Western Region Technical Attachment
No. 93-06
March 9, 1993

GOES-I, METEOSAT, AND GOES-7 UPDATE

The contract for GOES I-M was released in 1980 with an expected launch date of mid-1989. As many know, this contract has experienced technical problems and cost overruns. This Technical Attachment provides an overview of the current GOES I-M contract, and discusses the status of the existing GOES-7 and Meteosat satellites.

Status of GOES-I

In 1991, NOAA obtained an independent analysis of the GOES program, and significant changes were made to the contract during October of that year. Hence, the past 16 months have resulted in substantial progress towards launching an operational satellite. Currently, all specification tests have passed for the GOES-I spacecraft and instruments. The imager has met or exceeded all radiometric specifications. The sounder testing is completed, although the longest wavelength channels did not meet the highest specifications sought. Therefore, the GOES I-M contract has undergone a transformation from a research and development project to an orientation towards operational implementation within the last year.

The projected launch date for GOES-I is April 1994. This date is based on the imager and sounder availability in June 1993. The instruments must still pass thermal and vacuum testing. If successful, ten months are required from the sensing instrumentation delivery and integration to the actual launch date. If the instrumentation delivery is delayed, the launch date will be delayed accordingly.

An Atlas launch vehicle is expected to carry GOES-I into orbit and will be available in February 1994. Prior to GOES-7, a Delta launch malfunction destroyed a GOES satellite. Fortunately, three Atlas launches are scheduled to occur prior to this GOES launch; thus, no serious launch problems are anticipated at this time. Imagery will be routinely available from the satellite 10 weeks (about June 1994) after a successful launch; however, at least 22 weeks (September 1994) are required to fully check out and certify the satellite as operational.

GOES-I Technology

GOES-I contains an independent imager and sounder; hence, imagery will not be lost when the sounder is in operation as currently is the case with GOES-7. Additionally, multiple spectral imagery bands are available:

Channel 1 (0.55-0.75μm)	Visible wavelength. Used for imaging clouds, snow and ice, and land features.
Channel 2 (3.78-4.03μm)	Shortwave IR. Used for identifying fog or stratus, clouds versus snow, and fires or volcanoes.
Channel 3 (6.47-7.02μm)	Water vapor channel. Used for synoptic analysis and detecting convection.

Channel 4 (10.2-11.2μm)	Longwave IR. Used for cloud mapping and locating cloud tops.
Channel 5 (11.5-12.5μm)	Split window. Used primarily for low-level moisture identification and sea surface temperature determination.

GOES-7 currently has three channels: visible (0.55-0.75μm), IR (10-12.5μm) and water vapor (6.7μm).

Status of GOES 7 and Meteosat

GOES-7 was launched on February 26, 1987 and is currently located at 112°W. All systems are fully redundant on this satellite, so the actual hardware is in excellent condition. The problem with GOES-7 is an escalating inclination angle. All geostationary satellites orbits exhibit this problem and need periodic adjustments. Because the earth is not a perfect spheroid, the tug of gravity is not uniform on the satellite. This imbalance causes an oscillation of the satellite, described as an inclination angle. Considerable fuel is expended when inclination angles are corrected. The last adjustment was made in June 1992.

The current inclination angle of GOES-7 is estimated at 0.4°. This angle increases about 1.0° per year. When the inclination exceeds 3°, degradation of the imagery occurs. NESDIS estimates that 21 pounds of fuel remain on GOES-7. Generally, an inclination adjustment uses about 18 pounds of fuel, and an east-west location change uses about one pound of fuel. Therefore, the primary concern with GOES-7 is fuel conservation.

Due to the No-GOES concern, a complete ground station for Meteosat has been installed at Wallops Island by NESDIS. This ground station allows the European Space Agency to maintain control of their satellite beyond the normal western horizon limits, up to 115°W. The United States is currently using Meteosat 3, and the Europeans are using Meteosat 4 and 5. Meteosat 6 is due to be launched soon. The ground station at Wallops Island can be used to retrieve Meteosat 4 and 5 data, if the need arises.

Summary for Western Region Imagery

The location of GOES-I will depend on the situation with GOES-7 and Meteosat 3 at that time. The following is the current plan. GOES-I will initially be placed at 80°W, if Meteosat still resides at 75°W; otherwise, GOES-I will reside at 75°W. When GOES-I is operational, a two satellite system again exists and GOES-7 will be moved to 135°W. No plans exist for moving GOES-I further west until additional GOESNext satellites are in orbit. GOES-I placement is due primarily to the hurricane potential in the eastern United States. Current plans call for the launch of GOES-J one year later (April 1995), which would provide GOESNext capabilities over the western U.S. about September 1995.