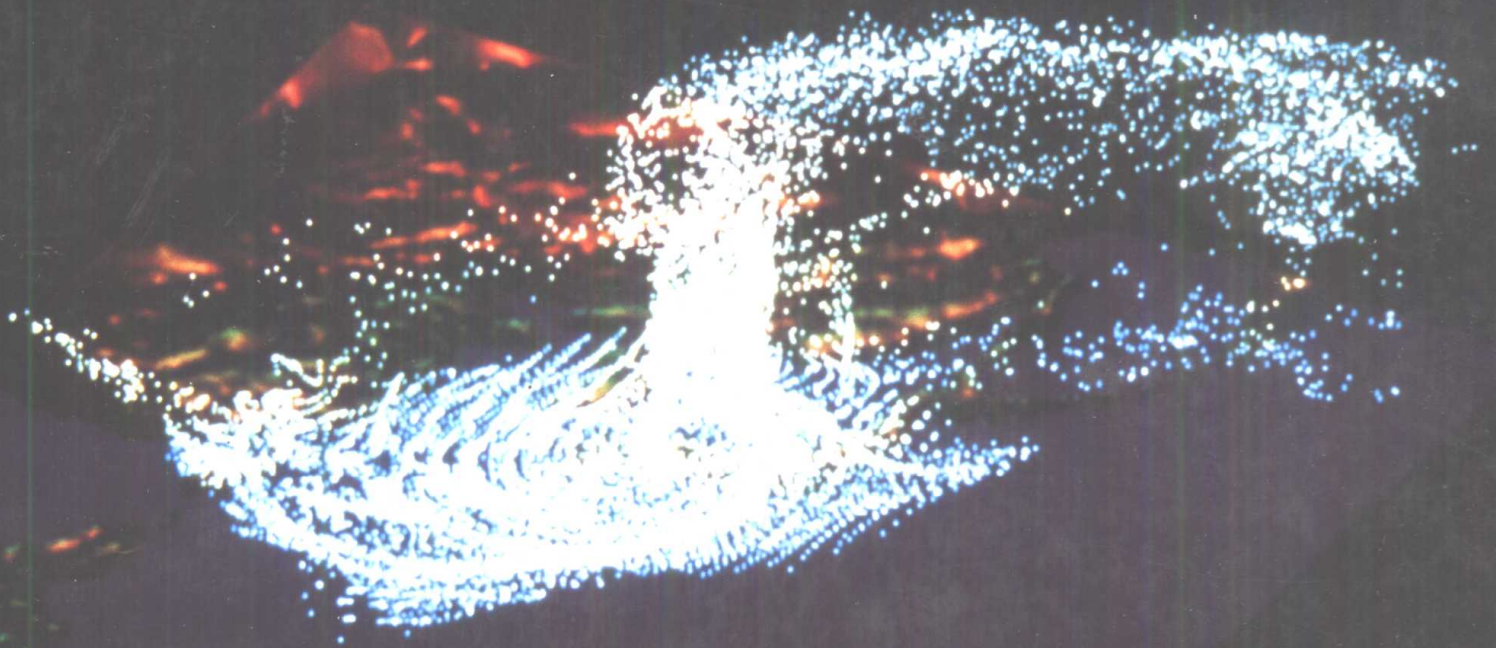


ESCAP/WMO Typhoon Committee Annual Review 1990



**SPECTRUM
1990**

ESCAP/WMO Typhoon Committee Annual Review 1990



UNITED NATIONS
Economic and Social Commission
for Asia and the Pacific



WORLD METEOROLOGICAL
ORGANIZATION

ESCAP/WMO

Typhoon Committee Annual Review

1990



UNITED NATIONS
Economic and Social Commission
for Asia and the Pacific



WORLD METEOROLOGICAL
ORGANIZATION

Typhoon Committee Secretariat
UNDP Manila
PO Box 7285 ADC
Pasay City
Philippines

Front cover: Typhoon Flo (9019) was one of the most intensely observed tropical cyclone during the SPECTRUM field phase in 1990. The 3-dimensional wind structure associated with Flo is simulated by the Typhoon Spectral Model (Experimental Model) of Japan Meteorological Agency. The rapidly ascending particles are flown eastwards by strong westerlies at the level of 10 km.

(Reproduced from a scene of animation for High Definition TV Programme: the wind field is visualized by the movement of particles. Computer graphics by courtesy of the NHK (Japan Broadcasting Corporation) and the Japan Meteorological Agency.)

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ESCAP, WMO AND THE ESCAP/WMO TYPHOON COMMITTEE

ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC (ESCAP)

The Economic and Social Commission for Asia and the Pacific (ESCAP) aims to initiate and participate in measures for concerted action towards the development of Asia and the Pacific, including the social aspects of such development, with a view to raising the level of economic activity and standards of living and maintaining and strengthening the economic relations of countries and territories in the region, both among themselves and with other countries in the world.

The Commission also :

- provides substantive services, secretariats and documentation for the Commission and its subsidiary bodies;
- undertakes studies, investigations and other activities within the Commission's terms of reference;
- provides advisory services to Governments at their request;
- contributes to the planning and organization of programmes of technical co-operation and acts as executing agency for those regional projects decentralized to it.

WORLD METEOROLOGICAL ORGANIZATION (WMO)

The World Meteorological Organization (WMO) is a specialized agency of the United Nations. WMO was created :

- to facilitate international co-operation in the establishment of networks of stations and centres to provide meteorological and hydrological services and observations;
- to promote the establishment and maintenance of systems for the rapid exchange of meteorological and related information;
- to promote standardization of meteorological and related observations and ensure the uniform publication of observations and statistics;
- to further the application of meteorology to aviation, shipping, water problems, agriculture and other human activities;
- to promote activities in operational hydrology and to further close co-operation between Meteorological and Hydrological Services;
- to encourage research and training in meteorology and, as appropriate, in related fields.

THE ESCAP/WMO TYPHOON COMMITTEE

Under the auspices of ESCAP and WMO, the Typhoon Committee was constituted with a view to

promoting and co-ordinating efforts for minimizing typhoon damage in the ESCAP region. The incipient stage of the Typhoon Committee dated back to 1964 when the United Nations Economic Commission for Asia and the Far East (ECAFE)* at its twentieth session recommended that the Secretariat, in co-operation with WMO, should study the practical means of initiating a joint programme of investigations of typhoons in the ECAFE region. Accordingly, a meeting of the Working Group of Experts on Typhoon was organized by ECAFE and WMO with financial assistance from the United Nations Development Programme (UNDP) in Manila in December 1965. Noting the extensive damage caused by tropical cyclones in the region, the meeting recommended that a Preparatory Mission on Typhoons be organized to visit the countries in the ECAFE region and neighbouring countries affected by tropical cyclones, in order to formulate an action programme to mitigate typhoon damage. It also recommended that a second meeting of experts be convened to examine the report of the Mission.

Consequently, the ECAFE/WMO Preparatory Mission on Typhoons was organized during the period from December 1966 to February 1967, with financial assistance from UNDP. Broadly, the report of the Mission provided recommendations to improve meteorological observing networks, telecommunication facilities, typhoon forecasting and arrangements for warnings. It also described requirements for the improvement or establishment of new pilot flood forecasting and warning systems on a key river basin in each of the countries visited. The establishment of a Regional Typhoon Centre was also dealt with in the report.

The second meeting of the Working Group of Experts on Typhoon was held in Bangkok in October 1967 and the meeting endorsed the report of the Preparatory Mission and reiterated the need for early action to mitigate typhoon damage as a means of speeding economic development in the region. It also reaffirmed that national as well as joint efforts were necessary to combat effectively the detrimental effect of typhoons. Accordingly, the meeting recommended that a Typhoon Committee with a Regional Typhoon Centre as its executive body be established under the auspices of ECAFE in co-operation with WMO; and the ECAFE and WMO secretariats were requested to draft jointly the statute and rules of procedure of the proposed Typhoon Committee and to convene an ad hoc meeting of government representatives to consider and finalize the drafts.

The ad hoc meeting on the statute of the Typhoon Committee was held in Bangkok from 29 February to 2 March 1968. The meeting, besides finalizing and adopting the statute and rules of procedure of the Typhoon Committee, recommended that the statute of the Typhoon Committee be submitted to the twenty-fourth session of ECAFE and the appropriate body of WMO for consideration. It also recommended that ECAFE and WMO should provide a small staff to undertake the preparatory work required for the implementation of the programme recommended by the Mission.

At its twenty-fourth session in April 1968, ECAFE endorsed the establishment of the Typhoon Committee in accordance with the statute as adopted by the ad hoc meeting. In a parallel action, the WMO Executive Committee, at its twentieth session in 1968, endorsed the establishment of the Typhoon Committee.

The inaugural session of the Typhoon Committee was convened in Bangkok in December 1968.

The Typhoon Committee is currently composed of 10 Members : China, Hong Kong, Japan, the Republic of Korea, Lao People's Democratic Republic, the Philippines, Thailand, Cambodia, Malaysia and Viet Nam.

* ECAFE was named as ESCAP (Economic and Social Commission for Asia and the Pacific) in 1974.

The functions of the Committee are to :

- review regularly the progress made in the various fields of typhoon damage prevention;
- recommend to the participating Governments concerned plans and measures for the improvement of meteorological and hydrological facilities needed for typhoon damage prevention;
- recommend to the participating Governments concerned plans and measures for the improvement of community preparedness and disaster prevention;
- promote the establishment of programmes and facilities for training personnel from countries of the region in typhoon forecasting and warning, flood hydrology and control within the region and arrange for training outside the region, as necessary;
- promote, prepare and submit to participating Governments and other interested organizations plans for co-ordination of research programmes and activities concerning typhoons;
- consider, upon request, possible sources of financial and technical support for such plans and programmes;
- prepare and submit, at the request and on behalf of the participating Governments, requests for technical, financial and other assistance offered under the UNDP and by other organizations and contributors.

In carrying out these functions, the Typhoon Committee maintains and implements action programmes under the five components of meteorology, hydrology, disaster prevention and preparedness, training, and research with contributions and co-operation from its Members and assistance by the UNDP, ESCAP, WMO and other agencies.

TYPHOON COMMITTEE (1990-91)

Chairman : Mr. Park Yong-Dai (Republic of Korea)

Vice Chairman : Mr. Luo Jibin (China)

TYPHOON COMMITTEE SECRETARIAT

Co-ordinator : Dr. Roman L. Kintanar (Philippines)

Meteorologist : Mr. J.E. Lucas (Philippines)
until 31 March 1990
Mr. Gabriel S. Monroy (Philippines)
from 1 April 1990

Hydrologist and Flood Forecasting Expert : Mr. A. Yoshii (Japan)
until 30 April 1991
Mr. Keigo Yanagiya (Japan)
from 23 April 1991

Disaster Prevention and Preparedness Expert : Col. (Ret.) V.R. Pagulayan, Jr. (Philippines, part-time)

Technical Assistant to the Co-ordinator : Mr. Juanito E. Lucas (Philippines)
from 1 April 1990 to 16 March 1991

FOREWORD

Moving into the last decade of the twentieth century, we can reflect on an era with great advances in science and technology. We left our footprints on the moon, sent space vehicles to Mars, and the Voyagers are sailing out of the Solar System. In spite of these achievements, we are still bemused by some earth-bound natural phenomena like typhoons. I have vivid memories of Typhoon Mike (9025) hitting the Philippines in mid-November when the Twenty-third Session of the Typhoon Committee was in progress in Seoul, Korea. Although thousands of miles away, the devastating effects of the typhoon could still be felt.

We know we cannot control weather despite the recent advances in science and technology. Likewise we cannot control typhoons. The best we can do is to be prepared. Although neither our knowledge nor observations on tropical cyclones is considered sufficient, the future looks promising and our efforts so far have not been in vain, knowing that many lives and properties have been saved from the horrible typhoons!

We have successfully implemented the SPECTRUM in 1990. It was an exceptionally well-coordinated experiment among Member countries. It confirmed our earnest intention of saving more human lives, and opened up a new potential area of research. Now it is up to the follow-up research activities to bring out the hidden knowledge on tropical cyclones. It is worth mentioning that RSMC Tokyo - Typhoon Center has contributed enormously from the field phase of SPECTRUM to the follow-up activities. It is obvious that we owe much of our present success to the RSMC. I am confident that the combination of our efforts and all disciplines of science and technology will lead us to a minimization of the disastrous impact of tropical cyclones. As such, I think the timing of the IDNDR is particularly meaningful. By wiping out the destructive natural disasters by the end of this decade, we will be witnessing at the end of the IDNDR the dawn of the twenty-first century and the realization of a dream of modern science and technology.

There will be several special events in the coming years. The Twenty-fourth Session of the Typhoon Committee will be held jointly with the Panel on Tropical Cyclones. It will be a great opportunity to exchange knowledge of mutual interest through such regional cooperation. The Committee is also proposing a project for the next UNDP programming cycle of 1992-1996. The Typhoon Committee is still not totally self-reliant even with contributions from Member countries and the Trust Fund. External sources of funds remain limited. It is a hard fact that the Committee is also dependent upon the substantive financial support from the UNDP. I would like to express my sincere gratitude to the UNDP for its support throughout the years and hope that such close cooperation will continue in the future.

On behalf of the Typhoon Committee, I wish to express my sincere gratitude to the Royal Observatory of Hong Kong for the service of the Chief Editor and for undertaking the printing of this publication. I also wish to thank the National Editors for their active cooperation in bringing together this invaluable Review. Acknowledgement is extended to ESCAP, WMO, and Typhoon Committee Secretariat for supporting the present issue.



Park, Yong-Dai
Chairman of the Typhoon Committee
1990-91

**ESCAP/WMO TYPHOON COMMITTEE ANNUAL REVIEW 1990
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INTRODUCTION

ESCAP/WMO Typhoon Committee Annual Review 1990, with primary contributions from Members, was compiled and published following the decision of the Typhoon Committee at its twenty-third session in 1990 to continue the publication of an annual review.

Chapter 1 provides an overview of the activities of the Typhoon Committee in 1990. It contains detailed information supplied by Members of the Committee on individual national programmes and activities related to meteorology, hydrology, disaster prevention and preparedness, training and research. Technical and administrative support provided and activities undertaken by the Typhoon Committee Secretariat during 1990 are also covered. A new section on RSMC Tokyo - Typhoon Center is incorporated.

Based on Members' post analyses of tropical cyclones and climatological data available at the Royal Observatory in Hong Kong, special features of the 1990 tropical cyclone season are highlighted. A summary of the 32 tropical cyclones in 1990 is given in the first part of Chapter 2. Each tropical cyclone is identified by a 4-digit code assigned by the Japan Meteorological Agency (JMA) and/or a name given by the Joint Typhoon Warning Center (JTWC) in Guam. The intensity of the tropical cyclone is classified as follows in accordance with WMO Guide to Marine Meteorological Services (WMO - No. 471) and WMO Manual on Marine Meteorological Services (WMO - No. 558) :

Classification	Maximum Sustained Winds	
	Equivalents in SI units	
(a) Tropical depression	up to 34 knots	up to 17.2 m/s
(b) Tropical storm	34 - 47 knots	17.2 - 24.4 m/s
(c) Severe tropical storm	48 - 63 knots	24.5 - 32.6 m/s
(d) Typhoon	64 knots or more	32.7 m/s or more

The second part of Chapter 2 contains in-depth reports on tropical cyclones affecting Members in the region. Each report includes a detailed account of the physical and dynamical processes influencing the movement and intensity of the tropical cyclone. Efforts were made to document the extent of damage caused by the tropical cyclone as accurately as possible utilizing statistics supplied by the national editors and damage reports from the press.

In the context of Chapter 2, sustained winds refer to wind speeds averaged over a period of 10 minutes. SI units of hectopascal (hPa) for atmospheric pressure and metres per second (m/s) for wind speed are adopted in accordance with WMO recommendations, while kilometres per hour (km/h) for speed of movement of tropical cyclones and other weather systems are used in accordance with the practice of some Members. Reference times used in this Chapter are primarily in Co-ordinated Universal Time (UTC). But when described in a more general context in the narratives, local time (with respect to the geographical area then affected by the tropical cyclone) is also used. Whenever possible, station names contained in WMO Weather Reporting - Observing Stations (WMO - No. 9, Volume A) are used for geographical references.

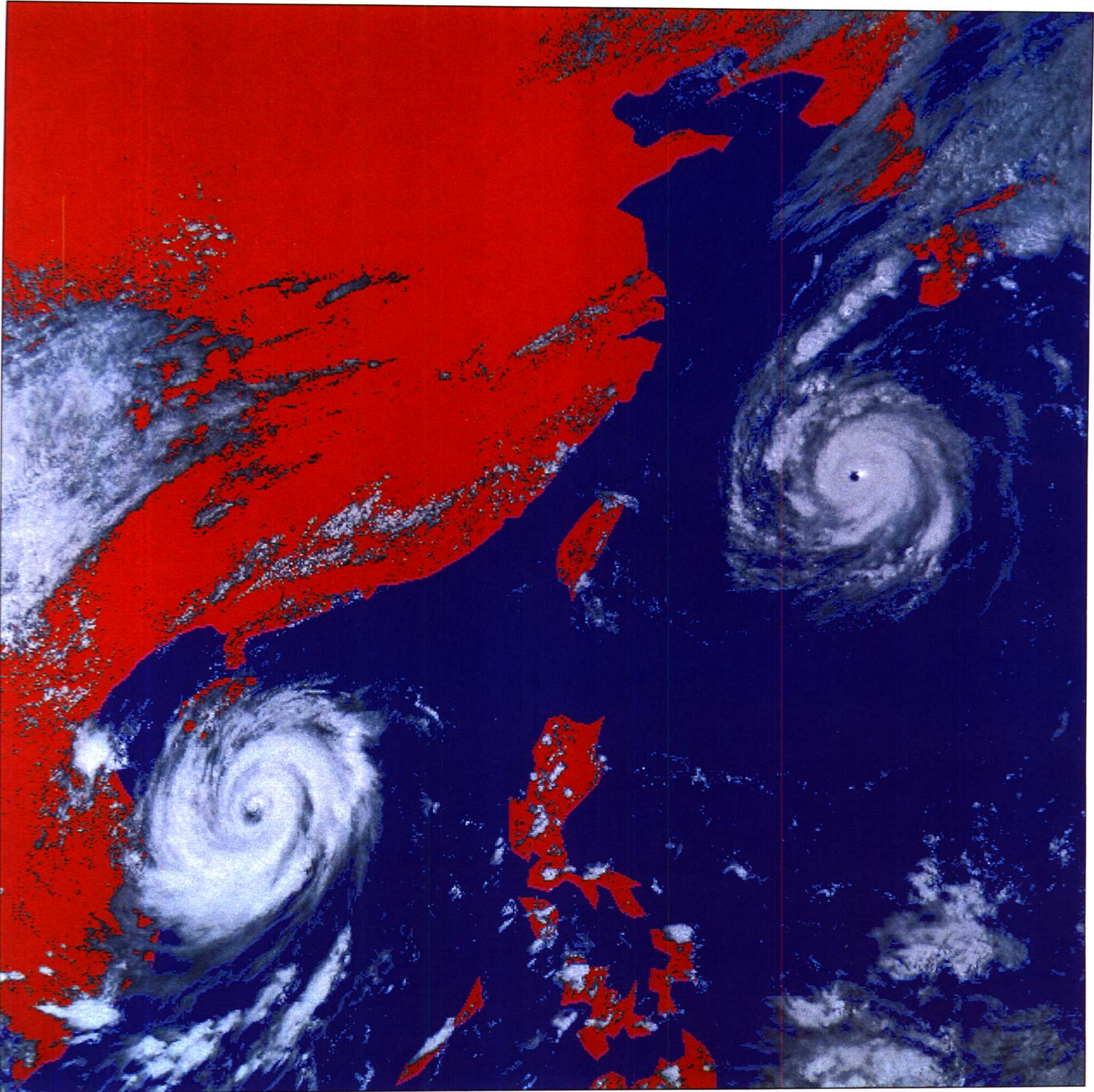
Chapter 3 consists of five contributed papers which discuss in depth topics of regional interest. The first paper is a special review on SPECTRUM by the Chairman of the SPECTRUM Steering Group. The

second paper is extracted from a JMA report and describes some special observations made in Japan during SPECTRUM. The third paper is the sequel to the Chinese FY-1 meteorological satellite programme. The fourth paper illustrates the studies and improvement undertaken at JMA in the field of numerical forecast of tropical cyclone tracks. The fifth paper provides an insight into the regional exchange of radar data between China and Hong Kong.

Chapter 4 outlines the activities of the WMO Tropical Cyclone Programme in 1990. In particular, the activities of regional tropical cyclone bodies are highlighted.

The Annual Review is a joint publication made possible through the support of ESCAP, WMO and UNDP. This Review could not have come to fruition without the co-operation and hard work of the National Editors of the Members of the Typhoon Committee and the valuable assistance of a number of colleagues at the Royal Observatory, Hong Kong. In particular, I would like to thank: Mr. K.P. Wong for his tireless effort in assembling and editing the manuscript, Miss P.C. Yu for her dedicated effort in extracting and verifying the required data, and Mr. Y.K. Lee for his fine artwork on tropical cyclone tracks.

Chief Editor
August 1991, Hong Kong



Typhoon Ed (9018) and Typhoon Flo (9019) are just two of the seven tropical cyclones observed during SPECTRUM in 1990.

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