

SCIENTIFIC COMMITTEE ON OCEANIC RESEARCH

WORKING GROUP 47
OCEANOGRAPHIC PROGRAMME DURING THE FGGE

Atlantic Ocean Panel of SCOR Working Group 47

The Atlantic Ocean Panel (SCOR-WG 47) met in Paris from 11 to 13 June 1980 under the auspices of the IOC. The list of attending scientists is given in Annex 1.

I - Dr Klaus Voigt, on behalf of Dr. Mario Ruivo, ICO Secretary, opened the workshop with welcoming remarks. Ph. Hisard, chairman of the panel, welcomed the participants and gave the general objectives for the meeting. These included providing input to the wrap-up meeting for FGGE and establishing mechanisms for future cooperation. The many contributions of Dr Walter Duing to the development of an oceanographic experiment in the Equatorial Atlantic were recalled. Dr. Duing died in March 1980. Dr. Voigt was congratulated on the 21st anniversary of the first direct measurements of the Atlantic Equatorial Undercurrent, which he made on the R.V. "M.Lomonosov".

The absence of USSR oceanographers at the meeting was discussed in view of the intensive program they conducted during FGGE on board the R.V. "AK. Kurchatov" and R.V. "Prof. Schtokman".

II - In the first presentation, Ph. Hisard described the large-scale meteorological conditions observed during FGGE, noting the severity of the 1978-1979 winter in the USA and Europe. The severity of the winter over the northeast USA was not predicted by a weather-Forecast-predictor model, a model which does not take into account

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the SST Field of the Atlantic Ocean. In fact, the SST Field of the Atlantic was anomalous, with a large pool of cold water found to the southeast of New Foundland. The cold water pool may be linked to a strongly negative trough in the atmospheric pressure field, as evidenced by the 700 mb height departure for the 1978-1979 northern winter (Harnack, 1980 in Monthly Weather Review 108-1)

Concurrently, it appears that the intensity of the coastal upwelling along the Canary Current was low, as indicated by positive SST anomalies at Dakar. Similary, the anomaly of air-temperature at Alexander Bay (28°34'S, 16°34'E) along the Benguela Current, was + 2°C. The relation of these anomalies to each other and other features such as hurricane development, warm water in the tropical North Atlantic, tuna captures and Solar Maximum years (79-80) is still unknown.

III - That afternoon and the next day and one half was spent reviewing data and preliminary results from the FGGE participants

1) P. Speth from Inst. Geoph. Meteor. Univ. Köln (FRG) discussed "Meteorological Influence on Equatorial Upwelling in the Atlantic Ocean" using SST data from TIROS-N (which provides a spatial resolution of 1° between 7°S and 15°N and a temporal resolution of one Field per day), meteorological data from ECMRWF and cloud wind data from Meteosat. He found that the southernmost position of the ITCZ occurred in March, along 3°N and the northernmost in May.

2) E.Fahrbach from Kiel presented results from the R.V. "Meteor" cruise along 22°W, from 3°N to 2°S, between 27 January and 23 June 1979. Data sets included those obtained by the towed Delphin system, CTD stations, current meter deployments, drifter experiments and nutrient sampling.

3) H.U. Lass , from Rostock-Warne/munde, DDR, presented results from the SOP-II cruise of the R.V. "A. von Humboldt". Equatorial Undercurrent measurements along 28°40'W (5 sections) between 2°N and 2°S showed surfacing and meandering of the Undercurrent. The variation of Undercurrent transport observed during the five sections is comparable to the observed seasonal variability. No clear separation of salinity maximum and velocity core was observed as evidenced during GATE. Low-pass filtered, current meter records at 1°20'N show energy maxima at 2-3 days, and at 4°N at 2-3 days and 7 days.

4) E.Katz and Prof. Mesquita (Lamont- Sao Paulo) discussed their cooperative effort in the western Atlantic on board the "Besnard", "Conrad" and "Oceanus". A long equatorial track was occupied from 45°W to 33°W and transequatorial sections from 2°N to 2°S, along 28°W, were occupied in February, March, October 1979 and March 1980. Three inverted echosounders were deployed and recovered. A meteorological station was deployed on St Peter Paul Rocks (0°55'N and 29°20'W). A rapid build-up of wind was observed at the end of April, early May. From May-June through December 1979, the average wind was about 6m/sec. In March, winds with a southward component were observed, consistent with the position of the ITCZ (see Speth, I).

5) R. Molinari, AOML, Miami, reported on the RESEARCHER FGGE cruises, July-August, 1978, January-February, 1979, July, 1979 and February-March, 1980. CTD, profiling current meter and XBT data were collected. These data support the contention of Katz et al that maximum zonal slopes along the equator occur during northern hemisphere summer, and minimum slopes during winter. Further evidence for the existence of a subsurface South Equatorial Countercurrent (discussed previously by Hisard and others) was presented.

6) F. Ostapoff, AOML Miami, presented "RESEARCHER" sections of

salinity and dynamic height using sigma-t as the vertical coordinate rather than depth.

7) Prof. de Mesquita (Sao Paulo) presented R.V. "Besnard" data he is using to study summer/winter variability of western Equatorial Atlantic waters.

8) B. Voituriez and C. Colin (ORSTOM) presented data from the 1978-1979 Capricorne and Nizery cruises and results from the Equatorial mooring at 0°, 4°W. Results from the SOP-I cruise of the R.V. "Capricorne" show quite clearly the presence of the Undercurrent in the Gulf of Guinea and its dissipation around Sao Tome Island, where a southeastward branch flows along the Gabon and Congo Continental Slopes.

The 1978 equatorial upwelling was shown to be more intense than the 1979 upwelling. The large area of warm water observed during April in the Gulf of Guinea seemed to be a precursor to an "El Nino" situation. However, upwelling did occur in 1979 but was of a short duration.

Data from current meter records at 0°, 4°W, at a depth of 66m were presented for the period 7 January to 25 February 1979 and 1 March to 30 April 1979. A maxima in the energy spectrum of the N.S. speed component was observed at 17.4 days.

9) Hisard, Ph. (ORSTOM) presented coastal station data provided by J. Picaut for the Ivory Coast and by CRO Dakar for Senegal stations. Features observed included : less intense upwelling at Dakar, anomalous precipitation over Senegal during January 1979 (the so-called : "pluie des mangues"), strong sand-storms and early monsoon rain of short duration.

A relatively strong upwelling occurred along the Ivory Coast during January-February 1979 (the so-called "short cold season"). This feature was compared to the pool of cold water observed on the equator (15°W-20°W) by Molinari during the same period, and with an intrusion of cold surface water at the equator around 25°W as observed on US National Weather Service SST maps.

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10) Herbland (ORSTOM) discussed the relation of the Undercurrent to biological processes using chlorophyll a and Primary Production data from the "Capricorne" SOP-I cruise at 0°, 4°W. The notion of an "Ecological Equator" was presented.

11) Hisard and Katz discussed USSR data from a paper published in Okeanologiya 1980 n°1 and from data provided by Prof. Monin for the IUGG Canberra meeting. The USSR data from the "Kurchatov and "Shtokman" cruise appear to be extensive. A recommendation was made to attempt cooperative studies, possibly by exchange of FGGE results through the Oceanographic Committee of the Soviet Union.

12) David Cartwright (I.O.S.) presented tide gauge data from the tropical Atlantic. He discussed a 2-year record from Fernando do Noronha Isld. and a 5-month record from St Peter-St Paul Rocks

13) J. Citeau (ORSTOM) presented Meteosat data showing the SST field over the Gulf of Guinea. Equatorial upwelling in the Gulf of Guinea was observed during the 1978 summer.

The possibility of cold water advection from the south causing the cold equatorial waters in the Gulf of Guinea was discussed. Nutrient analysis is adequate to delineate water upwelled on the equator from water advected from the south.

14) In addition, Dennis Moore (Hawaiï Univ.) discussed presentations given at the Equatorial Theoretical Panel meeting recently held in Tallahassee, Florida. In addition, he presented data provided by J. Picaut (ORSTOM-UBO) suggesting possible westward propagation of trapped waves in the Gulf of Guinea.

15) Bob Hunt (IOC) discussed the IGOSS program and solicited recommendations for future IGOSS programs.

16) Bob Dennis (EDIS) provided information on the RNODC/FOY and solicited recommendations for future RNODC/FOY efforts.

The following recommendation to the Chairman of SCOR WG.47 was approved relative to the April 1981 FGGE meeting. The members of the Panel felt that April 1981 was too early for a wrap-up meeting and that late 1982, early 1983 was more appropriate for such a session. The format for the April meeting should include several speakers on selected topics ; one speaker per ocean, when appropriate and one speaker for theoretical models. In addition, a moderator should be selected (one of the previous speakers, when appropriate) and sent pre-prints of his topic's articles, so that he can synthesize the theoretical and observational findings.

List of suggested topics :

- 1 - Eastern boundary and equatorial upwelling
- 2 - Western boundary currents
- 3 - Equatorial undercurrents
- 4 - South Equatorial current and equatorial countercurrents
- 5 - Equatorial waves
- 6 - Deep equatorial currents
- 7 - Surface forcing and heat budgets
- 8 - Special lectures

The individual selected for each topic should review all results pertinent to his ocean rather than presenting only his own work. Poster sessions might be one approach to presenting individual results.

To ensure dissemination of FGGE Atlantic results, each participant is requested to produce, as soon as possible, data reports which include graphical displays of data. These reports are to be forward to other participants. In addition, a collected data volume will be produced at ORSTOM and forwarded to the other SCOR WG 47 panels.

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V - A list of topics were also selected as possible for papers to be submitted for "Science". Each topic was given a leader and other interested participants whose goal was to write a Science article. The list of topics follows.

<u>Topic</u>	<u>Leader</u>	<u>Others</u>
1 - Key note	Hisard	
2 - Equatorial Undercurrent : transports and time series	Katz	Hisard, Lass, Molinari, Piton
3 - Equatorial Undercurrent : pressure gradient	Lass	Katz, Meincke, Merle, Ostapoff; Voituriez
4 - Equatorial Undercurrent water mass properties	Ostapoff	Brockmann, Voituriez
5 - Satellite imagery : Gulf of Guinea	Citeau	
6 - Satellite imagery large scale	Speth	
7 - SST and wind observations from ship	Hisard	Speth, Sy
8 - Gulf of Guinea : biology	Voituriez	Herbland, Le Borgne
9 - Nutrients	Mesquita	Bauerföind, Duncan, Fahrbach, Oudot
10 - Tides and sea level	Cartwright	Katz, Mesquita, Verstraete
11 - Current meter times series (moorings, profilers)	Fahrbach	Colin, Mesquita, Molinari, Rual
12 - Meridional sections	Molinari	Lass, Voituriez, Hisard
13 - Wind buoy data	Speth	Colin, Katz, Rual
14 - Gulf of Guinea coastal stations	Picaut	Piton, Verstraete

The following time table was established. As soon as possible, topic leaders, are to submit data requirements to the other members of their group. These members should then forward the data to the topic leaders by 15 October 1980. Topic leaders should have manuscripts written and approved by other members of their group by 1 January 1981.

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È Eli Katz volunteered to co-ordinate this effort. He will contact the editor of "Science" and ensure that the papers are submitted on time. All correspondence relative to these papers should be copied through Eli and the chairman.

VI - A last recommendation was adopted

- Whereas there is in motion multi-national plans to continue cooperative research in the tropical Atlantic and
 - whereas we foresee a need for continued co-operation in the analysis of FGGE Atlantic data for several years, and
 - whereas the tropical ocean is an acknowledged region of primary interest in the growing international climate programs.
- a Working Group be initiated to co-ordinate and make recommendations for future works in the tropical Atlantic. Considerations might be given by SCOR WG 47 to expand this recommendation to include all tropical oceans.

Paris, Juin 980

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Atlantic Ocean Panel Meeting

of the SCOR WG-47

Paris, 11-13 June 1980

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