FGGE NEWS

U.S. DEPARTMENT OF COMMERCE National Oceanic and Atmospheric Administration

U.S. FGGE Project Office 6010 Executive Boulevard Rockville, Maryland 20852 Phone (301) 443-8861

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NEW MASTHEAD

Please note the new appearance of the FGGE NEWS masthead; it now includes the official logo design for the Experiment.

A QUICK LOOK AT THE FIRST FGGE SOP

Introduction: The first FGGE Special Observing Period (SOP-I) began on January 5 and lasted till March 5, 1979. Within the SOP, an intensive observational period (January 15 - February 13) occurred during which selected FGGE Special Observing Systems were activated. This newsletter outlines last minute changes in the overall FGGE observing system for the first SOP and indicates the number of special observations taken during this period. It is too early to comment on the quality of specific data sets.

Geostationary Satellite Systems: For the first time five geostationary satellites are fixed some 60 to 80 degrees apart above the equator. During the operational year, the U.S. Geostationary Operational Environmental Satellite - 3 (GOES-3 or GOES-West at 135°W) has operated flawlessly. However, GOES-2 or GOES-East (at 75°W) experienced early problems with the precision latitude stepping mechanism of the Visible and Infrared Spin Scan Radiometer (VISSR). This resulted in a partial loss of coverage south of 35°S after December 28.

With the degradation of GOES-2 expected to continue, SMS-1, a satellite originally launched in conjunction with the GATE experiment, was transferred by NOAA's National Environmental Satellite Service (NESS) from 92°W on 9 January (its parking orbit position) to 75°W on 26 January. SMS-1 then replaced GOES-2 imaging operations and became known as GOES-East. In the transfer process during 16 January to 26 January, SMS-1 took sufficient southern hemisphere images to provide twice daily winds from the otherwise missing data areas. The ensuing images were transmitted to the University of Wisconsin (Space Science and Engineering Center or SSEC) via GOES-2 from which winds will be subsequently derived. As a consequence of these back-up operations, the only areal data lost was for the southern hemisphere area covered by GOES-2 during the period 12 January to 15 January.

During December and January, the GOES-West and GOES-East (SMS-1 and GOES-2) provided over 41,000 total wind vectors. It is anticipated that the monthly number of wind vectors from each satellite during the remainder of the experiment should be near 20,000 with a horizontal resolution of between 250-500 km.

In order to take full advantage of the high resolution visible image data of the GOES satellites, SSEC personnel are providing a mesoscale tropical wind data set from GOES-West and GOES-East. The wind fields will be available for the entire Operational Year between 15°N and 15°S. The number of wind vectors produced for December and January are 44,179 and 40,524 respectively with a resolution of between 100-200 km.

Japan launched its first geostationary satellite in the summer of 1977. Located at 70°E, the satellite provided during the first two months of the Experiment, over 13,000 ten-day mean sea-surface temperatures as well as over 300 wind vectors per day.

The European Space Agency (ESA) launched its first geostationary satellite in the fall of 1977. This satellite, located at 0° longitude, began production of winds twice daily on November 15, 1978. During December and January, 24,988 and 24,727 wind vectors were obtained respectively.

The USSR had originally planned to provide for the Experiment a fifth geostationary satellite. However, when it was determined that this satellite would not be ready in time, GOES-1, an earlier satellite already in orbit with a working VISSR, was transferred to 58°E to cover the Indian Ocean area (see FGGE NEWS No. 9, February 1978). SSEC personnel are processing this data and are providing winds in the Indian Ocean area in a delayed mode. During December there were 46,816 winds produced. The images provided by this satellite are presently of high quality.

Operational Polar Orbiting Satellites: The polar orbiting satellite system (TIROS-N) is operating as expected. The second satellite in the TIROS series (NOAA-A) is scheduled for launch on May 12, 1979.

During the months of December 1978 and January 1979 approximately 1000 daily atmospheric temperature soundings originated from NOAA-5/VTPR. In contrast the TIROS/HIRS system produced during its first full week of operation over 60,000 temperature soundings with an associated resolution of 250 km. This system became operational on 28 February 1979. The TIROS-N soundings from 1 January to 28 February are being processed in a delayed mode and will be included subsequently into the FGGE Level II-b data base.

In December, using the NOAA-5 Vertical Temperature Profile Radiometer (VTPR), 4660 sea-surface temperature (SST) observations were obtained daily. In January, the TIROS-N/AVHRR system produced over one million SST observations with a spatial resolution of 50 km.

The ARGOS data collection system on the TIROS-N satellite is operating extremely well. In addition to the data processing of drifting buoy and constant level balloon information, France, four times a day, has been distributing this data over the GTS.

A new satellite in the USSR Meteor series with a spectrometer-interferometer on board was launched on 25 January. At the present time, the quality of temperature soundings from this system is being evaluated and they are expected to be included in the FGGE data set.

Research Satellite: NIMBUS-7 was successfully launched on 24 October 1978 in a sun-synchronous, near-polar orbit. All instrument systems are functioning in a nominal fashion.

The Scanning Multi-Channel Microwave Radiometer (SMMR) on NIMBUS-7 operated in a one day on, one day off duty cycle throughout SOP-1. Data products remain the same as described in FGGE NEWS No. 5, April 1977. Because of software delays, the intended Level II-b products will not be available until the fall of 1979 and therefore will become part of the Supplementary Level II-b data set. The Limb Infrared Monitor of the Stratosphere (LIMS) lifetime is estimated at seven months due to the limited life of the solid cryogenic cooler. Due to this limited lifetime and a mechanical interference between the LIMS and the scanning modes of the Earth Radiation Budget experiment, the number of vertical profiles between 10 to 65 km, will be limited to approximately 30,000 per month. The Earth Radiation Budget (ERB) instrument is operating in a 3-day on, 1-day off duty cycle with the scanning modes being used during 50% of the observational times. The use of the scanning modes will return to nearly 100% once the LIMS instrument becomes inoperative. The Solar Backscatter Ultraviolet and Total Ozone Mapping Spectrometer (SBUV/TOMS) is being operated in a 5-day on, 1-day off duty cycle.

Aircraft Dropwindsondes: During the intensive period, the U.S. dropwindsonde aircraft operated six long-range tracks from four tropical bases (Hawaii, Panama, Ascension Island and Diego Garcia Island in the Indian Ocean). The first week of aircraft operations were plagued by numerous operational problems, therefore an extension of seven days was added to the originally scheduled 30-day intensive period. Specifically due to a series of mechanical failures and the need to divert U.S. Air Force aircraft for other high priority missions; observations did not effectively commence from Ascension till January 24. Even then only eleven (11) sorties were flown from Ascension with 152 successful sondes launched out of a total of 205.

Operations at other locations were far more successful (Panama, 31 sorties, 530 sondes launched, 91 percent successful; Hawaii, 70 sorties, 1210 launches, 91 percent successful and Diego Garcia, 59 sorties, 868 launches, 86 percent successful) with an overall success rate of 88 percent or a total of 2482 successful sonde launches out of 2813 attempts.

Southern Hemisphere Drifting Buoys System: For the SOP, at least 220 buoys were launched of which 46 were U.S. buoys. Included in these totals are 13 Arctic buoys supporting POLEX and FGGE and 5 tropical buoys. In December approximately 70 buoys were operational with nearly 3 reports per day per buoy. In January, 120 buoys were reporting till on February 15, 448 reports were being received from 157 buoys. As of early March, 156 buoys were still transmitting over the Global Telecommunications System (GTS) including 43 U.S. buoys.

Shortly into the second SOP, the U.S. FGGE Project Office plans to reseed via air drops the southern hemisphere drifting buoy network with 18 new buoys. The buoys will be placed into those remote areas of the South Pacific which have little, if any, surface vessel traffic during this time of the year. To date only the U.S. drifting buoys have been certified for air deployment.

Tropical Wind Observing Ships: Filling strategic ocean gaps in the tropics were some 40 oceanographic research vessels designated as Tropical Wind Observing Ships (TWOS). These ships provided twice daily vertical profiles of wind, temperature and humidity.

Ten USSR ships had radar windfinding systems on stabilized platforms. Five ships employed windfinding systems similar to those used in GATE. The remaining vessels used the new WMO-furnished "record-only" NAVAID sounding system.

A preliminary check with the TWOS NAVAID Center in Finland indicates that over 1300 cassettes (one per sounding) had been mailed to Finland by mid-March. Data from non-NAVAID ships are sent to the TWOS (radar) Data Center in the USSR. The results from this center are not yet available because of the nature of ship operations; in fact, the final processed data from both of the TWOS centers is expected to be the last available from all of the FGGE observing systems. During SOP-II and for the Summer Monsoon Experiment, additional ships from 22 countries are expected to be providing upper air measurements.

During the first SOP, six U.S. ships (Cromwell, Discoverer, Gyre, Jordan, Researcher and Wilkes) made 264 observations, approximately 65 percent of which were taken between 10°N and 10°S.

Tropical Constant Level Balloons: During the period from 6 January to 3 February, 153 balloons were launched by scientists of the National Center for Atmospheric Research (NCAR) from Canton Island (75) in the Pacific and from Ascension Island (78) in the Atlantic. These balloons, drifting at 47,000 feet, will provide over 3600 wind vectors in the region south of 25°N for the time period covering 5 January to 5 March. During the intensive period (15 Jan.-20 Feb.) an average of 70 wind vectors per day were obtained for the tropical belt of 10°N to 10°S. As a result of clustering around and downstream of the launch sites, two areas had virtually no coverage by the balloons (north of the equator in the Atlantic and south of the equator in the Indian Ocean and Indonesian areas). Arrangements for a third launch site at Guam are being initiated for the second SOP.

World Weather Watch (WWW) Systems: The foundation upon which this Experiment is built is an improved WWW. For the Experiment many countries have indicated their intentions to improve their upper air observations. The results of this effort are not yet available. Nevertheless, the amount of WWW data received by the National Meteorological Center does appear to have increased during the SOP. In particular the number of daily radiosonde reports for January 1978 rose from 1252 to 1327 per day during January 1979. The daily rate was even higher during February 1979 (1339 per day).

Because of the importance of measuring the wind field in the tropics, the United States temporarily implemented four upper air stations in the equatorial Pacific for the SOP's. These stations are located at Enewetak (11.4N, 162.4W), Woleai (7.4N, 143.9E), Kapingamarangi (1N, 154.8E), and Canton (2.8S, 171.7W). Observations were made at 0000 and 1200 GMT. In addition, the station at Fanning (3.9N, 159.4W), which had been temporarily implemented for the North Pacific Experiment (NORPAX) on a six per week observational schedule, was augmented to a two per day schedule throughout the SOP. Seven other U.S. stations, located within the 10°N-10°S zone and which are part of the World

Weather Watch basic observing network, were also augmented from one per day to two observations per day during the SOP (Ascension, Diego Garcia, Truk, Ponape, Majuro, Koror, Yap).

Automated Aircraft Reports: For the Experiment the Netherlands is processing delayed but automated data from various national commercial carriers. These carriers have approximately 80 aircraft equipped with Aircraft Integrated Data Systems (AIDS) capable of providing very accurate wind and temperature information. During the month of January 1979, AIDS countries (airlines) provided over 60,000 wind and temperature reports. Comparable number of observations (60,000 to 90,000) are expected per month for the duration of the Experiment.

The real-time Aircraft to Satellite Data Relay System (ASDAR) was described in FGGE NEWS No. 7 (August 1977). While the wind and temperature data from this new system is very accurate, the system is behind schedule. During SOP-I only 5 ASDAR units were operational in any one period. By the middle of March the number of ASDAR units in operation had doubled. It is anticipated that the operational version of ASDAR will become an integral part of the future global observing system of the WWW.

End-to-End Test: An end-to-end test of the complete data flow for the Experiment has been successfully completed. The purpose of this 30-day test was to ensure that all aspects of the Data Management Plan from data producers (organizations providing the Level I data from the various observing systems) to the data users (in this case, one of the centers producing the final analyzed fields of information) are evaluated. Data from as many FGGE observing systems as possible were gathered for the first five days of the intensive period within the Special Observing Period. Data producers made special arrangements for the delivery of data tapes to the Level II-b Space-based and Special Observing System Data Centre (Sweden). This center merged and checked all the test data sets and delivered them to the European Centre for Medium Range Weather Forecasts (ECMWF) Level III-b data producer in the United Kingdom. Invited experts evaluated the Level II and Level III data quality. The entire operation was completed in 28 days and the initial impression is that the preliminary results are favorable both in terms of data quantity and quality.

Publication and Information Update

A number of documents are now, or will shortly be available which describe in greater detail than presented in these newsletters, the observing and data systems as well as the research objectives of this Experiment. An excellent summary prepared by the U.S. Committee for GARP is now available and is entitled The Global Weather Experiment - Perspectives on Its Implementation and Exploitation. This document highlights the scientific problems associated with the Experiment. A copy of this document may be obtained care of this office. A short color film (14 minutes) describing the basic objectives and strategy of the Experiment is available on loan from the NOAA Motion Picture Service, 12231 Wilkins Avenue, Rockville, Maryland, 20852. A second 30-minute film on the conduct of the field phase portion of the Experiment is being prepared.

Atmosphere Technology, No. 10, Winter 1978-1979, published by NCAR, Box 3000, Boulder, Colorado, 80307, describes a number of instrumentation techniques and observational systems involved in the field phase of the Experiment. Articles are semitechnical in nature and designed to inform a broad readership in the tools of atmospheric research. Copies may be obtained directly from NCAR care of Mr. Vincent Lally, Editor.

Finally, a more comprehensive review of the first SOP is scheduled to appear in the Bulletin of the American Meteorological Society. Entitled "The Global Weather Experiment; I. The Observational Phase Through the First Special Observing Period", the article is expected to be published in the June 1979 issue.