



**UNITED NATIONS ECONOMIC AND SOCIAL COMMISSION**

**FOR ASIA AND THE PACIFIC**

**AND**

**WORLD METEOROLOGICAL ORGANIZATION**

**REPORT OF THE TYPHOON COMMITTEE  
ON ITS FOURTEENTH SESSION**

**Manila, Philippines  
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(Item 8 of the provisional agenda)

REPORT OF THE TYPHOON COMMITTEE ON ITS  
FOURTEENTH SESSION

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## I. ORGANIZATION OF THE SESSION

1. The fourteenth session of the Typhoon Committee was held at Manila from 10 to 16 November 1981.

### Attendance

2. The session was attended by representatives of China, Hong Kong, Japan, Malaysia, the Philippines, the Republic of Korea and Thailand. Observers from the Federal Republic of Germany and the United States of America attended the session. Observers were also present from the Office of the United Nations Disaster Relief Co-ordinator (UNDRO), the United Nations Development Programme (UNDP), the International Civil Aviation Organization (ICAO), the League of Red Cross Societies (LRCS) and the Technical Support Unit (TSU) of the WMO/ESCAP Panel on Tropical Cyclones.

### Opening addresses

3. The session was opened by a representative of the Deputy Minister of Defense for Munitions, Hon. Isabelo R. Castro. A message by the Executive Secretary of ESCAP was read by the Chief of the Natural Resources Division. A statement by the Secretary-General of WMO was read by a representative of that Organization.
4. In his message, the Deputy Minister of Defense stressed that studies and research on the destructive effects of typhoons should be pursued more vigorously as a development strategy for the 1980's to improve the quality of life of the people. In that regard, the full co-operation and concerted efforts of all nations in the exchange of information and mobilization of advanced scientific technology was necessary.
5. The Executive Secretary of ESCAP, in his message, expressed the hope that the salutary features of the Committee that he had learned about would remain in its long-term battle against typhoons and floods. He also expressed the readiness of ESCAP to co-operate, within its mandate and resources, in the implementation of the Typhoon Operational Experiment (TOPEX). Recognizing that the work of the Committee was relevant to the alleviation of poverty, he concluded with the hope that it would continue in its earnest endeavours for the benefit of the peoples in their respective countries.
6. In his message, the Secretary-General of WMO stated that 1981 had been a decisive year for TOPEX, the Pre-experiment representing the first attempt ever made to conduct an operational experiment on a tropical cyclone in real

/time.



time. It had demonstrated clearly the further action necessary in order to bring the operational system to the level required for the experiments in 1982 and 1983. He drew attention to the need for further resources to ensure the maximum success of TOPEX, especially in the manning of the International Experiment Centre (IEC) in Tokyo. In conclusion, he pledged the continued support of WMO in assisting members participating in TOPEX.

#### Election of officers

7. The Committee elected Mr. Roman L. Kintanar (Philippines) as Chairman of the Committee for the year 1981/82, Mr. Twee Montrivade (Thailand) as Vice-Chairman, and Mr. P. Sham (Hong Kong) as Chairman of the drafting committee.

#### Agenda

8. The Committee adopted the following agenda:

1. Opening of the session
2. Election of officers
3. Adoption of the agenda
4. The Committee's activities during 1981
  - (a) Meteorological component
  - (b) Hydrological component
  - (c) Disaster prevention and preparedness component
  - (d) Training
  - (e) Research
5. Typhoon Operational Experiment
  - (a) Report of the Management Board for TOPEX
  - (b) Reports of the International Experiment Centre and Experiment Sub-Centres on operations during the Pre-experiment
  - (c) Policy directives and guidelines for the Management Board and Second Planning Meeting on the further conduct of TOPEX
6. Support for the Committee's programme
7. Programme for 1982
8. Co-ordination with other activities of the WMO Tropical Cyclone Programme
9. Consideration of the agenda for the fifteenth session



10. Date and place of the fifteenth session
11. Scientific lectures
12. Adoption of the report

II. THE COMMITTEE'S ACTIVITIES DURING 1981  
(agenda item 4)

9. The Committee reviewed and evaluated the over-all progress made in implementing its programme during 1981, as set out in document WRD/TC.14/1. Five components, namely, (a) meteorological, (b) hydrological, (c) disaster prevention and preparedness, (d) training and (e) research were discussed in detail.

A. METEOROLOGICAL COMPONENT

10. The Committee noted with satisfaction that considerable progress was being made by members in improving their capabilities for typhoon forecasting and warning services.

11. The TOPEX Pre-experiment undertaken by members from 29 July to 18 August 1981 had been successfully carried out. That fact indicated that the planning and execution of TOPEX was proceeding satisfactorily and that the First and Second Operational Experiments might confidently be expected to be successful (see also the discussion under agenda item 5).

12. The Committee's review covered meteorological satellites, upper-air observations, radar stations and the exchange of radar fixes, ocean weather ships and buoys, reconnaissance flights and meteorological telecommunications.

13. China informed the Committee that 13 upper-air observation stations and five radar stations in coastal areas had already participated in carrying out intensified observations during the TOPEX Pre-experiment period and data recorded at those stations were disseminated over GTS. In order to handle the voluminous data exchange between Beijing and Hong Kong through the Guangzhou regional meteorological centre, an improvement of those telecommunication circuits by installing a computerized switching system and increasing the teletype speed was felt to be essential.

14. Hong Kong made special arrangements to request voluntary observing ships and commercial aircraft to make more meteorological reports, particularly during the TOPEX Pre-experiment period. A new 10-cm replacement storm warning

/radar



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radar was expected to be installed in April/May 1982. A test on reception of radar fix messages for tropical cyclone Ike (8104) originated from Hong Kong revealed that improvements in some telecommunication circuits were needed and recommendations were being circulated through the Typhoon Committee secretariat (TCS) for consideration by members.

15. In Japan, the new GMS-2 satellite was successfully launched in August 1981. The new satellite was expected to be operational soon to replace the existing one. The existing receiving facilities of members could be used for the reception of data from the new GMS-2 without any modifications. GMS-1 and the Japanese ocean weather ships Tango and Keifu-maru made intensified observations and provided valuable information during the TOPEX Pre-experiment period.

16. In Malaysia, two new 10-cm storm warning radar had been installed in Kluang and Kota Kinabalu. The Kota Kinabalu radar which had come into operation in September 1981 would be particularly useful in detecting weather disturbances associated with typhoons forming in the South China Sea. The high resolution satellite receiver had continued to receive GMS information satisfactorily. The TCS expert assisted in the calibration of meteorological storm warning and wind finding radars in Malaysia, thereby standardizing their performance throughout the country. Steps had also been taken to encourage ships to provide more information during the TOPEX Pre-experiment period.

17. In the Philippines, five new WSR-77 storm warning radars and five modification kits procured by the Philippines Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) had been received. Virac (98447), Daet (98440), Basco (98135) and Mactan (98646) radars had either already been replaced by new radars or modified. Installation of the remaining radars was underway. It was therefore expected that more radars would report typhoon information during the First and Second Operational Experiments. Newly procured GMS high resolution picture receiving equipment had already been received by PAGASA and installation was in hand. It was expected to commence operation by the end of 1981. In connection with the improvement of national data collection in the Philippines, the Government of Japan had assisted by sending survey teams to conduct a feasibility study on improving the meteorological telecommunication system in the Philippines. Appreciation was expressed to Japan by the Philippines which had requested further support for the implementation of the improved telecommunication system which would be of benefit not only to the Philippines but also for the implementation of the World Weather Watch (WWW) programme.



18. The data flow from Tokyo to Manila and from Tokyo to Hong Kong over the existing 75-baud point-to-point links had been overloaded with the result that there were serious delays in data transmission and some important information had not been received at all. Remedial measures were being considered.

19. The Republic of Korea reported that the existing 12-year old radar at Seoul was shortly to be replaced by a new one. In connection with the improvement of meteorological services in the Republic of Korea, one additional radar was planned to be acquired under the five-year national development programme. The Seoul-Tokyo point-to-point 75-baud circuit was overloaded so that a number of data transmissions had to be eliminated. Improvement of this circuit by increasing the speed to 200 baud was under consideration.

20. In Thailand, three new 5.6-cm radars had been procured with national resources and one had already been installed at Don Muang Airport, Bangkok. Installation of the other two radars at Chiang Mai and Songkhla was in hand. The defective 10-cm radar at Bangna had been repaired by TCS and was restored to regular operation in September 1981. The automated computer switching system at RTH, Bangkok, began full operation in August 1981, thereby greatly improving the smooth flow of the voluminous data exchange through RTH. A TIROS-N high resolution satellite receiver was expected to be installed in early 1982.

21. In Viet Nam, communication facilities at eight of the 14 synoptic stations committed for TOPEX were defective. Radio broadcasting was the only means of disseminating observational data outside the country. Improvement of the communication systems both for national data collection and for data dissemination was required.

22. Specifications for the procurement with UNDP funds of equipment and spare parts for the operation and maintenance of existing facilities were drawn up by TCS in consultation with the respective members. Some of the equipment and spare parts had been ordered by WMO to meet the immediate needs of members in 1981. The Committee recognized that UNDP assistance had been most useful.

23. The Committee noted with appreciation that the United States had confirmed that it expected to continue to carry out meteorological reconnaissance flights in the typhoon area in the year ahead.

24. In the light of the information available the Committee revised the priority list established at the thirteenth session, as shown below:

/Observing



Observing facilities:

(a) Upper-air stations:

98223 Laoag (Philippines)	)	
98645 Cebu (Philippines)	)	12 GMT RS/RW national projects
47187 Cheju (Republic of Korea)	)	External assistance needed

(b) Weather radar:

Shantou (China)	National project
Xisha (China)	National/External assistance needed
Cheju (Republic of Korea)	External assistance needed
Tanay (near Manila, Philippines)	National project
Haiphong (Viet Nam)	External assistance needed

(c) Satellite receiving equipment (GMS/TIROS-N satellite):

Manila (Philippines)	)	
Bangkok (Thailand)	)	National projects
Hanoi (Viet Nam)	)	External assistance needed

Telecommunication:

(a) Improvement of national data collection facilities:

Lao People's Democratic Republic	)	
Philippines	)	National/bilateral projects/
Thailand (night-time reception)	)	external assistance needed
Viet Nam	)	

(b) Regional telecommunication links:

Bangkok-Hanoi (new circuit)	National project
Beijing-Guangzhou-Hong Kong	National/external assistance
(strengthening of existing circuit)	

(c) Other telecommunication facilities:

Thailand - Strengthening of RTH	National/external assistance
Bangkok	needed

B. HYDROLOGICAL COMPONENT

25. The Committee reviewed the accomplishments during 1981 as reported in document WRD/TC.14/1 under the hydrological component and noted with satisfaction the progress made by members during the year. The review covered the establishment,

/improvement



improvement and operation of flood forecasting and warning systems as well as measures for comprehensive flood loss prevention and management.

26. The Committee noted and agreed with the amendments suggested by the representatives of China, Malaysia and the Philippines to document WRD/TC.14/1 covering the Committee's activities during 1981 under the hydrological component.

27. In Japan, a study on the comparison between the rainfall data obtained by a radar rain gauge and conventional rain gauges was in progress in order to calibrate the constants for the newly installed radar rain gauge in the Yodo river basin.

28. The Committee was informed that with the objective of upgrading the existing flood forecasting network capability in Peninsular Malaysia, the Drainage and Irrigation Department had secured technical assistance from the International Engineering Consultants Association (IECA) of Japan to review the existing flood forecasting systems and make recommendations for their extension and improvement.

29. The Committee noted with appreciation that in addition to a flood forecasting expert, a hydrologist had been provided by Japan to the Republic of Korea for a period of one year from November 1981 to improve the operation of the flood forecasting and warning system in the Han river basin.

30. The Committee was informed that basin councils had been established in 12 river basins in Japan for comprehensive flood loss prevention and management. Each basin council consisted of senior officials of municipalities, prefectures and regional bureaux of various government agencies which were involved in disaster prevention, urban and regional planning, housing development, land use etc. in the basin. Some of the action which had been taken by the basin councils included setting the rainfall intensity to be used in the design of flood control facilities and the dissemination of information concerning the flood vulnerability of certain areas. Information on flood-prone areas in some basins was found to be very useful by new dwellers in those areas.

31. The Committee was also informed that as a result of the destruction by mud flows of a number of towns at the foot of Mayon Volcano in the Philippines when a typhoon brought heavy rains to the area in July 1981, the Ministry of Public Works and Highways was considering undertaking a review of the Master Plan for Mayon Volcano Erosion Control.



32. The Committee was informed that the Republic of Korea had started surveys on natural and social conditions in the Anyang river basin, which was under rapid urbanization and which had been selected as a pilot area for comprehensive flood loss prevention and management.
33. The Committee recorded its appreciation of the Government of China's hosting a group study visit on watershed management for flood loss prevention and management which was organized by ESCAP for the members.
34. The Committee also recorded its appreciation to the Government of Japan of the various types of assistance it had rendered in connection with flood forecasting and warning systems in some of the member countries.
35. The Committee urged members which had not done so to initiate as early as possible the investigation and survey of the pilot basins which had been selected for comprehensive flood loss prevention and management.

#### C. DISASTER PREVENTION AND PREPAREDNESS

36. The Committee reviewed the information on disaster prevention and preparedness (DPP) given in document WRD/TC.14/1.
37. The Committee expressed its appreciation to WMO, UNDRO and LRCS of the valuable consultant services provided by them in DPP for two three-month periods, the first undertaken from 20 March to 15 June 1981 and the second from 15 September to 22 December 1981; the consultant (Mr. K. Seevaratnam) had visited most of the members. The main purposes of his mission were an in-depth examination of the action taken to implement earlier recommendations made by the joint LRCS/WMO/ESCAP missions of 1973 to 1976 and the later consultants' visits, and the stimulation of a programme of activities to be carried out during experimental periods under the Warning Dissemination and Information Exchange (WD/IE) component of TOPEX.
38. The Committee was informed by the consultant that in all the countries he had visited there had been efforts to implement the recommendations of earlier missions. A general deficiency in the disaster preparedness arrangements was caused by the weak or non-existent communication links, particularly in reaching remote areas.
39. As regards his second objective it had been agreed by all agencies involved that plans should be developed to use the experiment periods to check not only the dissemination of warnings at all levels but also to monitor the timeliness of receipt of the warnings.



40. In this connection, the consultant had been requested to design a format for the evaluation of the performance of the existing system at both national and local levels, which was prepared in the form of "Guidelines for the preparation of case studies and review of counter-disaster measures with particular reference to tropical cyclones".

41. The findings of the consultancy showed that:

(a) Considerable progress had been made by members in DPP since the WMO/ESCAP/LRCS joint missions carried out in 1973 to 1976;

(b) Co-ordination with other agencies involved in DPP showed a marked improvement;

(c) Media had been enhanced with regards to warning dissemination through considerable training activities undertaken by members on public education and public information;

(d) Test exercises had been conducted by members on DPP.

42. It was further shown that although considerable progress had been made on DPP by members there seemed to be difficulty in monitoring the WD/IE component of TOPEX thereby making it difficult for members to evaluate the effectiveness of warning dissemination.

43. The Committee was informed that a meeting had been held on the third component of TOPEX (WD/IE) at the Office of Civil Defense, Quezon City, Philippines, on 9 November 1981, prior to the fourteenth session of the Committee. Participants from China, Hong Kong, Japan, the Philippines, the Republic of Korea and Thailand were present, as well as representatives of WMO, UNDRP and TCS, including the consultant. Other participants included observers from the United States and TSU. A briefing on the operation of the Disaster Coordinating Council at all levels in the Philippines was made by the Office of Civil Defense.

44. In the Philippines, the plan of action on education, public information and training in disaster preparedness concentrated on barangays hit by floods and typhoons. The staff of governmental and non-governmental organizations in those areas were being trained to increase their skills. Pilot projects on Barangay Food Resources Centers were being carried out in Isabela province to enhance self-reliance and increase the capability to cope with disasters.

45. An initial evaluation of surveys made in connection with project "PAGMAMASIA" showed that most of the respondents received typhoon warnings

/through



through radio broadcasts. It was tentatively concluded that reliance could be placed on radio broadcasts as a preliminary means of communication for dissemination of warnings and other information but that further strengthening of the means was necessary.

46. The Committee was informed that disaster countermeasures in Japan were being promoted with emphasis placed on the following points, from a comprehensive and long-range point of view:

- (a) Promotion of scientific and technological research on disaster prevention;
- (b) Education and training for strengthening of disaster preparedness;
- (c) Streamlining of facilities and equipment for DPP;
- (d) Promotion of conservation of national land;
- (e) Implementation of emergency disaster measures and prompt disaster rehabilitation.

#### D. TRAINING

47. The Committee in reviewing the training activities and other related information given in document WRD/TC.14/1, noted that members had availed themselves of a number of training opportunities during the year.

48. In addition to the training courses mentioned in the document the following were also conducted and/or participated in by members:

- (a) A group training course in meteorology, organized by the Government of Japan, with emphasis on typhoons, held from October 1980 to January 1981, with six participants;
- (b) A group training course in the operation and maintenance of weather radar, organized by the Government of Japan, held from October 1981 to January 1982, with eight participants;
- (c) In support of TOPEX, a training course on hydrology and warning dissemination and information exchange, organized by the Government of Japan, held from 23 July to 21 August 1981, with five participants;
- (d) A training course on the prevention of meteorological disasters, organized by the Government of Japan, held from 21 February to 30 August 1981;
- (e) A training course on river engineering, organized by the Government of Japan, held from 23 July to 30 November 1981, with 11 participants;



(f) A training course on flood loss prevention and management, organized by the Government of Japan, held from 30 July to 25 September 1981, with eight participants;

(g) A training course on technology for disaster prevention, organized by the Government of Japan, held from 1 October to 15 December 1981;

(h) A regional disaster preparedness seminar, organized by the Commonwealth Government of Australia, held at the Australian Counter Disaster College, Macedon, Victoria from 15 to 28 March 1981, participated in by Typhoon Committee members from Hong Kong, Malaysia, the Philippines and Thailand;

(i) A training course on tropical cyclone hydrology and flood forecasting held at the University of Miami, Florida, United States, from 20 February to 30 May 1981.

49. In Malaysia, a WMO/UNDP roving seminar on the use of mathematical models for hydrological forecasting, jointly organized by the Drainage and Irrigation Department and the Malaysian Meteorological Service, was held in Kuala Lumpur from 16 to 27 March 1981 and attended by 16 local participants.

50. China reported that it had conducted a training course for national personnel on calibration and use of 5-cm radar, at Beijing. It was planned that a seminar on radar echo analysis would be held in December 1981.

51. An expert from Hong Kong assisted RTH, Bangkok in the completion of a computer system for message switching during the period from 8 to 21 June 1981. A second visit was undertaken from 3 to 17 August 1981 for the automation of the system.

52. The TCS telecommunications and electronics expert provided training in the operation and maintenance of radar, with special emphasis on calibration, in Malaysia, Thailand and Viet Nam. A total of 21 technicians attended the course.

53. In response to the request made by the Committee at its thirteenth session, TCS collected information on training courses open to members of the Committee and distributed material on courses in the United States and the United Kingdom to all concerned.

54. Information was received by the Committee from the United States that a training course on tropical meteorology and hurricane forecasting to be conducted at the University of Miami from 1 March to 7 May 1982 would be open



to members of the Committee. A seminar on the use of satellite data for tropical cyclone forecasting would be organized by the WMO/ESCAP Panel on Tropical Cyclones in June 1982 in Bangkok.

55. The Committee expressed its gratitude for the assistance provided by the Government of Japan in organizing a number of training courses in 1981.

56. The Committee also expressed its appreciation of the facilities provided by the Government of China in hosting a group visit on watershed management for flood loss prevention and management from 6 to 23 September 1981 and to the Government of the Philippines of the facilities provided for the regional training seminar on urban hydrology sponsored by WMO/ESCAP/UNESCO from 16 to 20 March 1981.

57. The Committee expressed its gratitude to the Governments which had made available valuable training courses and seminars to the Typhoon Committee.

#### E. RESEARCH

58. The Committee reviewed the research activities of members during 1981 reported in document WRD/TC.14/1.

59. The Committee noted with appreciation the list of technical papers and publications on research of interest to the Committee, as well as ongoing research related to the Typhoon Committee's activities, submitted to TCS by China, Hong Kong, Japan, Malaysia, the Republic of Korea and Thailand. A consolidated listing of those papers and publications would be prepared by TCS for circulation to the members. Copies of those research papers and/or publications might be obtained, upon request, directly from the member concerned or through TCS.

60. In addition to the research on typhoons earlier reported by China, it was also undertaking investigations on tropical cyclones forming and developing offshore and on heavy rains induced by typhoons making landfall in China.

61. In line with the Government's effort to strengthen its disaster prevention and preparedness programme, the Philippines was undertaking research on the sociological aspects of disasters, i.e., correlating the warnings to the expected damage within an area. The Committee welcomed that information and stressed the need for research activities not to be confined to the meteorological component but also to cover hydrology and DPP. Research on the third component (i.e., DPP) should be related to subjects such as the socio-economic impact of typhoon forecasts and warnings.



62. UNDRO recommended that whenever possible case studies should be undertaken after a disaster, including its social and economic impact. An example of such a case study was that carried out by the University of Andhra Pradesh in India after the severe tropical cyclone of 1977.

III. TYPHOON OPERATIONAL EXPERIMENT (TOPEX)  
(agenda item 5)

A. REPORT OF THE MANAGEMENT BOARD FOR TOPEX

63. The Committee reviewed the reports of the second and third sessions of the Management Board for TOPEX on the basis of a document (WRD/TC.14/2) summarizing the main decisions of those sessions. All members participating in TOPEX were unanimous in expressing their warm appreciation to Japan, and especially to the Japan Meteorological Agency (JMA) and the Japan International Co-operation Agency (JICA), of the substantial support provided for the Pre-experiment. The Committee considered that the facilities provided at JMA for IEC and the funding provided by JICA for the secondment of scientists to IEC and for the attendance of participants at the seminar on the hydrological and the WD/IE components of TOPEX had played a decisive role in the success of the Pre-experiment.

64.. Because of the major impact of this assistance on the Pre-experiment the hope was expressed by the Committee that Japan would give sympathetic consideration to repeating its assistance during the First and Second Operational Experiments in 1982 and 1983 respectively. The representative of Japan informed the Committee that although his country considered the principal support for TOPEX should be provided by international organizations such as UNDP and UNEP, consideration would be given to continuing the supplementary assistance such as Japan had provided during the Pre-experiment. That information was warmly welcomed by the Committee.

65. The Philippines and Thailand expressed their gratitude to China for the valuable contribution it was making in providing them with hydrogen cylinders, hydrogen pressure gauges and generators through the WMO Voluntary Co-operation Programme (VCP). The Philippines also wished to thank the United States for the hydrogen generators it had agreed to provide.

66. The current position with regard to the WMO Special Temporary Voluntary Fund for TOPEX was explained to the Committee. Malaysia announced that it had made a contribution of \$US 1000 and the Republic of Korea stated that it would contribute to the fund in 1982.



67. The Committee discussed a number of questions which the Management Board had suggested should receive further consideration. They included the number of typhoons to be followed during the Operational Experiment in 1982 and 1983 and the criteria for the selection of those typhoons and for intensified observation. The need for members to be able to justify to their Governments the secondment of senior scientists to IEC for long periods and the resources required to operate Experiment Sub-Centres (ESCs) was stressed. The Committee felt that it was essential to solve such outstanding problems if the maximum benefits were to be obtained from TOPEX.

68. At the same time it recognized the difficulties some of those problems posed for Japan. Nonetheless the Committee entered a strong plea to Japan to consider increasing the number of typhoons selected with intensified observing programmes so that TOPEX might be as successful as possible. The representative of Japan informed the Committee that whilst its position on those questions remained unchanged it felt they should receive further consideration at the Second Planning Meeting for TOPEX, provisionally scheduled to be held in Tokyo in February 1982. It further wished to reiterate the fact that TOPEX was not a research, but an operational experiment and, as such, should be based upon the WWW programme.

69. The Committee endorsed the reports of the second and third sessions of the Management Board.

B. REPORTS OF THE INTERNATIONAL EXPERIMENT CENTRE AND EXPERIMENT SUB-CENTRES ON OPERATIONS DURING THE PRE-EXPERIMENT, AND POLICY DIRECTIVES AND GUIDELINES FOR THE MANAGEMENT BOARD AND SECOND PLANNING MEETING ON THE FURTHER CONDUCT OF TOPEX

70. In view of their close relationship the Committee discussed the two sub-items together. The Director of IEC (Mr. I. Shimizu) in presenting a broad summary of the report of IEC informed the Committee that a more detailed report would be given at the fourth session of the Management Board for TOPEX. Following the presentation of the report members presented brief reviews of the reports of their ESCs. The Committee agreed that the Pre-experiment had been very successful as a dress rehearsal particularly in revealing weaknesses in the current systems which would need to be corrected before the First Operational Experiment.

71. In general, the recommendations made by the seconded scientists at IEC and by ESCs which were considered to be a basis for the better planning of the First and Second Operational Experiments, were referred for more detailed

/consideration



consideration by the fourth session of the Management Board. However, a number of items were considered in some detail with the purpose of providing the Board with guidance for its work at that session.

72. Because the Pre-experiment had revealed a number of shortcomings in the telecommunications system which would be of increased importance in 1982 as a result of the WMO synoptic codes, as well as the additional data resulting from TOPEX, the Committee established a subgroup to consider those difficulties. It further decided that the findings of the subgroup should be referred directly for consideration by the fourth session of the Management Board.

73. The Committee noted that, as requested by the Board, a document had been proposed on the storing of TOPEX data in archives for consideration by the Board at its fourth session. In view of the importance of that question both for the evaluation of the Operational Experiments as well as for future research based on TOPEX data, the Committee made the following decisions:

(a) A complete TOPEX data set should be assembled. ESCs should make special arrangements to store all available data in archives;

(b) The data should be archived on magnetic tape and should be compiled in the proper format;

(c) The data sets should be made available as soon as possible after each of the TOPEX experimental periods so that an evaluation of the results could take place; JMA should assist in that process to the maximum extent possible;

(d) WMO should endeavour to provide funds in order that one complete set of the data could be provided to each participating member of the Typhoon Committee. Priority should be given to assigning funds for that purpose.

74. Finally, the Committee requested the Management Board, in conjunction with the Second Planning Meeting for TOPEX, to make all the necessary arrangements to ensure that the First Operational Experiment would achieve the greatest possible degree of success.

#### IV. SUPPORT FOR THE COMMITTEE'S PROGRAMME (agenda item 6)

75. The Committee considered the item on the basis of information provided in document WRD/TC.14/3 which reviewed the position as regards both the staffing of TCS and the Committee's programme of activities.



A. STAFFING OF TCS

76. The Committee was informed of the results of the WMO inquiry with members in seeking the secondment of a co-ordinator to TCS as requested at its thirteenth session. No member was able to assume those functions for the time being. The Committee therefore expressed its strong desire that Mr. R.L. Kintanar (Philippines) should continue his exemplary services in that capacity. Mr. Kintanar agreed to serve as co-ordinator for a further period on the understanding that he did so in a temporary capacity.

77. The Committee then sought the agreement of Japan and the Philippines in continuing to second a hydrologist and a meteorologist respectively to TCS as counterpart staff. Japan indicated that it was willing to examine the continuation of the services of the hydrologist and the Philippines agreed to continue to provide the meteorologist. It would also continue to provide facilities for TCS in Manila. The Committee expressed its warm appreciation to both members.

78. Noting that UNDP funding for the telecommunications/electronics expert would continue only to the end of 1982, possible ways of covering the years 1983 and 1984 were examined by the Committee. The vital importance of that post as a means of providing direct assistance to members in the running of the operational forecasting and warning system was emphasized by all. The Committee considered that the post was essential for the success of TOPEX in the years 1982 to 1984 and that continuity of service of the current expert (Mr. C.H. Tang) was highly desirable. He would be of particular help to members in the installation and maintenance of the new equipment to be provided under the UNDP project covering those years. The Committee decided unanimously that a strong plea should be made to UNDP by WMO and ESCAP to secure an extension of the expert's services.

79. The Committee also wished to thank WMO, UNDRO and LRCS for providing six months of consultant services in DPP in 1981. The services of the consultant had been of great value in the development of that component and it was necessary to strengthen further those activities by continuing the consultant's services on a part-time basis in 1982, particularly during the TOPEX First Operational Experiment. The Committee therefore requested the organizations concerned to arrange for the consultant to be made available again in 1982.

80. The representative of UNDP expressed his satisfaction that Mr. Kintanar had agreed to continue to serve as co-ordinator. Up to the end of 1981 UNDP had contributed approximately \$US 2 million to the work of the Typhoon Committee

/which



which was considered by UNDP to be one of its most successful regional projects. The new project for 1982-1984 would continue that support and, through it, UNDP would be involved in TOPEX. He stated that he would convey the views of the Committee to UNDP Headquarters for an extension of the services of the telecommunications/electronics expert but, in view of the current UNDP financial position, it was unable for the time being to augment the funds in the 1982-1984 project.

#### B. PROGRAMME OF ACTIVITIES

81. The Committee reviewed the possible sources of support for its programme of activities. Apart from UNDP, they included UNEP, the WMO VCP and, for TOPEX, the Special Temporary Voluntary Fund established by the Secretary-General of WMO. It wished to record its warm appreciation to UNDP of its continued generous support. It felt that the support provided by UNEP in 1981 for the manning of IEC in Tokyo was a valuable contribution to TOPEX and urged UNEP to provide at least further limited support for that purpose in 1982 and 1983. It also requested the Secretary-General of WMO to encourage WMO members to make the maximum contribution possible to TOPEX, either through the WMO VCP or the Special Temporary Voluntary Fund for TOPEX.

82. The representative of the Philippines called the attention of the Committee to the desirability of making use of all possible sources of support for the Committee's priority projects including TOPEX. He further proposed that the Committee should make strong representations to ESCAP for the allocation within the context of its mandates of a portion of its resources to support such priority projects of the Committee. The representative of Japan strongly supported the Philippine proposal. The representative of Japan informed the Committee that it was prepared to examine carefully possible bilateral aid for TOPEX on the basis of requests given high priority by the Governments seeking assistance.

83. WMO and ESCAP were asked to consider the use of any uncommitted funds to support fellowships, training and equipment to strengthen the activities under any of the components of the Committee's programme, especially the second and third components.

84. Noting that the third session of the Management Board for TOPEX had encouraged members to investigate the possibilities of exchanging experts between themselves as a TCDC arrangement, the Committee was of the opinion that such exchanges could make a valuable contribution to the wider activities



of its programme. It therefore decided that those possibilities should be further studied and requested WMO, ESCAP and TCS to consider how such exchanges could be arranged.

85. The Committee was informed that it had been decided to re-open IEC in Tokyo for the period 30 November to 3 December 1981 in order that the directors of ESCs might evaluate the experience gained during the Pre-experiment with the staff of IEC. UNEP had kindly agreed to meet the costs involved in that IEC activity.

86. The representative of Japan outlined the arrangements made for the roving mission on TOPEX which was planned for three periods of 15 days each between December 1981 and February 1982. The proposal was based on a request submitted by the Secretary-General of WMO following the offer made by Japan at the third session of the Management Board.

87. Finally, the Committee also wished to express its appreciation to the Secretary-General of WMO of the assignment of a secretariat officer to the area for three months in the last quarter of 1981. His functions of reviewing the results of the Pre-experiment and assisting members in their further preparation for TOPEX were considered to have been of great value to the countries he had visited. It felt that it would be beneficial for the First Operational Experiment if the mission could be resumed in early 1982 and continued for appropriate periods for the duration of TOPEX. The Committee hoped that the Secretary-General of WMO would give careful consideration to that proposal. It also wished to thank ESCAP for having provided office space and other facilities for the WMO officer in Bangkok.

V. PROGRAMME FOR 1982.  
(agenda item 7)

88. In considering its programme for 1982<sup>3</sup> as set out in document WRD/TC.14/4, the Committee took into account <sup>programme of work which was approved by the Committee at 15/5</sup> the short-term and long-term activities <sup>and 11th session</sup> and expected assistance from external sources. The execution of the First Operational Experiment of TOPEX <sup>Second</sup> that would bring new activities and additional requirements <sup>which is one of the important activities of the Committee</sup> in 1982<sup>3</sup> was fully considered.

89. Recognizing that a number of national activities of particular interest <sup>the individual members and some of these are to be executed by joint efforts of all members</sup> to the Committee would be carried out by the members, the Committee directed that special attention should be given, with the assistance of TCS, to the following items of work in 1982<sup>3</sup>:



(a) Meteorological component:

- (i) Operation and maintenance of electronic equipment (RS/RW) radar, radar picture transmission, satellite receiving and telecommunication equipment);
- (ii) Establishment of new radar stations in Malaysia, the Philippines and Thailand;
- (iii) Replacement and/or upgrading of old radar sets in Hong Kong, the Philippines and the Republic of Korea;
- (iv) Provision of equipment, spare parts and training of technicians for proper calibration and maintenance of weather radars and satellite data receiving equipment;
- (v) Provision for improvement of meteorological and telecommunication facilities included in the priority list established by the Committee;
- (vi) Establishment of satellite data receiving equipment for reception of cloud imagery and other data from GMS and TIROS-N satellites in the Philippines and Thailand;
- (vii) Review of national data collection facilities and data exchanges needed for typhoon warning services and taking remedial measures where necessary;
- (viii) Review of the existing arrangements for dissemination of typhoon and flood warnings with a view to introducing improvements, where necessary;
- (ix) Preparation for and execution of the TOPEX First Operational Experiment on the basis of the programme recommended by the First and Second Planning Meetings and the decisions made by the Management Board for TOPEX;
- (x) Collection and dissemination of tide gauge and water-level data for use in storm surge prediction;
- (xi) Procurement and installation of equipment and spare parts for telecommunication, radar satellite data receivers etc. under the UNDP fund provided for 1982;

(b) Hydrological component:

- (i) Investigation, survey and study of the pilot areas selected for comprehensive flood loss prevention and management including flooding by storm surges;



(ii) Further improvement in the operation of existing flood forecasting and warning systems in China, Malaysia, the Philippines and the Republic of Korea;

(iii) Establishment of flood forecasting and warning system in the Agno and Cagayan River basins in the Philippines, the Se Bang Hieng River basin in the Lao People's Democratic Republic, the Kinabatangan River basin in Sabah and the Sadong basin in Sarawak, Malaysia, and the Pasak river basin in Thailand;

(iv) Determination of magnitudes and frequency of floods in flood-prone areas and assessment of corresponding potential flood damage in the pilot areas mentioned in item (i) above;

(v) Development of flood forecasting and warning systems for dam operation in the Philippines;

(vi) Monitoring and reporting on the operation and performance of the flood forecasting systems selected for the TOPEX Hydrological Component;

(c) Disaster prevention and preparedness:

(i) Follow-up action on the joint LRCS/WMO/ESCAP missions in 1973-1976, the recommendations of the regional seminar at Tokyo in 1976, the review mission in 1976, the consultant's reports on Malaysia, the Philippines and Thailand in 1978-1979 and the recommendations made by the consultant in 1981;

(ii) Promotion of special programmes under the WD/IE component of TOPEX during the First Operational Experiment;

(iii) Follow-up action on the Philippine proposal to establish a Philippine training and research centre for disaster prevention and preparedness;

(iv) Advice and assistance with training in disaster prevention and community preparedness, through consultancy services where appropriate;

(v) Improvement in the dissemination of timely warnings on typhoons, floods and storm surges, with particular attention to remote areas;

(vi) Compilation of information on damage caused by typhoons and floods to be sent to TCS before the annual session. Such information should cover the disaster situation as regards loss of human life and damage to houses, public facilities, agricultural products, etc.;



(d) Training:

(i) Training of personnel through group training courses in Japan and through fellowships available under the UNDP assistance, technical co-operation among developing countries, from VCP and through bilateral assistance schemes. Short-term training courses and fellowships on maintenance of satellite data receiving equipment, radar and telemetering equipment might be given special consideration;

(ii) Assistance to members in exploring the possibility of providing long-term training courses in meteorology, hydrology and electronics. The VCP scheme might be further exploited for that purpose;

(iii) Training by TCS experts, assisted by counterpart staff, in meteorology and hydrology. On-the-job training by TCS experts, particularly in the operation and maintenance of radar, satellite data receiver and telecommunication equipment;

(iv) Exchange of information and identification of training facilities available among WMO members in the areas of concern and a survey of available fellowships and scholarship assistance;

(v) Participation in study tours and seminars relevant to the Committee's programme organized by members or international bodies;

(vi) Organization of training under TCDC in flood forecasting, including study tours;

(vii) Provision of short-term fellowships and organization of training in storm surge prediction;

(viii) Organization of a seminar on typhoon forecasting in China for a duration of 10-15 days;

(ix) Explore the possibility of providing facilities for training of trainers for the DPP component;

(e) Research:

(i) Stimulation of research activities through advisory services, visits of study groups and exchange visits by research personnel;

(ii) Undertaking of research on typhoons, particularly during the TOPEX period, and the promotion of joint collaboration on selected topics, such as studies directed towards the development of improved storm surge prediction methods, disaster preparedness and flood forecasting;

/(iii)



(iii) Promotion of exchange of information on typhoon and allied research activities, including developments on related matters outside the region;

(iv) Initiation of provisional studies on disaster risk evaluation in typhoon-prone areas, including flood risk mapping;

(v) Encouragement of co-operation between meteorologists, hydrologists and social scientists in the study of the social and economic impact of typhoons including response to warnings, estimation of damage, etc.

VI. CO-ORDINATION WITH OTHER ACTIVITIES OF THE WMO  
TROPICAL CYCLONE PROGRAMME  
(agenda item 8)

90. The Committee's discussion was based upon the information given in the seventh status report on the implementation of the WMO Tropical Cyclone Programme (TCP) (document WPD/TC.14/5), together with a verbal presentation of developments since 30 June 1981.

91. The Committee noted with satisfaction that in response to the request of Eighth Congress a revised plan of action for TCP had been drawn up and had been approved by the President of WMO as authorized by the Executive Committee. The plan had been distributed to all WMO members. It felt that the main principles upon which the plan was constructed, as endorsed by the Executive Committee, and the plan itself would ensure that over the next few years TCP could make further progress taking full account of developments in technology.

92. As part of the work under the general component a number of new publications had been issued since the thirteenth session, notably that on "Automatic weather stations for tropical cyclone areas" (sub-project No. 3) and two in the TOPEX Series - the "TOPEX operational manual" and "Typhoon Operational Experiment - a general description". Other sub-projects (Nos. 1, 4, 9 and 12) were close to completion, draft texts being under final review or ready for publication. The Committee expressed its appreciation to all those participating in the sub-projects and stressed the need for the work to be pursued with dispatch.

93. The activities of the WMO/ESCAP Panel on Tropical Cyclones, the RA I Tropical Cyclone Committee for the South-west Indian Ocean and the RA IV Hurricane Committee under the regional component of TCP were also reported to the Committee. The plan for the holding of a seminar on the application of satellite data to tropical cyclone forecasting as part of the programme of the



Panel on Tropical Cyclones was welcomed by the Committee. It was noted that the seminar was tentatively scheduled to be held in Bangkok from 31 May to 11 June 1982 and the Typhoon Committee expressed the hope that its members might also be invited to participate. The chief technical adviser to the Panel on Tropical Cyclones presented a report on the recent activities in his area.

94. The Committee was advised that at its fourth session (March 1981) the Hurricane Committee had decided that, in order to foster closer co-operation between the four regional cyclone bodies, representatives of the other three representatives of the Hurricane Committee be invited to participate in sessions of the Typhoon Committee was considered. The Committee agreed that such an arrangement would strengthen co-operation between bodies and recorded its readiness for invitations to its sessions to be addressed to the other three bodies. In that connection, it pointed out that the chief technical adviser to the Panel on Tropical Cyclone had already attended Committee sessions for several years and felt that that arrangement should continue. Similarly, the Co-ordinator or a member of the TCS staff should, whenever possible attend Panel Sessions.

95. Attendance of a Typhoon Committee representative at sessions of the Tropical Cyclone Committee for the South-west Indian Ocean and the Hurricane Committee was desirable but problematical because of the financial implications. It was suggested that the WMO secretariat should investigate the possibilities in the light of the circumstances prevailing when sessions of those bodies were held.

#### VII. CONSIDERATION OF THE AGENDA FOR THE FIFTEENTH SESSION OF THE COMMITTEE (agenda item 9)

96. The Committee requested the ESCAP and WMO secretariats, in consultation with TCS, to prepare the detailed agenda for the fifteenth session. In that connection, the Committee decided that the agenda should include the following item "Review of the 1981 and 1982 typhoon seasons". Members would be requested to prepare country papers containing information on typhoons and corresponding damage up to August 1982. It was agreed that members would inform ESCAP, WMO and TCS at an early date of any appropriate topics which they might wish to propose for the next session.

#### VIII. DATE AND PLACE OF THE FIFTEENTH SESSION (agenda item 10)

97. The Committee requested the ESCAP and WMO secretariats in consultation with the Chairman of the Committee to decide on the date and venue of the fifteenth session.



IX. SCIENTIFIC LECTURES  
(agenda item 11)

98. The following scientific lectures were presented:

- (a) "A preliminary analysis of the sudden change of direction and weakening of the selected typhoon "Poy" by Mr. Li Zhao Xiang (China);
- (b) "TOPEX - Are we on the right track?" by Mr. P. Sham (Hong Kong);
- (c) "The global socio-economic impact of tropical cyclones" by Mr. R.L. Southern (TSU).

99. A film entitled "NOAA - A global view" was shown by the United States.

100. The Committee expressed its thanks to the lecturers and to the United States for these presentations.

101. It was decided that the following subjects should be included in the scientific lectures to be presented at the fifteenth session:

- (a) A review of the typhoon season (1981 to August 1982);
- (b) A review of the TOPEX First Operational Experiment.

X. ADOPTION OF THE REPORT  
(agenda item 12)

102. The Committee adopted its report on 16 November 1981.

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