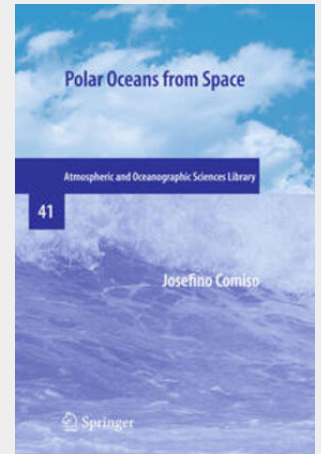


Polar Oceans from Space

Only a few centuries ago, we knew very little about our planet Earth. The Earth was considered flat by many although it was postulated by a few like Aristotle that it is spherical based on observations that included the study of lunar eclipses. Much later, Christopher Columbus successfully sailed to the West to discover the New World and Ferdinand Magellan's ship circumnavigated the globe to prove once and for all that the Earth is indeed a sphere. Worldwide navigation and explorations that followed made it clear that the Earth is huge and rather impossible to study solely by foot or by water. The advent of air travel made it a lot easier to do exploratory studies and enabled the mapping of the boundaries of continents and the oceans. But aircraft coverage was limited and it was not until the satellite era that full coverage of the Earth's surface became available. Many of the early satellites were research satellites and that meant in part the development of engineering measurement systems with no definite applications in mind. The Nimbus-5 Electrically Scanning Microwave Radiometer (ESMR) was a classic case in point. The sensor was built with the idea that it may be useful for meteorological research and especially rainfall studies over the oceans, but success in this area of study was very limited.

The book presents a wealth of material about the polar oceans, more specifically the ice-covered areas and peripheral seas. It provides a detailed history of the changing climate of the polar oceans as observed by satellite sensors in the last three decades. The satellite research data show spatial distributions of surface temperature, sea ice, albedo, chlorophyll concentration, clouds, ocean color and sea level pressure. The book discusses remote sensing techniques and algorithms used to transform digital data to geophysical parameters, to process and analyze the data, the limitations of these data and the enormous potential in the use of this data. The main goal of the book is the presentation of results from studies of the time evolution of polar surfaces as observed by satellite sensors and their relevance to the study of cryospheric and ocean processes and climate change. The book contains about 150 satellite images of surface parameters which reveal that from month to month and from one year to another the Earth is changing. Although the historical record of about three decades of continuous satellite observation is relatively short, these measurements have provided useful insights into the current state of the polar environment and have served as a powerful tool for studying the processes that govern the Earth's climate system. The advent of even more sophisticated technology, including international ventures like the Global Earth Observation System of all Systems (GEOSS), will speed the progress. The advances in understanding of the Earth's climate engine, including the crucial role played by the polar oceans, have been tremendous, and people look forward to being able to forecast effectively the state of the planet in the immediate and foreseeable future.



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