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CURRENT STATUS OF METEOROLOGY IN CHINA

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CURRENT STATUS OF METEOROLOGY IN CHINA

This is a translation of an article written by Yeh T'u-heng in "Acta Geophysica Polonica, Vol VI, No 4, Warsaw, 1958, pages 372-377.

Even in antiquity the Chinese people paid a great deal of attention to the influences of weather and climate upon the various facets of the country's life. One finds a rich source of materials describing meteorological occurrences in diary manuscripts that are 4000 years old as well as in the ballads and legends that are widespread among the people. Meteorology as a modern science starts in China, however, only during the 20's of our present century, and its mighty development began only within the last seven years, that is, since 1949 or the establishment of the people's rule.

We will give below a short description of the present state of observation work, didactic research and publishing activities in the field of meteorology, allotting the most space to research work.

1. The Present State of Observation Work
in the Field of Meteorology

Although there were meteorological scientific and research institutes as well as an organized meteorological service in China before the liberation, their development was, nevertheless, weak because of a lack of interest on the part of the reactionary government in this branch of learning. For example, only a few land stations were scattered over the vast areas of the northwest and southwest. The number of stations in the coastal regions of eastern and southern China was also insignificant. With respect to aerological stations, only a few radio weather stations were continuously active outside of the small number of flight-weather stations.

Shortly after the liberation (in 1949) a new management of the meteorological service was created and, at the same time, the network of observation stations was put in order

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and expanded. Central and local weather forecasting bureaus were organized which were also made responsible for collecting meteorological data from previous years. This reorganization was dictated by the need to fulfill the country's continuously growing defense needs and meet the requirements of building the national economy. The newly created stations surpass considerably those in existence before the liberation with respect to quality as well as quantity (the number of stations presently active is ten times higher). For example, there are now over 40 radio weather stations and over 150 aerological stations for measuring wind velocities at various altitudes functioning in China. The distribution of the stations is now also more equable, which the example of the Tibetan Plateau attests to. Previously there was a lack of data from this area, but now observations are being carried on there by numerous stations of various orders. The scope of weather forecasting increases from year to year and the number of forecast users grows. In 1954, we started to work out medium-range forecasts and to post, in all sections of the country, advance forecasts for three to seven days including a precipitation forecast and rain areas. Short-range forecasts are correct 75 to 80 percent of the time and medium-range ones usually have a 70 percent accuracy. Work is now in process on the preparation of instruments for meteorological measurements and recording of observations by mechanical methods.

II. The Present State of Didactic Works
in the Field of Meteorology

Before the liberation, from all institutes of higher learning in China there were merely a few meteorology graduates, so that they did not even number 100 in 1949. Since then, in only one year - 1956 - over 200 graduates from institutes of higher learning went into the various branches of meteorology and we foresee that this number will continuously increase in the future. Meteorology is now given in the meteorology department of the Nanking University, where specialization in meteorology and climatology is offered, as well as in the physics department of Peking University, where specialization in meteorology is offered. In addition, there exist in the Chinese People's Republic special meteorological schools that prepare meteorology specialists. Meteorology lectures are also given in all geography departments of all universities, as well as in the Institute of Countryside

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Management and in the Institute of Water Management. In order to enable science and research workers to achieve higher qualifications in the field of meteorology, the Chinese Academy of Sciences, the University of Peking and the University of Nanking not long ago accepted several scientists from the different meteorological branches. Didactic work in the field of meteorology will develop rapidly in the next few years in agreement with the national long-range plan.

III. The Present State of Research Work in the Field of Meteorology

The number of workers in the field of meteorology that worked under the old regime was quite insignificant. As we mentioned above, before the liberation the institutes of higher learning graduated merely some 100 meteorologists. In the period immediately after the liberation they were almost all assigned to observation work; therefore, the work pertaining to analysis and forecasting had to be stopped almost completely during the first three years after the liberation. In the last few years scientific and research work entered a state of continuous development. Due to a lack of workers, particularly those with higher qualifications, the level of this work is, however, inadequate and does not yet satisfy the practical needs of the country. Nevertheless, because of the persistent work of the great majority of Chinese meteorologists, we have achieved certain progress in scientific and research work. Four institutes in China are now carrying on research in the field of meteorology. They are: 1) The geophysical Institute of ChAN / Chinese Academy of Sciences /; 2) the Central Meteorological Institute; 3) the Peking University with Specialization in the field of Meteorology; and 4) the Meteorological Department of Nanking University.

1. The Geophysical Institute of ChAN was created as a result of the expansion and reorganization of the Meteorological Institute of the former Central Academy and it has therefore a considerable concentration of meteorological specialists from the research field. Ten independent workers as well as several score of auxilliary and medium-qualified workers now work there. A series of investigations, crowned by positive results, were carried out in theoretical meteorology under the direction of Professor Chao Tsu-chan.

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a) Research into atmospheric circulation. In this investigation the main stress was on learning the specificity of atmospheric circulation in eastern Asia and its effects upon the circulation over the Tibetan Plateau. A number of works were published on this subject under the direction of Professors Yeh T'u-heng, Ku Heng-chao, Tao Hsi-yan and Yen Tsien-ch'u. The results obtained by the investigations of the relations between atmospheric circulation and synoptic processes on a large scale, as well as the working out of forecasts of cold streams, typhoons, frosts and rainstorms, have already been used in forecasting. Certain investigations were also carried out as regards the appearance and disappearance of monsoons in eastern Asia, establishing the types of circulation in eastern Asia, the changes of circulation during the seasons, and the activity of cool air during the summer. The following are some of the topics that were worked out: "Energy Conversions", "Atmospheric Rotational Moment", "Periodic and Annual Circulation Run", and "The Vertical Circulation in Western Wind Currents".

b) An analysis of synoptic conditions in eastern Asia. In this field analyses were carried out of: low pressure pockets that stretch eastward from India and Burma, southwesterly winds, northwesterly low pressure gulfs, north-easterly low pressure. Also analyzed were dangerous weather phenomena such as: cold stream currents, typhoons, strong winds, frosts, rainstorms, and hailstorms. Lately, particular attention is being devoted in research work to the quantitative and statistical synoptic forecasts in eastern Asia as determined by hydrodynamic methods. In the near future calculations will be carried out by electronic calculating machines. We may expect that the research results will be published shortly. This work is being conducted under the leadership of Professors Yeh T'u-heng, Ku Heng-chao, Tao Hsi-yan and Yen Tsien-ch'u.

c) Research in the field of climatology. In this field the main emphasis is on learning the radiation balance, the heat balance, and the water balance. Preliminary results were already obtained in the investigations of the quantity of actual evaporation in China. These investigations are conducted under the leadership of Professor Ch'u Han-k'an. During the last few years a great deal of work was put into an investigation of the specificity of local weather as well as into carrying out a division of China according to climatic conditions. Archive materials pertaining to

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precipitation and temperatures in China were put in order and various climatological maps were put together. This tedious work was done under the leadership of Professor Ch'ao Pao-k'an. In addition, comrade Kao Yueh-hsi undertook work on the specificity of occurrence, disappearance and structure of East Asian monsoons. These projects are being continued.

d) Research in the field of Agrarian Meteorology (agrometeorology). In these investigations emphasis is placed on conducting observations on permanent and patrol points. Research is based on the following: the observation, recognition and analysis of the growth of tropical plants; the effects of meteorological conditions on the plants of the moderate and cold region. These investigations have been conducted for ten years under Professor Lü Tsun. A lot of attention is also given to phenological observations and to the construction and preparation of agrometeorological observation instruments.

e) Research in the field of atmospheric physics and sea waves. Research work in these two fields is conducted by the director of the Ch'AN Geophysical Institute, Ch'ao Tsiu-ch'an. Valuable work was carried out in the field of observing ozone layers and of observing sea waves as well as in constructing instruments for sea research.

2. The Central Institute of Meteorology was created as a result of the reorganization of the former Central Meteorological Station which was under the management of the Central Administration of Meteorological Services. In the last few years, in cooperation with and under the leadership of the workers from the Geophysical Institute of Ch'AN, the former Central Meteorological Station carried out a number of scientific investigations simultaneously with their continuous and uninterrupted work in the field of meteorological services. The most important research pertained to weather analysis and forecasting. A lot of work is being done in the field of short-range forecasts. For the past years the station has been learning Soviet techniques and, simultaneously, has been carrying on medium-range forecasting research; rich and useful experiences have been achieved through this work. A lot of work was also expended on statistical and procedural observation work pertaining to station record entries. The station was named the Central Institute of Meteorology in 1956. At the time its name was changed, a weather

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laboratory was organized in the Institute where, after it is strengthened with research and scientific workers, investigations will be carried out in the following directions: short-range forecasts, medium- and long-range forecasts, statistical forecasts! The technical work of the Institute is under the direction of engineer Ch'en Ch'un-su and the laboratory director is Ch'u Hei-chou. First order stations which belong to the network of the Central Meteorological Service Administration are found in all regions of the country. These stations carry on certain research work together with their meteorological services primarily in the field of local weather analysis and forecasting, as well as in the field of local climatic conditions.

3. The Peking University with specialization in the field of meteorology. Under the leadership of Professors Hsieh I-pin and Li Hsien-hsi, research work in the field of meteorology developed in the institution after the studies revision carried out in the last few years. Positive results were obtained in the following: learning the conditions that shift typhoons; a tri-measurement analysis of rain weather types; theoretical calculation of visibility; calculation of the precipitation density coefficient. We must also mention that the work on the construction, testing and investigation of observation instruments carried on under the leadership of lecturer Yen K'ai-wei, as well as the graduate work started in 1956 - which is distinguished by a very penetrating scope with respect to weather theory and analysis - deserve special attention.

4. The Meteorological Department of Nanking University carries on research work in various meteorological branches under the leadership of professors Ch'u Pin-hai, Hsin Erh-hao, Yao Ch'eng-hsin and Huan Hsi-sum / ? /. Most work, compared with other fields, was done in the field of climatology. For example, the following topics were worked on: local climate; precipitation distribution; water vapor circulation; and so on. Research is now being carried on on the following topics: atmospheric circulation; cold stream currents in eastern Asia; state of precipitation and the like.

The activities of the Meteorological Institute must also be included within the realm of scientific activities for, although the society itself does not carry on any studies of scientific problems, it nevertheless popularizes the latter through the systematic organization of scientific

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lectures. The Chairman of the society is Professor Ch'u K'e-ch'iao, Vice Chairman of the ANChRL / Academy of Sciences of the Chinese People's Republic /. The Vice Chairman is Professor T'u Ch'ou-wan, the chief of the Central Meteorology Service Administration.

IV. The Present State of Publications
in the Field of Meteorology

There were very few publications in the field of meteorology before the liberation. A meteorological periodical was published that appeared once a year and was called "The Periodical of the Society of Chinese Meteorologists." This periodical began to appear in the middle of 1924 but stopped publishing for several years because of the war with Japan. Although this periodical was a Chinese scientific publication with a relatively long-lasting activity, the articles published in it were not of a high level. Besides this periodical, the former Meteorological Institute published notebooks with collections of work that were on a much higher level. Non-periodic publications were also printed but their number was insignificant. The literature consisted of: "The Temperature of China," "Precipitation in China," "The Monthly Meteorological Bulletin," and others.

After the liberation, in connection with the growing need for meteorological and climatological information, we translated a number of foreign works from the field of meteorology and climatology. The former "Meteorological Periodical" was renamed "Meteorological News" and now appears quarterly under the editorship of the Meteorological Society. The Central Administration of Meteorological Services publishes "The Weather Monthly" dedicated for use by the Service. This journal has many readers among the synoptics. There has been added to this monthly "The Synoptic Publication". The Institute of Geophysics of CHAN publishes a periodical in the field of meteorology and climatology. Publications from the field of meteorology are not limited to these publications alone. Articles about meteorology and climatology are also frequently published in bulletins of the Universities of Peking, Nanking and Shantung.

Since the creation of the new China, the Communist Party of China, as well as the government of the Chinese People's Republic, continuously call the entire nation to learn about leading scientific achievements, particularly those of the Soviet Union and the people's democracies. Translations of

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a considerable number of works by foreign authors were therefore undertaken after the liberation. Since 1954 the meteorological Society has been publishing a quarterly entitled "Translations of Foreign Meteorological Literature," which includes primarily articles by famous Soviet authors as well as by authors from the people's democracies.

Great attention is also paid to the working out and publishing of synoptic material. In 1951 the Geophysical Institute of ChAN, with the Central Administration of Meteorological Services, organized an archive whose main object is to work out meteorological material. The archive regularly publishes "The Synoptic Monthly," climatological atlases and collections of meteorological elements, i.e. precipitations, temperatures and others. In order to satisfy the needs of socialist construction we are working on and preparing for publication meteorological elements of China's great cities. The aforementioned archive has been under the care of the Central Administration of Meteorological Services since 1956. The archive is concerned with the publication of meteorological and, partially, synoptic works.

These, in brief, are the activities in the field of meteorology in China. Since some branches of meteorology do not measure up to the needs of socialist construction in China, which is characterized by tremendous progress, a great effort is needed in the future to develop work in the field of meteorological research. Primarily, it is imperative to prepare cadres of scientific workers, to prepare a great number of college graduates, graduate students and doctoral candidates. The increase in the number of station networks cannot be delayed either. In agreement with the Second Five-Year Plan, at the end of the Plan (that is, in 1962) aerological stations will be spaced every 200 kilometers and precipitation stations every 100 kilometers. We must simultaneously strengthen research in numerous fields and organize new ones, which we have not had time to do until now, such as: the physics of upper atmospheric layers; the physics of clouds and rain; micro-climate; applied climatology; the physics of atmospheric layers close to the earth; and the construction of instruments, which are urgently needed by science in the present period of socialist construction.

This short description shows clearly that although meteorology developed rapidly after the liberation of

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China, it is nevertheless not yet at the level where it would satisfy the needs of the country. We need foreign aid, particularly from the Soviet Union and the people's democracies, with whom China would like to cooperate.

Poland has achieved considerable success in the field of meteorology. The Chinese meteorologists express their desire for help from the Polish meteorologists. They would like to see in the future close cooperation between Polish and Chinese meteorologists.

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