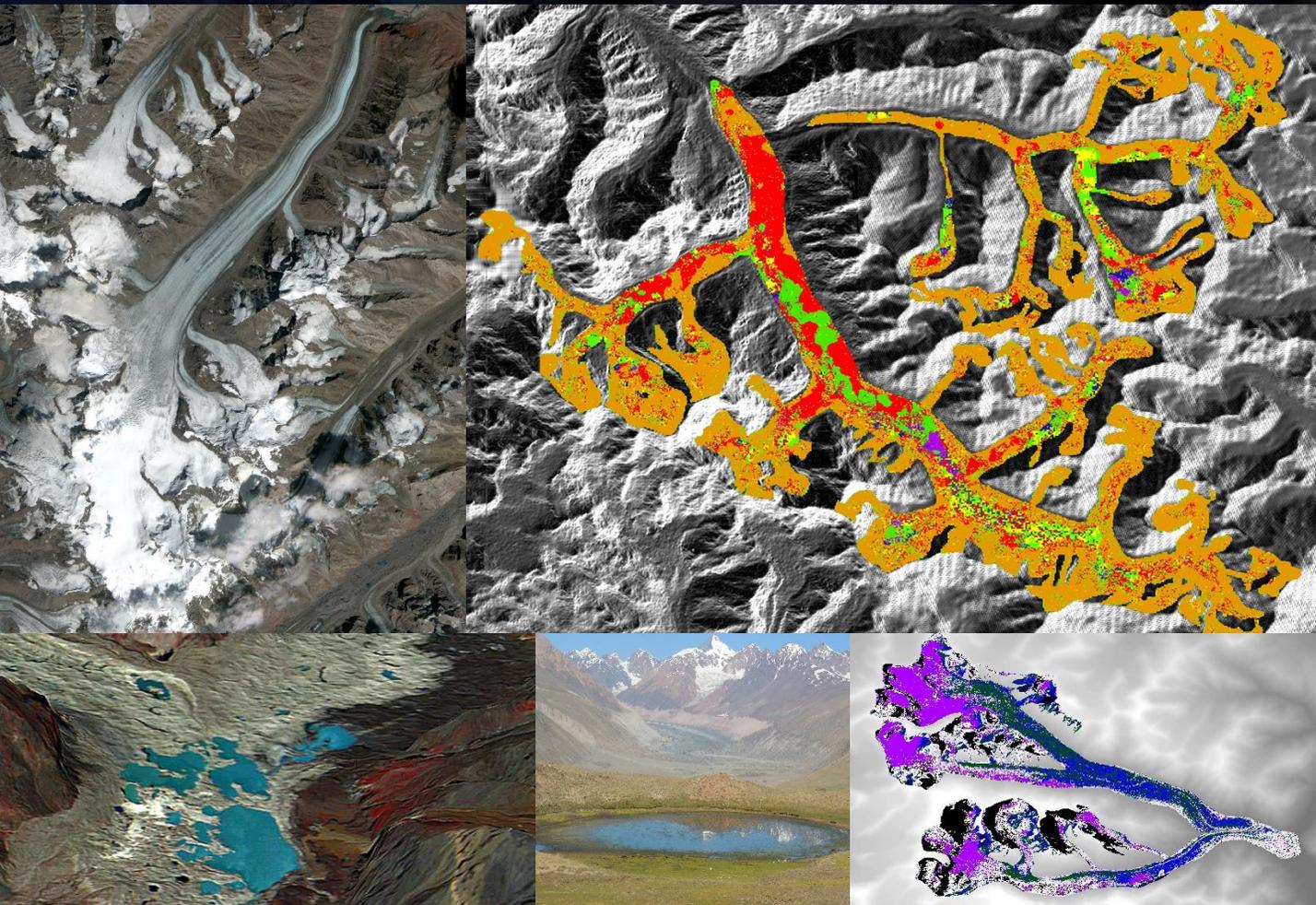


# Remote Sensing for Himalayan Cryosphere Studies: Recent advances and challenges

February 14, 2020



**Organised by**  
**Indian Institute of Remote Sensing**  
Indian Space Research Organisation  
Department of Space, Govt. of India Dehradun  
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## About IIRS

The Indian Institute of Remote Sensing (IIRS) is a constituent unit of Indian Space Research Organisation (ISRO), Department of Space, Govt. of India. Since its establishment in 1966, IIRS is a key player for training and capacity building in geospatial technology and its applications through training, education and research in Southeast Asia. The training, education and capacity building programmes of the Institute are designed to meet the requirements of Professionals at working levels, fresh graduates, researchers, academia, and decision makers. IIRS is also one of the most sought after Institute for conducting specially designed courses for the officers from Central and State Government Ministries and stakeholder departments for the effective utilization of Earth Observation (EO) data. IIRS is also empaneled under Indian Technical and Economic Cooperation (ITEC) programme of Ministry of External Affairs, Government of India providing short term regular and special courses to international participants from ITEC member countries since 2001.



IIRS Main Building

IIRS hosts headquarters of Centre for Space Science and Technology Education in Asia and the Pacific (CSSTEAP), affiliated to the United Nations and provides support in conducting the Remote Sensing and GIS training and education programmes. IIRS also plays a key role in the activities of Indian Society of Remote Sensing (ISRS), which is one of the largest non-governmental Scientific Societies in the country. To widen its outreach, IIRS has started live and interactive Distance Learning Programme (DLP) since 2007. IIRS has also launched e-learning course on Remote Sensing and Geo-information Science since August, 2014.

IIRS is located in Dehradun and well connected to major cities via, air/rail/road. The city is famous for its picturesque landscape, pleasant climate, high quality school education and several scientific organizations of national & international repute. Places of religious & tourist importance like Haridwar, Rishikesh and Mussoorie etc. are located in the vicinity of Dehradun.

## **About the Workshop**

Studies on the Himalayan cryosphere have attained global significance due to the impact of climate change on Himalayan glaciers and snow cover vis-a-vis its consequence across all major river basins arising from Himalaya affecting almost 1.5 billion people. Numerous studies have been carried out to address the glacier retreat, dynamics of snow cover variations, and snow melt run-off. Most of the studies are limited to very few select glaciers. The key science issues are: How much is the stored glacial water in the Himalaya; How much is ice lost every year and its impact on societal activity. Other emerging issues include the impact of glacier and snowmelt resulting in formation of several new lakes, some of which pose severe risk due to potential Glacial Lake Outburst Flood (GLOF). A relatively new phenomenon has emerged i.e. permafrost melting and its associated hazards. Due to changing pattern of precipitation, including extreme precipitation, many avalanche chutes and snout regions have experienced huge debris slides. The glacier retreat and dynamics show unprecedented changes as revealed by DInSAR based observations. Glacier landform dynamics in the snout region during Last Glacial Maxima (LGM) to Little Ice Age (LIA) and until recent times needs a thorough analysis. The erratic snowmelt run off, debris slides, large proportion of bed load and suspended sediment particles can cause havoc in terms of disasters and severely affect hydroelectric power generation.

Most of the studies on the Himalayan cryosphere are carried out either using field based techniques or remote sensing based techniques with limited field validation/observations. The remote sensing based techniques were mostly limited to visual analysis of optical images mainly due to limited availability of satellite data products. In recent time, there have been significant progress in earth observation based techniques concerning to the availability of high resolution data at the closer temporal intervals, both in optical and SAR domain, and it can be very effectively utilized to address some of the critical emerging issues in the Himalaya. The planned mission of ISRO and NASA in the near future, known as NISAR would further enhance the SAR coverage of Himalayan region in both C and L band that will in turn improve the EO capabilities in all weather conditions.

Therefore, a one-day workshop is envisaged to deliberate on these important issues, but not limited to, such as glacier dynamics including retreat, lake formation, GLOF assessment, permafrost melting, snow cover dynamics and snow melt run-off and its impact on flood and hydroelectricity generation.

## **Expected Outcome**

The one-day workshop is expected to improve understanding of the emerging issues of Himalayan cryosphere in a holistic manner mainly related to glacier dynamics, lakes, permafrost, landform dynamics, snow cover dynamics and snow melt run off. This will help scientists and stakeholders to launch new projects and add new dimensions and understanding to ongoing projects. The wide variation of emerging issues, large geographical area and emerging EO/UAV based techniques demand a more collaborative and complementary approach, which will be explored during the workshop. The discussion will also be useful for utilization of upcoming ISRO missions datasets for glacier studies.

## **Workshop Duration and Location**

The workshop will be held at Indian Institute of Remote Sensing (IIRS), ISRO, Dehradun, India on February 14, 2020.

## **Target Participants**

This will be a wonderful platform for all researchers (faculty members, scientists and students) working in the field of Himalayan cryosphere to exchange ideas on issues, emerging tools and collaborative approach. Govt. officials working on climate change impact, disaster management and hydro power generation would likely to benefit from the workshop.

## **How to Apply**

Most of the speakers will be by invitation only, however, some selected participants can present their papers. All interested candidates can registered either for in-campus participation or as off-campus candidate to attend through EDUSAT network/webcast. The aspirant participants may fill the online form available in IIRS website (<https://admissions.iirs.gov.in/shortcourse>) on or before January 31, 2020. For more information and additional details, please mail to [gsd@iirs.gov.in](mailto:gsd@iirs.gov.in) or [pratima@iirs.gov.in](mailto:pratima@iirs.gov.in).

## **About accommodation and other details**

Accommodation will be provided in the sprawling green campus of IIRS with breathtaking view of imposing Himalaya. Interested persons should apply for the same and others may choose a nearby hotel (by own arrangement), which are in plenty on main Rajpur Road, which is within 2 km from IIRS campus. During your stay at IIRS campus, you may explore other opportunities/facilities available at IIRS, and we strongly encourage to interact with our diversified faculty members to discuss any issues related to RS and GIS technology and applications.

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