**Abstract**

Constituted of global snow and ice, Cryosphere, is one of the most important components of
Earth system. Globally, it governs the terrestrial and oceanic radiation balance that regulates
the eustatic level. Regionally, mountain snow and glaciers are of paramount significance to
human life as they hold large reserves of fresh water which sustain the civilizations world
over. Perennial Himalayan snow and glacier melt is the source of freshwater for South Asian
countries supporting irrigation, hydropower and drinking water demands. Due to their
sensitivity to variations in the temperature, all cryospheric elements are treated as sensitive
indicators of climatic variations. Therefore, monitoring the cryosphere is of essence to
understand the ever changing global climatic patterns. Owing to the areal expansivity, rugged
terrain, remoteness in terms of accessibility and largely hostile weather conditions, only
sparse in situ measurements are available for such regions. Monitoring from ground is
evidently arduous, thus, in such a scenario, remote sensing becomes the ipso facto choice for
monitoring and understanding the variability in various cryospheric phenomena and it is to
this end that data from suitable sensors on-board various satellites are utilized.
Space Applications Centre (SAC), ISRO, Ahmedabad has been contributing to the
development of techniques for the extraction of relevant information and its dissemination in
the form of maps and products of snow, glaciers, ice sheets and sea ice derived from earth
observation data acquired by sensors onboard Indian satellites for more than past two
decades. The Centre has been instrumental in generating a colossal amount of digital database
and maps that highly aid in comprehending the state of Himalayan and Polar cryosphere.
Chief contributions made towards investigating Himalayan cryosphere are:
● Creation of Himalayan glacial inventory using AWiFS data,
● Development of Himalayan glacier information system (HGIS),
● Monitoring and analysis of Himalayan snow cover utilizing AWiFS data,
● Monitoring the variations in glaciated area based on LISS III and LISS IV sensors,
● Extraction of variations in glacier zones from Indian Radar RISAT SAR data
● Monitoring of glacial lakes, and
● Extraction and analysis of glacier ice velocity using LISS III, LISS IV and SAR data.
In Polar cryosphere, the major contributions are:
● Monitoring of polar sea ice using Scaterrometer data,
● Monitoring of ice shelves using multisensor data and
● Monitoring the surface elevation of continental ice using SARAL /AltiKa data.
The studies are planned to be continued using data from sensors onboard forthcoming
missions so that long term database is utilized by large scientific community.