ICE PACK OBSERVATION SATELLITES

REMOTE SURVEILLANCE: THE EARTH SEEN FROM SPACE

Artificial satellites have revolutionised the way we see our planet; they are now used to map the Earth, to trace roads, to monitor the spread of cities, to forecast crop harvests, and to monitor everything from volcanoes, clouds and forests to oceans and ice packs. Satellites can take measurements and make observations from far out in space without coming into contact with what they are monitoring; this is known as remote sensing or surveillance.

SATELLITE IMAGERY, EVEN AT NIGHT

Earth observation satellites, often hundreds of kilometres out in space, orbit the Earth about 15 times every 24 hours. They closely observe each region on a regular basis. Some are simply designed to record the natural light that is reflected by the ground or the atmosphere. Others send down radar signals and record the echoes, this gathering data even at night and when the ground is obscured by cloud.

GROUND-TRUTHING THE INTERPRETATION OF SATELLITE IMAGERY

Once satellites send data back to Earth, it is processed into images with "false colours" depicting the different surfaces. Each type of surface (rock, water, cropland) sends back a different wave, called its spectral signature, which is allotted a colour. But in order to be sure the system works, the results must eventually be verified via "ground-truthing" by teams in the field. This is why the observations being made by Jean-Louis Etienne and his team on the pack ice are indispensable. In order to be sure of what is seen or measured via satellite, the data must be "ground-truthed", i.e. the interpretation of satellite imagery must be verified by benchmarking against sample measurements taken on the ground.

STUDYING THE PACK ICE WITH QUIKSCAT

The Arctic Ocean is a huge and inhospitable region that cannot easily be studied from the surface, so it is an ideal candidate for remote sensing. The American QuikSCAT satellite is equipped with a radar system that can use the surface appearance of a target zone to measure the speed and direction of wind on the ocean and can monitor the movement of polar pack ice. Using this satellite data, scientists can draw up ice maps to learn more about how the ice is changing and how it could react to climate variations.

CRYOSAT: MEASURING THE THICKNESS OF THE SEA ICE

Satellite imagery has allowed scientists to measure how much the ice pack has shrunk over the last ten years. Now the Cryosat satellite will be used to measure the thickness of the ice. This data will be important for monitoring changes in the ice pack and their impact on global warming.