

日本学術会議会長  
塚田裕三

気候変動国際協同研究計画 (WCRP) の実施に  
ついて (勧告)

標記について、日本学術会議第91回総会の議決に基づき、  
下記のとおり勧告します。

記

国際学術連合会議 (IOSU) は、1978年9月の第17回総会で、世界気象機関 (WMO) と協同して、気候変動国際協同研究計画 (World Climate Research Programme. 略称 WCRP) を、国際的協力により推進する事を決定した。我が国の研究者も国際的立案の段階からこの研究計画の審議に参画してきており、この国際協力事業に我が国の研究者を参加させることは、その意義が極めて大きいと考えられる。したがって、この国際的かつ学際的事業を成功させるために、政府は気候変動

国際協同研究計画 (WCRP) の我が国での実施について必要な予算措置を講じられたい。

(別添 説明資料)

本信送付先

内閣総理大臣

本信写送付先

外務大臣

大蔵大臣

文部大臣

農林水産大臣

通商産業大臣

運輸大臣

建設大臣

科学技術庁長官

環境庁長官

水産庁長官

海上保安庁長官

気象庁長官

( 説 明 )

国際学術連合会議 ( I C S U ) は 1967年の総会において、大気大循環の機構を解明して天気予報の精度向上を図るために、国際的に協力して地球大気開発計画 ( Global Atmospheric Research Programme. 略称 G A R P ) を、世界気象機関 ( W M O ) と協同して推進することを決定した。この計画に我が国も参加して多大の成果を挙げ、数日さきの天気予報の精度を向上させることができるようになった。これらの成果と大気科学の発展に伴い 1970年代末になって、大気大循環の長期変動の機構を解明し、1～2か月の長期予報さらには年々の気候変化の予想に確実な科学的基礎を与え得る可能性が急速にひらけてきた。

一方、1970年代から世界各地でかんばつ・異常低温など異常天候が頻発し、飢饉など、社会的・経済的に著しい被害を生じたこと、化石燃料の消費による大気中の二酸化炭素の増加が確実に把握され、その気候に及ぼす影響が懸念されることなどのため、世界気候の変動の研究を組織的に行うことが緊急の課題となった。

このような状況を考慮して、世界気象機関 ( W M O ) は、国際学術連合会議 ( I C S U )、国連教育科学文化機関 ( Unesco)、食糧農業機関 ( F A O ) などの協力の下に 1979年2月に世界気候会議を開催し、世界気候とその影響について詳細な討議を行った。この会議の成果を踏まえて、世界気象機関は 1979年5月の

総会で世界気候計画（World Climate Programme. 略称WCP）を国際的に協力して推進することを提案した。

この世界気候計画（WCP）に含まれる気候変動国際協同研究計画（World Climate Research Programme. 略称WCRP）について、国際学術連合会議（ICSU）は1978年9月の総会で、世界気象機関（WMO）と対等の立場で推進することを決定し、1979年11月にWMOとの協定に調印した。そして、ICSUは各国にWCRPへの参加を、財政的寄与を含めて、要請した。

我が国は、GARPを通じて大気大循環の研究の発展に多大の貢献をしてきた実績があり、その上、気候変動とそれを支配する物理過程に関する研究において蓄積された成果を有している。それ故、我が国の研究者は気候変動の研究に主要な役割を果たすべき立場にあり、我が国のWCRPへの参加が強くのぞまれるところである。

WCRP計画の目的は、数週間ないし数十年の時間スケールの気候変動の機構に関する理解を深め、それによって1～2ヵ月先までの天候の長期予報及び数ヵ月～数年の気候変動予測を可能ならしめるとともに、二酸化炭素の増加など人間活動がより長期の気候変化に及ぼす影響を明らかにすることがある。これらの目的を達成するために、

目標1：長期天気予報の物理的基礎を確立する。

目標 2 : 大気大循環の年々変動の機構を解明する。

目標 3 : 長期気候変動の機構と気候に対する人間活動の影響を解明する。

などの目標を、

- (a) 気候を支配する物理過程の観測
- (b) 人工衛星などのデータベースの確立
- (c) 観測データ解析による実態把握
- (d) 気候数値モデルの開発とそれによる数値実験

により、追求する。これらの目的を達成することは、食糧・エネルギー・産業活動など経済政策・社会政策の決定に際して、気候変動による蹉跌を軽減することになるので、人類の直面する重大問題の解決の基礎となるであろう。

なお、我が国の W C R P 計画は、当面第 1 期 ( 1986-1989 ) 及び第 II 期 ( 1990-1993年 ) の計 8 年間について策定した。国際学術連合会議と世界気象機関は、W C R P 計画の目標に完全に到達するのに 10 年を越す期間を要すると考え、その期間を決定しないで、4 年毎に両者の間の協定を見直すこととしている。我が国の W C R P 計画の第 III 期及びそれ以降については、第 I 期及び第 II 期の研究成果の評価に基づき検討される予定である。

( 添付資料 )

1. ICSU 会長、ICSU 事務総長及び会計役からの来信
2. 気候変動国際協同研究計画 ( W C R P ) の研究計画

International Council of Scientific Unions

Paris, 9 July 1979

To: National Members of ICSU  
From: The President of ICSU

Dear Member,

For the past several years, intensive international debate has been in progress among intergovernmental agencies, non-governmental bodies and national groups concerned with the study of climate and its impact to devise a new international collaborative programme that would broaden and intensify efforts to reduce our vulnerability to climatic changes. To the concern about the impact of natural fluctuations of climate-drought, temperature, rainfall, etc. - must be added growing concerns about human impacts, for example changes caused by industrial or land use practices and implications for mankind's natural environment and for world food production. It is this increasing sensitivity to the impact of human activities on climate that provides a new and decisive feature of the proposed World Climate Programme (WCP) and differentiates it from previous efforts.

To provide you with information about the World Climate Programme, which was discussed in detail at the recent World

Climate Conference (Geneva, February 1979), and at the VIII Meteorological Congress (April-May 1979), I am attaching the Declaration of the Conference (Appendix I). As you will see, the major purpose of the new programme is not only to expand and intensify efforts to understand climate, but to provide services that aid in the application of climatic knowledge and data to improving social and economic development. In fact, the WCP is a family of programmes, separate, but inter-related. The four major components are : 1) a climate data programme (CDP); 2) a climate applications programme (CAP); 3) a climate impact study programme (CIP); and 4) the climate change and variability Research Programme (CRP). The proposed plan for the programme is attached as Appendix II.

As part of this dialogue, ICSU and the World Meteorological Organization have negotiated a new agreement to provide for continued collaboration between the two organizations in the context of the CRP. Specifically, the new agreement will guide the development of joint activities in designing the Climate Research Programme component. The draft text of an Agreement was approved at the 17 General Assembly of ICSU in Athens (September 1978) and has been accepted with minor modifications at the VIII Meteorological Congress in Geneva in May (see attached full text of the draft agreement - Appendix III). This new agreement will replace on 1 January 1980 the present one which was signed in 1967 and provided the framework for collaboration in the Global Atmospheric Research Programme

(GARP).

The World Climate Programme will build on the achievements of the Global Atmospheric Research Programme. The information that is to be collected this year as a part of the First GARP Global Experiment will provide an indispensable data base for modelling and understanding climate variations and will contribute to the design of the new research programme.

The administrative and financial arrangements for the CRP will be similar to those for GARP. Considerable care has been taken to ensure an orderly administrative and programmatic transition between the activities of the present Joint Organizing Committee (JOC) and the proposed Joint Scientific Committee (JSC). The financial arrangements for the CRP call for a continuation of the system of equal contributions by ICSU and WMO to a Joint Climate Research Fund (JCRF), although each organization may decide unilaterally to subscribe an additional amount to the Fund. Under the present agreement, ICSU contributes somewhat over \$100,000. For the purposes of the new agreement, it is expected that this obligation will approximately double. Prior to the signing of the agreement, the ICSU Executive Board would like to ascertain from its National Members an indication of the level of support that might be expected from 1980 onwards.

It is hoped that your contribution to the Joint ICSU-WMO



Research Programme central operating costs will involve at least a similar doubling of previous contributions. I think you will agree that this initial amount of seedmoney is repaid many times over in the wealth of information and other data that accrues to all participants.

I would very much appreciate having from you by the time of the ICSU Executive Board in Paris in October, an indication, not a commitment, of the approximate amount of support you anticipate being able to provide. Such an indication will be extremely helpful in our further deliberations with officials of the WMO. If you have any particular questions, or require amplification of any points in the Draft Agreement, please contact me immediately.

Sincerely yours,

Signed: C. de Jager  
President

## APPENDIX I

### THE DECLARATION OF THE WORLD CLIMATE CONFERENCE

The World Climate Conference, a conference of experts on climate and mankind, held in Geneva, from 12 to 23 February 1979, was sponsored by the World Meteorological Organization in collaboration with other international bodies.

The specialists from many disciplines assembled for the Conference expressed their views concerning climatic variability and change and the implications for the world community. On the basis of their deliberations, they adopted the following.

#### An Appeal to Nations

Having regard to the all-pervading influence of climate on human society and on many fields of human activity and endeavour, the Conference finds that it is now urgently necessary for the nations of the world:

- (a) to take full advantage of man's present knowledge of climate;
- (b) to take steps to improve significantly that knowledge;
- (c) to foresee and to prevent potential man-made changes

in climate that might be adverse to the well-being of humanity.

#### The problem

The global climate has varied slowly over past millennia, centuries and decades and will vary in the future. Mankind takes advantage of favourable climate, but is also vulnerable to changes and variations of climate and to the occurrence of extreme events such as droughts and floods. Food, water, energy, shelter, and health are all aspects of human life that depend critically on climate. Recent grain harvest failures and the serious decline in some fisheries emphasize this vulnerability. Even normal variations and modest changes relative to the normal climate have a significant influence upon man's activities.

All countries are vulnerable to climatic variations, and developing countries, especially those in arid, semi-arid, or high rainfall regions, are particularly so. On the other hand, unfavourable impacts may be mitigated and positive benefits may be gained from use of available climate knowledge.

The climates of the countries of the world are interdependent. For this reason, and in view of the increasing demand for resources by the growing world population that strives for improved living conditions, there is an urgent need

for the development of a common global strategy for a greater understanding and a rotational use of climate.

Man today inadvertently modifies climate on a local scale and to a limited extent on a regional scale. There is serious concern that the continued expansion of man's activities on earth may cause significant extended regional and even global changes of climate. This possibility adds further urgency to the need for global co-operation to explore the possible future course of global climate and to take this new understanding into account in planning for the future development of human society.

#### Climate and the future

Climate will continue to vary and to change due to natural causes. The slow cooling trend in parts of the northern hemisphere during the last few decades is similar to others of natural origin in the past, and thus whether it will continue or not is unknown.

Research is revealing many basic features of climatic changes of the past and is providing the basis for projections of future climate. The causes of climate variations are becoming better understood, but uncertainty exists about many of them and their relative importance.

Nevertheless, we can say with some confidence that the burning of fossil fuels, deforestation, and changes of land use have increased the amount of carbon dioxide in the atmosphere by about 15 per cent during the last century and it is at present increasing by about 0.4 per cent per year. It is likely that an increase will continue in the future. Carbon dioxide plays a fundamental role in determining the temperature of the earth's atmosphere, and it appears plausible that an increased amount of carbon dioxide in the atmosphere can contribute to a gradual warming of the lower atmosphere, especially at high latitudes. Patterns of change would be likely to affect the distribution of temperature, rainfall and other meteorological parameters, but the details of the changes are still poorly understood.

It is possible that some effects on a regional and global scale may be detectable before the end of this century and become significant before the middle of the next century. This time scale is similar to that required to redirect, if necessary, the operation of many aspects of the world economy, including agriculture and the production of energy. Since changes in climate may prove to be beneficial in some parts of the world and adverse in others, significant social and technological readjustments may be required.

Increasing energy use and thus release of heat have also caused local climatic changes. In the future such heat sources

from densely populated and heavily industrialized regions could possibly have some effects on climate on a larger scale. Other human activities such as agriculture, pastoral practices, deforestation, increased use of nitrogen fertilizers and release of chlorofluoromethanes might have climatic consequences and therefore require careful study. Also, a systematic search for still other possible effects on climate of major human efforts is needed.

Some forms of warfare have local climatic effects. World thermonuclear conflict, besides its catastrophic consequences for mankind, would degrade the natural environment and might cause climatic changes on a large scale.

It is conceivable that in the future man may be able to produce limited changes in climate on a large scale by deliberate intervention. It would be irresponsible to consider such actions until we have acquired the essential understanding of the mechanisms governing climate that is needed to predict the consequences. Moreover, international agreement must be reached before such projects are implemented.

## Conclusions and Recommendations

The World Climate Programme proposed by the World Meteorological Organization deserves the strongest support of all nations

Its main thrusts are:

Research into the mechanisms of climate in order to clarify the relative roles of natural and anthropogenic influences.

This will require the further development of mathematical models which are the tools for simulating, and assessing the predictability of, the climate system. They will also be used to investigate the sensitivity of climate to possible natural and man-made stimuli such as the release of carbon dioxide and to estimate the climatic response.

Improving the acquisition and availability of climatic data.

The success of the climate programme depends on the development of a vast amount of meteorological, hydrological, oceanographic and other pertinent geophysical data. Furthermore, climatic impact studies and practical application of knowledge of climate by nations in addition requires detailed information about their natural resources and socio-economic structures.

Application of knowledge of climate in planning, development and management. This effort should include programmes to

assist national meteorological and hydrological services to increase the awareness of users of the potential benefits to be gained through the use of climate information, to improve capabilities to provide and disseminate this information, and to facilitate training in nationally significant climate applications. It should include programmes to develop new methodologies for the application of climate data in the food, water, energy and health sectors.

Study of the impacts of climatic variability and change on human activities and the translation of the findings of such studies in terms of greatest use to governments and the people. This will require improvements in our understanding of the relationships between climate and human society including:

- (i) The possible range of societal adjustments to climate variations and change;
- (ii) The characteristics of human societies at different stages of development and in different environments that make them especially vulnerable or resilient in the face of climate variability and change;
- (iii) The means by which human societies can protect against adverse consequences of, and take advantage of the opportunities presented by, climate variations and changes.



The overall purposes of the Programme are thus to provide the means to foresee possible future changes of climate and to aid nations in the application of climatic data and knowledge to the planning and management of all aspects of man's activities. This will require an inter-disciplinary effort of unprecedented scope at the national and international levels.

The conduct of the World Climate Programme involves a broad range of activities and requires leadership and co-ordination among international bodies and close collaboration among nations

It is fully recognized that the international co-operation which is the prerequisite for any world climate programme can only be successfully pursued under conditions of peace:

There is an immediate need for nations to utilize existing knowledge of climate and climatic variations in the planning for social and economic development

In some parts of the world, there is already sufficient information to provide many applied climate services. However, only a start has been made; data and expertise and generally lacking in developing countries. Programmes must be set up to assist them to participate fully in the World Climate Programme through training and the transfer of appropriate methodologies.

The long-term survival of mankind depends on achieving a harmony between society and nature. The climate is but one characteristic of our natural environment that needs to be wisely utilized. All elements of the environment interact, both locally and remotely. Degradation of the environment in any national or geographical area must be a major concern of society because it may influence climate elsewhere. The nations of the world must work together to preserve the fertility of the soils; to avoid misuse of the world's water resources, forests and rangelands; to arrest desertification; and to lessen pollution of the atmosphere and the oceans. These actions by nations will require great determination and adequate material resources, and they will be meaningful only in a world at peace.

## Appendix II

### DEFINITION OF THE WORLD CLIMATE RESEARCH PROGRAMME

#### Objectives

Our social and economic life is vulnerable to periods of climate stress. Human activity may itself influence local, regional and global climate. These are problems which the international community should address through a World Climate Research Programme (WCRP) which will attempt to determine why, how and where climate changes and variations occur, and thereby attempt prediction of their future occurrence.

The major objectives of a World Climate Research Programme should be to determine:

- To what extent climate can be predicted;
- The extent of man's influence on climate.

To achieve these objectives it is required:

- a) To improve our knowledge of global and regional climates, their temporal variations, and our understanding of the responsible mechanisms;
- b) To assess the evidence for significant trends in global and regional climates;

- c) To develop and improve physical-mathematical models capable of simulating, and assessing the predictability of, the climate system over a range of space and time scales;
- d) To investigate the sensitivity of climate to possible natural and man-made stimuli and to estimate the changes in climate likely to result from specific disturbing influences.

#### Time and Space Scales

The WCRP should be primarily concerned with time scales from several weeks to several decades. However, the ensemble properties of individual weather events with characteristic time scales of less than several weeks, such as synoptic disturbances, are included. The general limitation to several decades is consistent with the availability of comprehensive data sets, the practicalities of numerical modelling and the major concern of planners and decision makers. Some requirements such as paleoclimatic reconstructions will undoubtedly involve larger time scales.

A WCRP should be primarily concerned with space scales from regional, of about 1000 km, up to global. The emphasis on these large scales is consistent with the technical limitations on climate modelling and the correlation scale of climatic anomalies. It is recognized that small-scale processes can play a significant