

# Science Bulletin

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## Taiwan Weather Research Program and Green Island Mesoscale Experiment

In order to gain a profound understanding of the atmospheric processes relating to violent and destructive weather in the Taiwan area, torrential rain events associated with Meiyu (plum rain) fronts and super typhoons, and to closely integrate basic research and applied research in the field of meteorology, the National Science Council Natural Sciences Department is promoting and implementing the Taiwan Weather Research Program (TWRP). This is the seventh year of the research program. In Taiwan, 12 research and administrative agencies, such as the Department of Atmospheric Sciences at National Taiwan University and the Central Weather Bureau, are taking part with over 100 researchers participating at various levels. A numerical modeling of torrential rain systems in western Taiwan has been completed, and a quantitative precipitation ensemble forecast system has been established for the Taiwan Meiyu season. In addition, a basic theory describing the periodic rotation of the eye of Typhoon Herb, which struck Taiwan on July 31, 1996 has been successfully developed, and Doppler weather radar analysis and a computer modeling experiment for the effects of Taiwan's topography upon a typhoon's landfall path and precipitation distribution have been completed. During May and June of this year, the TWRP is set to carry out an intensive atmospheric boundary layer observational experiment, the Green Island Mesoscale Experiment (GIMEX), which will target southeast Taiwan where Central Weather Bureau precipitation forecasts have proven least accurate.

Taiwan encounters many severe

natural disasters each year. Some examples from recent years include the severe flooding in June of 1998 throughout the Kaohsiung and Pingtung areas caused by a stationary front, and the torrential rains in Hsichih brought by Typhoon Xangsane in November 2000. Both caused considerable casualties and property damage and severely harmed the basic infrastructure of the country, leading to social and public disquiet. The meteorological community has a duty to apply basic meteorological theory toward improving weather forecasting techniques to attain the ultimate goal of preventing or mitigating the effects of natural disasters. With the NSC's support, the atmospheric science departments of various major universities and administrative agencies in Taiwan have collectively formed the TWRP implementation task force with the responsibility of planning and implementing the overall research program.

The specific goals of the TWRP are to 1) develop Taiwan's quantitative precipitation forecasting techniques so that it can double its current quantitative precipitation forecast threat score, and 2) develop techniques for applying oceanic atmosphere observation data to greatly improve the accuracy of typhoon landfall path and intensity predictions in Taiwan.

In order to attain the aforementioned objectives, the TWRP has integrated meteorological personnel, equipment and funding in Taiwan and has adopted new observational equipment and techniques to carry out individual case analyses, prognoses, and computer modeling studies. Profound familiarity with basic principles is

then applied to upgrading techniques for forecasting disastrous weather.

Among the TWRP's major research results, the portion pertaining to torrential rains associated with Meiyu fronts primarily involves quantitative precipitation forecast techniques. The principal content includes 1) Establishment of a quantitative precipitation ensemble forecasting system for the Taiwan Meiyu season, as well as, 2) analysis of how the complex terrain features of Taiwan affects the formation and development of the mesoscale convective systems during the Taiwan Meiyu season.

The typhoon portion of the TWRP major results primarily involves the effect of asymmetric structure on the intensity and trajectory of Typhoons. Targeting Typhoon Herb, which struck Taiwan on July 31, 1996, it constitutes publication of a series of articles 1) utilizing Central Weather Bureau Doppler radar data from Mount Wufen to understand how landfall intensity is affected by the complex terrain of Taiwan, 2) developing a basic theory that successfully describes the periodic rotation of the typhoon eye, and 3) explaining the effect of Taiwan topography on trajectory and precipitation distribution of a landfall typhoon by use of a numerical model.

The TWRP plans to carry out the following projects over the next five years:

- (1) An experiment modeling Taiwan Area Precipitation (MTAP) that utilizes ensemble forecast techniques to improve the capability of quantitative precipitation forecasting in Taiwan.
- (2) The Green Island Mesoscale Ex-

periment (GIMEX): This experiment will be conducted in May and June of 2001 in southeast Taiwan. The scientific objectives of the experiment is to explore the characteristics of local circulations and mesoscale weather systems in this area and the relationship of these weather systems with the heavy rains. Besides the facilities used daily by administrative agencies (Central Weather Bureau, Civil Aeronautic Administration and Air Force), the equipment involved in this experiment will include a boundary layer pibal system, boundary layer wind profiler, acoustic sounder, microwave radiometer, and unmanned air-exploration aerosonde to enhance understanding of atmospheric temperature and moisture, sea conditions, and three-dimensional air current characteristics. This ex-

periment has received support from Aerospace Industrial Development Corporation, Taiwan's first company to develop navigation devices for scientific use, which will provide four hours of flying time free of charge during the period of the experiment to carry out the first high-altitude observations in Taiwan of lee-side cyclone and mountain wave atmospheric phenomena. This observational data will be key to understanding the effects of Taiwan's topography on extreme weather development.

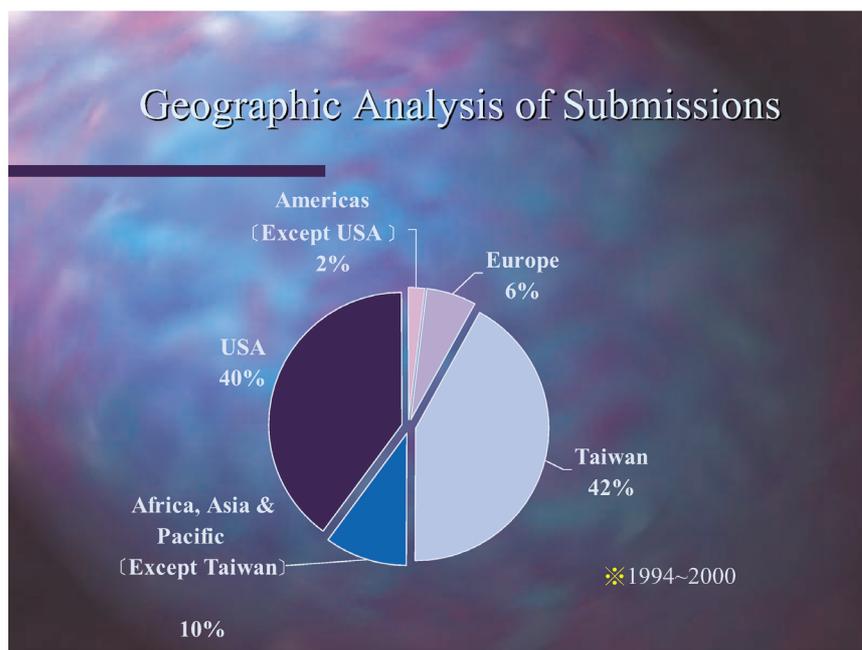
(3) Implementation of a Taiwan area Meiyu and typhoon observational and modeling experiment scheduled for 2005. This particular year has been chosen because it will mark the completion of Taiwan's meteorological modernization. It will include completion of a na-

tionwide Doppler radar network, a network of Global Positioning System receiving stations, and the Chunghua No. 3 Weather Satellite. The radar network will allow meteorological observations extending as far as 450 km from the island. The Chunghua No. 3 Weather Satellite will greatly improve Taiwan's marine atmospheric observation capabilities. Through international collaboration, Taiwan will be able to collect a high temporal and spatial resolution meteorological data, which can be served as a basis for case diagnosis and validation base for numerical forecasting model. Through a deeper understanding, we may greatly improve the accuracy of forecasts and help to mitigate the possible damages made by violent and destructive weathers.

## NSC Journal of Biomedical Science Ranked Among Top 20% of Academic Periodicals Worldwide

According to the newest Journal Citation Report (2000) issued by the Institute for Scientific Information in the US, the NSC-published *Journal of Biomedical Science* was ranked 1,185th among academic periodicals worldwide, putting it among the top 20% of the 5,684 periodicals collected. In addition, its impact factor rose to 1.798; this was even higher than its 0.990 last year, which was already higher than that of any other academic periodical ever published in Taiwan.

Since the *Journal of Biomedical Science* was first published in 1994, the NSC noted, the number of submitted articles and number of times articles have been cited have increased steadily. Continuing its amazing success, the *Journal* has made another great improvement over last year. Besides moving up in rank more than a thousand places, it also moved up



“NSC statistics indicate that 40% of manuscripts submitted to “*Journal of Biomedical Science*” are from the US, 42% are from ROC authors, and the remainder are from 28 other countries worldwide.”



The *Journal of Biomedical Science* is an international academic periodical that is edited in Taiwan and strives for the highest standards. It publishes superior articles on basic medicine, specifically the fields of physiology, pharmacology, pathology, immunology, virology, microbiology, anatomy, neuroscience, and parasitology, etc. The editorial committee consists of outstanding biomedical scholars from Taiwan, the US, Canada, Japan, Britain, France, the Netherlands, Australia, and Singapore. The *Journal* has established regional editorial offices in

the world. Published six times a year, the *Journal's* subscribers include major biomedical research institutions, libraries, and medical specialists.

The NSC emphasizes that the publication of the *Journal of Biomedical Science* has been meant to realize the goals of "expanding the nation's international academic breathing room and raising the nation's academic standing." In this light, the *Journal* has done exceedingly well to earn a top place in the highly-competitive world of medical periodicals in less than a decade since it was conceived in 1992. The journal's current level of global acceptance also indicates that the international biomedical community approves of the standards of academic research being performed in Taiwan. In the future the *Journal of Biomedical Science* will continue to publish superior domestic articles, while also making a shift to monthly publication and striving to raise its impact factor. It is hoped that the *Journal* will soon become the "most representative biomedical periodical in the Asia-Pacific region."

eleven places to 31<sup>st</sup> in the category of "research and experimental medicine" periodicals. Its total number of citations rose by 63% over last year, and its impact factor rose to 1.798 from 0.990.

three European and American cities to bear responsibility for accepting and reviewing manuscripts and performing promotional work. Articles have been submitted to the *Journal* from more than thirty nations around

## Implementing Training for Laboratory Animal Personnel under the Animal Protection Law

The enactment of the Animal Protection Law has sought to show respect the lives of animals and raise the standards of laboratory animal science in Taiwan. Commissioned by the Council of Agriculture (COA), Executive Yuan, the NSC National Laboratory Animal Breeding and Research Center plans to hold the first "Personnel Training Program for the Laboratory Animal Care and Management" of 2001 over July 11~13 in Conference Room 1 of the Tri Service General Hospital in Neihu, Taipei. This training program is jointly sponsored by the National Laboratory Animal Breeding & Research Center,



**Personnel Training Program for the Laboratory Animal Care and Management.**

the National Health Research Institute, and with the National Defense Medical Center serving as an associate sponsor. The program is offered to all persons using and caring for laboratory animals including scientists, research and animal care personnel. And the program, which will include tours of superior animal facilities, is expected to attract roughly 150 personnel from laboratory animal user organizations (or institutions) throughout the country. Persons who complete the course and pass a test will receive a "Laboratory Animal Care and Management Personnel" certificate.

In light of the importance of laboratory animals, the COA drew up a chapter of the Animal Protection Law to specifically regulate the scientific uses of animals, has established the "Animal Ethics Committee" in 1999, and has promulgated the "Regulation for the establishing and Management of Institutional Animal Care and Use Committee (IACUC)" on July 13, 2001. The latter regulation requires that all institutions using laboratory animals establish an "Institutional Animal Care and Use Committee (IACUC)", and this committee must include a veterinarian or a laboratory animal management specialist who has passed training given by a COA-commissioned training organization. The National Laboratory Animal Breeding and Research Center was commissioned by the COA last November (2000) to conduct training program, and the success of the program held so far has prompted the COA to renew the Center's contract.

To safeguard the accuracy of research results and enshrine the 3R (**R**efinement, **R**eduction, **R**eplacement) correct animal management outlook, in the future all project applications calling for the use of animals will be accepted only after passing review by the applicant's "IACUC". The functioning of "IACUC" and members' qualifications will thus impact the development and quality of domestic biomedical research.

The scientific applications of animals primarily fall into three categories: **Scientific research** (biomedicine, psychology, veterinary medicine, pharmaceuticals, and vaccine development), **testing** (safety testing of household cleaners and cosmetics, foodstuff safety testing), and **education** (live dissection demonstrations in class instruction). It is undeniable that laboratory animals have made a tremendous contribution to the process of many scientific discoveries, and they have played major roles in basic and applied life science, biomedicine, and genomic research. The Western nations and Japan have devoted considerable efforts to laboratory animal R&D over many years, and this work has in turn accelerated the development of medical science, biotechnology, genetics, and immunology, etc. Laboratory animal science is thus seen as a key underpinning of progress in medicine and life science. It is not too far-fetched to consider laboratory animals the raw materials of medical and life science research. For instance, animal experiments are a key method of main-

taining the safety of newly developed drugs. Since these experiments must be reliable to insure safety, the Department of Health has drafted the "Good Laboratory Practice for Nonclinical Laboratory Studies" as a set of reference guidelines for animal experiments in drug R&D. These standards will safeguard the integrity and credibility of important experimental data, and will provide a basis for future review of animal tests during the new drug evaluation and registration process.

The training programs given by the National Laboratory Animal Breeding & Research Center explain domestic and foreign laws concerning laboratory animals, the IACUC, relevant systems and the review of projects, and occupational health and safety issues. The programs also discuss practical laboratory animal quality control, standardized laboratory animal facilities, zoonoses, and laboratory animal care and breeding technology. We believe that these professional training programs, which cover both the legal and practical aspects of laboratory animals, will foster a correct animal use attitude, raise the qualifications of animal experiment personnel, promote the welfare of humans and animals, and strengthen Taiwan's role in the age of bioscience. We hope the programs will help accelerate the development of biotechnology in Taiwan, enabling it to join the ranks of the advanced nations and realize its vision of becoming a Green Island of Technology.

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