

## REMOTE SENSING OF THE EARTH AND THE MOST CONVENIENT SENSING METHOD

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**Abstract.** Remote sensing of the Earth is a crucial tool for understanding and monitoring the planet's dynamic processes. It involves the collection of information about the Earth's surface and atmosphere from a distance, using sensors on aircraft, satellites, and other platforms. This data is then used to study and analyze various aspects of the Earth, such as land use, vegetation cover, ocean currents, and atmospheric composition.

**Key words:** remote sensing, satellite-based sensors, passive sensors, active sensors, distance, radiation, radar.

### Introduction

Satellite-based remote sensing is a convenient and valuable method for studying the Earth's dynamic processes. The different types of sensors available offer unique capabilities for studying various aspects of the Earth's surface and atmosphere, making them valuable tools for environmental monitoring and research. While satellite-based remote sensing has its limitations, it remains an essential tool for understanding and managing our planet's environment.

One of the most convenient methods of remote sensing is through the use of satellite-based sensors. These sensors can provide continuous, global coverage of the Earth's surface, allowing for the monitoring of large-scale environmental changes over time. In this paper, we will explore the various types of satellite-based sensors and their applications in remote sensing, as well as the advantages and limitations of this method.

Satellite-based remote sensing sensors can be broadly categorized into two types: passive sensors and active sensors. Passive sensors measure the natural radiation emitted or reflected by the Earth's surface, while active sensors emit their own radiation and measure the response from the Earth's surface. Each type of sensor has its own unique capabilities and applications, making them valuable tools for studying different aspects of the Earth.

Passive sensors, such as those used in optical and infrared remote sensing, are particularly useful for studying the Earth's surface features and vegetation cover. These sensors measure the amount of sunlight reflected or emitted by the Earth's surface at different wavelengths, allowing for the identification of different types of land cover

and the monitoring of changes in vegetation health over time. Additionally, passive sensors can also be used to study atmospheric composition and temperature, providing valuable information for climate research and weather forecasting.

Active sensors, on the other hand, are commonly used in radar remote sensing to study the Earth's surface topography and monitor changes in land elevation. Radar sensors emit microwave radiation towards the Earth's surface and measure the time it takes for the signal to bounce back, allowing for the creation of detailed topographic maps and the detection of subtle changes in land elevation. This makes radar remote sensing particularly useful for studying natural hazards such as earthquakes, landslides, and volcanic eruptions.

In addition to their unique capabilities, satellite-based remote sensing sensors offer several advantages over other methods of data collection. Firstly, they provide global coverage of the Earth's surface, allowing for the monitoring of large-scale environmental changes that may not be observable from ground-based sensors. This is particularly important for studying processes such as deforestation, desertification, and urban expansion, which can have widespread impacts on the environment.

Furthermore, satellite-based sensors can provide consistent and reliable data over long periods of time, allowing for the monitoring of changes in the Earth's environment on a decadal or even centennial timescale. This is crucial for understanding long-term trends in environmental change and for assessing the impacts of human activities on the planet.

Despite these advantages, satellite-based remote sensing also has some limitations that need to be considered. For example, cloud cover can obstruct the view of the Earth's surface from space, limiting the availability of data in certain regions and at certain times. Additionally, satellite-based sensors have limited spatial resolution compared to ground-based sensors, making it difficult to study small-scale environmental changes in detail.

Satellite-based remote sensing has revolutionized the way we study and monitor the Earth's environment. With the ability to capture continuous, global coverage of the Earth's surface and atmosphere, satellite-based sensors have become indispensable tools for environmental monitoring, resource management, disaster response, and scientific research.

One of the key advantages of satellite-based remote sensing is its ability to provide a synoptic view of the Earth, allowing researchers to study large-scale environmental changes and processes. This global perspective is particularly valuable for studying phenomena such as climate change, deforestation, urbanization, and natural disasters, which often have widespread and long-lasting impacts on the environment.

Furthermore, satellite-based sensors can provide data at regular intervals over long periods of time, allowing researchers to track changes in the Earth's environment

and assess the effectiveness of conservation and management efforts. This longitudinal data is crucial for understanding the long-term trends and impacts of human activities on the planet, and for informing policy and decision-making.

In addition to its global coverage and long-term monitoring capabilities, satellite-based remote sensing also offers the advantage of spatial resolution. While ground-based sensors can provide very high-resolution data for small-scale studies, satellite-based sensors can cover large areas with moderate to high resolution, making them suitable for studying regional and global environmental processes.

Moreover, the data collected by satellite-based sensors is easily accessible and can be shared among researchers, policymakers, and the public. This open access to environmental data allows for collaboration and knowledge-sharing across disciplines and geographic boundaries, ultimately leading to a better understanding of the Earth's environment and more informed decision-making.

Despite its many advantages, satellite-based remote sensing also has some limitations that need to be considered. For example, the cost of launching and maintaining satellites can be prohibitive, limiting the availability of data for certain regions and research purposes. Additionally, the processing and interpretation of satellite data require specialized skills and resources, which may not be readily available to all researchers and stakeholders.

Furthermore, satellite-based sensors are susceptible to technical limitations such as sensor degradation, orbital drift, and data gaps, which can affect the quality and continuity of the data. These technical challenges need to be addressed through ongoing research and development efforts to ensure the reliability and accuracy of satellite-based remote sensing data.

### **Conclusion**

Satellite-based remote sensing is a powerful and versatile tool for understanding and monitoring the Earth's dynamic processes. The continuous global coverage, long-term monitoring capabilities, and spatial resolution of satellite-based sensors make them invaluable for studying environmental change, managing natural resources, responding to disasters, and informing policy decisions. While there are challenges and limitations associated with satellite-based remote sensing, ongoing advancements in technology and data processing are continuously improving the capabilities of this important tool for environmental research and management.

### **The list of used literature**

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