RAL

DESIGN & DISCOVERY

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RUTHERFORD APPLETON LABORATORY

SCIENCE AND ENGINEERING RESEARCH COUNCIL

ERS-1 (ESA's First Remote Sensing Satellite)

Heat, water vapour and momentum fluxes across the ocean - atmosphere boundary layer provide the driving force for the global weather and climate system. To obtain these parameters it is necessary to measure:

* Sea Surface temperature

* Surface wind velocity

* Significant wave height

* Ocean surface height.

ERS - 1, the European Space Agency's First Remote Sensing Satellite due for launch in 1990, will carry instruments specifically designed to measure these parameters.

These payload instruments are:

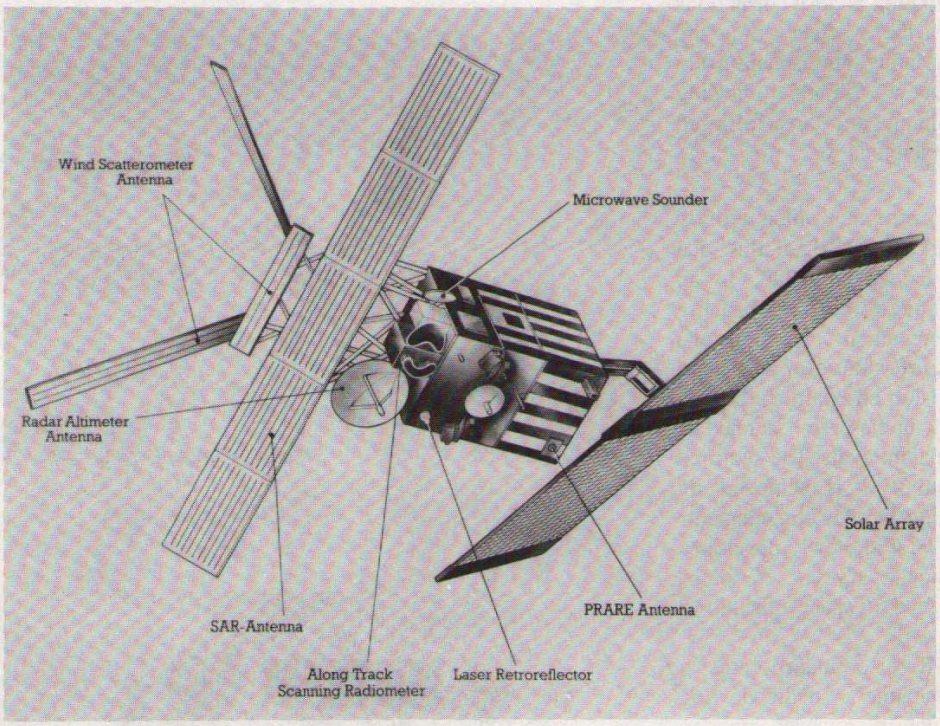
(1) Scatterometer: for surface wind and wave spectra.

(2) Synthetic Aperture Radar: for surface imaging.

(3)Radar Altimeter: wave height, surface roughness and topography.

(4) Along Track Scanning Radiometer: sea surface temperature.

(5) Precise Range and Range Rate Equipment: satellite positioning.



ERS - 1, ESA's first remote sensing satellite

Of these, the Along Track Scanning Radiometer (ATSR) is provided by a consortium of UK, French, and Australian research institutes.

Not only will ERS-1 provide a comprehensive set of global oceanographic data, enabling scientists to understand and model the complex air/sea interactions that drive the long term climate, it will also demonstrate how this data can be exploited commercially in weather forecasting, ship routing and offshore operations etc.

Instrument Parameters

Size	3m x 2m x 2m (12m x 12m with antennae and solar array)
Mass	2000 kg
Launch date	May 1990
Orbit	777 km circular, 99 deg inclination
Lifetime	3 years

ATSR (Along - Track Scanning Radiometer)

This satellite instrument is a sensitive and advanced infra-red radiometer for measuring Global Sea Surface Temperature (SST) from space with new levels of accuracy. ATSR achieves this by making accurate measurements of the thermal infra-red emissions from the Earth's surface, and computing precise corrections for the effect of the intervening atmosphere using a new 2-angle viewing technique, and three infra-red wavelengths.

The instrument which will fly on ESA's ERS-1 satellite, due for launch in 1990, is an advanced self-calibrating radiometer. In operation, two specially-developed high precision on-board calibration black bodies are scanned at regular intervals. The required sensitivity is achieved by cooling the detector elements to 80K with newly developed Stirling Cycle Coolers, designed for space aplications.

ATSR also incorporates a two-channel nadir-viewing passive microwave sounder. Data from the microwave radiometer can be used to derive total atmospheric water vapour amount, which is required to improve the precision of the ERS-1 radio altimeter range measurements, as well as enhancing the precision of the ATSR SST values.

SST is one of several crucial parameters that is used to compute heat fluxes between ocean and atmosphere, which in turn drive our global climate and weather systems.

For further information contact:

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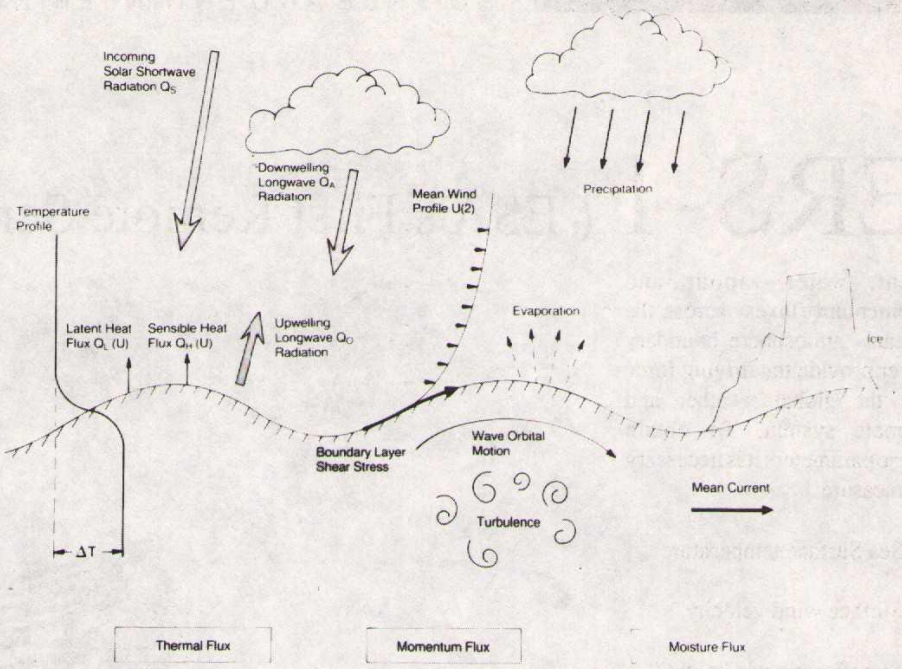
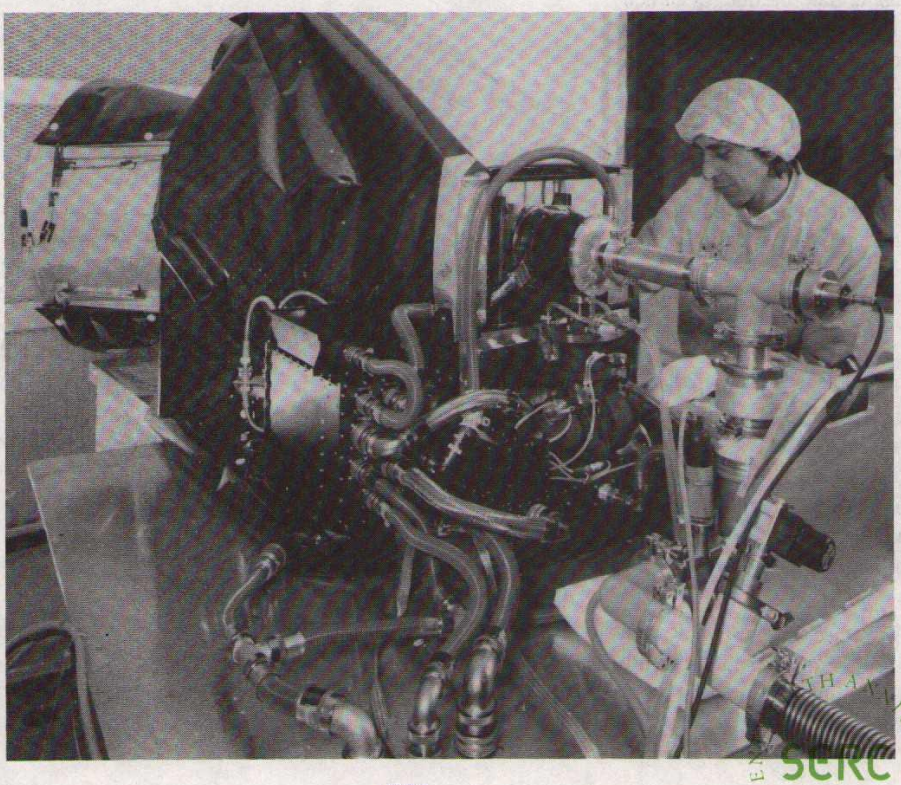


Ocean - Atmosphere interactions



ATSR