

# MICROWAVE RADIOMETRY FOR ANALYSIS OF CLIMATE CHANGE BY MONITORING SEA ICE, SNOW COVER AND OCEANS

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## KEY WORDS:

## ABSTRACT:

Methodology: Satellite remote sensing using the visible, infrared and the microwave wavelengths has been used successfully in various applications related to earth resources studies and monitoring of the environment. A microwave radiometer is a passive device which records the natural microwave emission from the earth. It can be used to measure the total water content of the atmosphere within its field of view. A Microwave Radiometer (MWR) is a radiometer that measures energy emitted at sub-millimetre-to-centimetre wavelengths (at frequencies of 1-1000 GHz). The primary application has been onboard spacecraft measuring atmospheric and terrestrial radiation and are almost solely used for meteorological or oceanographic remote-sensing. The MWR is used for the measurement of atmospheric humidity for tropospheric path correction of the radar altimeter signal, which is influenced both by the integrated atmospheric water vapour content and by liquid water. MWR measurement data are useful for the determination of surface emissivity and soil moisture over land, for surface energy budget, investigations to support atmospheric studies, and for ice characterization. Sea ice is formed from ocean water that freezes, whether along coasts or to the sea floor (fast ice) or floating on the surface (drift ice) or packed together (pack ice). Seasonal snow is a major source of fresh water for many areas and it also regulates the heat budget of Earth's surface throughout its albedo. The high-latitude ice/snow-albedo feedback is a principal element in many paleoclimate theories and global warming scenarios. The strength of this feedback is determined by the ice/snow effects on the top-of-atmosphere (TOA) albedo, which is also strongly affected by clouds. Using currently available satellite observations, we can estimate the radiative effectiveness (RE) of ice and snow with regards to the TOA albedo, which we define as the change in the TOA albedo corresponding to changes of 0% to 100% in the ice or snow cover. The vast amounts of water added to or removed from the oceans and atmosphere, the behavior of polar ice packs have a significant impact of the global changes in climate. Efficient monitoring of the snow cover is possible by use of satellite remote sensing methods, which are able to provide improved temporal and spatial coverage. For operational use in hydrology microwave techniques are very promising because microwaves are able to penetrate clouds and therefore to provide data on the snow cover in regular time intervals. Another advantage is the possibility to detect the depth and water equivalent of dry snow because of the penetration capability. Altimeters are used to measure thickness and provide other parameters like backscatter coefficient and waveform shape that give information on surface roughness and snow pack characteristics such as stratification or ice grain size. These parameters are related to relevant unknown quantities affecting the climate, like snow accumulation rate or snow drift caused by wind. Applicable research results: In the satellite data assimilation system, the brightness values are simulated using a fast radiative transfer model and surface emissivity model from the analysis variables and compared to the actual observations. The model variables are then adjusted based on the differences between all the simulated and observed quantities and the appropriate error statistics to produce the most probable atmospheric state. The sea ice thickness which can be determined using Conclusions: Emissivity data from satellite like SRTM, MODIS, ERS-1, ERS-2, and Envisat are used in monitoring the Sea ice, snow cover and oceans. This paper mainly aims in creating an emissivity model and albedo model for analyzing the climate change impacts because of melting of Sea ice and snow.

**TOPIC:** Microwave remote sensing

**ALTERNATIVE TOPIC:** Not Specified