

Titan is one of the most interesting satellites in the solar system and the one that has the most analogies with the Earth: a kind of primordial version of Earth with a thick atmosphere and a chemistry of organic nature.

Both have stable liquids on the surface: water on Earth, methane and ethane on Titan.

The Cassini spacecraft will make a new Titan flyby on May 17 at less than 3000 km, allowing new investigations of this satellite.

The end of winter at the northern hemisphere and the concomitant thinning of the clouds, which made difficult in the past the observation of the surface at the north pole, are a unique condition before the next flybys, considering that Titan takes 29 years to orbit around the Sun.

These aspects, and the concomitants hardly repeatable, lead me to indicate Titan as the main target of the forthcoming observations of the Cassini spacecraft.

Similarly to water on Earth, methane on Titan is simultaneously present in three forms, solid, liquid and gassy, thanks to a combination of pressure and mean surface temperatures near its triple point. Cassini, during a flyby in July 2006, has discovered large methane lakes around the north pole through spectrometers and radar on board.

The approaching summer in the northern hemisphere and the presence of methane seas and lakes should cause the formation of clouds and thunderstorms phenomena, predicted by meteorological models developed by scientists but never directly observed before.

The next flyby is a unique opportunity to investigate this eventuality.

If there are storms, it will be confirmed the hydrological cycle based on methane too, that would justify the presence of seas, lakes and rivers on the northern surface of Titan.

The largest of these seas of hydrocarbons, the Kraken, has been observed in last flybys through the infrared spectrometers and radar from the Cassini spacecraft.

The next flyby orbit, planned less inclined than in the past, would allow to investigate the nature and composition of Kraken Sea better.

It would be also possible to get data that will be compared with those obtained from the next flybys, thus allowing scientists to determine whether rains have fed rivers and lakes and how they have changed the morphology of the surface.

Another aspect that could be better deepened is certainly the presence of waves on the surface of the seas.

During the observations of the Punga Sea, carried out in 2012 and 2013, the spectrometers noted constant changes on the reflections of light: as if to suggest the presence of waves.

The order of magnitude of waves is probably very low, by the high viscosity of the hydrocarbons and density of the Titan's atmosphere.

The change of seasons could increase the winds to the point of producing the waves and provide the definitive evidence to the hypothesis of the scientists.

In 2017 the mission will end and Cassini will precipitate on Saturn: this is a unique opportunity to observe Titan!