



Use of remote sensing and GIS techniques for geoscience applications: an introductory workshop

June 3-4th, 2018, Royal Thimphu College, Bhutan

You are cordially invited to participate to a two-day workshop on remote sensing and GIS techniques for geoscience applications. This initiative is joint collaboration between the '[Himalayan glaciers and risks to local communities](#)' project funded by IGCP/UNESCO and the 'Contribution to High Asia Runoff from Snow and Ice (CHARIS) project funded at USAID and conducted at University of Colorado/CIRES. Both projects aim at facilitating knowledge and expertise exchange among Asian institutions in Nepal, India and Bhutan and beyond. Using various types of satellite imagery combined with terrain analysis, these projects assess one hand, the potential glacier-related risks associated with glacier and climate changes, and on the other hand, the changing water resources in High Asia. By combining science with community involvement, these projects aim to understand the socio-economic impacts of glacier hazards and water scarcity in high altitude areas where people live. This program is co-organized with the Centre for Climate Change and Spatial Information (CCCSI), Sherubtse College, Royal University of Bhutan. The workshop is facilitated by Dr. Adina Racoviteanu, Ser Cymru II Fellow at Aberystwyth University, Department of Geography and Earth Sciences (DGES) (UK).

Workshop presentation:

GIS and remote sensing are emerging as standard tool for terrain mapping, glacier monitoring, glacier risk assessment, land use mapping and change assessment, and a variety of other applications. Large amounts of satellite imagery are increasingly made available at no cost, ranging from coarse multi-spectral imagery (500m) to high-resolution commercial satellite imagery (<1 m). GIS and remote sensing tools are evolving from commercial software to open source and freely available code. This workshop presents an introduction to remote sensing and GIS techniques which can be applied to various geoscience and hydrology applications among others. The workshop is entirely hands-on and is designed to be interactive, so that participants can apply it to their area of interest. *The workshop will focus on the Himalayan region.*

Overall workshop scope:

To introduce key concepts about the use of GIS and remote sensing for geoscience and hydrologic applications in remote areas which lack systematic surveys, and to provide an introduction to ArcGIS/QGIS software.

Who can participate?

The workshop is suitable for participants interested in using remote sensing for their geoscience applications. Examples of applications include (but are not limited to) *glacier mapping, terrain analysis, hydrologic mapping, hazard assessment, vegetation mapping, land use etc.*

DAY1: Working with Satellite imagery

Morning session

1) Introduction to ArcGIS software:

- ArcGIS toolboxes, menus, file naming, workflows;
- Getting online documentation/help
- Establishing metadata
- Raster vs Vector GIS

2) Basics of remote sensing:

- Overview of optical remote sensing for geoscience applications
- Existing optical remote sensing data (Landsat/ASTER/Sentinel etc) and upcoming missions (Landsat9, Sentinel3 etc)
- Searching and ordering for satellite imagery of various resolutions
- Satellite image selection (type, resolution, source)

3) Image pre-processing (clipping, mosaicking, resampling etc.)

Afternoon session:

- Simple image classification techniques in ArcGIS (band ratios)
- Examples for snow and ice mapping; vegetation mapping; cloud masking; water detection etc.

DAY2: Digital elevation models

Morning session:

1) Use of digital elevation models for terrain modeling:

- Overview of freely available global DEMs (SRTM, ASTER, TanDEM-X)
- Choosing an appropriate DEM
- DEM pre-processing workflow
- Terrain analysis (slope, aspect, elevation etc..)

2) Combining DEMs and satellite image analysis

- the raster analysis environment
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Afternoon session:

3) Case studies / applications

- Adapted to participant's area of application (combining the techniques learned in this workshop)
- We will work interactively to tackle various potential applications and identify challenges and solutions