



GOES I-M DataBook

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Foreword

The Geostationary Operational Environmental Satellite (GOES) program is a key element in National Weather Service (NWS) operations. GOES weather imagery and quantitative sounding data are a continuous and reliable stream of environmental information used to support weather forecasting, severe storm tracking, and meteorological research. Evolutionary improvements in the geostationary satellite system since 1974 (i.e., since the first Synchronous Meteorological Satellite, SMS-1) have been responsible for making the current GOES system the basic element for U.S. weather monitoring and forecasting. Spacecraft and ground-based systems work together to accomplish the GOES mission.

Designed to operate in geosynchronous orbit, 35,790 km (22,240 statute miles) above the earth, thereby remaining stationary, the advanced GOES I-M spacecraft continuously view the continental United States, neighboring environs of the Pacific and Atlantic Oceans, and Central and South America. The three-axis, body-stabilized spacecraft design enables the sensors to “stare” at the earth and thus more frequently image clouds, monitor earth’s surface temperature and water vapor fields, and sound the atmosphere for its vertical thermal and vapor structures. Thus the evolution of atmospheric phenomena can be followed, ensuring real-time coverage of short-lived dynamic events, especially severe local storms and tropical cyclones — two meteorological events that directly affect public safety, protection of property, and ultimately, economic health and development. The importance of this capability has recently been exemplified during hurricanes Hugo (1989) and Andrew (1992).

The GOES I-M series of spacecraft are the principal observational platforms for covering such dynamic weather events and the near-earth space environment for the 1990s and into the 21st century. These advanced spacecraft enhance the capability of the GOES system to continuously observe and measure meteorological phenomena in real time, providing the meteorological community and the atmospheric scientist greatly improved observational and measurement data of the Western Hemisphere. In addition to short-term weather forecasting and space environmental monitoring, these enhanced operational services also improve support for atmospheric science research, numerical weather prediction models, and environmental sensor design and development.

The main mission is carried out by the primary payload instruments, the Imager and the Sounder. The Imager is a multichannel instrument that senses radiant energy and reflected solar energy from the earth’s surface and atmosphere. The Sounder provides data for vertical atmospheric temperature and moisture profiles, surface and cloud top temperature, and ozone distribution.

Other instruments on board the spacecraft are the search and rescue transponder, ground-based meteorological platform data collection and relay, and the space environment monitor. The latter consists of a magnetometer, an X-ray sensor, a high energy proton and alpha detector, and an energetic particles sensor, all used for in-situ surveying of the near-earth space environment.

End users, scientific and technical persons, program personnel, and others desiring mission data from or further information about the GOES system may contact the specific National Environmental Satellite Data and Information Service (NESDIS) point of contact.

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Preface

To further enhance the utility of the GOES system, this DataBook presents a summary and technical overview of the GOES I-M system, its satellites, subsystems, sensor suite, and associated ground communication and data handling subsystems. The DataBook is intended to serve as a convenient and comprehensive, desktop technical reference for persons working on or associated with the GOES I-M missions. Sufficient technical information and performance data are presented to enable the reader to understand the importance of the GOES I-M mission, the system's capabilities, and how it meets the needs of end users.

Certain performance data presented herein, e.g., Imager and Sounder radiometric performance, were predicted from or measured on the GOES I satellite. As the satellites undergo on-orbit operations and actual data are obtained, such technical information in this book may not necessarily reflect current capabilities.

Space Systems/Loral (SS/L) is the prime contractor for the GOES I-M system under NASA Contract No. NAS5-29500. The GOES program is managed for the National Oceanic and Atmospheric Administration (NOAA), the principal user, by the National Aeronautics and Space Administration (NASA), Goddard Space Flight Center (GSFC). The Aerospace/Communications Division of ITT is the subcontractor to SS/L for the Imager and Sounder instruments. The space environment monitor sensors are all provided by Panametrics, except for the magnetometer, which is built by Schonstedt Instrument Company.



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