

Abstract

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Paper Title: The NASA Discovery 5, Genesis Mission (an Invited Paper)

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"Genesis" is the NASA Discovery 5 mission to return solar wind samples to the Earth for analyses in terrestrial laboratories. This data will significantly increase our knowledge of the elemental abundance and isotopic composition of the solar system. This knowledge will be used to address questions about the materials and processes involved in the origins of the solar system. While oxygen, nitrogen and noble gas isotopes and elements comprise the primary objectives, Genesis has a total of 19 prioritized measurement objectives.

Upon return, Genesis samples will be analyzed in individual PI and Co-I laboratories using gas source mass spectrometry (GSMS), secondary ion mass spectrometry (SIMS), resonance ionization mass spectrometry (RIMS), and radiochemical neutron activation analysis (RNAA). Additionally, a general access facility called the Advanced Analytical Instruments Facility (AAIF) will be developed by the Genesis Project specifically for the analysis of Genesis samples. The strawman AAIF "PAYLOAD" includes secondary ion mass spectrometer (SIMS), resonance ionization mass spectrometer (RIMS).

In order to gather the materials to accomplish its objectives, the mission will place a spinning spacecraft outside the earth's magnetosphere, in an orbit about the first Earth-Sun libration point (L1), for two years, to collect solar wind samples by implantation into passive collectors made of ultra-pure materials. Two solar wind monitors will be used to determine solar wind regime and speed to control the collection by a set of collector arrays and an electrostatic concentrator. The collected samples are returned to earth and recovered at a U.S. test range. Sample curation will be provided for by the Johnson Space Flight Center.

The integration and test of the flight system and the payload will continue through September 2000, with launch scheduled for January 2001. The sample will be returned to earth approximately 32 months after launch in August 2003.