GATE NEWS

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SOME RESULTS OF TEB-V, 3-7 DECEMBER 1973

Operations Plans: A central theme of this session was the review of planning for the field phase of the experiment. The specific plans discussed and the contacts for information in the U.S. GATE Project Office are: Ship Operations (E. Tiernan), Aircraft Operations (L. Weaver), Satellite Operations (T. Kaneshige), Telecommunications (A. Durkee), and Operations Support (D. Rushford). The Ship Ops Plan was approved. All of these component plans exist in considerable detail and will be summarized in issues of "GATE NEWS". The ISMG is now combining them with supporting information to compile an overall International GATE Operations Plan.

GOCC Organization: An organizational structure was adopted for the GOCC in Dakar with Dr. J. Kuettner as GATE Director, Dr. Y. Tarbeev as Deputy Director for Operations and Mr. R. Long as Associate Director for Support/Administration. The basic responsibility for focusing the day-to-day choices for the flexible parts of the aircraft and ship observation programs will rest with scientists comprising a Mission Selection Team, with the advice and participation of Subprogram Scientists contributed by ISMG. The Project Office is now identifying positions for U.S. personnel in Dakar. A discussion of the organization will appear in a later issue.

Data Management: A revised plan, including the results of the September meeting in Moscow, was presented. The concept of Subprogram Data Centers introduced at TEB-IV has now been developed in considerable detail. In this scheme, the data collected and processed by participating countries will be integrated into international data sets at five Subprogram Data Centers. At this session of the TEB, the following countries formally accepted these international roles as follows: Synoptic-scale--United Kingdom; Convection--U.S.A.; Boundary Layer--Federal Republic of Germany; Radiation--U.S.S.R.; and Oceanography--France. The overall Data Management Plan will be finalized at the data management meeting in Washington, D.C., 4-8 February.

TEB-VI is tentatively set for 8-11 April 1974. Other items of TEB-V will be reported in later issues of GATE NEWS.

U.S. POLAR-ORBITING SATELLITE SYSTEMS OF INTEREST TO GATE

NAME OF SATELLITE SYSTEM	NOAA-2 (1) NOAA-3 (2)	DAPP (2 Satellites)	NIMBUS-5	NIMBUS-F
Responsible Agency	NOAA	DoD	NASA	NASA
Orbital Altitude	(1) 790nm (1464km) (2) 815nm (1520km)	450nm (834km)	600nm (1112km)	550nm (1020km)
Nodal Period	(1) 115 min. (2) 116 min. (12.5 orbits per day)	101 min. (14.3 orbits per day)	107 min. (13.5 orbits per day)	107 min. (13.5 orbit per day)
Equatorial Crossing Times	(1) A 2100L D 0900L (2) A 2030L D 0830L	(1) A 0830L D 2030L (2) A 1230L D 0030L	A 1200L D 0000L	A 1200L D 0000L

TABLE 1: U.S. polar-orbiting meteorological satellite systems expected to be operating during GATE.

The polar-orbiting meteorological satellites are identified in Tables 1-3. These satellites will be in near-polar, sun-synchronous orbits with periods slightly less than 2 hours. During successive orbits of the satellites, the earth's rotation exposes each portion of the earth to view at least twice daily. The equatorial crossing times in this table depict the local time at which the satellite crosses the equator (A = ascending pass, D = descending pass).

The National Oceanic and Atmospheric Administration (NOAA) currently is utilizing visible and infrared image data and vertical sounder data from the NOAA satellite to provide for near real-time, operational support to its customers. In addition, ground stations equipped with Automatic Picture Transmission (APT) receiving equipment are able to receive the analog image data when the satellite is within "view" of the ground station. (The Advanced Vidicon Camera System pictures from the ESSA-8 satellite will continue to be available to those APT stations which have not modified their equipment to receive SR data.)

The Department of Defense (DoD) currently is utilizing visible and infrared image data and vertical sounder data from the DAPP satellites (two presently in orbit) to provide for near real-time, operational support to DoD customers world-wide. Special command and data acquisition stations

NAME OF SATELLITE SYSTEM	NOAA-2 NOAA-3	DAPP	NIMBUS-5	NIMBUS-F
Imaging Sensors	SR VHRR	HR,IR VHR,WHR	THIR	THIR
Vertical Sounders	VTPR	SSE	ITPR NEMS SCR	HIRS LRIR PMR SCAMS
Other Experiments	---	---	ESMR THIR	ERB ESMR THIR TWERLE

TABLE 2: Meteorological sensor packages of interest to GATE aboard U.S. polar-orbiting satellite systems expected to be operating during GATE. (Nimbus-5 was launched in December 1972 and the status of the spacecraft systems and sensor packages during GATE is uncertain.)

NAME OF SATELLITE SYSTEM	NAMES OF SENSOR	SPECTRAL INTERVAL	HORIZONTAL RESOLUTION (SUBPOINT)	COMMENTS
1. NOAA-2 NOAA-3	SR (2-channel)	V:0.5-0.7μ * I:10.5-12.5μ	V: 2.0 n.m. I: 4.0 n.m.	*One SR instrument on NOAA-3 has interval V:0.5-0.94μ
	VHRR (2-channel)	V:0.6-0.7μ I:10.5-12.5μ	V: 0.5 n.m. I: 0.5 n.m.	(1) Limited tape storage (2) Blind orbits over Atlantic
2. DAPP	HR	V:0.4-1.1μ	V: 2.0 n.m.	(1) Spectral interval extends into near-infrared
	IR	I:8.0-13.0μ	I: 2.4 n.m.	
	VHR	V:0.4-1.1μ	V:0.33 n.m.	(1) See note for HR (2) Limited tape storage (3) Blind orbits over Atlantic
	WHR	I:8.0-13.0μ	I: 0.33 n.m.	(1) See notes (2) and (3) for VHR
3.Nimbus-5 Nimbus-F	THIR	I:10.5-12.5μ	I: 4.0 n.m.	

TABLE 3: Characteristics of visible and infrared imaging sensors aboard U.S. polar-orbiting satellite systems expected to be operating during GATE. (NOTE: ESSA-8 is expected to be operating, but only APT information will be available.)

ACRONYMS

DAPP - Data Acquisition and Processing Program
ERB - Earth Radiation Budget
ESMR - Electrically Scanning Microwave Radiometer
HIRS - High Resolution Infrared Sounder
HR - Visible Channel of the Radiometer (2n.m.resolution)
IR - Infrared Channel of the Radiometer (4n.m.resolution)
ITPR - Infrared Temperature Profile Radiometer
LRIR - Limb Radiance Inversion Radiometer
NEMS - Nimbus-E Microwave Spectrometer
PMR - Pressure Modulated (CO_2) Radiometer
SCAMS - Scanning Microwave Spectrometer
SCR - Selective Chopper Radiometer
SR - Scanning Radiometer
SSE - Supplementary Sensor E (DAPP Sounder)
THIR - Temperature Humidity Infrared Radiometer
TWERLE- Tropical Wind, Energy Conversion, and Reference Level Experiment
VHR - Visible Channel of the Radiometer (1/3n.m.resolution)
VHRR - Very High Resolution Radiometer
VTPR - Vertical Temperature Profile Radiometer
WHR - Infrared Channel of the Radiometer (1/3n.m.resolution)

at Fairchild AFB, Washington and Loring AFB, Maine are linked to the Air Force Global Weather Central (AFGWC) at Offutt AFB, Nebraska, where a substantial amount of data processing takes place to produce data products required to support worldwide DoD operations. In addition, specially-equipped mobile vans are located over various parts of the globe in support of local field operations. It is expected that the DoD will continue to have two DAPP satellites in orbit during the GATE field operations period.

The National Aeronautics and Space Administration (NASA) currently is acquiring various types of data from the assortment of meteorological sensor packages aboard the Nimbus-5 satellite. Two Spaceflight Tracking and Data Network (STDN) ground stations, located near Fairbanks, Alaska and Rosman, North Carolina, collect the raw sensor data from the spacecraft for relay to the Goddard Space Flight Center (GSFC) in Maryland. These data are used primarily in a lag-time mode for research and development purposes. The launch of Nimbus-F into an orbit similar to that for Nimbus-5 is expected to take place in June 1974.

It should be understood clearly that any GATE requirements for polar-orbiting satellite data and data products must take into consideration the primary functions of these satellite systems. All of the U.S. agencies involved have definite requirements for data from their satellite systems. Any new requirements identified by GATE should take

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EQUATORIAL OCEANOGRAPHIC TEST RESULTS

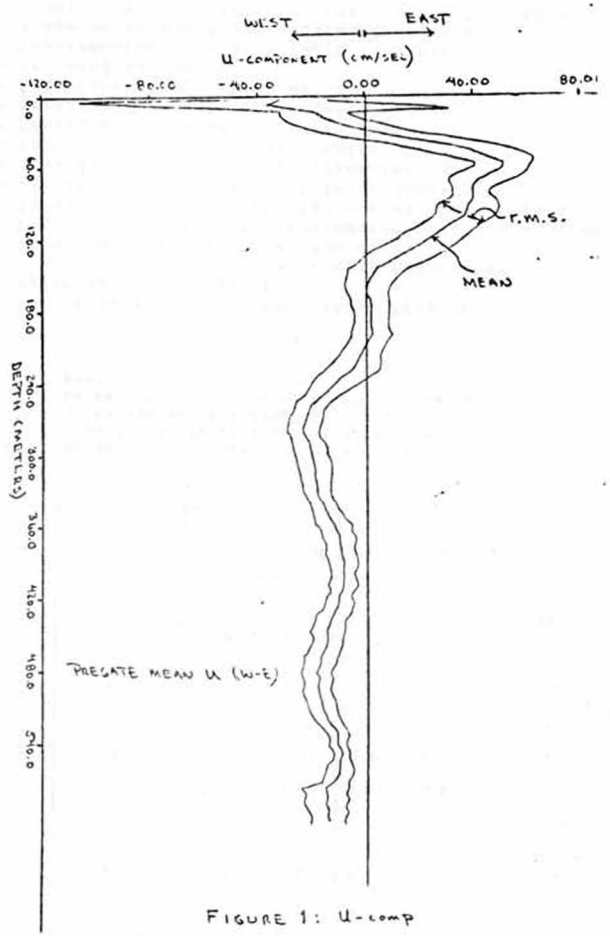

FIGURE 1: U-comp

Oceanographic observations on the RV GILLISS from the University of Miami were taken during a 3-day period in late August 1973 at 0°, 10°W. This cruise was in preparation for the Equatorial Oceanographic Experiment (See GATE News No. 6). Some results are now available and are presented in this article.

Figures 1-3 show the mean profiles for the U-component, V-component, and temperature as well as their respective standard deviations for a profiling current meter station at 0°, 10°W during August 23-24, 1973. The computation of the mean profiles is based

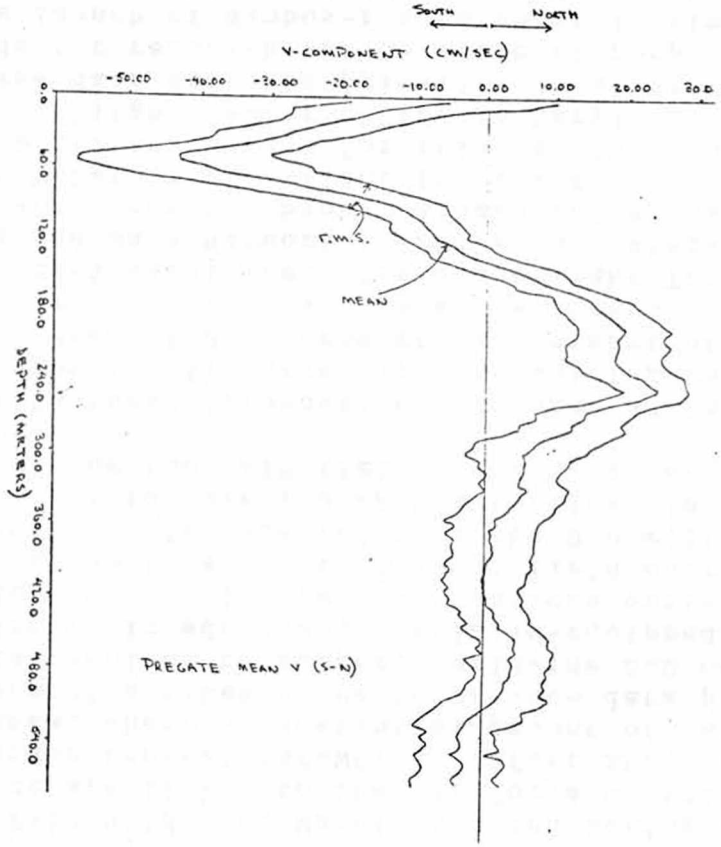

FIGURE 2: V-comp.

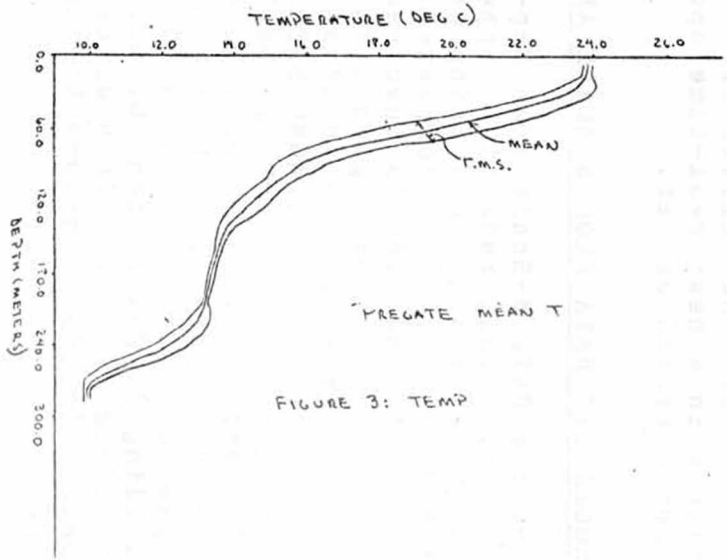

FIGURE 3: TEMP

on a sequence of 18 profiles observed at 3-hourly intervals with a mean vertical resolution of 5 meters. The observations were made from the drifting R/V GILLISS with reference to a taut-line radar reference buoy. The obtained shear profiles were converted into absolute current profiles by vectorially subtracting the mean drift vector of the ship. Figure 1 shows a mean westward flow of about 30 cm/sec near the surface, a weakly developed Equatorial Undercurrent with an intermediate maximum at 50 meters, and a westward flow between 200 and 600 meters. The surprising feature (Figure 2) is the occurrence of a strong southward-directed flow at the level of the undercurrent and northward-directed flow underneath it at about 200-meters depth.

At present we can only speculate about the occurrence of this strong cross equatorial flow, but it seems likely that it is related to the coastal flows near the West African Coast. It is not likely that these conditions are representative for typical mid-oceanic conditions further to the west. The temperature distribution (Figure 3) shows the typical pattern of the equatorial temperature profile; namely, a relatively thin homogeneous layer near the surface and a second homogeneous layer at the depth or below the core of the Equatorial Undercurrent. It is remarkable that the variability in the current components is fairly large in the upper layers (approximately $\pm$ 15 cm/sec r.m.s.) despite the short observational period of 51 hours. *(Article received from Prof. Walter Düing, Chairman, Division of Physical Oceanography, University of Miami.)*

GATE UNIVERSITY PERSONNEL

A total of 252 applications were received from university undergraduate and graduate students for participating aboard U.S. ships during GATE. The applications have been screened and contacts are now being made with prospective candidates.

ONLY 166 DAYS UNTIL GATE

(1 Jan 1974)

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into account the amount and types of data and data products being produced routinely in support of non-GATE operations.

Possible Applicability to GATE - In the past, documentation on GATE scientific requirements for polar-orbiting satellite data and data products have expressed the need for temperature sounding data, sea surface temperature data, radiation budget data (from the ERB), and TWERLE upper air data. Requirements for image sensor data have been focused on the high-frequency imaging capability of the SMS and its geostationary position over the GATE area. It should be realized that the SMS VISSR infrared data will have a horizontal resolution of approximately 5 n.m. at the subpoint. The infrared imaging sensors on the polar-orbiting satellites provide much higher resolution infrared image data, even though the observation frequency is only two times a day over a given region. Certainly, these higher resolution infrared data, coupled with their coincident visible data, could be extremely useful for case studies of cloud cluster activity.

Requirements for satellite-derived temperature soundings and sea-surface temperature data generally have reflected the needs of synoptic-scale modelling groups. The horizontal resolutions of the near-real time derivations of the above data are primarily of the synoptic scale. Techniques do exist, or are being developed, to provide for higher-resolution temperature sounding and sea-surface temperature data. These higher-resolution data probably could be obtained for the GATE archive, if specific GATE requirements are identified. However, the utility of higher-resolution retrieval techniques in a near real-time operational environment has not been demonstrated as yet.

PRE-GATE METEOROLOGICAL AND OCEANOGRAPHIC DATA FROM B-SCALE AREA

The RESEARCHER was in the center of the GATE B-Scale area September 17-24, 1973, collecting meteorological, radiation, upper air, radar, and oceanographic data. The data are now being prepared for publication as a pre-GATE data set. When completed, this publication will be forwarded to all individuals involved in the U.S. GATE program. Those requiring meteorological, radiation, upper air (radiosonde), or oceanographic data in advance of the publication should contact Dr. Kirby Hanson, AOML/SAIL, National Oceanic and Atmospheric Administration, 15 Rickenbacker Causeway, Miami, Florida, 33149 (305-361-3361, Exts. 336, 7, 8, 9). Those requiring radar data should contact Dr. Mike Hudlow, CEDDA, National Oceanic and Atmospheric Administration, 3300 Whitehaven Street, N. W., Page Building 2, Washington, D. C., 20235 (202-343-5262). *(Article received from Dr. Kirby J. Hanson, Sea-Air Interaction Laboratory, Atlantic Oceanographic and Meteorological Laboratories, NOAA/ERL).*