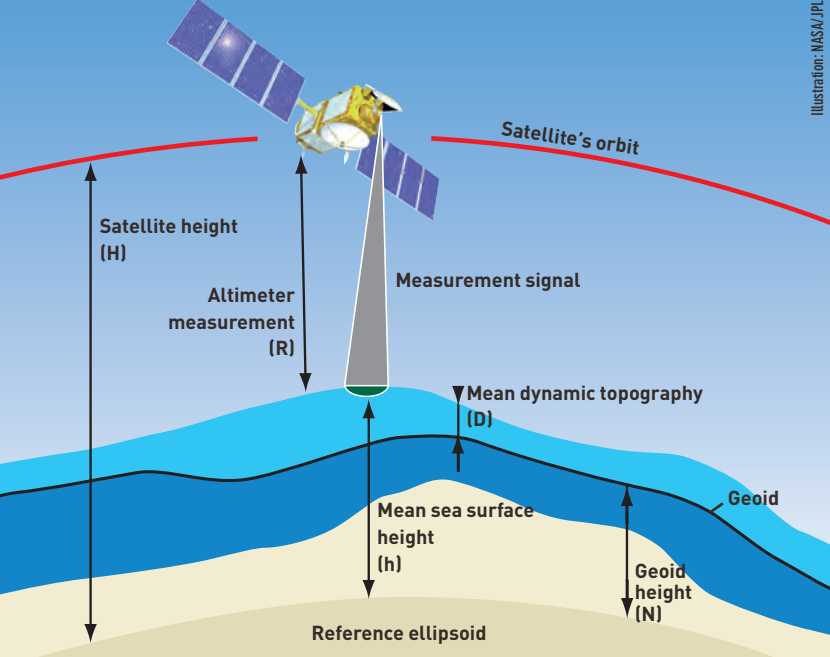**Altimetry (Altitude measurement):** Altimetry observation satellites circle the Earth in known orbits. Researchers always know the position of a specific satellite, through information from other satellites such as GPS or other methods. The satellites send a radar signal to the ocean's surface, and then measure the signal when it returns to the satellite. The time it takes for the signal to travel from the satellite to the ocean and back again is multiplied by the speed of light and represents the distance between the satellite and the ocean surface.

HERE'S HOW THE MEAN SEA SURFACE HEIGHT IS COMPUTED: $h = H - R = N + D$

Satellite's orbit

Satellite height (H)

Altimeter measurement (R)

Measurement signal

Mean dynamic topography (D)

Mean sea surface height (h)

Geoid

Geoid height (N)

Reference ellipsoid

Reference ellipsoid: Because the Earth is somewhat flattened at the poles (and thus is elliptical) it is inaccurate from a mathematical standpoint to describe it as a ball with a constant radius. Instead, we use what is called a reference ellipsoid – a simple mathematical surface that provides a more appropriate description.

Geoid: The Earth's gravitation varies, and the Earth's surface is pulled closer to the centre of the Earth in some places more than others. These variations are described by the geoid. Thus, the geoid is a close approximation of the Earth's physical form, or more precisely, of the Earth's gravitational field.

Mean dynamic topography: Neither the ocean's surface nor the surface of the Earth is completely still. Both pulsate in and out depending upon the position of the moon. This is what we call ocean and Earth tides. The geoid is therefore based on a mean of the sea surface. The difference between the mean sea surface and the geoid is called the mean dynamic topography. By knowing this, researchers can better analyse ocean currents and their significance for climate.