

Science Bulletin

National Science Council
Republic of China

A Visit to Taiwan by the Head of the EC's Research Directorate-General



Fig. 1 Prof. Jorma Routti, head of the EU's Directorate General for Science, Research and Development, paid a recent visit to Taiwan.

Prof. Jorma Routti (Fig. 1), the Director General of the European Commission's Directorate-General for Science Research and Development, and Dr. Karapiperis, an advisor to the Directorate-General, visited Taiwan at the NSC's invitation during January 14~18. The main purposes of this visit were (1) to meet with the government's science and technology chiefs, (2) learn about the current state of industrial technology in the ROC, (3) tour Taiwan's science-based industrial parks, and (4) discuss the prospects of sci-tech cooperation between the EU and the ROC. Prof. Routti and his entourage first visited NSC Chairman Jenn-tai Hwang on January 17 (see Fig. 2) and then jointly hosted a discussion on ROC-European sci-tech cooperation with NSC vice chairman Chang Jin-fu (Fig. 3). On January 18 the delegation

toured the Hsinchu Science-Based Industrial Park.

Appointed head of the Directorate-General for Science, Research and Development by the European Commission in 1996, Prof. Routti has been the highest-ranking EU official to visit Taiwan to date. A native of Finland, Routti has served as the president of the Finnish National Fund for Research and Development and the chairman of the Finnish Physics Society. Routti has long been involved in promoting technology transfer and start-up investments, and has taken great pains to bring basic research and technology transfer closer together. Routti hoped that this trip will lead to substantial sci-tech cooperation with the ROC in connection with the EU's Fifth Framework Programme. And in light of the vitality and entrepreneurial record of Taiwan's small and medium enterprises, particularly those involved in high-tech fields, Routti specially arranged to talk with some representatives of these enterprises in order to

share experiences.

Begun in 1998, the EU's Fifth Framework Research Programme has funding of US\$15 billion and includes projects focusing on life science, energy, the environment, and sustainable development. The EU hopes that the Fifth Framework Programme will promote innovation and encourage small and medium enterprises to participate in research projects and international cooperative ventures. From the point of view of Taiwan, participation in relevant projects will provide a better understanding of research trends in Europe's most advanced countries, which will enable Taiwan's high-tech products to more easily enter the European market. The NSC hopes that, in the wake of Routti's visit, sci-tech interchange and cooperation between the ROC and the EU will become more institutionalized and enduring. With this in mind, the following proposals were made at the discussion on ROC-EU sci-tech cooperation held on January 17:



Fig. 2 NSC Chairman Jenn-tai Hwang (left) exchanged views concerning bilateral sci-tech interchange with EU research head Jorma Routti.



Fig. 3 Prof. Routti jointly hosted a discussion on ROC-European sci-tech cooperation with NSC vice chairman Chang Jin-fu.

1. Since both parties are interested in jointly developing advanced general-purpose technologies, it is recommended that the EU submit a list of research institutions and firms so that their counterparts in Taiwan can find partners for cooperative projects.

2. In order to increase knowledge

of Taiwan's science, technology, and high-tech industry among young European scientists and engineers, it is recommended that the two parties emulate the "Summer Institute in Taiwan," to be held this summer by the NSC and America's NSF, and jointly conduct a "Euro-

pean Summer Institute in Taiwan" program.

3. In light of the emphasis that both the ROC and the EU place on energy, the environment, and sustainable development, it is recommended that the two parties jointly organize and hold three conferences on these three

topics. It is hoped that these conferences will promote future research cooperation and the sharing of research results in these areas.

4. In light of the fact that the establishment of science-based industrial parks plays an important role in helping high-tech industries take root, and considering Taiwan's successful experience in creating science-based industry parks, it is recommended that the two parties jointly sponsor a conference in Taiwan with the theme "The Development of Science Parks in Europe and Asia and their Role in Technology Transfer." Neighboring Asian countries should be invited to attend this conference.

Director General Routti responded enthusiastically to the above proposals and indicated that he would send relevant personnel to negotiate various details. Routti also expressed his firm hope that the two parties would enter into an increasingly close cooperative relationship.

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German-Chinese Academic Interchange in Coastal Engineering

Because of their harsh and unfavorable coastal environment, both Taiwan and Germany have put great effort into solving coastal engineering problems. Germany and the ROC began academic cooperation twenty years ago by means of reciprocal visits of individual researchers, and in 1997 National Cheng Kung University and Germany's Rostock University held the first "German-Chinese Joint Seminar on Recent Developments in Coastal Engineering" in Hasenwinkel. Since both sides were strongly interested in continuing academic interchange, a second seminar was held September 13-15 of this year at National Cheng Kung University in Taiwan.

This seminar was organized by National Cheng Kung University and

Rostock University, and was sponsored by the German Research Foundation (DFG), MOEA Water Resources Bureau, and the NSC. Besides the three-day seminar, the event also included one day of field meetings and a seven-day fact-finding tour of harbor and coastal installations. More than 170 persons attended the seminar, which had a theme of "Sustainable Development in the Coastal Zone," including 17 German



Fig. 1 A group photo of German and Chinese researchers attending the Second German-Chinese Joint Seminar on Recent Developments in Coastal Engineering, held at National Cheng Kung University.

specialists led by Professor Soeren Kohlhase. Thirty-five papers were presented at the seminar, and in the

case of 20 of these the first author was an ROC scholar.

The seminar's theme of sustainable development of the coastal zone had the following five subtopics: numerical modeling, harbor and coastal structures, environmental effects and impacts, coastal protection, and field marine data observation.

To summarize the results presented at the seminar, the following measures must be taken in coastal areas in order to preserve their environmental, ecological, scenic and utilitarian value, raise people's quality of life, and achieve the goal of sustainable development:

1. In order to fully understand the oceanographic, meteorological, and geological characteristics of coastal areas, environmental observations, surveys, analysis, and modeling must be performed.
2. Coastal erosion and flooding warning systems must be established.
3. Marine pollution must be measured, monitored, and controlled in ac-

cordance with marine environmental protection conventions.

4. The environmental effects and impacts of construction must be understood, and soft construction techniques employed to lessen the burden on the environment.

Sustainable development has become a major issue during the final decade of the 20th century, and has been acknowledged by UN member nations, including developed countries, developing countries, and even third world countries, as the most important factor to be considered when embarking on economic development and resource exploitation. Besides development on land, sustainable development is also of the utmost importance in the development of coastal areas. The most important future issue in coastal engineering will be how to protect the environment and ecology, and insure that resources are passed down to future generations throughout the process of developing and uti-

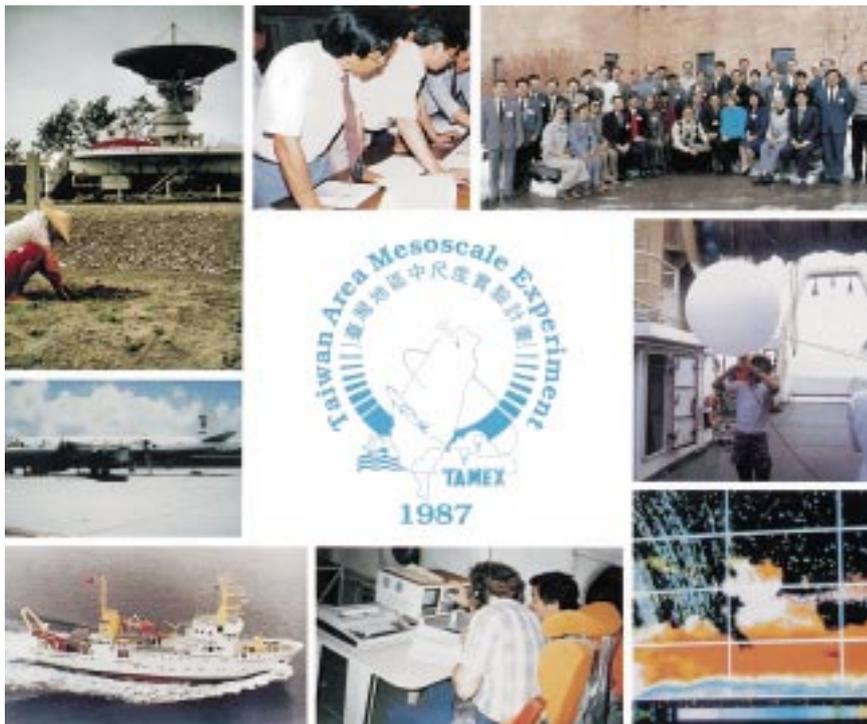
lizing coastal resources, engaging in industrial activities, and bringing about economic prosperity.

Representatives of the two countries participating in this seminar signed a joint memorandum laying out possible topics for future cooperation, including:

1. The creation of inshore hydrological databases; conducting meteorological and sea state observation and analysis.
2. Coastal disaster mitigation.
3. Research on the scouring of dike toes and other coastal structures.
4. The research and development of large-scale experimental techniques.
5. Demonstration use of the Internet for coastal engineering and sea state forecasting purposes.

Future cooperative activities will take the form of the exchange of researchers or doctoral students and the implementation of joint research projects.

Torrential Rain Research in Taiwan



The NSC has systematically supported and drafted plans for atmospheric science research and development since 1971. The NSC's support for conferences and large-scale research projects during this period has done a great deal to increase the quality and quantity of academic research and meteorological forecasting. The first "National Conference on Atmospheric Science," sponsored by the NSC in 1976, set the tone for later research in this field. Forty-six papers on atmospheric sciences were presented at the conference, reflecting the considerable interest in meteorology research that already existed at the time.

Fig. 1 The April 1990 issue of the *Bulletin of the American Meteorological Society* ran a cover story on the TAMEX project.

In 1978 the NSC-sponsored "Conference on Severe Weather in Taiwan Area" provided guidance and encouragement for basic and applied research on meteorological disasters, and focussed attention on localized severe weather research providing the public with direct benefits. The meteorological phenomena to be studied included typhoons, the *Meiyu* systems, winter cold air outbreaks, and droughts. The damage caused by continuous rainfall and torrential rain during the *Meiyu* season received widespread attention from meteorologists during this conference. The downpours that fell throughout the Taoyuan, Hsinchu, and Miaoli region of Taiwan on May 28, 1981, caused severe damage, and it is estimated that property losses totaled NT\$10 billion (US\$320 million). This disaster further awakened government, meteorologists, and the public to the problem of torrential rain during the *Meiyu* season.

In order to increase understanding of torrential rains and improve local weather forecasting ability and technology, in 1982 a research team led by Prof. George Tai-Jen Chen of the National Taiwan University Department of Atmospheric Sciences proposed the TAMEX (Taiwan Area Mesoscale Experiment); this project was formally implemented with NSC support in 1983. Intensive observations of torrential rains in the Taiwan area were conducted in May and June 1987, and follow-up research was performed during the next five years. TAMEX was a ten-year international project that provided training oppor-

tunities to more than 20 local and foreign doctoral students and more than 50 M.S. students. The project resulted in the publication of close to a hundred papers in academic journals, and led to the development of the Central Weather Bureau's Weather Integration and Nowcasting System (WINS). This system has made a great contribution to people's livelihoods and economic development by helping weather forecasters keep up with transient, fast-moving weather changes, enabling timely warnings to be issued when severe weather conditions threaten.

The fact that the *Bulletin of the American Meteorological Society* included a special report on TAMEX, and selected the project for the cover story of its April 1990 issue, shows the importance and success of the intensive observations conducted under the TAMEX project. In addition, some scientific findings were published in the November 1991 "TAMEX special issue" of the American Meteorological Society's authoritative *Monthly Weather Review*.

Basic research on torrential rain and efforts to develop better forecasting technology have continued unabated after the end of the TAMEX project. Hoping to overcome the limited scope of the intensive observations conducted under the TAMEX project, meteorologists also began exploring the feasibility of joint *Meiyu*/torrential rain research projects with their counterparts in mainland China.

Prof. Jong-Dao Jou of the National Taiwan University Department of Atmospheric Sciences is currently

responsible for directing the "Torrential Rain Research Team," which is performing basic research on *Meiyu* rain. In addition, the "Taiwan Area Torrential Rain Forecasting Research Team," which is supported by the National Project on Hazards Mitigation and is directed by Dr. Shui-Shang Chi of the Central Weather Bureau, is developing better technology for forecasting heavy and torrential rain during the *Meiyu* season. These two research teams carried out the "Meiyu Experiment 1998" in May and June of 1998 in parallel with the joint international SCSMEX (South China Sea Monsoon Experiment) project. The "Huanan and Taiwan Area Mesoscale Experiment" was meanwhile being conducted in mainland China as part of the same coordinated research campaign.

While the completion of the TAMEX project has helped us understand the environmental conditions that lead to torrential rains during the *Meiyu* season, and has also given us a glimpse of the mechanisms of torrential rain, Prof. Chen feels that we still have very limited knowledge of what combinations of environmental factors and triggering mechanisms actually cause these downpours. Chen suggests that further investigation is needed of the structure and role played in torrential rains of the *Meiyu* front, low-level jets, and mesoscale convective systems. Since these three phenomena usually form over southern China, cooperative international research with a scope extending into the southern areas of the Chinese mainland is likely to result in major breakthroughs.

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