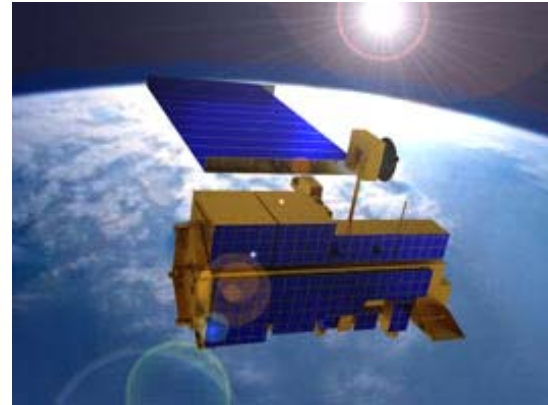




FreeFlyer® Provides The Operational Responsiveness To Put The Terra Mission Back On Course

In January 2000, the Terra spacecraft was successfully launched into its injection orbit by an Atlas launch vehicle. The ascent to operational orbit was to consist of four maneuvers. However, the first ascent maneuver, although scheduled for 516 seconds, was aborted after only 67 seconds because the satellite began to diverge from its nominal attitude. The ground operations team knew it must quickly identify and resolve the issues causing this unexpected behavior. With constellation phasing to other Earth Observing Sciences (EOS) spacecraft a major concern, there remained only a five-day window of opportunity to identify, analyze, and begin implementing alternate orbital insertion strategies. The Terra Operations Team, including **a.i. solutions**, quickly began assessing the problem.



It was determined that the Attitude Control System (ACS) thrusters were impinging upon the solar arrays causing the destabilization. The satellite remained in its parking orbit while the Terra Operations Team immediately began to examine alternate ascent maneuver strategies which would resolve the problems. Using **FreeFlyer®**, the powerful mission planning and operations tool from **a.i. solutions**, the team went to work.

The Results

Over the next 4 days **FreeFlyer®** was used to identify and evaluate the impact of alternate ascent strategies, including multiple variations in the number of planned maneuvers, durations, fuel consumption, and start times. Using **FreeFlyer®**, *more than 50 alternative strategies and their lifetime impacts were evaluated within a few days.* (Note: In the past, legacy software often took as long as one full day to evaluate each alternate strategy and its impact over the life of the mission.) Once the operations team determined the best solution, they used **FreeFlyer®** to plan a maneuver schedule that fired thrusters at optimal solar panel attitudes and limited the duration of each firing to minimize the impingement effect. Of all the strategies presented by **FreeFlyer®**, the team selected a six maneuver ascent which satisfied the operational requirements of fuel usage and time to orbit. Terra achieved its ideal operational orbit and is currently performing and transmitting images as designed.

The Customer
NASA's Earth Observing Sciences (EOS) Terra Mission Team

The Challenge
Terra's first ascent maneuver had to be abruptly aborted because the satellite began to diverge from its nominal attitude.

The Solution
FreeFlyer® - the mission planning and operations tool from **a.i. solutions**

The Results

- The operational responsiveness of **FreeFlyer®** provided more engineering cycles - and more options - to the operations team.
- The optimum maneuver strategy was chosen and executed.

Today the Terra mission is still providing invaluable information to NASA's EOS group

More data. More engineering cycles. More options. Better decisions.

a.i. solutions is proud to be a part of the Terra Team.