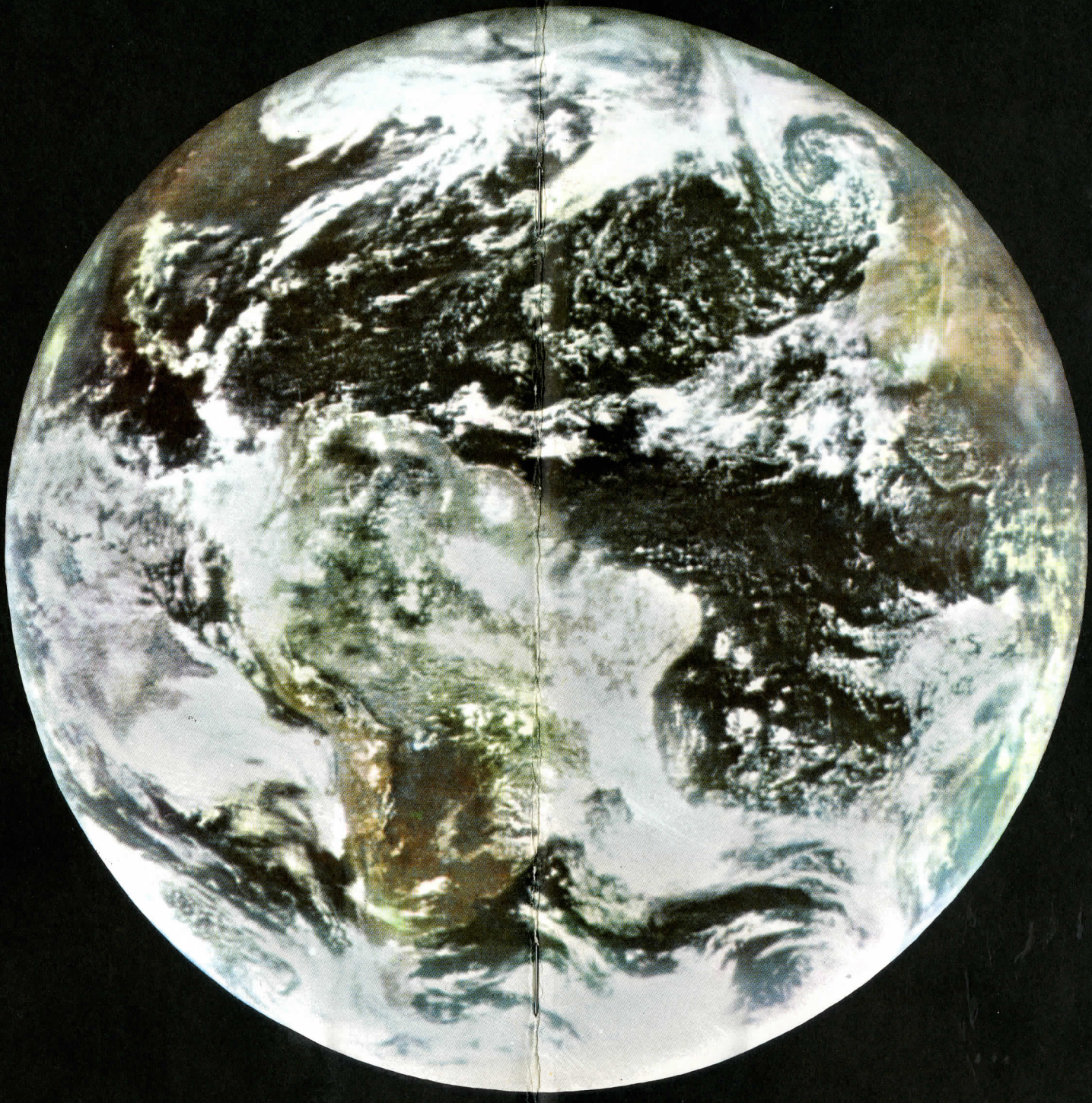
Project Storm Track
A Proposal



PROJECT STORM TRACK. . .
A PROPOSAL FROM THE UNIVERSITY OF WISCONSIN

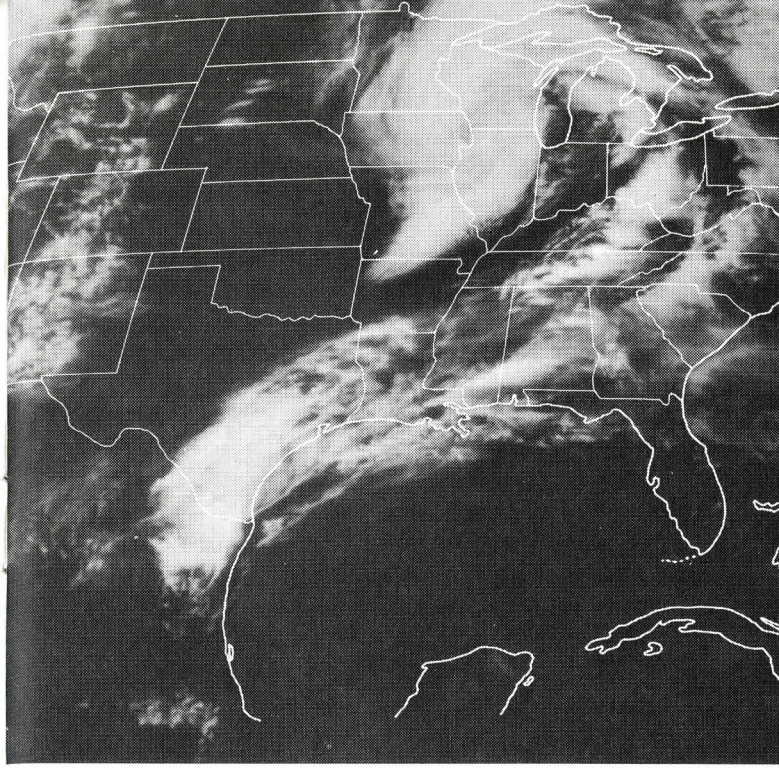
Background

The photograph on the cover represents one of the most spectacular accomplishments of modern technology. It is a view of the earth's western hemisphere as observed by NASA's ATS-III satellite at a distance of 22,300 miles in space.

The color spin-scan camera experiment aboard this satellite, which was launched in 1967, was carried out by the University of Wisconsin. The significance of this feat was immediately recognized by meteorologists as providing a moving panorama of the atmosphere as denoted by the shifting cloud patterns. Meteorologists are now able to view in cinematic fashion the evolutionary development of world-wide storms, thereby providing an entirely new dimension to weather observation.

Among the many scientific discoveries resulting from access to the data coming from ATS-III has been the revelation that we can identify and track severe local storms whose detailed characteristics are unperceivable on the weather maps now used by forecasters.

Consequently, meteorologists, with ATS-III's remarkable capability at their disposal, are on the threshhold of gaining significant fresh insights regarding violent weather phenomena.



ATS-III photo of cloud systems over the United States

The Opportunity

ATS I and III are providing us with photographs of the earth's atmosphere at 15 minute intervals. This capability is making it possible to pinpoint and track severe local storm systems with a degree of precision previously undreamed of by meteorologists.

A dramatic case in point is illustrated by the picture above which depicts a cloud system moving over Kentucky and Tennessee. The cellular structures shown are actually blow-off anvil tops of severe thunderstorms which generated many tornadoes in these two states.

Equipped with this new technology, a unique and timely opportunity exists to move forward to establish an integrated severe local storm tracking system which simultaneously affords more accurate storm detection, greater understanding of violent storm systems, and more effective warnings to the population located along a storm's track.

Failure to exploit to full advantage the weather satellite's capabilities and potential will drastically retard progress in advancing our understanding of severe weather phenomena and in disseminating more accurate weather warning information to the public.

PROJECT STORM TRACK

A Proposal. . .

to develop an integrated severe local storm detection, identification, and warning system built around the synchronous meteorological satellite observing capacapability.

We believe that the technology is available to permit the development of an integrated system which combines the ATS III satellite capability with a real-time identification of damaging storms and with mass media facilities designed to communicate accurate and rapid warning of impending storms to the public.

An Integrated System

The development of an integrated severe local storm tracking system with the capabilities described above could be rapidly achieved through the establishment of a storm tracking center which would attempt the following:

EXPLORE the uses and advantages of synchronous orbit meteorological satellites for monitoring severe local storms.

INVESTIGATE techniques for collecting and collating all relevant meteorological data in the most effective manner and shortest time possible.

ASSESS the severity and magnitude of identified storms with emphasis on quick identification and reaction.

DEVELOP display systems to aid forecasters in assimilating and synthesizing the data from the satellites rapidly and develop techniques for effective public communication which will enhance the credibility of the final product.

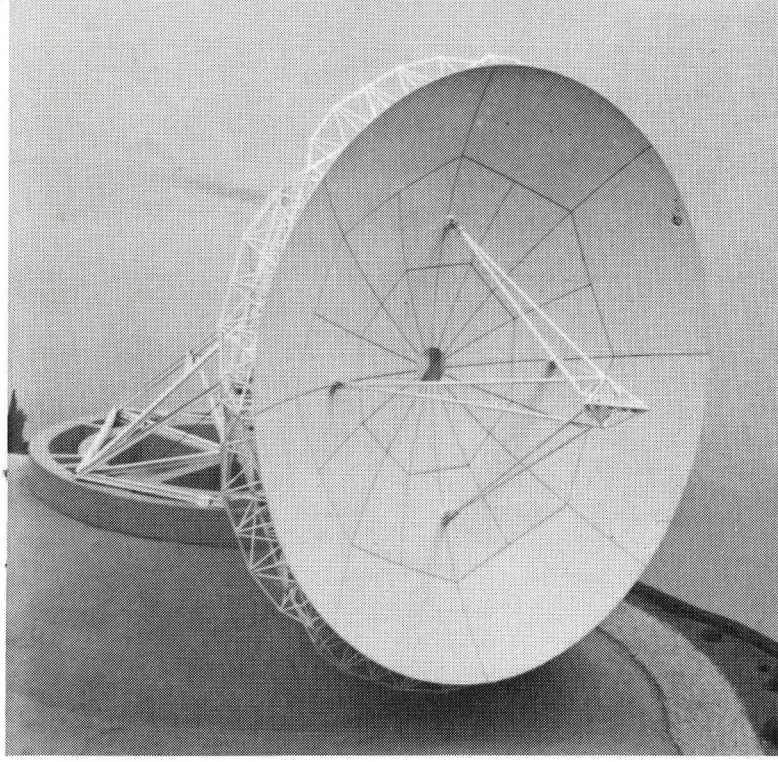
EXAMINE the effectiveness of various means of disseminating timely warnings of potentially destructive local storms.

EVALUATE the effectiveness of storm warnings and ascertain the response of the public with a view toward improving the communication and use of these warnings.

COMPARE the expense of proposed and existing systems in cost-benefit studies.

RECOMMEND how existing agencies could be united to form the most effective storm warning service which employs the concept of an integrated system.

ANTICIPATE future requirements of an integrated system and evaluate new techniques in observation, analysis, and weather forecasting.



Model of a typical Ground antenna needed to pick up weather satellite information

Components of the System for Project Storm Track

We envision that the proposed system would consist of the following key components:

1) An observation platform in synchronous orbit.

2) A ground station equipped for real-time acquisition of data and display.

3) A display system for rapid collation and assessment of the severity and magnitude of severe local storms.

4) A communication system for timely dissemination of storm warnings.

Model of newly completed Meteorology and Space Science Building at the University of Wisconsin

The Observation Platform

The key need in this area is to establish the ability from an "eye in the sky" position which will enable the accurate identifcation and movement of storm patterns at intervals of 15-20 minutes both day and night.

The present ATS-III satellite has only a daytime capability. The development of an IR system permitting night tracking of cloud systems is required.

There is also a need to include sensors which will enable us to measure cloud height, vertical temperature structure, circulation, and other factors which will facilitate in accurately identifying a storm's severity.

The Ground Station

A ground station which provides real-time data accessibility and a direct command and control link with the satellite must be established at the site of the system as we need the capability to freely select the combination of sensors aboard the spacecraft necessary for engaging in various types of probing experiments.

The Display System

A sophisticated display system capable of superimposing various analyses on the satellite photos is an essential tool in the entire procedure of collating satellite and ground data to rapidly identify potential storm areas.

The ultimate system will be sufficiently flexible to let the forecaster "mix and match" any combination of analyses or photographs he desires thus permitting the rapid interpretation of a storm's severity. The display system should also be equipped to make possible the preservation of chart and photograph combinations for future reference.

The Communication System

An easily recognized and understood severe weather warning system must be developed if PROJECT STORM TRACK is to serve the public well. Clear and precise weather warnings would help save lives and help prevent property destruction.

COMMUNICATIONS AND THE PEOPLE

If the public is to benefit from the advances made in weather study and forecasting ability by meteorologists, a quick and effective communication system is essential.

Despite ongoing efforts to inform the public of the meaning of weather warnings and wise precautionary actions to be taken in the event of a severe storm, many people, especially those living in the severe weather fringe areas, are still unfamiliar with the warning system in use and the appropriate safety measures to be taken.

Several factors help to explain why the communication of severe storm information to the public is presently inadequate:

1) SEMANTICS

The public is confused by the following terms:

Alert
Watch
Warning
Forecast

2) SPOTTING OF ALERT AREAS

The typical weather alert now gives geographical landmarks as points of reference. . ."A line 40 miles either side of a line from Prairie du Chien to Madison. . ." The listener or viewer must be familiar with the cities cited or he will lose the significance of the warning.

3) TECHNICAL DISTRIBUTION

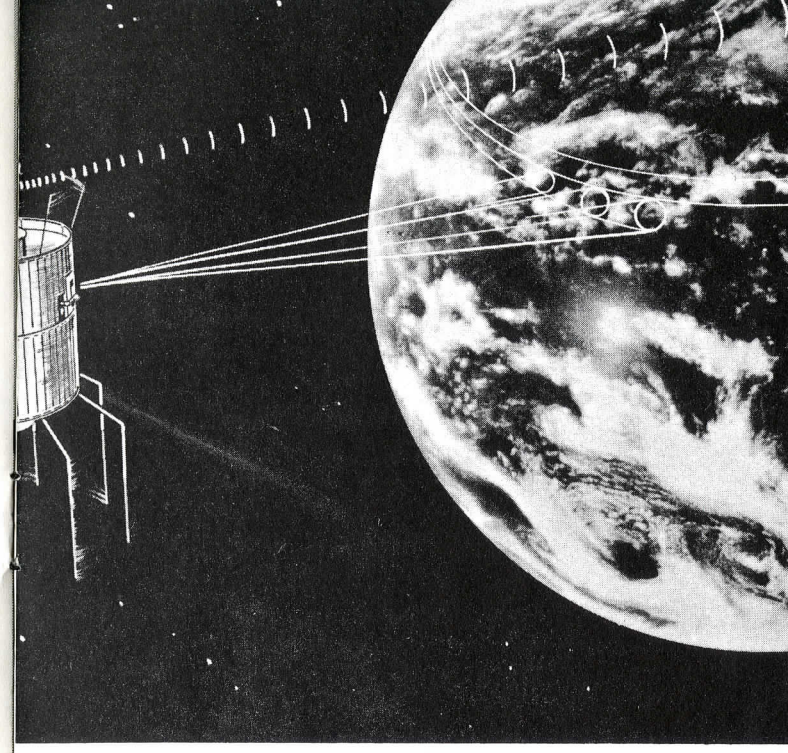
There have been cases of storm warnings being broadcast locally after a storm has passed. In such instances, the public's faith in the speed and reliability of weather warnings is lessened.

4) RAPID AND COMPREHENSIVE COMMUNICATION

Although weather alert reports are provided simultaneously to Civil Defense, police, and the news media, the communication of this storm weather information is neither rapid nor comprehensive enough to serve the public well.

5) FEEDBACK

At this time, no uniform, reliable, and fast procedures exist which enable individuals to report severe weather situations to the weather bureau.



ATS-III beams storm system data to the tracking center.

COMMUNICATIONS AND PROJECT STORM TRACK

Project Storm Track, utilizing the facilities of a television network will study and where necessary recommend changes in:

1) Severe storm warning vocabulary in order to eliminate problems in semantics.

2) Methods employed for warning the public of impending severe storms.

3) Communicating weather warnings in ways which are uniform and consistent.

4) Increasing the speed and reliability of public weather warning systems.

5) Public education programs providing information on severe storm characteristics and the safety measures to be taken when threatened by oncoming violent storms.

WHY THE UNIVERSITY OF WISCONSIN?

Since the ATS satellites will not last forever, steps to implement PROJECT STORM TRACK should be taken soon or a valuable opportunity will be lost. Although it would be feasible to pursue this project through governmental laboratories or other institutions, the necessity of implementing PROJECT STORM TRACK promptly requires that the facilities and specialized manpower for the project already be assembled.

The major components of such a system are currently under investigation at the University of Wisconsin; therefore the possibility of undertaking PROJECT STORM TRACK at this institution is attractive.

The entire problem of developing an effective severe local storm tracking system reduces to three vital areas:

1) Data acquisition

2) Collation of ground and satellite information

3) Dissemination of accuarate storm warning information to the public

1) Data Acquisition

A large team of people already familiar with the problems associated with satellite pictures, reception, and preparation are working together at the University of Wisconsin.

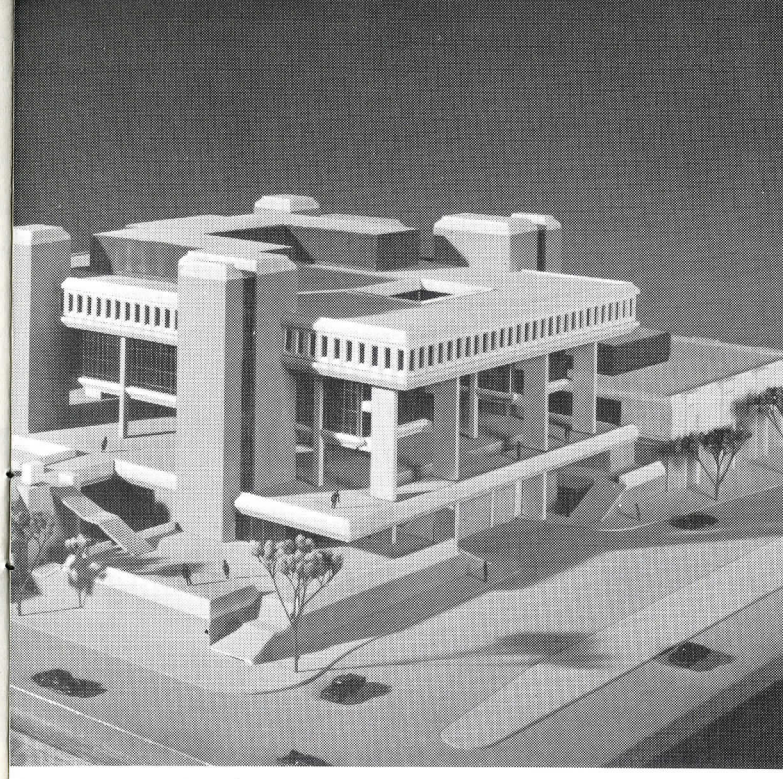
The university also has the computer facilities necessary for undertaking this project.

2) Collation and Identification

The University of Wisconsin's Meteorology Department has persons who possess the technological "know-how" to carry out PROJECT STORM TRACK.

3) Dissemination

The University of Wisconsin's radio and television networks and the University's mass communications center place the university in a position to communicate the weather information stemming from the storm tracking system quickly and effectively.



Proposed new building for the University of Wisconsin's Mass Communications Center

OPPORTUNITY FOR INTER–DISCIPLINARY RESEARCH

Once PROJECT STORM TRACK is developed, it may be desirable to undertake research to examine the system's effectiveness which requires the resources of and inter-disciplinary research team. The University of Wisconsin has a distinguished faculty which could contribute significantly to any cross-disciplinary research activity which might be proposed .

Courtesy *Chicago Tribune*

PROJECT STORM TRACK. . .
A LARGER VIEW

The expertise of the meteorologist when coupled with the modern technology of space science now makes it possible for us to confidently undertake the development of an integrated system which will ultimately provide a better understanding of the severe storm systems which frequently wreak catastrophic effects by taking many human lives and causing massive and costly destruction of property.

The Palm Sunday Tornadoes of April 11, 1965, the most disastrous tornado outbreak in 40 years, are telling cases in point. Despite public warnings, the 37 distinct tornadoes which broke out over six midwestern states that day took 271 lives and created millions of dollars worth of property damage.

A subsequent study of the Palm Sunday tornado disasters by the U.S. Weather Bureau revealed clearly that our current capabilities for detecting violent storm activity and effectively informing the public for it are wanting.

PROJECT STORM TRACK could make an invaluable contribution to our society and to the international scientific community if it can indeed develop more sophisticated techniques to track severe local storms and establish a warning system which communicates effectively with the public and thus conserves human life and property.

FOR MORE INFORMATION ABOUT PROJECT STORM TRACK:

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