December 19, 2007

TO: Associate Administrator for Science
    Director, Goddard Space Flight Center

FROM: Assistant Inspector General for Auditing

SUBJECT: Final Memorandum on NASA’s Management of the Flight Project for the Geostationary Operational Environmental Satellite Series-R Program (Report No. IG-08-006; Assignment No. A-06-023-00)

The Offices of Inspector General (OIGs) for the Department of Commerce (Commerce) and NASA concurrently reviewed the Geostationary Operational Environmental Satellite Series-R (GOES-R) Program. The Program is under Commerce’s National Oceanic and Atmospheric Administration (NOAA). NASA is responsible for managing the development of the Program’s Flight Project, which includes the spacecraft and instruments for the GOES-R series of satellites. We conducted our reviews because previous GOES Program acquisitions have experienced severe technical problems, significant cost overruns, and schedule slips that threatened continuity of coverage. During the course of our reviews, the NASA and Commerce OIGs agreed to focus on their individual agency’s challenges as they apply to their respective GOES-R Projects and report separately on their review objectives. Specifically, the NASA OIG’s objectives were to determine whether

- NASA’s responsible Program Management Council (PMC) was effectively reviewing program issues and progress and
- procedures and processes were in place to adequately identify, mitigate, and report technical risks in accordance with NASA policy.

See Enclosure 1 for details of the audit’s scope and methodology.

This memorandum addresses NASA’s ability to effectively procure, manage, and execute NASA’s GOES-R Flight Project acquisitions in support of the GOES-R Program. Commerce’s OIG Final Inspection Report, “Successful Oversight of GOES-R Requires Adherence to Accepted Satellite Acquisition Practices” (No. OSE-18291, November 20, 2007), addresses whether NOAA and Commerce established effective mechanisms for handling their responsibilities to oversee and manage the overall GOES-R Program.
Executive Summary

We determined that the responsible NASA PMC for the GOES-R Program was effectively reviewing project issues and progress and that NASA’s GOES-R Flight Project Office had procedures and processes in place to adequately identify, mitigate, and report technical risks in accordance with NASA policy. However, we found that NASA’s ability to effectively procure, manage, and execute the GOES-R Flight Project was impeded by the level of oversight provided by NOAA and Commerce. Specifically, increased management oversight by NOAA and Commerce delayed the release of requests for proposals (RFPs) for the GOES-R spacecraft. The delays were caused by Commerce implementing processes that were in conflict with the current Memorandum of Understanding (MOU) between Commerce and NASA, dated June 15, 2007. The MOU states that guidance for GOES-R Program processes will be derived from NASA Procedural Requirements (NPR) 7120.5D, “NASA Space Flight Program and Project Management Requirements,” March 6, 2007. The process followed for the spacecraft RFP conflicted with NPR guidance and the resultant delays increased the risks to GOES-R Program development and the GOES-R launch schedule.

On August 6, 2007, the GOES-R Flight Project Manager notified Commerce of those risks in a memorandum (see Enclosure 2) issued to NOAA’s Acting System Program Director, GOES-R Program Office, with a copy to the Goddard Deputy Director-Technical, a member of the Goddard Space Flight Center PMC1 responsible for the GOES-R Flight Project. Additionally, Commerce’s OIG Final Inspection Report makes recommendations that address Commerce’s application of NPR 7120.5D processes to the GOES-R Program. Because the Flight Project memorandum notified Commerce of the additional risks, and the Commerce OIG recommendations could potentially mitigate those risks, we make no recommendations in this memorandum. Management comments on the draft of this memorandum, issued December 5, 2007, were not required and none were received.

Background

GOES Program Satellites. NOAA and NASA began the joint development of the first series of satellites for the GOES Program in 1975. The satellites operate at a fixed position above the Earth’s surface to collect and transmit environmental data used to forecast the weather. The launch of the first satellite in the GOES Program was on October 16, 1975. That satellite, GOES-A, became GOES-1 when it reached orbit.2 GOES Program satellites help meteorologists observe and predict local weather events, including hurricanes, tornadoes, thunderstorms, fog, flash floods, and other severe

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1 NPR 7120.5D changed the name of NASA Centers’ Program Management Councils (PMCs) to Center Management Councils (CMCs). Goddard Procedural Requirement 1060.2C, “Management Review and Reporting for Programs and Projects,” April 12, 2005, had not been revised to reflect the name change as of November 2007. As a result, we refer to the Goddard Council as a PMC.

2 Prior to reaching orbit, the satellites are designated by a letter (e.g., GOES-A); once in orbit, the satellites are assigned a number (e.g., GOES-1).
weather conditions. The satellites simultaneously provide data on a geographic region covering the central and eastern Pacific Ocean, the contiguous 48 states, and the central and western Atlantic Ocean. The satellites provide continuous data on weather patterns for about 60 percent of the Earth’s surface.

The R series of GOES will represent a significant step forward in technology for both the ground and space segments of the Program. The estimated cost for the GOES-R Program is currently $6.96 billion, which includes $3.1 billion for the GOES-R Flight Project. The GOES-R series of satellites will provide more data faster, allowing more timely and accurate weather forecasts. Major instruments on the GOES-R series of satellites will be

- Advanced Baseline Imager (ABI),
- Space Environment In-Situ Suite (SEISS),
- Solar Ultra Violet Imager (SUVI),
- Extreme Ultraviolet and X-Ray Irradiance Sensors (EXIS), and
- Geostationary Lightning Mapper (GLM).

The scheduled launch date for the first satellite in the GOES-R series is December 2014.

**GOES Program Agreements.** Commerce and NASA delineated responsibilities for each agency in a 1964 Basic Agreement. In 1973, a Basic Agreement requiring a separate Memorandum of Agreement for each major acquisition superseded the 1964 Basic Agreement. The 1973 Basic Agreement between NOAA and NASA established that NOAA was to provide requirements and funding for the GOES Program and that NASA was to serve as NOAA’s agent in the procurement and development of the satellites. In 1998, NOAA and NASA revised the 1973 Basic Agreement, assigning Goddard with the responsibility for procuring, developing, and testing GOES Program spacecraft and instruments. NOAA maintained responsibility for the overall Program, funding, operation of the satellite control center and data acquisition stations, and determination of satellite replacement needs.

On May 25, 2005, the Commerce Deputy Under Secretary for Oceans and Atmosphere and the NASA Associate Administrator for the Science Mission Directorate released a joint memorandum, “GOES-R Roles and Responsibilities,” that briefly highlighted the NOAA and NASA roles and responsibilities for the GOES-R Program. The agencies planned to enter a formal agreement within 120 days of the joint memorandum that would detail more specific agency roles and responsibilities for the GOES-R Program.

On March 7, 2007, the Commerce Under Secretary for Oceans and Atmosphere, who is also the NOAA Administrator, issued a memorandum addressing a change in the GOES-R management structure and acquisition strategy. The memorandum states that

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3 Government Accountability Office (GAO) Testimony, “Geostationary Operational Environmental Satellites: Further Actions Needed to Effectively Manage Risks” (GAO-08-183T, October 23, 2007), states that an independent review team estimated the GOES-R Program cost will grow to $9.3 billion.

4 This was accomplished 2 years later, with the signing of the current MOU in June 2007.
NOAA and NASA agreed to acquire elements of the Program under the auspices of an integrated GOES-R Program Office, led by NOAA and located at Goddard. NOAA is responsible for overall program management as well as the ground segment (Operations Project) and associated contracts. NASA is responsible for the space segment (Flight Project) and associated contracts. The memorandum states that NOAA and NASA concluded this was the best approach, because it

- results in a direct NOAA or NASA interface with the contractor for each of the key elements of the GOES-R system—the spacecraft, the instruments, and the ground system;
- allows for strong NOAA oversight and control throughout the program;
- gives management and acquisition responsibility for the ground segment, including the development of the ground system, to NOAA and gives management and acquisition responsibility for the space segment to NASA; and
- allows NOAA to retain overall Program management authority and control without overextending available NOAA management and acquisition resources.

The oversight changes Commerce made to the GOES-R Program were because of acquisition problems Commerce experienced with the National Polar-Orbiting Environmental Satellite System Program. In testimony before the House Committee on Science in September 2006, the Commerce Under Secretary for Oceans and Atmosphere stated that NOAA was implementing lessons learned in program management and acquisition strategy into the GOES-R Program. The Commerce Under Secretary for Oceans and Atmosphere further stated that NOAA made the changes to the program management of GOES-R based on direction from the House Committee on Science, reviews by the Government Accountability Office (GAO) and the Commerce Inspector General, and the Nunn-McCurdy certification process for the National Polar-Orbiting Environmental Satellite System Program. The changes are intended to strengthen NOAA’s oversight and control throughout the GOES-R Program.

On June 15, 2007, NOAA and NASA signed an MOU “to define a relationship between the parties that results in the successful planning, implementation, and management of the GOES-R Program.” Under this MOU, NASA no longer serves as the single agent in the acquisition and development of the satellites for the Program as it did for previous GOES series. NASA’s primary responsibility for GOES-R is to manage the development of the Flight Project, which includes spacecraft, launch services, instruments, and satellite integration. NOAA’s GOES-R Program Office is responsible for all program management; acquisition strategy; program-level systems engineering and integration; and scientific, technical, and administrative support.

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NASA Was Complying with Its Policies and Procedures

We determined that Goddard’s PMC effectively reviewed the status of the GOES-R Flight Project as required by Goddard Procedural Requirement 1060.2C, “Management Review and Reporting for Programs and Projects,” April 12, 2005. The Goddard Procedural Requirement states that the Goddard PMC will schedule and conduct monthly reviews to assess the status of each of the programs, projects, and instruments assigned to the Center. The Goddard Procedural Requirement also states that the monthly review will highlight significant items of progress, issues, risks, metrics, and trends, as well as include identification and closure of open issues and options for resolving variances in baseline cost, schedule, and technical metrics. The Goddard PMC required the GOES-R Flight Project to present a monthly status review. We analyzed 37 monthly status reviews briefed by the GOES-R Flight Project Manager to Goddard’s PMC. We determined that the monthly status reviews met all the requirements of Goddard Procedural Requirement 1060.2C by effectively identifying and communicating the progress, issues, risks, metrics, and trends associated with the GOES-R Flight Project.

We also determined that the GOES-R Flight Project Office complied with NPR 8000.4, “Risk Management Procedural Requirements (Revalidated February 1, 2007).” NPR 8000.4 delineates procedural requirements for NASA projects that provide aerospace products or capabilities and operations for space and aeronautics. NPR 8000.4 states that “the Project Manager is responsible for applying a continuous Risk Management Plan throughout the project’s life cycle; documenting and managing risks throughout the project’s cycle; and providing project risk status to the Program Manager, Center Director, and governing PMCs.”

During our review, we evaluated the Risk Management Plan developed by the GOES-R Program Office and compared it with the requirements of NPR 8000.4. We determined that the Risk Management Plan complied with NPR 8000.4 requirements for managing risks. The Risk Management Plan outlines management processes to be used by NASA’s GOES-R Flight Project Office for identifying, mitigating, and reporting risks. We evaluated the processes used by the GOES-R Flight Project Office by reviewing the Flight Project Manager’s application of the Risk Management Plan in relation to the development of the ABI, as this instrument was farthest along in the acquisition process and had identified risks. The GOES-R Flight Project Office effectively applied the provisions of the GOES-R Program Office Risk Management Plan to identify, mitigate, and report risks. As of August 2007, the GOES-R Flight Project Office had identified 205 risks associated with the development of the ABI and reported the status of those risks to the appropriate NOAA and Goddard PMCs.

Increased Commerce Oversight of Spacecraft Acquisitions for NASA’s GOES-R Flight Project Increases GOES-R Program Risks

NASA’s GOES-R Flight Project has experienced slippage in the acquisition schedule for the spacecraft. In a May 2007 GOES-R Spacecraft Procurement Strategy Meeting, the
GOES-R Flight Project Office presented an acquisition schedule to NOAA and Commerce that all parties considered low risk. The schedule showed request for proposal (RFP) release dates of July 2007 for the draft and September 2007 for the final, with the spacecraft contract award projected for May 2008. The GOES-R Flight Project Office’s estimate of 2½ months from release of the draft RFP to release of the final RFP included time for NOAA’s review. The Flight Project Manager based this estimate on personal experience with previous GOES Series Projects and the average time between draft and final GOES-R instrument request for proposals. Based on the November 2, 2007, GOES-R Series Integrated Master Schedule, the Flight Project Office will have 7 months less than originally planned for spacecraft development and the integration of flight instruments. The following table shows planned, actual, and estimated dates.

<table>
<thead>
<tr>
<th>Spacecraft Acquisition Date Slippages</th>
<th>Draft Request for Proposal Release</th>
<th>Final Request for Proposal Release</th>
<th>Contract Award</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planned date</td>
<td>July 2007</td>
<td>September 2007</td>
<td>May 2008</td>
</tr>
<tr>
<td>Actual date</td>
<td>August 2007</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Estimate as of November 2007 Integrated Master Schedule</td>
<td>February 2008</td>
<td>December 2008</td>
<td></td>
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</tbody>
</table>

The slippage occurred because of increased Commerce oversight of the GOES-R Flight Project. As required by the June 2007 MOU, NOAA and NASA developed a draft Management Control Plan, the most recent version dated September 15, 2007. The draft Management Control Plan states that the GOES-R Program must ensure that an adequate procurement strategy is in place prior to Key Decision Point (KDP) I\(^{7}\) and that a single, combined ground and space segment KDP review take place. Commerce’s KDP review and approval process calls for top-level reviews prior to approval by the Secretary of Commerce, as shown in the following list:

- Independent Review Team\(^{8}\) Flight and budget review.
- KDP Flight briefing to NOAA National Environmental Satellite and Data Information System.
- KDP briefing to Deputy Under Secretary of Commerce for Oceans and Atmosphere or NOAA PMC.
- KDP Flight briefing to NOAA Administrator.

\(^{7}\) KDP I is referred to as KDP C/D in the Commerce OIG Report. At KDP I for the GOES-R Program, Commerce grants authority to proceed to the implementation (acquisition and operations) phase, which would allow the Operations (ground) and Flight (space) Projects to begin the source selection processes for the ground system and spacecraft.

\(^{8}\) NOAA-established team comprising senior industry and Government space acquisition personnel.
The preceding list shows that the final RFP for the spacecraft acquisition is not to be released until after KDP I and approval by the Secretary of Commerce. This is contrary to NPR 7120.5D guidance, which the June 2007 MOU stated would be the source for GOES-R Program processes. NPR 7120.5D places KDPs at the end of a phase as a comprehensive review performed to determine whether a program is ready to proceed to the next phase, not as part of the process for releasing an RFP.

Commerce’s requirement that the release of the final spacecraft RFP be dependent upon the completion of KDP I added at least 7 months to the spacecraft acquisition schedule, although the scheduled launch date remains December 2014, which could increase spacecraft development and instrument integration risks. As of November 2007, that KDP review had not taken place, and the GOES-R Program Office was projecting a February 2008 final RFP release and a December 2008 contract award for the spacecraft.

The GOES-R Flight Project Office informed the NOAA and Goddard PMCs in July 2007 that the lack of approval from the GOES-R Program Office to release the draft RFP for the spacecraft was increasing risks to the Program. On August 6, 2007, NASA’s GOES-R Flight Project Manager issued a formal memorandum to NOAA (see Enclosure 2), stating that the GOES-R Flight Project Office can no longer meet NOAA’s required launch date of December 2014 with the same level of risk that was previously accepted by the Program Office, the NOAA Independent Review Team, the Goddard PMC, and the NOAA PMC.

The memorandum notified Commerce of the increased risks caused by the spacecraft procurement delays. In addition, the Commerce OIG Final Inspection Report, “Successful Oversight of GOES-R Requires Adherence to Accepted Satellite Acquisition Practices,” addressed the application of NPR 7120.5D processes to the GOES-R Program. Specifically, the report states that the “current life-cycle process defined for GOES-R diverges from NPR 7120.5D.” The Commerce report recommends detailing in the Management Control Plan how NPR 7120.5D will be used for managing and overseeing the GOES-R Program, including deviations and the rationale for those deviations, and that decision authority for KDP I be delegated to NOAA. NOAA concurred with the Commerce findings and recommendations and is working with NASA to finalize the Management Control Plan. Therefore, we made no recommendations to

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NASA management, and comments on the draft of this memorandum, issued December 5, 2007, were not required.

We appreciate the courtesies and cooperation provided to the staff during this audit. If you have questions, or would like to discuss this matter further, please contact Mr. Raymond Tolomeo, Science and Aeronautics Research Director, at 202-358-7227 or Mr. Tony Lawson, the Project Manager, at 301-286-6524.

signed
Evelyn R. Klemstine

2 Enclosures

cc:
Chief Engineer
Associate Administrator for the Science Mission Directorate
Deputy Director-Technical, Goddard Space Flight Center
Director, Flight Projects Directorate
Project Manager, GOES-R Flight Project Office
Commerce Under Secretary for Oceans and Atmosphere/NOAA Administrator
Commerce Deputy Under Secretary for Oceans and Atmosphere
System Program Director, GOES Program Office, NOAA
Assistant Inspector General for Systems Evaluation, Office of Inspector General, Department of Commerce
Scope and Methodology

We performed this audit from August 2006 through November 2007 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

We performed this audit at NASA Headquarters, Goddard, and Commerce. We reviewed NPR 8000.4, NPR 7120.5D, and Goddard Procedural Requirement 1060.2C. We reviewed past and present GOES Program memorandums of agreement and MOUs that outlined processes and the respective agencies’ roles and responsibilities in managing the GOES Program. In addition, we reviewed the May 25, 2005, joint memorandum of the Commerce Deputy Under Secretary for Oceans and Atmosphere and the NASA Associate Administrator for the Science Mission Directorate, which briefly described the NOAA and NASA roles and responsibilities for conducting the GOES-R Program.

We conducted interviews with NASA GOES-R Flight Project personnel to discuss risk management, critical milestone reviews, and the impact of the March 2007 change in NOAA’s management and acquisition strategy. We interviewed Goddard PMC personnel to discuss the review and reporting functions of the Goddard PMC. We also attended three monthly status review presentations of the GOES-R Flight Project Office to the Goddard PMC. We reviewed the documentation for the Monthly and Quarterly Status Reviews held from January 2004 through January 2007, which the GOES-R Flight Project Office used for its presentations. In addition, we reviewed all formal notes taken by the secretary of the Goddard PMC during calendar year 2006 and documentation for all PMC open action items from January 2004 through October 2006 to determine whether the Goddard PMC had made any official comments or required corrective actions for the GOES-R Flight Project.

To determine whether the GOES-R Flight Project Office had procedures and processes in place that adequately identified, mitigated, and reported technical risks in accordance with NPR 8000.4, we compared the GOES-R Risk Management Plan of February 12, 2007, with NPR 8000.4 requirements. We also analyzed how NASA’s Flight Project Office identified, mitigated, and reported risks. We assessed compliance with NPR 7120.5D by verifying that the GOES-R Flight Project Office addressed requirements prior to allowing GOES-R instruments to proceed to the next critical milestone review.

Use of Computer-Processed Data. To determine the number of identified risks to the GOES-R Flight Project, we used NASA’s “Program Risk Information Management eXchange” system. We compared the system’s database of risks with a listing of risks reported to the Goddard PMC to ensure that the GOES-R Program accounted for risks identified in the GOES-R monthly status reports. We did not test the database to ensure
that all risks were included. However, we do not believe that such a test would have revealed information that would have affected our findings or conclusions.

**Review of Internal Controls.** We identified and tested GOES-R Flight Project acquisition processes for compliance with NASA’s policies and procedures. We reviewed Goddard procedures for controlling GOES-R Flight Project risks. In addition, we reviewed Goddard procedures for conducting critical milestone reviews of contractor performance. We did not identify any NASA internal control weaknesses.

**Prior Coverage.** Within the past year, the Government Accountability Office (GAO) has provided testimony to Congress and issued reports that have particular relevance to the subject of this memorandum and Commerce has issued one report. The GAO testimony and reports listed below can be accessed over the Internet at [http://www.gao.gov](http://www.gao.gov); the Commerce report, issued by the OIG’s Office of Systems Evaluation, is not available online (see [http://www.oig.doc.gov/oig/reports/001537.html](http://www.oig.doc.gov/oig/reports/001537.html)).

**Government Accountability Office**

GAO Report, “Geostationary Operational Environmental Satellites: Progress Has Been Made, but Improvements Are Needed to Effectively Manage Risks” (GAO-08-18, October 23, 2007)

GAO Testimony, “Geostationary Operational Environmental Satellites: Further Actions Needed to Effectively Manage Risks” (GAO-08-183T, October 23, 2007)


GAO Report, “Geostationary Operational Environmental Satellites: Steps Remain in Incorporating Lessons Learned from Other Satellite Programs” (GAO-06-993, September 6, 2006)

**Department of Commerce**

OIG Final Inspection Report, “Successful Oversight of GOES-R Requires Adherence to Accepted Satellite Acquisition Practices” (No. OSE-18291, November 20, 2007)
Programmatic Risk of Delaying Spacecraft Procurement

August 6, 2007

TO: NOAA/GOES-R System Program Director (acting)
FROM: 417/GOES-R Flight Project Manager
SUBJECT: Programmatic Risk of Delaying GOES-R Spacecraft RFP

The purpose of this memo is to inform you of the impact that is being incurred due to the delay in receiving approval to release the draft Request For Proposal (RFP) for the GOES-R spacecraft. The Flight Project can no longer meet NOAA's required Launch Readiness Date (LRD) of December 2014 with the same level of risk that was previously accepted by the Program Office, the NOAA Independent Review Team, the GSFC CMC, and the NOAA PMC. The risk continues to increase with each passing day.

Background Information –

May 7: GOES-R Spacecraft Procurement Strategy Meeting (PSM) conducted with GOES-R Program, NOAA, and DOC representatives in attendance.

May 24: The Flight Project informed the NOAA PMC of NASA/GSFC’s intention to release the draft RFP as soon as it cleared GSFC Procurement and Legal review. The NOAA PMC established Action Item #37 - “...determine procedures for RFP review between DOC Budget and Acquisition Offices...”

June 11: The Flight Project placed the draft RFP into review with GSFC Procurement and provided a copy of the draft RFP to the GOES-R Program Office.

July 13: The draft RFP review was completed by GSFC Procurement and Legal and the GOES-R Program Office was informed that the draft RFP was ready for release.

July 17 & 19: The Flight Project informed the GSFC CMC and the NOAA PMC that the lack of approval from the GOES-R Program Office to release the draft RFP was increasing the risk to the program.
It will take approximately two and one-half (2 ½) months, following the release of the draft RFP, for the Flight Project to be ready to release the final RFP for the GOES-R spacecraft procurement. This is based upon the time it takes to receive and incorporate comments to the documents and to complete the final review – including review by NOAA.

At the GOES-R Spacecraft PSM, the Flight Project presented a procurement schedule that showed a July 2007 draft RFP release, a September 2007 final RFP release and a May 2008 spacecraft contract award. Given the current date and the continuing delay, the earliest the final RFP can be reasonably expected to be ready for release is mid-October. The contract award date is now June 2008 and moving further out with each passing day.

The Flight Project presented to the Program Office, the NOAA Independent Review Team, the GSFC CMC, and the NOAA PMC a spacecraft development schedule of 79 months (contract award to launch readiness). This schedule was considered low risk by all parties. Slips (incurred to date and in the future) to the contract award date require the Flight Project to adopt a more aggressive development schedule to maintain NOAA’s required December 2014 IRD. As a result we have increased the development risk. We will articulate the extent of that risk once the RFP is released.

I request that the Program Office secure the authorization from DOC/NOAA for the immediate release of the draft spacecraft RFP, close NOAA PMC AI #37, and take all advance steps necessary to ensure the approval to release the final spacecraft RFP in October 2007.

Respectfully,

Michael L. Donnelly

cc:
GSFC/100/Ms. D. Perkins
GSFC/400/Mr. G. Morrow
GSFC/400/Mr. A. Obenshain
NOAA/NESDIS/Ms. M. Kiczka