Glossary

Nomenclature & Acronyms

	Acoustic detectors	are used to measure sea-floor bathymetry (for ocean bottom profiling) and to detect density variations in he water column, identifying the stratification and fronts, as well as, the presence of particulates
	Acoustic detectors	Acoustic detectors are used to measure sea-floor bathymetry (for ocean bottom profiling) and to detect density variations in he water column, identifying the stratification and fronts, as well as, the presence of particulates
	Active sensors	instruments create their own radiation to illuminate the target, they then observe the nature of the reflected signal. Active sensors all operate in the microwave
AATSR	**Advanced Along - Track Scanning Radiometer**	
AVHRR	**Advanced Very High Resolution Radiometer**	
ATBD	**Algorithm Theoretical Basis Documents**	
ATSR	**Along-Track Scanning Radiometer**	The ATSR was designed with the specific goal of improving the accuracy of global SST measurement. ERS-1, ERS-2
AM	**Amplitude Modulated**	radio band is characterized by km-long wavelengths that are not used in satellite remote sensing
AOML	**Atlantic Oceanographic and Meteorological Laboratory**	
AIRS	**Atmospheric IR Sounder**	
APT	**Automatic Picture Transmission**	broadcasts the local visible and infrared imagery in an analog format with a 4-km pixel size to any receiving station
ABT	**Averaged Brightness Temperature**	A data product from the ATSR sensor series
ASST	**Averaged Sea Surface Temperature**	A data product from the ATSR sensor series
	Big-endian systems	when the second byte is treated as the most significant
	Blackbody	the most efficient possible radiator
B	**Brightness**	incident radiances, used in passive microwave radiometry for both incoming and outgoing radiation. Effectively mixed with black
	Brightness Temperature	the temperature of the blackbody which would emit the measured radiance across the waveband of the detector
T_b	**Bulk Temperature** (Buoy temperature)	for weak winds T_b responds to diurnal heating & cooling on the order of hours; for strong winds, T_b responds at shorter periods. In the AVHRR procedure for SST calibration and removal of aerosols, T_b is a surrogate for T_S
	Cartesian Coordinate System Images	lines are counted from the bottom left of the image (think: origin of a graph)
	Colour	refers to both the magnitude & the spectral composition of the light leaving the water, it's a characteristic of the seawater properties
CEOS	**Committee on Earth Observation Satellites**	created by international agreement in order to co-ordinate all space-borne Earth-observing missions

CPCA	**Complex Principal Components Analysis**	
CGMS	**Co-ordination Group for Meteorological Satellites**	
	Cylindrical Projection	distorts the shape of the continents towards the poles and does not represent directions accurately
DAC	**Data Assembly Center**	
	Depth of Color	the extent to which the color is mixed with white
	Discrepancies between skin and bulk temperatures	in a related source of error, the daytime solar-driven increase in T_S increases the difference between the buoy temperature and T_S, yielding a larger bias in the matchup data.
	Diurnal Solar Heating	short-term solar heating can increase the skin temperature without changing the atmospheric temperature and humidity profiles
	Diurnal Thermocline	the presence of a stable warm layer of water in the topmost decimeter to meters created by solar heating
Q_G	**Downwelling**	IR radiation from the atmosphere & cloud (-)
EMR	**Electromagnetic Radiation**	EMR has a dual nature—it behaves as both: discrete quanta of radiation & electromagnetic waves
e.m.	**Electromagnetic Spectrum**	
$\lambda; \theta; \phi$	**Emissivity**	the ratio of gray body radiance to the blackbody. $e(\lambda; \theta; \phi) = L_\lambda(\lambda, T; \theta, \phi)/f_P(\lambda, T)$
M	**Exitance**	the emitted or outgoing radiation, there are 3 forms of the irradiance:
EHE	**Extremely High Frequency**	N = 11
ELF	**Extremely Low Frequency**	N=2
	false-color composite	
FOV	**Field of View**	
$d\Phi/dA$	**Flux density**	has units of Wm^{-2} and is the radiant flux per-unit-area that is either incident on or emitted from a unit surface area.
	Footprint	the region on the ground contributing to the measurement
FM	**Frequency Modulated**	has a higher frequency than AM as do TV & cell phone bands
	Geophysical Calibration	When the raw data have been calibrated and atmospheric correction has been applied, the next stage in the processing chain is to manipulate the data in order to derive estimates of a particular ocean parameter
	Geostationary	circular orbit, Satellite revolves with the earth, continuously looks over large areas
GOES	**Geostationary Operational Environmental Satellites**	
GAC	**Global Area Coverage**	
GCOS	**Global Climate Observing System**	
GLI	**Global Imaging Sensor**	
GLONASS	**Global Navigation Satellite System**	Russian
GODAE	**Global Ocean Data Assimilation Experiment**	

GOOS	**Global Ocean Observing Systems**	
GOSSTCOMP	**Global Ocean Sea Surface temperature Computation**	
GPS	**Global Positioning System**	US
	Gradient Filter	returns a positive value if the image values increase locally from the bottom to top, and visa-versa
	Gray bodies	non-blackbody radiators, they radiate less than blackbodies & their radiation properties are defined in terms of an emissivity
	ground segment	receiving and initial processing of satellite data
HIRS	**High Resolution Infrared Radiometer sounder**	
HRPT	**High resolution Picture Transmission**	broadcasts digital data with 1-km pixels
	High thin cirrus clouds	cirrus clouds consist of thin, semitransparent layers of ice crystals that are associated with the penetration of convectively active rain cells into the upper troposphere.
	High-Pass filters	are those which would register zero if the image were uniform, but which return numerically larger values (positive or negative) if there is a particular type of variability within the window of the filter
HRPT	**High-Resolution Picture Transmission**	
GHRSST-PP	**High-resolution SST Pilot Project**	
	Hue	the balance between primary colors
	Hyperspectral image	data contain many tens of channels → special image processing software is required which can provide ready acess to the spectral dimension that lies behind a single pixel
	Image	recording of a scene by an instrument that scans to provide one dimension and moves past its target to provide the second dimension; raster data
IR	**Infrared**	
IFOV	**Instantaneous Field of View**	determines the spatial resolution of the data; the solid angle from which signal is received by the sensor at an instant. Strictly defined in directional terms
	Instantaneous footprint	intersection of the IFOV with the ground
ICSU	**International Council of Science Unions**	
ITU	**International Telecommunication Union**	
IUCAF	**Inter-Union Commission on Frequency Allocation for Radio Astronomy & Space Science**	
Q_{IR}	**IR radiation**	emitted by the sea surface (+)
E	**Irradiance**	the incident flux density
	1) Scalar irradiance	1) the irradiance incident on a spherical sensor from all directions
	2) Vector irradiance	2) the irradiance divided into its orthogonal spatial components
	3) Plane irradiance	3) the fluxes that are incident or emitted in all directions, above or below the half plane, weighted by the cosine of their angle to the vertical
GLI	**Japanese Global Imager**	

	Lambert Surfaces	have the useful property that their emitted radiance is independent of direction; these surfaces are of particular importance for ocean remote sensing in the visible/infrared
	Laplacian filter	is positive if locally the mage value surface has a minimum, and negative for a maximum or peak
Q_L	Latent heat flux	normally +
	Lidars	active sensors operating in the visible waveband
	line broadening	The process by which emission and absorption in the atmosphere occur in spectral bands, not discrete lines
	Little-endian systems	when the first byte is treated as the most significant
LAC	Local Area Coverage	
LUT	Look-up-table	
	Loss-Less Compressions	Some compression methods permit full restoration of the original data values
LEO	Low Earth Orbit	satellites fly between 500 & 2,000 km, placing them in a nearly circular polar orbit with inclinations of ~±90°. They alone provide a regular sampling cycle of each point on the Earth and can be maintained in stable orbit for a lifetime of several years
MEDS	Maritime Environmental Data Service	
	Mean filter	smooth out small amplitude spatial data that occurs over length scales within the dimensions of the filter
	Mercator projection	has been widely used instead for navigation purposes
	Metadata	the information needed to unpack images from the numbers stored in the file
MSG	Meteosat second generation	
MWR	Microwave Radiometers	measure ocean salinity
	Mie	aerosol scattering
MODIS	Moderate Resolution Imaging Spectrometer	
MCSST	Multichannel SST	
MVIRSR	Multispectral Visible/IR Scanning Radiometer	
NDBC	National Data Buoy Center	
Q_N	Net vertical heat flux	
Nimbus-7	Nimbus-7	satellite and the 1st ocean color sensor
NEδT	Noise Equivalent Difference Temperature	
NEDT	Noise Equivalent Difference Temperature	
NaN	Not a Number	
OCTS	Ocean Colour and Temperature Scanner	
	Passive sensors	rely exclusively on the naturally occurring radiation. Passive sensors are used in the 3 principal spectral windows used to study the ocean (visible waveband, thermal-IR, and the microwave)
PFMDB	Pathfinder match-up database	

	Photograph	recording of a scene or object by usual camera-light sensitive recording combination (like a camera)
	Pixel	picture element; smallest element of an image
	Pixel size	the distance between the adjacent pixel centers and thus is set by the sampling rate along the line and the time interval between lines
	Polarimetric Microwave Radiometers	to measure wind speed and direction
	Polarization 1) **Linearly polarized** 2) **Circularly polarized** 3) **Left-circular polarized** 4) **Right-circular polarized** 5) **Elliptically polarized** 6) **Randomly polarized**	1) the wave is *linearly polarized* when the resultant *E* points in a single direction 2) the wave is *circularly polarized* when the 2 components have equal magnitudes but different phases, then *E* rotates around the *z*-axis at the frequency (f) 3) the wave is *left-circularly polarized* when, looking into the wave, the rotation is counter-clockwise 4) the wave is *right-circularly polarized* when, looking into the wave, the rotation is clockwise 5) the wave is *elliptically polarized* when the 2 components have unequal magnitudes 6) the wave is *randomly polarized* when the *E* takes different directions at random (the sun is randomly polarized)
POES	**Polar-Orbiting Environmental Satellites**	
PCA	**Principal Components Analysis**	in the land of remote sensing context is usually considered in terms of manipulating multispectral data (i.e. different wavelength channels of the same sensor)
	push-broom	type are likely to be the primary means of improving spatial resolution in the future
L	**Radiance**	emitted radiances, used in ocean color observations
Φ	**Radiant Flux**	the rate at which energy is transported toward or away from a surface, with units of watts (W). For example the total radiant flux or power emitted by the sun is Φ_S= 3.9 x 10^{26}W.
$I = d\Phi /d\Omega$	**Radiant Intensity**	the radiant flux per-unit-solid-angle, with units W sr^{-1} and used in the description of radiation propagating from a point source. Thus from the definition of Φ, and because there are 4π steradians in a sphere, the sun has a radiant intensity of I = 3.1 x 10^{25} W sr^{-1}
RTE	**Radiative Transfer Equation**	
	Radiometer	the simplest passive remote sensing instrument, it measures the flux of e.m. energy reaching the sensor from a given small cone of directions, they measure in the visible, thermal-IR, and microwave parts of the spectrum, though very different types of sensor are required for each
	Rayleigh	molecular scattering
	remote sensing system	platform, sensor, data transmission, "ground segment", and data utilization

	Roberts Filter	is a 2x2 filter that computes the gradient as the root of the sum of squares of the diagonal differences, or simply as the sum of the absolute value of each diagonal difference, it is a good edge detector and highlights sharp changes in any orientation in an ocean image
RAL	Rutherford Appleton Laboratory	
	Scan line	cross-track swath of picture elements; determined by sampling rate of IFOV
	Scanning radiometer	device that uses mirrors or lenses to systematically sweep from horizon to horizon along a path normal to the direction of travel of spacecraft
SR	Scanning Radiometer	
	Scatterometer	device that measures the average radar back-scatter from a fairly wide area
SSOF	Scripps Institute of Oceanography Satellite-Oceanography Facility	
SST	Sea Surface Temperature	
Seasat	Seasat	satellite was dedicated to ocean viewing, its sensors used mostly microwaves which are unobstructed by clouds, it also carried the radar altimeter, synthetic aperture radar (**SAR**), and scatterometers to measure sea surface height & roughness, to get information about temperature, winds, and sea ice.
Q_H	Sensible Heat Flux	+ when the sea is warmer than the air, or – when the air is warmer than the sea
	Sensor Design	the arrangement of optical lenses and mirrors or the geometry of the microwave antenna
XBT	Ship expendable bathythermographs	
	Sidereal day	day length is measured in relation to the stars
SNR	Signal-to-noise ratio	
	signed values	containing positive and negative numbers
T_S	Skin temperature	contributes to the determination of the ocean/atmosphere heat and moisture fluxes
	Sobel filter	designed for edge detection, it is the sum of squares of the results of separately applying the 3x3 filters
	Spectral signature	radiance value plotted against wavelength
sr	Steradians	
	Sun-synchronous	crosses the equator at the same time daily, it's a retro-grade orbit, the orbit is tilted to the left of the axis when it is ascending
SFOV	Surface Field of View	
SAR	synthetic Aperture Radar	have a very high data rate and at present rely entirely on direct transmission
	thermal skin layer effect	a much finer scale phenomenon, it is though to occur within less than 1mm of the surface
T_{bi}	TOA Measured Brightness Temperature	the measured TOA brightness temperature in channel i
TOA	Top-of-atmosphere	
TECU	Total Electron Content Unit	

	Transmissity	in the microwave wavelength window
	Transmittance	in the visible/infrared wavelength window
TRMM	**Tropical Rainfall Measurement Mission**	
UKMO	**UK Meteorological Office**	
UV	**Ultraviolet**	
	Variance filter	is a more complex high pass filter, it evaluates the variance in the window, which is the sum of the square of the differences between each value in the window and the mean of the window
VHRR	**Very High Resolution Radiometer**	
VIR	**Visible and Infrared**	wavelengths occur between approximately 0.4 and 20 μm
VISSR	**Visible Infrared Spin Scan Radiometer**	
	Volcanic aerosols	episodes of volcanic aerosols create serious problems for the algorithms.
	Weighted mean filter	can smooth over larger scale perturbations while allowing strong isolated peaks to show through. Mean filters are essentially low-pass filters
WMO	**World Meteorological Organization**	

Symbols

a		**Semi-major axis of the ellipse**
c	**Speed of light**	
e		the eccentricity of the ellipse
f	**Frequency**	
i		the inclination of the orbital plane to the Earth's equatorial plane
V	**variable columnar water vapor**	
w		the angular distance of perigee around the orbit, measured from the ascending node
θ		the angular position of the satellite in its orbit
λ	**Wavelength**	
Ω		the right angle ascension of the ascending node, measured eastward from the point of Aries which is a fixed point in the heavens, close to the equatorial plane)