DEEP SPACE 4 / CHAMPOLLION

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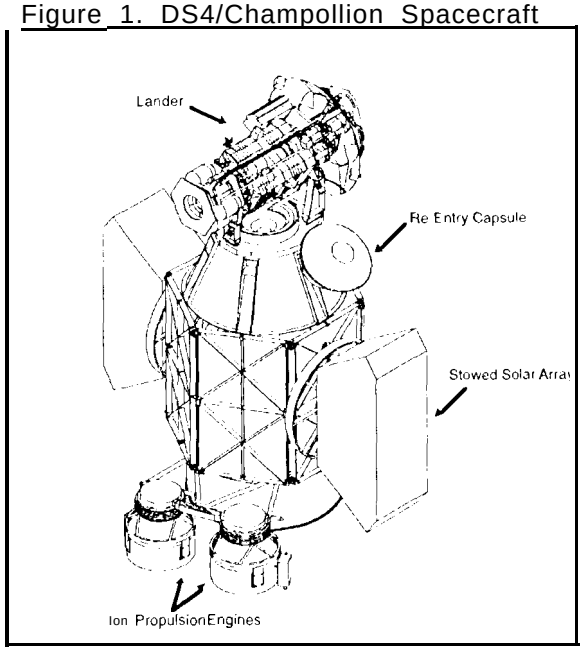
The Deep Space 4 (DS4)/ Champ onion mission is being developed in collaboration with the New Millennium Program at JPL and has recently been recommended by the New Millennium Science Working Group as the DS4 mission. The goals of the New Millennium Program are to qualify advanced technologies for use on future NASA missions and to perform meaningful science with the new technology. DS4 (Figure 1 .) would perform the first landing of scientific instruments on the surface of a comet, and demonstrate technologies for collecting and returning extraterrestrial samples. DS4 would demonstrate the feasibility of advanced solar electric propulsion technology, precision guided landing, remote sample collection, automated orbital rendezvous, and transfer, and sample return technologies, which could then be used on future sample return missions.

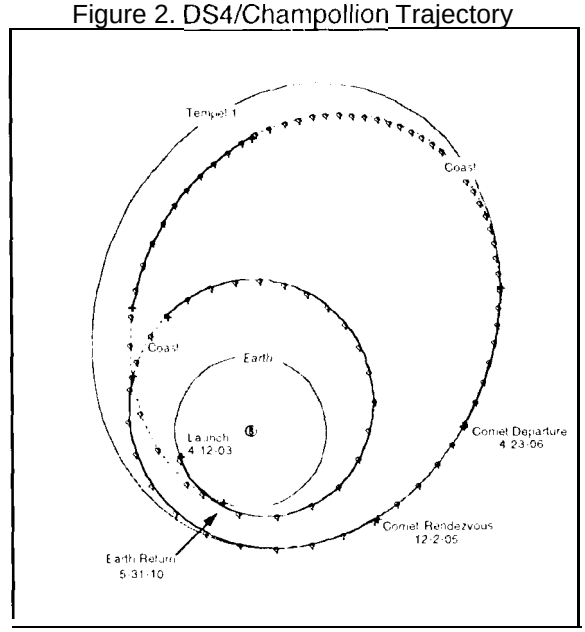
Figure 1. DS4/Champollion Spacecraft



Comets contain a record of the conditions and composition of the primordial solar nebula at the time of the formation of the planetary system. Thus, the ***in-situ*** study and return of cometary samples are among the highest priority goals of the planetary exploration program. DS4'S science objective would be to decipher some of the cosmo-chemical record of the primordial solar system that is believed to be encoded in comets.

DS4/Champollion would launch in Apri12003 on a Delta II 7925 from Cape Canaveral Air Station. The solar-electric carrier spacecraft would rendezvous with the periodic Comet Tempel I in December 2005 (Figure 2.) and would spend four months at the comet in order to ***completely*** map the surface at high resolution, Once a site is selected, the lander would descend to the surface and anchor itself while the solar-electric stage remains in orbit to serve as a radio relay to Earth.

Figure 2. DS4/Champollion Trajectory



Operations on the nucleus surface are expected to last approximately 3.5 days. The DS4/Champollion lander would perform *in-situ* science and collect a sub-surface sample, detach itself from the anchor, and take off, leaving the lower portion of the spacecraft and most of the scientific instruments on the comet. The lander would then rendezvous with the carrier spacecraft, and transfer the sample to the sample return vehicle (SRV). Flight time back to Earth is 4.2 years, delivering the sample in June, 2010. The passively cooled sample would be enclosed in a direct re-entry vehicle (SRV) that would decelerate in the Earth's atmosphere and then parachute safely to the surface. The sample would be transported for analysis in terrestrial laboratories.