

INTERNATIONAL CONFERENCE
ON THE GENERAL CIRCULATION
OF EAST ASIA

Organized by
the Organizing Committee of the International
Conference on the General Circulation of East Asia
and co-sponsored by
the Institute of Atmospheric physics and the Lanzhou
Institute of plateau Atmospheric physics, Academia Sinica,
and the Meteorological Society of Japan

April 10-15, 1987, ~~Chengdu~~ Chengdu, China

International Conference on the General Circulation of East Asia

(Chengdu, China, 10-15 April 1987)

CONTENTS

- Qingcun Zeng and Xinzhong Lian (China)
Numerical Simulation of the Abrupt Changes, Low Frequency Oscillation,
Teleconnection of Atmospheric Circulation by I.A.P. GCM.....(1)
- Tomio Asai, Yasumasa Kodama and Ji-Cang Zhu (Japan)
Long-Term Variations of Cyclone Activities in East Asia.....(3)
- Shiyan Tao, Wenmei Zhu and Wei Zhao (China)
Some characteristics of the East Asia Monsoon circulations during anomalous
droughts and Floods in 1978 and 1980.....(4)
- Akimasa Sumi (Japan)
Equilibrium States over the Tropical Ocean with Zonally Uniform SST Surrounded
by the Dry Continents.....(6)
- Akimasa Sumi and Takenobu Toyota (Japan)
Observed Study on cold Surges around the Tibetan Plateau.....(8)
- Maocang Tang and Zhuguo Ma (China)
The Climatic Characteristics of Boundary Layer Wind Field of China in Summer
and Winter.....(9)
- Ronghui Huang and Wijing Li (China)
Influence of the Anomaly of Heat Source over the Northwestern Tropical Pacific
for the Subtropical High over East Asia.....(10)
- Guoxiong Wu (China)
Some Aspects of Dynamics of Tibetan Plateau.....(11)
- Binkai Su, Congbin Fu and Xiaowei Quan (China)
The Propagation Features of the Equatorial Pacific Warming.....(12)
- Masatoshi Yoshino (Japan)
Cold Waves and Winter Monsoon in East Asia.....(14)
- Shuying Xu and Youyuan Si (China)
Variation of the Centers of Action and Monsoon and Their Influence on Eastern
Asian Climates.....(15)
- Masato Murakami (Japan)
Analysis of the Cold Surge over ~~East Asia~~ and the Large-Scale Convective
Activity in the Tropics.....(17)
- Chongyin Li and Ji Hu (China)
An Analysis on the Interaction between the General Circulation in the
Atmosphere over East Asia/the Northwestern Pacific and El Nino.....(19)

Yuxiang Chen and Chongyin Li (China)	
A Teleconnection Analysis on the Cold Surges over East Asia in Winter.....	(21)
Mingli Zhang (China)	
Teleconnection of the Dominant Spatial Patterns of 500hPa GPH Field with SST in Tropical Ocean.....	(22)
Tsuyoshi Nitta (Japan)	
Convective Activities in the Tropical Western Pacific and Their Impact on the Northern Hemisphere Summer Circulation.....	(24)
Liren Ji (China) and S. Tibaldi (ECMWF)	
On the Effects of Heat Sources during the Seasonal Transition of General Circulation over Asia.....	(25)
Lieting Chen (China)	
Zonal Anomaly of Sea-Surface Temperature in the Tropical Indo-Pacific Ocean and Its Effect on Summer Asia Monsoon.....	(26)
Dengyi Gao, Han Zou and Wei Wang (China)	
Influence of Water Vapor Pass along the Yarlungzangbo River on Precipitation... ..	(27)
Zhifang Fang (China)	
The Effect of the North Polar Ice in January on the Eastern Asian Summer Circulation.....	(29)
Congbin Fu, Dongfeng Dong, Xiaowei Quan and Binkai Su (China)	
The Moisture Variability over the Tropical Pacific and Indian Oceans.....	(31)
Baozhen Zhu (China)	
Characteristics of the General Circulation over Eastern Asia in Relation to the Dynamics Effect of the Tibetan Plateau.....	(32)
Shisong Huang, Mingmin Tang and Chunyu Lin (China)	
The Rainy Season of the Middle-Lower Reaches of Yangtze River and the Atmospheric Circulation in Low Latitudes.....	(33)
Yihui Ding and Jian Hu (China)	
The Variation of the Heat Sources in East China in the Rainy Summer of 1984 and Their Effects on the Large-Scale Circulation in East Asia.....	(34)
Jingya Zhou, Dasheng Yang, Jiayou Huang and Jizhi Wang (China)	
A Study on Periodic Oscillations of Wind Field over Low-Level Atmosphere for Region of 90 E-90 W.....	(37)
Guoqing Li (China)	
Some Correlation Phenomena of Low Latitude Circulation Systems over the Asian Summer Monsoon Area.....	(39)

Guangji Yang (China)	
The Characteristics of Precipitation in East China and Its Relation to India and North America.....	(41)
Tatsuya Iwashima and Ryozauro Yamamoto (Japan)	
Climatic Jump of the Asia Monsoon Circulation.....	(43)
Tan Zhang (China)	
Analysis of Mid-Term Oscillation of Summer Monsoon Circulation over Asia...	(44)
Zhaomei Zeng (China)	
Relationship between the Warming in different Sea Regions and Mid-Latitudes Atmosphere Circulation and the Climate in china.....	(46)
Yan Zhang (China)	
Application of Numerical Diagnostic Analysis and Its Facsimile Transmission on Heavy Rain Forecast in Yangtze Valley.....	(48)
Kuranoshin Kato (Japan)	
A Review on the Studies on Large-Scale Features of the Baiu Front in East Asia.	(50)
Kesu Zhang (China)	
Ageostrophic Mesoscale Instability of a Baroclinic Flow.....	(52)
Tomio Asia (Japan)	
Study of Heavy Rainfall Associated with Baiu-Front.....	(54)
Siwei Luo, Weijing Li and Shihua Lu (China)	
An Analysis of Numerical Forecast of the Effect of the Tibetan Plateau on the Meso- Weather Systems.....	(55)
Shuqing Sun (China)	
A study on Background Circulation of Low Level Jet in East Asia.....	(58)
Shihua Lu (China)	
The Effects of the Sensible and Moist Convective Heat on the formation and Development of a Mesoscale Vortex over the East Tibetan Plateau.....	(60)
Sixiong Zhao (China)	
A Diagnostic Study of Cyclogenesis on Baiu Front.....	(62)
Kuranoshin Kato (Japan)	
Characteristics of the Baiu (Mei-yu) Front in China and Their Relation to the global Summer Monsoon.....	(64)
Kuranoshin Kato (Japan)	
Airmass Transformation due to the Heating from the Ground in the Semiarid Region from Mongolia to North China in Late May Relating to the "Structure Change" in the Baiu (Mei-yu) Front in China.....	(66)

Jingya Zhou, Dasheng Yang and Yafen Zhu (China)	
The Characteristics of the Tropical LLJ and the Upper Level Easterly Jet during Large Scopic Heavy PPT over China.....	(68)
Kesu Zhang and Jian Liu (China)	
A Possible Triggering Mechanism for Mesocale Rain Band of Mei-yu Front.....	(70)
Fujun Huang (China)	
A Compresive Diagnostic Analysis of Southwest Vortex during Summer Monsoon.....	(71)
Hua Sheng and shiyan Tao (China)	
Dynamic Effect of Qinghai-Xizang Plateau and Rocky Mountains on the Lee Cyclones.....	(73)
S. Tibaldi (ECMWF)	
The Performance of the ECMWF Forecasting Model over East China.....	(74)
Zhihao Yu and Xiaozhen Ge (China)	
Numerical Simulation of Seasonal Displacement of Subtropical High Ridge Line...	(75)
Rujin Shen and Liren Ji (China)	
The Effect of Topography and Heating Components on the Formation of Summer Monsoon in Asia-Africa.....	(77)
Siwei Luo and Weijing Li (China)	
A Numerical Simulation of the Effect of Qinghai-Xizang Plateau on the Mean Criculation in Asia for October.....	(79)
Meixia Luo and Kesu Zhang (China)	
A Numerical Experiment of the Effect of the Large Scale Topography and Diabatic Heating on the Formation of East Asia Monsoon and India Monsoon Circulation....	(81)
Akimasa Sumi (Japan)	
Review: Present Status of Numerical Weather Prediction at Japan Meteorological Agency.....	(83)

NUMERICAL SIMULATION OF THE ABRUPT CHANGES, LOW FREQUENCY OSCILLATION,
TELECONNECTION OF ATMOSPHERIC CIRCULATION BY I.A.P GCM

Zeng Qingcun and Liang Xinzhong

(Institute of Atmospheric Physics, Academia Sinica, Beijing, China)

I.A.P GCM is a global grid-point two-level primitive equation model which differs from the other GCM. In this model, departure of temperature, geopotential and surface pressure are introduced to cancel automatically the large truncational errors in the mountain regions. Moreover, new coordinates and new variables are introduced to lead a compact form of the energy equation and a more flexible arrangement of the grids in the model. This model is, successfully, used to simulate the global circulations, especially the atmospheric circulations and its changes over East Asia, for example, "June and October abrupt changes", "South oscillation", "North Oscillation", and "teleconnection", et al.,

The results of numerical simulations show as follows

1. Comparisons of the results simulated by using I.A.P GCM and OSU GCM and other models explain that the dynamical and numerical schemes is important for the simulation of atmospheric circulation.

2. The abrupt changes of the seasonal transitions, which exactly occurs in June and October, in East Asia may be a nonlinear interactions in the dynamical and thermal processes in the dissipative

atmosphere.

3. the low frequency oscillations may be the in herent energy cycle in the whole atmosphere.

LONG-TERM VARIATIONS OF CYCLONE ACTIVITIES IN EAST ASIA

Tomio Asai, Yasumasa Kodama and Ji-Cang Zhu

Ocean Research Institute, University of Tokyo

As is known well, East Asia is one of the most active cyclogenesis regions in the world. A statistical analysis is made of temporal and spatial variabilities of cyclone activity in middle latitudes in East Asia during the recent fifty years.

A longer-term variation in frequency of cyclones passing over Japan and its vicinity with time scale of twenty years is found as well as shorter-term variations with periods of a few years. A significant decreasing tendency is shown in cyclone frequency since late 1960's.

Three principal tracks of cyclones are distinguished in East Asia all the year around except for disappearance of the south one in summer and their behaviors will be discussed.

SOME CHARACTERISTICS OF THE EAST ASIA MONSOON CIRCULATION DURING
ANOMALOUS DROUGHTS AND FLOODS IN 1978 AND 1980

Tao Shiyan

(Institute of Atmospheric Physics, Academic Sinica)

Zhu Wenmei and Zhao Wei

(Academy of Meteorological Science)

In this paper, by using the U.S.A. NMC and E.C grid point data, the characteristics of the East Asia Monsoon system for the typical flood year and drought year over Jianghuai area in the summer are analysed; the results show that the position of the westerly Jet stream at the middle latitude of the Northern Hemisphere in the flood year is five latitudes more southern than that in drought year. This is in correspondence with the strong divergence area of E-P flux and the strong convergence area of momentum flux. In flood year of the Jianghuai area monsoon circulation is quite normal while in drought year monsoon circulation is not typical. The position of East Asia Monsoon system of the Northern Hemisphere in flood year is 7-8 latitude farther south than that in drought year. We also found that the cross-equatorial flow at 105°E has a week oscillation and that in the flood year and drought year Southern Hemisphere Australia cold high has a little shift in the West-

East direction.

EQUILIBRIUM STATES OVER THE TROPICAL OCEAN WITH ZONALLY UNIFORM SST SURROUNDED BY THE DRY CONTINENTS

Akimasa Sumi

Geophysical Institute, University of Tokyo

In order to understand the behavior of an ensemble of cloud clusters over the tropical ocean with the zonally symmetric SST surrounded by the dry continent, numerical experiments have been conducted. A long time-integration was performed under the three different conditions corresponding to the northern hemisphere winter, summer, and spring.

The following significant results have been obtained:

(1) Cloud clusters on the equator tend to be located at the eastern end of moist region over the ocean (3000 km westward from the eastern boundary). Dry air over the continent is induced on the equator by the airflow generated by the cloud clusters, and contribute to the redistribution of moisture field. The location of the cloud cluster on the equator is also determined by the moisture field. Thus, the location of cloud clusters on the equator is determined by the mutual interaction between cloud clusters and moisture fields. Due to the difference of the wind speed of easterly (westerly) at the western (eastern) boundary of the ocean, eastward gradient of moisture field is steeper than

westward gradient.

(2) Cloud clusters in the subtropics tend to be located in the western part of the ocean. Time-averaged maximum of the precipitation exists 3000 km-6000 km away from the western boundary. The location of the cloud cluster in the subtropics can be explained by the balance of the land-ocean contrast and the beta-effect. In other words, the atmosphere can feel the existence of the western boundary.

OBSERVED STUDY ON COLD SURGES AROUND THE TIBETAN PLATEAU

Akimasa Sumi and Takenobu Toyota

Geophysical Institute, University of Tokyo

The existence of cold surge event around the Tibetan Plateau have been pointed out by Murakami and Nakamura (1983) and Sumi (1985). However, these phenomena is mainly based on the numerica modelling's results and there is few observational study on it. Therefore, we dicided to investigate the cold surge events around the Tibetan Plateau only by using the radio-sonde data.

The cast of 21-23, December, 1983 which was discussed in Sumi (1985), is mainly discussed in this study. The basic feature that cold northerly is trapped around the mountain is also demonstrated by the observations. Furthermore, observations around the Tibetan Plateau clearly shows that cold air is trapped and propagates clockwise around the mountain. Statistical study also revealed that there exists some phenomena relating to the existence of mountain.

It is confirmed from the observation stydt that there exists the cold surge around the mountain.

THE CLIMATIC CHARACTERISTICS OF BOUNDARY LAYER WIND FIELD
OF CHINA IN SUMMER AND WINTER

Tang Maocang Ma Zhuguo

(Lanzhou Institute of Plateau Atmospheric Physics, Academia Sinica)

Based on the upper wind data in January and July (1960-1969). The resultant wind field of three standard layers near surface layer was analysed, which shown that: A) boundary layer wind can be divided into three wind systems (Planetary Western Wind, Plateau Monsoon and Ocean-Land Monsoon); B) there is a Low-Level Jet (LLJ) near the region with strongest surface thermodynamics contrast in the boundary layer; C) the vertical profile of wind speed in LLJ region is like "S"; D) in summer, to the east of Tibet Plateau, there are two LLJ regions, they are matched with the two steps of topography respectively, while to the east of Rocky Mountain only one LLJ matched the topographic step.

INFLUENCE OF THE ANOMALY OF HEAT SOURCE OVER THE NORTHWESTERN TROPICAL
PACIFIC FOR THE SUBTROPICAL HIGH OVER EAST ASIA

Huang Ronghui

(Institute of Atmospheric Physics, Academia Sinica, Beijing, China)

Li Weijing

(Lanzhou Institute of Plateau Atmospheric Physics,
Academia Sinica, Lanzhou, China)

Many observational facts show that intensified convection may occur around the South China Sea and Philippines in the period of positive SST anomaly in the tropical western Pacific in summer. Some observational studies show there is closely relationship between the development of the subtropical high over East Asia and the intensified convection around the South China Sea and Philippines.

A 34-level, quasi-geostrophic, spherical coordinate model is used to study this relationship. The computed results show that when the convection intensified around the south China Sea and Philippines, the subtropical high will intensify over East Asia. The computed results also show that the sensible heat anomaly due to SST anomaly in the western tropical Pacific mainly influence the North Pacific High.

SOME ASPECTS OF DYNAMICS OF TIBETAN PLATEAU

Wu Guoxiong

Institute of Atmospheric Physics, Academia Sinica

Theoretical research and numerical modelling show that, although mountain torque owes its existence to the unevenness of the ground surface, its sign, intensity and location depend strongly upon the relative disposition between mechanical and thermal forcing. These are evidenced by the annual variation of mountain torque in the Northern Hemisphere reported by Yeh and Zhu (1958).

Some comparisons of dynamical effects between Tibetan Plateau and Rockies are given. Numerical experiments show that the convergence of three branches of flow over the eastern flank of Tibetan Plateau due to the deflection and climb effects of orography is responsible for the formation of a mesoscale vortex. It differs from the standard flow pattern of mid-latitude cyclones proposed by Browning.

High frequency in cyclone occurrence over East Asia is also attributed, at least partly, to the high elevation of Tibetan Plateau.

THE PROPOGATION FEATURES OF THE EQUATORIAL PACIFIC WARMING

Su Binkai

(Department of Atmospheric Science, Nanjing University, China)

Fu Congbin and Quan Xiaowei

(Institute of Atmospheric Physics, Academia Sinica, Beijing, China)

The anomalous warming of sea surface temperature (SST) in the equatorial Pacific is one of the basic features of ElNino/Sonthern Oscillation phenomenon. However some questions about its origin and formation are remained to be answered.

In this paper, the complex EOF analysis (CEOF) is used to study the amplitude and phase variation of SST in the tropical Pacific and Indian Oceans. It is found that three centers of large amplitude located at the east, central and western Pacific respectively, show strong signal in the SST distribution.

The phase distribution shows the large scale characters with information flow between different parts of the equator, which could be some indicates of propogation of equatorial warming.

It is very interesting that the phase transform of second eigenvector showing the strong SST signal in the central Pacific, appears usually about one year before the ElNino onset. That means the