and modeling the lunar surface's geophysical, mineralogical and structural parameters. Over the past few decades, a variety of remote sensing techniques and advanced data processing techniques have been developed to analyze the lunar surface. Missions that have been undertaken over the years, including the Lunar Reconnaissance Mission by NASA, the Chandrayaan mission by ISRO, and the Chang'e mission of CNSA, have led to unprecedented analysis of the lunar surface. As a result of the successes of previous missions, future missions, including NASA's Artemis 1, ISRO's Chandrayaan-3, CNSA's Chang'e 5, and KARI's Korea Pathfinder Lunar Orbiter, will allow scientists to explore the lunar surface. It is expected to get information about the hidden secrets of the lunar surface of which the human world is still unaware.

The special issue will invite papers and research works that make a significant and innovative contribution to data processing techniques and modeling approaches to retrieve geophysical, mineralogical, and structural parameters of the lunar surface using Remote Sensing data and In-Situ Investigations. A tentative list of topics on which manuscripts can be submitted is as follows:

1. Integration of Remote Sensing data and In-situ investigations for lunar mapping and modeling.
2. In-situ data analysis for retrieving geophysical, mineralogical, and structural parameters of the moon surface.
3. Data analysis for understanding the volcanism on the Moon.
4. Dielectric characterization of the lunar surface.
5. Geomorphological and geophysical parameters retrieval of the lunar surface using Synthetic Aperture Radar (SAR) data.
6. Visualization and characterization of Lunar Dark Polar regions using active remote sensing technique.

7. Quad-pol and Hybrid-pol SAR data modeling for characterization of the probable location of surface ice clusters.
8. Detection of lunar subsurface features like lava tubes using SAR data.
9. 3-D terrain mapping and generation of Digital Elevation Models for the lunar surface using remote sensing data.
10. Spaceborne Remote sensing technique-based machine learning approaches for automatic detection of lunar craters.
11. Characterization of the lunar surface pyroclastic deposits
12. Analysis of the thermophysical characteristics of the lunar surface using infrared remote sensing.
13. Spectroscopic observations for the mineralogical diversity of the lunar surface.
14. Retrieval of morphological features using active and passive remote sensing.
15. Role of remote sensing in the identification of impact craters, geometric parameters, and their age determination.
16. Remote Sensing observation-based studies for petrography, mineralogy, and geochemistry of the lunar surface.

Papers must be submitted electronically to https://www.editorialmanager.com/AISR. To ensure that all manuscripts are correctly identified for inclusion into the special issue, authors must select **"Special Issue: RS and In-Situ for Moon"** when they reach the "Article Type" step in the submission process. Submitted papers must be written in English and should include full affiliation postal addresses for all authors. The general format for submission of papers can be found on the *ASR* Elsevier web site at

http://www.journals.elsevier.com/advances-in-space-research/

Only full-length papers will be considered for publication, subject to peer review by a minimum of two reviewers. There are no page limits although the length of the paper should be appropriate for the material being presented. While the deadline for submissions is **15 February 2023** papers will be published electronically with a doi number as soon as they are accepted. The printed issue will be assembled within a reasonable time with late papers being printed in regular issues of ASR. All articles will be typeset at no cost to the author. There is a charge for printing color figures; there is no charge for color figures on the electronic version.

Dr. Shashi Kumar (shashi@iirs.gov.in; sksinghiirs@gmail.com) and **Dr. Anil Kumar (anil.kumar@ddn.upes.ac.in)** are the Guest Editors for this special issue. Questions can be directed to Dr. Shashi Kumar, Dr. Anil Kumar or to the Co-Editor for Special Issues, Dr. Peggy Ann Shea (sssrc@msn.com).