

Titan Flyby Nomenclature, History, and Some Useful Definitions

TOST (Titan Orbiter Science Team) was chartered and starting working just after the prime mission trajectory was selected. This happened in the year 2000 - roughly the middle of Cassini's 7-year cruise to Saturn. When TOST began its planning work, it simply numbered the flybys T1 through T44 and the various science teams began their analysis. As the Project Mission and Science Planning processes were further developed, the Project ultimately adopted a naming convention for all flybys (including Titan and Saturn's other moons). This naming convention is in the format [orbit#][body] where [orbit#] is the number of the orbit (or revolution) measured from apoapse to apoapse and [body] is a 2 character code for each moon - TI for Titan. So, 13TI is the Titan flyby on the 13th orbit about Saturn of the mission. However, TOST had been calling this flyby "T6" for some time. TOST felt that too much work had been invested using the old names (i.e. T6) and were reluctant to change, so in most of the TOST work you will find the use of both conventions such as 13TI(T6) or 13TI_T6.

Why is T6 the 7th flyby of the mission?

The redesign of the mission to accommodate the Huygens receiver problem (described elsewhere) removed revs 1 and 2 and replaced them with revs A, B, and C. Consequently, T1, and T2 went away, and TA, TB, and TC were added in their place. This makes the "counting" of the Titan targeted flybys non-intuitive if you don't know that background. So, in the prime mission, there were 45 targeted flybys of Titan (TA, TB, TC, T3-T44). No orbiter science was collected on the probe delivery flyby (TC). To summarize:

- TA = First targeted flyby
- TB = Second targeted flyby
- TC = Third targeted flyby (Huygens Mission, no orbiter science)
- T3 = Fourth targeted flyby (yes...T3 is the 4th targeted flyby)
- T4 = Fifth targeted flyby, etc.
- T126 = 127th targeted flyby of Titan

A complete, easy list with all naming conventions can be found with the one page summary of the mission ([link to 1 page summary](#))

Some useful definitions that will ultimately go into a glossary:

Targeted Titan Flyby: a flyby where the navigation team planned maneuvers before and after the flyby in order to control the trajectory and ensure that the spacecraft stayed “on the tour”. The “approach” and “cleanup” maneuvers were scheduled for roughly three days before and after the Titan flyby, respectively. These Titan “tie points” (another name for the targeted flybys) were essential to the shaping the overall Cassini trajectory. Until T126 where the spacecraft became a ballistic projectile on a collision course with Saturn regardless of any further maneuvers, the entire Cassini mission was basically a targeted Titan flyby to the next targeted Titan flyby.

Non-targeted Titan flyby: a flyby that was close enough that the Titan scientists wanted the time around the flyby dedicated to Titan observations and requested they be allowed to create the conflict free timeline of events, but not one where the Navigation team had planned maneuvers to shape the tour.

TOST: Titan Orbiter Science Team. A PSG (Project Science Group) working group tasked with creating a balanced scientific plan of activities across the suite of all Titan flybys of the mission. The purpose of the Orbiter Science Teams was similar to the Target Working Teams (TWTs), but the OSTs were created by and reported to the PSG. TOST consisted of representatives from each instrument, co-chairs (chosen by the Project Scientist and concurred by the Science Planning Manager), Science Planning staff, and others (representatives from the Spacecraft and Mission Planning teams, and (as needed) Interdisciplinary Scientists). Candy Hansen and Scott Bolton were the original chairs, followed by Trina Ray and Marcia Burton. TOST was formed soon after the initial tour trajectory was chosen (Tour 18-5 in the year 2000) as it was well understood that the 24 hours around a Titan flyby would be dedicated to Titan-related observations, so the work on integrating those time periods could begin immediately without having to consider if the time interval should be awarded to one of the other disciplines for integration. The first TOST meeting was held on November 6, 2000. To put the total time allocated to TOST to be integrated in perspective: TOST was ultimately awarded 318 of the 4870 days. Roughly 7% of Cassini’s 13 years at Saturn, but one of the most scientifically compelling targets resulting in over 1000 of the 3000 peer reviewed publications by end of mission in 2017.