

# Foreword

Remarkable advances have been made during the past few decades in our understanding of the Earth, and students of the past two or three decades are the first ever to have the tools to study the Earth as a system. Recent developments in Earth observation capabilities have revolutionized the procedures for inventorying and monitoring changes in terrestrial ecosystems. The more Earth scientists know and understand the complex components and processes of the Earth system, the better prepared they will be to advise governments and policy-makers on strategies to manage, preserve and sustain terrestrial ecosystems.

During the past five decades the concomitant development and integration of technologies in data acquisition systems, high volume data transmission, Earth orbiting satellites and spectral sensors, data computation, analysis and storage have been spectacular. These advances required a steep and positive learning curve by practitioners of the applications of these systems for inventorying and monitoring terrestrial ecosystems, including status of soils, land cover and use, agricultural crops, rangelands, and forests.

After almost half a century of development and advances in Earth Observation Systems, many government agencies at local, state and national levels have come to depend on these systems to provide quantitative data for monitoring rates of change of Earth surface features including food production and changing land use. Many agricultural producers in the private sector are dependent upon a continuing updating of information provided by Earth Observation Systems.

During the first twenty years after the launch of NASA's first Earth Observation Satellite in July 1972, data from these satellites for many nations provided the best, if not the first, national inventory of their land resources. Many scientists from around the world have attended workshops and earned university degrees in the methods and applications of these technologies during the 1970s and 1980s. During the past two decades other nations have been developing their own Earth observation systems. These include France, India, Germany, Brazil, and China.

For the past thirty years many nations have become increasingly concerned about the complex phenomena of global change. One of the key components in the study of global change is the time dimension. Detection over time of environmental change requires accurate measurements of components and processes in the Earth system. Only with temporal measurements is it possible to determine with any precision the rate of change of a specific component or process in the Earth system.

Another factor which challenges the research community is the continuing development and refinement of techniques to relate well defined ground observation data collected concurrently with the data observed by orbiting satellite sensors. The value and use of these technologies will continue to increase with improvement in understanding relationships between ground observation and satellite sensor data.

In May 1994 President Clinton signed a Presidential Decision Directive in support of providing more stability to the Landsat Program. One of the provisions of that Directive was the assignment of responsibility to the U.S. Geological Survey, an agency in the U.S. Department of the Interior, to design, construct and manage the National Land Remote Sensing Data Archive. An Advisory Committee appointed by the Secretary of the Interior was requested to address Landsat data management issues and provide recommendations to the Secretary. The following are sample questions the Secretary posed: How does management decide what Earth observation data to archive? What data will be discarded? How can data be stored, retrieved and delivered to any data user for any

#### **4 | Foreword**

land area of the world, for each month for a year, or each decade for five decades and delivered in a timely schedule to users 5, 10, 25, or 100 years from now?

This Foreword attempts to remind readers of the kinds of challenges which continue to face all practitioners who now depend, or in the future may depend increasingly, upon data from Earth observation satellite sensors for managing terrestrial ecosystems. During the past decade a serious decline has occurred in U.S. government support of the Earth observation satellite program. If the United States phases out its government-sponsored Earth observation systems, which agency or government will provide a continuing source of compatible, current Earth observation data to address vital issues related to the rate and amount of global change and the sustainability of terrestrial ecosystems?

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