Name of the faculty	PhD topic	A brief description about the topic, and specific requirements, if any
Biplab Banerjee	Self-supervised learning in the context of remote sensing image analysis	The project will deal with developing novel self-supervised learning techniques for remote sensing image classification under limited or sparse supervision
Avik Bhattacharya	Synergistic Integration of Optical and Radar Remote Sensing Datasets for Urban Applications	This interdisciplinary approach harnesses the combined strengths of optical and radar remote sensing datasets to provide comprehensive insights for urban applications. By fusing data from both modalities, it enables a deeper understanding of urban dynamics, facilitating more accurate mapping, monitoring, and analysis of urban environments.
Alok Porwal	Compositional data analysis (Coda) approach to geochemical data for mineral exploration	Good background of geology, geochemistry and geostatistics
Alok Porwal	Semi-supervised machine learning for delineating geophysical/geochemical anomalies for targeting mineral deposits.	Good understanding of machine learning algorithms and good coding skills
Alok Porwal	Text mining of geological reports	Good understanding of machine learning algorithms and good coding skills
Karthikeyan Lanka	Global terrestrial ecosystem response to dry extreme events	Climate change has a multitude of effects in terms of increase in temperature, vapor pressure deficit, and frequency of dry extreme events such as droughts and heatwaves. It is important to understand how terrestrial ecosystems are responding to these extremes since their sustenance is important in the context of carbon sequestration and other benefits. This project deals with studying the terrestrial ecosystem response using a variety of remote sensing and reanalysis datasets. The focus will be on soil-plant-atmosphere interactions. Candidates will have the freedom to study both past and future responses using GCM simulations.
Karthikeyan Lanka	Hyper resolution land surface modelling towards generating farm scale soil moisture profile simulations	Soil moisture is an important variable that is present at the land-atmosphere interface, which is responsible for the partitioning of land surface fluxes into evapotranspiration, runoff, and subsurface contributions. Accurate soil moisture information is

		critical for agriculture water management, monitoring of floods and droughts, and land surface feedback mechanisms. This project deals with setting up a hyper-resolution land surface model, which has the ability to produce surface and rootzone soil moisture at an unprecedented scale of 30 meters resolution and subsequently ingest satellite data in a data assimilation algorithm to simulate soil moisture fluxes at hyper-resolution scales in an Indian catchment. The outcomes of the project can contribute to the agriculture, hydrology, and climate communities of India.
Karthikeyan Lanka	Land-atmosphere interactions during dry extreme events [with Prof. Vishal Dixit, IDPCS]	Soil moisture has a significant role in influencing the feedback from the land surface. There is a growing literature that depicts its influence on the evolution of dry extreme events. This project deals with a thorough examination of soil moisture feedback using numerical weather model Weather Research and Forecasting (WRF) model simulations. Specifically, we would be interested to study the role of land using water and heat tracking schemes when extreme dry events and compound extremes get triggered. It is desirable for the candidates to have experience running the WRF model.
Karthikeyan Lanka	Sub-seasonal to seasonal agricultural drought prediction	Sub-seasonal to seasonal predictions are now the frontline research to ensure adequate time for planning and adaptation. There is limited effort that is made to carry out predictions at S2S scales (1-3 months ahead) in India. This work deals with developing models using machine learning or dynamical models to predict various aspects of droughts at S2S scales. Candidates with a good understanding of atmosphere processes and programming background are desirable for this project.
Prof. Surya Durbha	Geospatial Knowledge Representation	Development of geospatial knowledge representation framework for Disasters
Prof. Surya Durbha	Geospatial Generative AI	Understanding Generative AI for Geographic problems.
Deepak Singh	Understanding planetary evolution using Moon and Mars caters distribution with Machine Learning	Crater distribution and characteristics are similar and different in many ways between Mars and Moon. This work will explore the

		planetary evolution using crater's distribution/characteristics with Machine learning techniques.
Deepak Singh	Characteristics and dynamics of Venus atmosphere and it's interaction with the surface	The work will be done using current modeling techniques and latest observations of Venus. Some modeling/coding background is desired. MATLAB and fortran knowledge is a plus
Deepak Singh	Surface characteristics and cryovolcanism evolution of solar system icy moons	Cryovolcanism process significantly alter the icy surface of icy moons such as Europa, Enceladus etc. over a period of time. This study will utilize state of the art modeling techniques along with remote sensing observation to study the surface ice and it's evolution for icy moons of our solar system. Prior knowledge with modeling and MATLAB is desired.
Ashutosh Tiwari	Groundwater subsidence monitoring using distributed scatterers in multi-temporal InSAR	The PhD scholar will work towards developing an indigenous software for monitoring deformation activities using Similar Time-series Interferometric Pixels (STIP) based Multi-temporal SAR Interferometry (MT-InSAR), which will utilize the information available in the phase time series of highly coherent PS as well as moderately coherent DS. The software will later be evaluated in monitoring groundwater changes and integrating it well level data acquired from groundwater monitoring wells.