TRAINING ON
GLACIER STUDIES AND REMOTE SENSING

04 - 14 June 2019

Divecha Centre for Climate Change
Indian Institute of science
Bengaluru – 560 012

Introduction

Glaciers and ice masses in the Himalaya stores large quantity of fresh water and feeds major north Indian rivers. Majority of population at the foothills of Himalaya is dependent on glaciers fed rivers for livelihood. Perennial nature of those rivers flourishes agriculture and small scaled industries over their banks. Since areal extent of glaciers are changing constantly under the influence of climate change, continuous monitoring of Himalayan glaciers is important to assess future changes in the water availability. Field-based cryosphere experiments are difficult to carry out due to harsh terrain. Satellite based technology overcomes these limitations. In India due to lack of trained manpower, it is difficult to generate reliable information. Therefore, proper training in extracting glaciology information from remote sensing data is necessary and we also need to attract talented young people in this field.

Therefore, Divecha Centre for climate change organizes training for young students who wished to work in the field of glaciology. Training lectures will be taken by faculty members in Divecha Centre for Climate Change. In addition, well known scientists will be invited as a guest faculty. Series of tutorials and practical sessions will be conducted during the training.

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Syllabus

1. Distribution of Glaciers and snow cover

Importance of glaciers, forms of precipitation, formation of snow, physical characteristics of snow crystals, areal distribution of glaciers/snow cover and factors controlling the distribution of snow cover.

2. Climate

General circulation of atmosphere and oceans, climate variability, spatial and time scales, errors and accuracy assessment, feedback mechanism and carbon cycle.

3. Morphology of glaciers

Classification of glaciers, Crevasses and icefall, moraines, dead ice, depositional and erosional landforms of glacier.

4. Transformation of snow to ice

Different types of metamorphism, transformation of snow into ice, Zones in a glacier, effect of metamorphism on albedo of snow and ice, grain growth.

5. Paleo glaciation

Milankovitch cycles and Greenhouse effect, Little ice age (LIA), Glacial and interglacial cycles.

6. Distribution of temperature in glaciers

Thermal parameters of snow/ice, types of glacier based on temperature distribution, temperature profiles, seasonal variation of temperature as function of depth.

7. Flow and sliding of glaciers

Driving and resisting stresses, Vertical profile of flow, simple models of glacier flow, deformation, steady and non-steady flow of glacier.

8. Glacier Mass Balance

Concept of glacier mass balance, methods of glacier mass balance estimation, concept of ELA, AAR methods, hydrological method.

9. Ice and Snow ablation

Physics of snow melt, heat budget and radiation. Snow melt runoff model.

10. Fundamentals of remote sensing

Interaction of electromagnetic radiation with common objects on the Earth. Laws governing this interaction. Spectral reflectance characteristics of the common objects as snow, ice and glaciers.

11. Optical properties of snow and ice

Reflectance characteristics of snow in optical regions, effect of mineral dust and black carbon on reflectance of snow and ice.

12. Response of glaciers to climate change

Reaction to change in mass balance and reaction to additional forcing.

PRACTICAL:

Topographic corrections of reflectance, Supra glacier debris cover mapping, Depth estimate using different techniques, mass balance modeling, Runoff Estimates in Himalayan river, Aerosol modelling, Heat transport

Faculty

- **Dr. Anil Kulkarni**
  Distinguished Scientist, Divecha Centre for Climate Change, Indian Institute of Science, Bengaluru.
- **Dr. S. K. Satheesh**
  Professor, Centre for Atmospheric and Oceanic Sciences and Chairman, Divecha Centre for Climate Change, Indian Institute of Science, Bengaluru.
- **Dr. J. Srinivasan**
  Distinguished Scientist, Divecha Centre for Climate Change, Indian Institute of Science, Bengaluru.
- **Dr. Bala Govindasamy**
  Professor, Centre for Atmospheric and Oceanic Sciences, Indian Institute of Science, Bengaluru.

Guest Lectures by eminent Scientists.

Venue and Date

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Divecha Centre for Climate Change, Indian Institute of Science, Bengaluru, India

June 04 - 14, 2019.

Eligibility

Post Graduate M.Sc., M.Tech., M.E. and Ph.D. students from recognized Institutes/Universities.

Registration

No registration fees for the trainees.

Deadline

Last date for submission of application form: April 22, 2019

Intimation to selected candidates: April 29, 2019

How to reach

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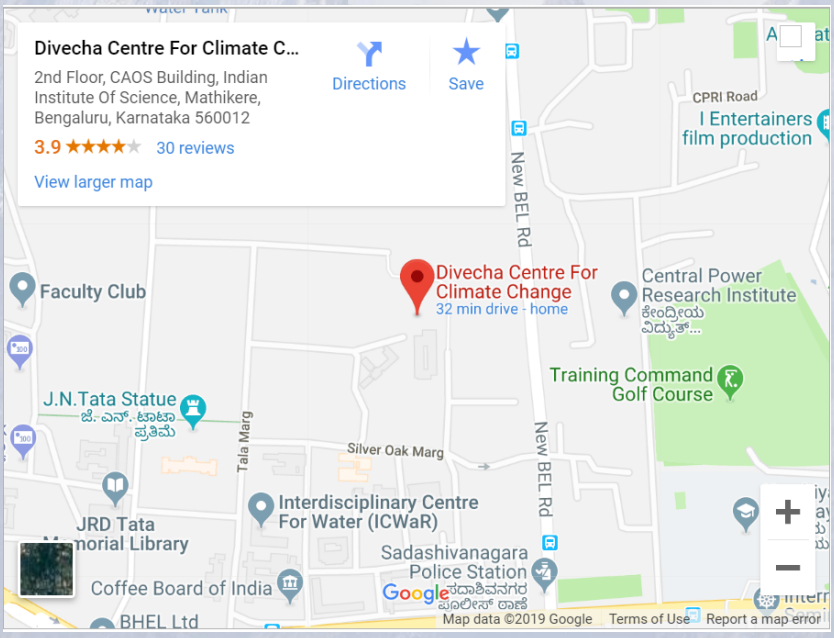
The IISc campus is conveniently located for those arriving by air as well as those choosing to travel by train. The new Bengaluru International Airport is 35 km from the campus. The campus is equidistant from the City Railway Station (Majestic) and the Cantonment Railway Station which are both about 7 km away. The Yeshwanthpura Railway Station is no more than 2 km.

https://goo.gl/maps/V1nuJ3Ga95p



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Accommodation

Accommodation will be provided to deserving candidates by Divecha Centre for Climate Change.

Course Director

Please send the application forms along with a recent passport size photograph to the following address:

Dr. Anil V. Kulkarni
Distinguished Scientist,
Divecha Centre for Climate Change,
Indian Institute of Science,
Bengaluru- 560 012, India
E-mail id: glacier.dccc@iisc.ac.in

Application Form

Passport size photograph

Name.....

Qualification (Subject):.....

University/Institute:.....

Year of Passing:.....

(Mention marks, year and Board/ University from 12th standard on separate sheet)

Phone:.....

E-mail Id:.....

Relevance of training in future research. Give one page write up in separate sheet

Signature of Candidate

If the above student is selected, he/she will be given leave to participate in the training program.

Name and Signature of P.I. / Guide / H.O.D

Seal of the organization