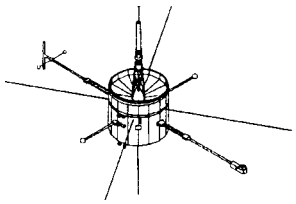
ISEE 3

International Sun Earth Explorer 3

Spacecraft Sketch	Mission Objective
	A major project objective of the International Sun-Earth Explorers (ISEE 1,2 & 3) is to study the interaction of the interplanetary medium with the earth's immediate environment and to study the magnetosphere bow shock and magnetosheath in order to derive a better model of the interaction. The ISEE 1 & 2, which will be launched by the same vehicle, will investigate the structure and response to the solar activity of the various physical phenomena in the earth's magnetosphere, magnetopause, bow shock and hydromagnetic tail. The ISEE 3 will measure characteristics of interplanetary medium in an area that is essentially unperturbed by the earth's influence, so that the effect of the earth's presence and its environment can be removed from measurements that represent the effects of the sun.

TYPE OF MISSION	PROGRAM OFFICE	PROJECT LEAD CENTER	MANAGEMENT APPROACH	S/C CONTRACTOR	I&T CONTRACTOR
SPACE PHYSICS	SPACE SCIENCE	GSFC	AUGMENTED HYBRID	GSFC IN-HOUSE	FAIRCHILD

Payload Description

The International Sun-Earth Explorers (ISEE 1,2 6 3) payloads include a total of 32 instruments. While each of the payloads has a separate scientific significance; maximum benefit will be obtained when all three spacecraft are operating simultaneously. Hence, the ISEE-] 6 2 will be launched together on the same launch vehicle, placed in an identical eccentric earth-orbit and separated by a controlled distance to allow for the separation of space and time effects necessary to study the interation of the solar wind with the magnetosphere. In conjunction, the ISEE 3 will be placed in an elliptical halo orbit about the Libration point between the earth and the sun and will measure conditions in the interplanetary medium and on the sun. The ISEE 3 spacecraft is basically the same as the ISEE 1 spacecraft with a few significant differences. The ISEE 3 omni S-band antenna is located on the top end of the cylinder body instead of near the top of the lower solar array like the ISEE 1. The ISEE 3 attitude control system also includes a third star sensor in addition to the two which are in common with ISEE 1.

INSTRUMENT NAME	ACRONYM	PI AFFILIATION	PRINCIPAL INVESTIGATOR	I&T CONTRACTOR
COSMIC RAY ELECTRONS	NONE	UNIV CHICAGO	P. MEYER	SRL
HELIUM VECTOR MAGNETOMETER	NONE	JPL	E. J. SMITH	JPL
HIGH ENERGY COSMIC RAY	NONE	CIT	E. C. STONE	PARIS OBSERV
HIGH ENERGY COSMIC RAYS	NONE	UCB	H. H. HECKMAN	UCB
LOW ENERGY COSMIC RAYS	NONE	MAX PLANCK	D. HOVESTADT	CIT
MEDIUM ENERGY COSMIC RAY	NONE	GSFC	T. VON ROSENVINGE	UCB
PLASMA COMPOSITION	NONE	GSFC	K. W. OGILVIE	JPL
PLASMA WAVES	NONE	TRW	F. L. SCARF	GSFC
PROTONS	NONE	SRL UTRECHT	L. D. DE FETTER	GSFC
RADIO MAPPING	NONE	MEUDON OBS	J. L. STEINBERG	TRW
SOLAR ELECTRON EXPERIMENT	NONE	UCB	K. A. ANDERSON	SPACETEC
SOLAR WIND PLASMA	NONE	LOS ALAMOS	S. J. GAME	UCB
SOLAR X-RAY EXPERIMENT	NONE	UCB	K. A. ANDERSON	UCB

Instrument Descriptions
The ISEE 3 Cosmic Ray Electrons detector system consists of seven active counters, two lithium drifted silicon detectors, one CsI scintillator, two plastic scintillators, one gas Cerenkov counter and one quartz Cerenkov counter. All seven telescope elements are pulse-height analyzed using analog and digital compression techniques to obtain the required dynamic range.
The ISEE-3 Helium Vector Magnetometer, Data Point 480, is designed and built by JPL to study the solar interplanetary phenomena. The design is similar to the Pioneer Jupiter Magnetometer. The instrument is boom mounted and will operate at low field ranges of 4 to 146 gammas.
The ISEE 3 High Energy Cosmic Ray instrument developed by California Institute of Technology consists of 13 solid state detectors. Two solid-state-matrix detectors provide the necessary angular and positional information. The thicknesses of the other detectors are designed to optimize energy-loss measurement. Anticoincidence elements help provide background discrimination. The instrument has 4 basic modes: 1) normal; 2) flare; 3) penetrating particle; and 4) low-Z.
The ISEE-3 High Energy Cosmic Rays, Data Point 473, is developed by the University of California at Berkeley to measure the isotopic compositions in the primary cosmic rays from hydrogen through iron. The instrument includes a 10-element solid-state particle telescope consisting of lithium-drifted silicon detectors. Events selected for mass and/or charge analysis require coincidence between any four drift chamber planes and the first two detectors.
The ISEE 1 &3 Low Energy Cosmic Rays instruments consist of two sensors: 1) ultra low energy nuclear charge, total energy, and ionic charge assembly (ULEZEQ); and 2) ultra low energy wide angle telescope (ULEWAT). Charged particles entering the ULEZEQ are electrostatically deflected in four deflection systems and measured by eight silicon detectors. The ULEWAT and its array of proportional counters is backed by an anti-coincidence detector with incoming particle residual energy determined by two solid state detectors.
The ISEE 3 Medium Energy Cosmic instrument includes four basic detector systems: 1) Very Low Energy Telescope system (VLET); 2) Low Energy Telescope system (LET); 3) Medium Energy Telescope system (MET); and 4) X-ray/electron proportional counter. The telescopes consist primarily of solid state detectors. All detector systems operate in a selfcalibrating dE/dx vs E mode.
The ISEE 3 Plasma Composition instrument consists of a hemispherical electrostatic energy analyzer, a stigmatic Wien filter and electron multiplier detectors. An electrostatic quadrupole defocussing lens is used in front of the energy analyzer to reduce the flux of protons. This instrument uses buffer storage, and performs completely flexible measurement cycles in variable time, as programmed by ground command.
The ISEE 3 Plasma Waves instrument consists of a spectrum analyzer measuring solar wind and plasma wave magnetic field and electric field levels. The magnetic field levels are measured in 8 channels, from 20 Hz to I kHz. The electric field levels are measured in 16 channels from 20 Hz to 100 kHz. The magnetic field sensors are boom mounted parallel to the spacecraft spin axis. The electric field sensor is mounted perpendicular to the spacecraft spin axis.
The ISEE 3 Protons instrument measures the energy spectrum of low-energy solar protons in 8 channels and the 3dimensional angular distribution of protons in the energy range 0.03 to 1.4 MeV. The experiment includes three identical telescopes aligned at approximately 30 degrees, 60 degrees and 135 degrees to the spin axis. Each telescope consists of two surface barrier detectors, a mechanical collimator for sheilding and a broom magnet to sweep away electrons.
The ISEE 3 Radio Mapping radiometer has four superheterodyne receiving channels, the tuning frequencies of which are swept stepwise from 30 kHz to 2 Mhz. The radiometer consists of six high input impedance preamplifiers: 1) two on Z dipole; 2) two on spin plane dipole SB; and 3) two spares. The radiometer has two independent receiving channels with different bandwidths to provide redunduncy and versatility.

Launch
10/22/77 (1)
10/22/77 (2)
8/12/78 (3)