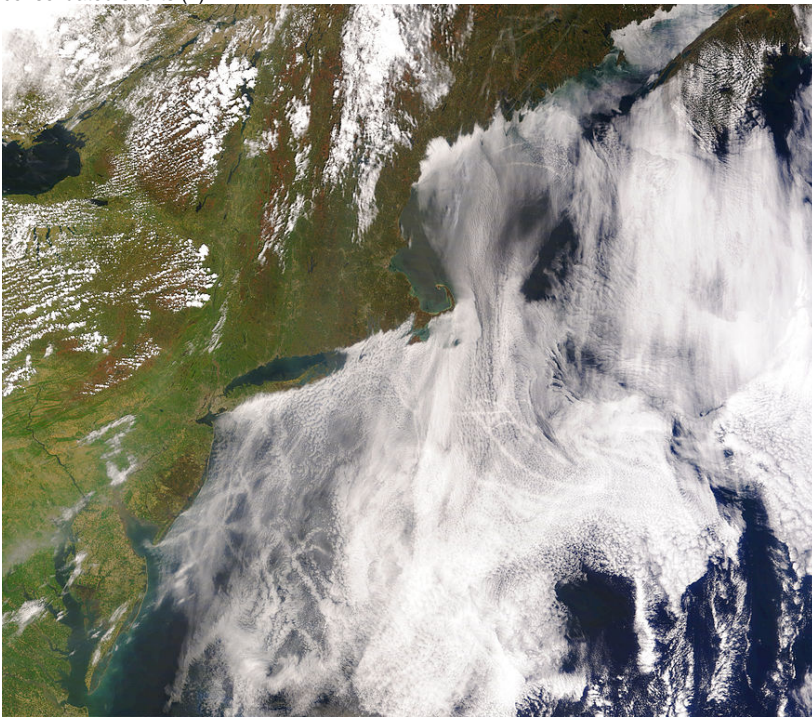


Forecast weather

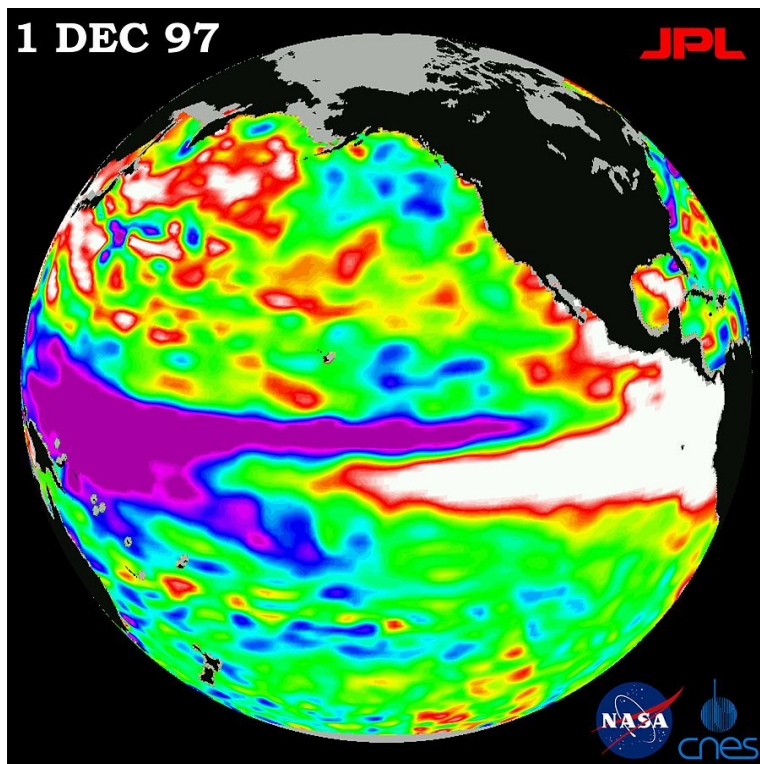
Applications

The use of satellites to monitor and forecast weather conditions has a long history: more than 30 years of consistent data makes it one of the most established sectors of applications of satellite data.

At the international level several programmes are coordinated by WMO (the World Meteorological Organization) with the aim of establishing and maintaining an operational observation network for weather and climate; it also favours the free and open exchange of weather data, fostering global cooperation in the domain. Many of these data and records come from satellite measurements; in particular the Global Earth Observation System of Systems (GEOSS) fosters the development of a "comprehensive, coordinated and sustained Earth observation system of systems to understand and address global environmental and economic challenges". The Global Observing System (GOS) coordinates surface-based and space-based infrastructures and methods for meteorological and environmental observations. The facilities are owned and operated by the Member countries of WMO each of which undertakes to meet certain responsibilities in the agreed global scheme so that all countries can benefit from the consolidated efforts (1).



The international commitment to provide and maintain consistent and comparable time series requires scientists and operators to take into account different satellite characteristics (e.g. sensitivity to Earth signals, evolution of performance over time, orbit stability) to reprocess and calibrate primary data (1).



Weather satellites can be polar orbiting or geostationary. Polar orbits are characterised by satellites passing above both poles on each revolution, while their passage over the equator is at each time at a different longitude. A geostationary satellite has instead the same rotation period as the Earth and it stays above the equator, in the same area of the sky from the point of view of an observer on the Earth.

Environmental satellites, used to monitor the Earth environment, also collect useful meteorological and climate data. For example el Niño and its impacts on weather are constantly monitored via satellite images: it is a band of warm water temperatures that cyclically drops from the Pacific coast of South America, generating extreme climate events such as floods and droughts.

The 1997 El Niño seen by the US/French TOPEX/Poseidon satellite

Data recalibration and reprocessing is the step to make those information available to downstream applications for business and science. Meteorological data can also be reprocessed to fit into climate change models and Essential Climate Variables (ECV) measurements.

The applications of this study and analysis of atmospheric variables, temperature and precipitation are well known to everybody: everybody is a final user of such information for everyday life, while more precise products are for example used in agriculture and in the stock markets. Other domains of applications are hydrometeorology, aviation, maritime navigation, and the military and nuclear sectors.

References

(1) <http://www.wmo.int/pages/prog/www/OSY/GOS.html>

(2) <http://www.eumetsat.int/website/home/AboutUs/WhatWeDo/MonitoringClimate/index.html>

Products

Products	Ext. Source	Descriptions	Product Standards	Ref. Project
		meteorological variables: temperature, atmospheric pressure, humidity, surface wind, precipitation, radiation, visibility, evaporation, soil (moisture, T, heat flux, conductivity, thermal properties), state of the ground, ground water level, upper air (pressure, T, humidity, wind), present and past weather, clouds, atmospheric composition, water (flow, T, level, composition)		

Success Stories

References

Topic	Description	Key words	Reference
Assessing forest productivity in Australia and New Zealand using a physiologically-based model driven with averaged monthly weather data and satellite-derived estimates of canopy photosynthetic capacity	Research paper to evaluate the effects of spatial variation in climate and soils on forest productivity across broad regions requires an approach that can be widely applied and tested (<i>requires purchasing to view full text</i>)	Ecosystem remote sensing; AVHRR; Eucalypt forest; Net primary productivity (NPP); Fraction of photosynthetic active radiation (fPAR)	ScienceDirect
Extrapolation of synoptic meteorological data in mountainous terrain and its use for simulating forest evapotranspiration and photosynthesis	Research paper presenting a model for calculating daily microclimate conditions in mountainous terrain	Satellite data, Meteorological data, Mountainous terrain	secure.ntsg
Predicting malaria seasons in Kenya using multitemporal meteorological satellite sensor data	Article describes research that predicts the seasonality of malaria in Kenya using remotely sensed images from satellite sensors (<i>requires purchasing to view full text</i>)	Meteorological data, Satellite sensor data	ScienceDirect
Comparative Analysis on Applicability of Satellite and Meteorological Data for Prediction of Malaria in Endemic Area in Bangladesh	Research article investigating relationships between yearly malaria incidence and (1) climate data from weather station and (2) satellite-based vegetation health (VH) indices for prediction of malaria vector activities in Bangladesh	Meteorological data, Climate, Malaria	Hindawi
Applicability of Space Derived Meteorological Data to Atmospheric Correction of Satellite Infrared Measurements	Research paper performing A comparative analysis of vertical temperature and humidity profiles, retrieved from MODIS and test radiosonde data from RAOB inventories	Satellite data, Meteorological data, Remote sensing	Springlink
Characterizing a cyanobacterial bloom in western Lake Erie using satellite imagery and meteorological data	Research paper - The distribution and intensity of a bloom of the toxic cyanobacterium, <i>Microcystis aeruginosa</i> , in western Lake Erie was characterized using a combination of satellite ocean-color imagery, field data, and meteorological observations	Satellite data, Meteorological data	ASLO
Remotely sensed surrogates of meteorological data for the study of the distribution and abundance of arthropod vectors of disease	Research paper giving an overview of how certain meteorological data used in studies of the population dynamics of arthropod vectors of disease maybe predicted using remotely sensed satellite data	Satellite data, Meteorologica data, Remote sensing	Oxford University press
Meteorological Satellites	Research paper presents a general overview of satellite systems and characteristics of different satellite orbits viz. polar, and geostationary orbits	Satellite data, Meteorological data, Remote sensing, GIS	WAMIS
Russia Launches Meteorological Satellite	News article on Russia satellite launch	Russia, Meteorological, Satellite	Spacemart
Outline of meteorological satellites	Report on meteorological satellites	Meteorological data, satellite	RAMMB
A History of the Military Polar Orbiting Meteorological Satellite Program	Report on the polae orbiting meteorological satellite program	Satellite, Meteorological	NRO
New meteorological satellite ready for use	News article on meteorological satellite in China	Satellite, Meteorological, China	PeopleDailyOnline
China: Meteorological satellite monitors snow cover in drought-hit areas	Report on the National Satellite Meteorological Center of China Meteorological Administration (CMA) finding snow covered in North China and Yellow-Huaihe River valley since Feb. 11, the most-hit areas by drought.	Satellite, Meteorological data, China	CMA
NPOESS Weather Satellites: From Crisis to Program Splits	News article on NPOESS weather satellites	Satellite, Meteorological data	Defence Industry Daily
Defense Meteorological Satellite Program (DMSP) Satellite F13	Document describes the DMSP mission, the satellite, and its environment	Satellite, Meteorological data, DMSP mission	NSIDC
CGMS Directory of Meteorological Satellite Application	Directory - Publication meant to reflect the capabilities of the global system of meteorological satellites coordinated informally by the CGMS and has contributions from a wide range of establishments located in many countries around the world	Satellite, Meteorological data	WMO
Progress on meteorological satellite and satellite meteorogy in China	Research article providing a brief introduction to the latest activities of Chinese meteorological satellite system, its products and applications	Satellite, Meteorological data	IUGG
KMA's Geostationary Meteorological Satellite	Presentation on COMS (Communication, Ocean, Meteorological Satellite)	Satellite, Meteorological data	Goes-R
Geostationary Meteorological Satellite Data Processing System	Research paper (<i>requires purchasing to view full text</i>)	Satellite, Meteorological data, Geostationary	Scientific.net

Meteorological Satellite Reception System in Hong Kong

News article on reception of meteorological satellites in Hong Kong