ISSN: 2469-4134
Journal of Remote Sensing & GIS

OPEN ACCESS Freely available online

Perspective

Applications of High Resolution Satellite Data for Extraction of Antarctic Land Cover Information

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DESCRIPTION

The cryosphere extensively composed of all the regions of the planet Earth which contain water in a frozen state. The cryosphere is the geo-scientific term to describe frozen portions of Earth's surface. The cryosphere chiefly includes snow-cover, frozen ground, ice on rivers and lakes, glaciers, ice caps, ice sheets and sea-ice. Essentially ice sheets, glaciers, ice/snow-cover, lake ice, river ice, and permafrost constitute the terrestrial components of the cryosphere. On the other hand, icebergs, sea-ice and its forms and frozen seabed constitute the oceanic components while ice particles in the upper atmosphere and snow precipitation near the surface are the atmospheric components of the cryosphere framework.

Two major cryosphere components are: (1) Polar ice and (2) Alpine/mountain glaciers. Polar ice includes the Antarctic and Greenland ice-sheets, the Arctic and Antarctic sea-ice, frozen regions of Canada, Siberia and other lands within the Arctic circle. Even though extremely different in many aspects, both of these polar regions are dominated by cold climatic conditions and the presence of ice, snow and water. Glaciers confined by adjacent mountain terrain are called Alpine glaciers and include many glaciers outside of the polar regions. The cryosphere is a crucial component of the Earth's climate system with significant linkages and responses conveyed through its influence on atmospheric and oceanic circulation, surface energy, moisture fluxes, precipitation and hydrology. The cryosphere plays a substantial role in the Earth's climate through these feedback processes.

Continuous spatio-temporal scale observations of the cryosphere are essential for understanding future variability in ice cover and its interaction with other Earth systems. Consequently, airborne and space-borne RS technologies with global synoptic coverage play a key role in capturing data crucial to study the essential physical processes that govern the evolution of the cryosphere. The global spatial coverage of essential cryospheric processes and the daily-to-seasonal changes in the extent of land/snow/ice-cover makes studying the land-cover in cryosphere a specially challenging scientific objective.

Moreover, the variety of forms in which ice can manifest in Earth systems means that no single observing system is capable of making adequate observations. Rather an ensemble of techniques is required to fully appreciate and eventually understand the complexities of the cryosphere and its interaction with other earth systems. A variety of specific tools is necessary to characterize the cryospheric land-cover on a multi-temporal scale where the inhospitable climate and the physical isolation of many regions of the cryosphere cause complications to the scientific investigation. Here, sensors mounted on aircraft and spacecraft are required to infer spatio-temporal changes from a remote distance.

CONCLUSION

The polar regions of the planet Earth are the world's coldest biome. The polar regions are also known as Earth's frosty zones, which are the regions of planet Earth surrounding its geographical poles the North and South poles. These regions are dominated by Earth's polar ice caps, the Arctic Ocean to the north and the continent of Antarctica to the south.

The two polar regions are differentiated from the other two climatic and biomatic belts of the planet Earth, a tropics belt near the equator and two middle latitude regions located between the tropics and polar regions. Antarctica is Earth's southernmost continent, encompassing the geographic South Pole. Antarctic continent is situated in the Antarctic region of the southern hemisphere, almost exclusively south of the Antarctic circle, and is surrounded by the Southern Ocean.

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Received: 02-Jan-2023, Manuscript No.JGRS-23-19886; **Editor assigned:** 04-Jan-2023, Pre QC No. JGRS-23-19886 (PQ); **Reviewed:** 18-Jan-2023, QC No JGRS-23-19886; **Revised:** 23-Jan-2023, Manuscript No. JGRS-23-19886 (R); **Published:** 03-Feb-2023, DOI: 10.35248/2469-4134.23.12.273

Citation: Rossetti M (2023) Applications of High Resolution Satellite Data for Extraction of Antarctic Land Cover Information. J Remote Sens GIS. 12:273.