

Geosciences through the eye of space sciences

Muhammad Shafique^{1,2*}, Muhammad Hanif^{1,2}, Liaqat Ali^{1,2}, Sohail Wahid^{1,2}, Muhammad Ali^{1,2}, Saleem Ullah^{1,2}, Sami Ullah^{1,2}

¹ National Centre of Excellence in Geology (NCEG), University of Peshawar

² GIS and Space Applications in Geoscience, National Centre of GIS and Space Applications

*shafique@uop.edu.pk

Given the exponential progress in the tools and data from space sciences, the research and applications of geosciences have greatly expanded with effective, efficient, local to regional scale overview and accuracy of the outcomes. The applications of space sciences in natural hazards assessment, mapping and characterization of the geological units, forest and water resource dynamics have significantly assisted in developing and implementing policy guidelines for sustainable development. The “GIS & Space Applications in Geosciences (G-SAG)” laboratory, affiliated with the National Centre of GIS and Space Applications (NCGSA) and established at the NCEG, aims to effectively utilize various data and techniques of space sciences and field information for the fostering scientific research and capacity buildings in the lab themes of geohazards, geological applications, water and forest resources. In the multi-hazard prone northern Pakistan, advanced space and air-borne remote sensing data are utilized to assess and evaluate the landslides and earthquake-induced hazard, vulnerability and risk assessments, to contribute to the disaster risk reduction. The space-borne multi and hyperspectral satellite images, spectral analysis and image interpretation techniques are employed for the seamless mapping of lithological units and demarcation and characterization of the mineral zones to assist in mineral exploration. The temporal satellite images and secondary data are applied to characterize the water and forest resources to evaluate the trends and assist in their categorization and sustainable utilization. Sites are demarcated for the forestation of the various tree species considering the suitable climate, topography, environment and other conditions. Capacity building of the relevant officials and researchers is a significant element of the lab, and therefore a series of training workshops and awareness seminars are organized. Moreover, collaboration is established with the relevant government and non-government organizations to assist in the activities related to the lab themes.

Keywords: Geosciences; Space Sciences; Geohazard; Geological mapping; Water, Forest