

# SCAR

SCIENTIFIC COMMITTEE ON ANTARCTIC RESEARCH

# BULLETIN

ARGENTINA AUSTRALIA BELGIUM  
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PUBLISHED BY  
SCOTT POLAR RESEARCH INSTITUTE, CAMBRIDGE, ENGLAND  
INSTITUTO ANTARTICO ARGENTINO, BUENOS AIRES, ARGENTINA



## SCAR BULLETIN

No 30, September 1968

### TENTH MEETING OF SCAR, TOKYO

10 TO 15 JUNE 1968

*Present:*

President: L. M. Gould.

Vice-President: R. N. M. Panzarini

Secretary: G. de Q. Robin.

Assistant Secretary: G. E. Hemmen.

Delegates: Argentina, C. A. Perticarari; Australia, P. G. Law; France, G. Pillet; Japan, T. Nagata; New Zealand, R. W. Willett; Norway, T. Gjelsvik; Republic of South Africa, S. M. Naudé; United Kingdom, G. de Q. Robin; United States, L. M. Gould; USSR, N. P. Grushinskiy; IUGG\*, V. A. Troitskaya; IUGS, R. W. Willett; IGU, T. Yoshikawa; URSI, T. Nagata; WMO, M. Shimizu.

Observers: IUCSTP, T. Nagata; IUGS, T. van Autenboer; SCOR, G. E. Hemmen.

Advisers: Argentina, N. Fourcade, J. F. R. Busico; Australia, A. M. Brown, D. F. Styles, I. R. McLeod, M. I. Homewood; Belgium, T. van Autenboer, F. E. Bastin; France, J. Nougier, R. Schlich, J.-P. Bloch, O. Vaugelade; Japan, Y. Harada, T. Kawahara, M. Kodama, K. Kusunoki, Y. Miyake, T. Oguti, K. Ozawe, J. Shimoizumi, T. Tatsumi, M. Tazimi, T. Torii, K. Wadati, T. Yoshikawa; New Zealand, R. D. Adams, R. B. Thomson; Republic of South Africa, M. J. Coetsee, L. E. Kent; United Kingdom, R. J. Adie, Sir Vivian Fuchs, B. B. Roberts, P. L. Willmore; United States, J. L. Abbott Jr., F. J. Bernstein, C. Craddock, L. de Goes, J. Keith, L. O. Quam, P. M. Smith; USSR, Ye. S. Korotkevich, E. D. Koryakin, M. G. Ravich, V. A. Troitskaya.

Interpreter: J. Rinaldini.

Dr Sin-itiro Tomonaga, President of the Science Council of Japan, and Dr Kiyoo Wadati, Chairman of the Local Organizing Committee, welcomed the delegates to the Tenth Meeting of SCAR, and Dr L. M. Gould, President of SCAR, expressed SCAR's great appreciation for the kind invitation to hold the Tenth Meeting in Tokyo.

#### Report of Ninth Meeting

The reports of the Ninth Meeting of SCAR (IX SCAR), Santiago, Chile, September 1966, were confirmed.

#### Executive Meeting

The report of the meeting of the SCAR Executive, Cambridge, July 1967, was accepted subject to correction of the penultimate sentence, of minute 8(b) on

\* A list of abbreviations used in this report is appended. Annex E.

which there was a clerical error in Doc. X SCAR I and in *SCAR Bulletin* No 28. This should read 'SCOR was the correct ICSU body to put forward the scientific viewpoint at inter-governmental meetings'. This was correct in the official Minutes of the Executive Meeting as conveyed to National Committees.

### SCAR Constitution

It was noted that the revised rules for the Scientific Committees of ICSU, which were being considered at the General Assembly of ICSU in June 1968, provided for Officers of Special and Scientific Committees to be appointed for periods of four years, which was in accordance with the revisions in the SCAR Constitution proposed at the last meeting and subsequently approved by ICSU.

### SCAR Working Groups

Reports from Secretaries and/or reports from meetings held since IX SCAR and other matters concerning the Permanent Working Groups were received:

*Biology.* This Group will meet in Cambridge, 27 July to 3 August 1968.

*Geodesy and Cartography.* The *ad hoc* Working Group of Delegates was asked to consider a request that approval be given for the meeting in 1970.

*Geology.* The Chairman reported briefly that discussions that had been held the previous week had been concerned primarily with national activities and such special problems as dating, palaeontology, and relationship with other working groups of SCAR.

*Glaciology.* The report of the meeting of the working group held in Berne on the occasion of the IUGG General Assembly in September 1967 was approved. It was agreed to request the *ad hoc* Working Group of Delegates to consider the resolution that the IHD North/South chain of selected glacier basins for combined heat, mass, and water balance studies should include one or several basins in the Antarctic Peninsula region, and special note was taken of the Joint French/US/USSR programme in Antarctica which was considered to be a major development.

*Logistics.* The report of the meeting of the Working Group held in Cambridge, 24 to 26 July 1967, was received.

A report of a preparatory *ad hoc* panel on communications which met in Brussels in March 1968, and a paper by A. H. Sheffield, Chairman of the former Working Group on Communications, were received and referred to the *ad hoc* Working Group of Delegates and the Working Group on Logistics.

The President of SCAR and the Chairman of the Working Group commended highly the work of the Secretary of the Group, F. E. Bastin, in connexion with the preparation for meetings of the Group and the telecommunications panel, and also for his work in preparing material for the proposed *Antarctic Radio Communications Guidance Manual*.

*Meteorology.* The *ad hoc* Working Group of Delegates was asked to consider the suggestion from the Meteorological Working Group that it might meet on the occasion of the next SCAR meeting.

*Oceanography. Recommendation X. General-1.* It was agreed to convey

to National Committees the Soviet National Committee's request that SCAR draw attention to the importance of investigations of the inshore waters of the Bellingshausen, Weddell and Lazarev Seas, and of the need for timely transmission of oceanographic data to both WDCA and to WDCB in accordance with the recommendations contained in the *IOC Manual on International Oceanographic Data Exchange*.

It was noted that the Secretary of the Group had resigned.

*Solid Earth Geophysics.* Renewed activity in the group was reported.

*Upper Atmosphere Physics.*

(i) A report of the meetings of the Upper Atmosphere Physics Working Group, London and St Gallen, 24 July and 30 October 1967, and the resolutions contained therein was adopted. The Secretary of the Group again stressed the importance of National Committees reconsidering their membership of the group, and it was agreed that the Chairman be invited to discuss with the national delegates concerned changes in representation which would provide a more effective Working Group.

(ii) The Chairman was authorized to convene an informal meeting of upper atmosphere physicists present at this meeting to prepare recommendations, particularly concerning International Active Sun Years (IASY) for consideration at the Final Plenary Session which SCAR might then convey to all permanent members of the Group for approval and to National Committees.

The reports and recommendations of the Working Groups which met during the X SCAR Meeting—*ad hoc* Delegates, Finance, Geology, Geology and Solid Earth Geophysics, Logistics, Solid Earth Geophysics—were approved after some amendments had been made. Annex A.

### SCAR Groups of Specialists

Reports on activities of SCAR Groups of Specialists were received as follows:

*Quaternary Studies Group.* It was noted that this group was planning to meet in Cambridge in July 1968, and that SCAR was providing some financial support to assist travel.

*Ice Core Studies.* It was noted that this Group believes its function to be largely one of information exchange, and of ensuring that all interested parties are kept informed of current activities.

*Ice Shelf Studies.* A report by the Convenor was received.

*Pack Ice Zone.* It was noted that studies in Pack Ice Zone present complex problems, particularly logistic difficulties of obtaining observations in winter and in spring. The Convenor reported that he hoped that the final document would be prepared later this year and would draw attention to the need for studies in the Pack Ice Zone.

*Benthos.* A report by the Convenor was received.

### Progress Report on SCAR groups of Specialists

A summary report on the progress of the twelve groups of specialists was received, it was noted that to date it had not proved possible to establish an

effective group of specialists on Communications and that the Working Group on Logistics had taken over responsibility in this sphere, also it had not been possible to appoint a Convenor for the Specialist Group on technical problems affecting Communications. The *ad hoc* Working Group of Delegates and the Working Group on Logistics were asked to consider further the need for a group of specialists on technical problems of communications and the *ad hoc* Working Group of Delegates was invited to enquire of G. R. Laclavère what progress had been made with regard to the group of Specialists on the use of Space Vehicles.

#### **International Antarctic Meteorological Research Centre**

A pamphlet describing the facilities available at IAMRC had been distributed widely during 1968.

A report from the leader of the Centre, H. R. Philpott, was considered. SCAR expressed its disappointment that no research meteorologists were taking advantage of the grants that were available through WMO and ICSU to support work at the Centre.

*Recommendation X General-2.* SCAR appealed to National Committees to encourage young research meteorologists to work in Melbourne.

#### **Relation with other ICSU bodies**

A summary of liaison links with ICSU Unions, Associations of the Unions, and other ICSU Committees was received. The Working Group on Geology was asked to suggest a means of establishing effective liaison with IAVCEI, and the Working Group on Solid Earth Geophysics was asked to suggest a means for establishing effective liaison with the Upper Mantle Committee.

*CIG/IQSY.* The SCAR representative on CIG reported that CIG and the IQSY Committee had now terminated, and their responsibility for guiding the work of WDCs would be assumed by a newly formed ICSU panel on WDC's under the chairmanship of D. F. Martyn, with representatives of IUGG, IUCSTP and WDC's A and B.

*COSPAR.* A report by A. H. Shapley was received.

*IAGA.* It was noted that Professor T. Nagata was now President of IAGA and Dr H. Troitskaya Vice-President; thus effective liaison between SCAR and IAGA was assured.

*ICPM of (IAMAP).* A report by M. J. Rubin, the SCAR representative on ICPM, was received.

*IUCSTP.* Professor T. Nagata, the SCAR representative on IUCSTP reported that of the twelve programmes proposed for the International Active Sun Year, the two which were likely to be of most importance to SCAR were No 5, Conjugate point experiments, and No 9, Magnetic storms and polar disturbances.

It was expected that the informal meeting of the Upper Atmosphere Working Group would discuss these during X-SCAR.

*IUGG.* Professor K. E. Bullen reported on the IUGG General Assembly, September–October 1967. It was agreed to convey the IUGG resolution concerning heat flow measurements to the SCAR Working Groups on Solid Earth Geophysics, Glaciology and Oceanography.

*SCIBP.* A report by M. W. Holdgate on the Fourth meeting of SCIBP was received. It was noted that no report on the Fifth meeting of SCIBP was available, but that little of direct concern to SCAR had been expected to arise at that meeting.

*SCOR.* G. E. Hemmen reported on the SCOR Executive meeting, October 1967. It was agreed to inform SCOR that SCAR supported the SCOR proposal that IOC establish a Co-ordination Group for the Southern Ocean but SCAR expected to retain responsibility for the development of marine science programmes in Antarctica in close collaboration with SCOR.

*WMS Board.* A report by Professor T. Nagata was received; it was noted particularly that the WMS Board was planning to compile a report on WMS and had requested that summaries of magnetic survey results be submitted to the Secretary of the WMS Board by 31 August 1968. The Working on Solid Earth Geophysics was requested to include this item on its Agenda.

### **Relations with intergovernmental bodies**

*Antarctic Treaty Organization.* (i) It was reported that a meeting of logistics experts had been held in Tokyo 3–8 June 1968, and that the papers from this meeting would be published.

(ii) It was reported that the Fifth Antarctic Treaty Consultative Meeting would be held in Paris in November 1968.

*Recommendation X. General-3.* SCAR urges all National Committees to submit their comments on the proposed SCAR recommendations on pelagic sealing as soon as possible after the recommendations have been received, so that amendments could be incorporated by the SCAR Executive and conveyed to National Committees in time for them to transmit the recommendations to their governments before the Fifth Consultative Meeting.

*World Meteorological Organization.* A review of The World Meteorological Organization activities in Antarctic meteorology was referred to the *ad hoc* Working Group of Delegates and the Working Group on Logistics for further consideration, particularly those items referring to telecommunications.

*Standardization of geographical names.* A report on the United Nations Conference on Standardization of Geographical Names by the SCAR Observer, B. Lambert, was received.

*Geological Map of the World.* A report was received from Dr R. J. Adie, SCAR representative on the Commission of the Geological Map of the World. He emphasized that difficulties still existed over the financing of the colour printing of the Antarctic section of the 1:5 million Geological Map of the Antarctic. The Working Group on Geology was invited to consider this problem and to submit recommendations in its report to the final Plenary Session.

### **Symposia**

*SCAR/SCOR/IAPO/IUBS Symposium on Antarctic Oceanography, Santiago, September 1966.* The proceedings of the SCAR/SCOR/IAPO/IUBS Symposium on Antarctic Oceanography were in page-proof stage and publication was expected in about three months.

*WMO/SCAR/ICMP Symposium on Polar Meteorology.* The Proceedings of this Symposium had been published in *WMO Technical Notes Series*, No 87, available from the WMO Headquarters, Geneva at a price of SW Fr 78.

*SCAR/IUBS Symposium on Antarctic Ecology, in association with SCIBP.* The SCAR/IUBS Symposium on Antarctic Ecology would be held in Cambridge, 29 July to 3 August 1968, and the latest version of the programme was available at X SCAR for examination.

*SCAR/IASH Symposium on Antarctic Glaciological Exploration.* The SCAR/IASH International Symposium would be held in Hanover, New Hampshire, 2-7 September 1968, and the *ad hoc* Working Group of Delegates would be discussing publication.

It was noted that on some previous occasions scientific symposia on the Antarctic had been held under the auspices of other international organizations, that some of these had attempted to deal with the whole range of Antarctic scientific disciplines whilst others had been of more limited scope, and that in view of the series of scientific symposia that SCAR promoted in collaboration with appropriate unions of ICSU, which were considered to be an important function of SCAR, other symposia on Antarctic topics were unlikely to prove so effective and it was undesirable for such symposia to be promoted without prior consultation with, and with the full support of SCAR. The Executive was requested to consider this question further.

### Conclusion

In closing the Meeting, the President expressed the deep appreciation and gratitude of SCAR to the Japan National Committee of Antarctic Research, its Chairman, Dr Wadati, and its Secretary, Dr Harada, to the office staff of the Department of Polar Research of the National Science Museum and to Professor Nagata, Chairman of the Special Committee for Antarctic Expedition to the Japan National Science Museum, to Dr Torii, the Secretary General of the Japan Polar Research Association, and all who assisted in making the admirable preparations which had contributed so largely to the effective running of the X-Meeting of SCAR.

Dr Naudé expressed the thanks of SCAR to the President for his guidance and to the members of the Executive.

## ANNEX A

### *Reports and recommendations of Working Groups*

#### *Ad hoc Working Group of Delegates*

##### *International Hydrological Decade*

Noting that the International Commission on Snow and Ice (ICSI) and the Working Group on Glaciology had recommended an extension to the proposed IHD North/South chain of glacier basins for detailed study, and that the United Kingdom hoped to undertake such studies on Hodges Glacier in South Georgia, it was agreed:



*Recommendation X. General-4.* To draw the attention of National Committees with operations in the Antarctic Peninsula area to Minute 4 of the SCAR Working Group on Glaciology, Berne, September–October 1967, concerning the International Hydrological Decade, and the need for detailed studies of glacier basins there.

It was reported that the IHD Committee was co-operating closely with ICSI, and that UNESCO had invited the SCAR Working Group on Glaciology to join IHD and ICSI at the next IHD meeting in Paris.

#### *Working Group on Logistics; Financial Support*

*Recommendation X. General-5.* That SCAR should continue to assist financially with the secretarial work of the group; that the Executive should be empowered to meet the cost of the Secretary's attendance at SCAR meetings, and that SCAR should support financially the publication of the *Communications Guidance Manual*. SCAR could not consider meeting the cost of all Working Group members' attendance at SCAR meetings, but should the Working Group on Logistics succeed in raising funds themselves, they would be empowered to administer such funds entirely outside SCAR central accounts.

#### *Communications*

The Secretary explained the background to the calling of the meeting of a preparatory *ad hoc* panel on Communications in Brussels in March 1968, and emphasized that this was to be regarded as an informal meeting of a group of communications experts.

The WMO representative reported that the WMO Executive Committee was meeting from 30 May to 15 June, and expected to reach some firm decisions regarding data processing and Antarctic Telecommunications centres. It was noted that WMO had an effective liaison with the Antarctic Treaty governments, and was aware that the communications network was required to cater for other than meteorological requirements.

It was felt that, although the Communications Working Group of SCAR had been disbanded, the assumption of responsibility for Communications by the Working Group on Logistics showed signs of proving effective. The delegates expressed the hope that the WMO Resolutions would be discussed at the Fifth Antarctic Treaty Consultative meeting.

*Recommendation X. General-6.* That SCAR endorses the paper on Antarctic Telecommunications by A. H. Sheffield and requests National Committees to convey this paper together with the suggestions from the Working Group on Logistics to their governments indicating their support to both.

#### *Working Group on Oceanography*

The Delegates noted that the Secretary of the Working Group on Oceanography had resigned, and that the Assistant Secretary of SCAR was currently handling working group matters from the SCAR Secretariat at Cambridge.

*IOC Co-ordination Group on the Southern Ocean*

It was reported that a message had been received from the IOC Bureau and Consultative Committee Meeting in London stating that the Co-ordination Group had been established with an initial composition of eight member nations, all of which were SCAR nations.

*Recommendation X. General-7.* That G. E. Hemmen be nominated as the SCAR observer on the IOC Co-ordination Group on the Southern Ocean, and that he be requested to keep the SCAR Working Group on Oceanography informed of the IOC group's activities.

*Working Group on Upper Atmosphere Physics*

It was noted that the Working Group on Upper Atmosphere Physics was still concerned about the nomination of national members of the Group.

*Recommendation X. General-8.* To request National Committees again to consider their nomination to membership of the Upper Atmosphere Working Group, and to ensure that their nominee was actively interested in Antarctic upper-atmosphere physics research and was prepared to contribute effectively to the work of the Group. SCAR suggests to National Committees that, because the work of the Working Group on Upper Atmosphere Physics involved a variety of subdisciplines, small groups of specialists be appointed in each country to assist and advise the national member of the permanent Working Group on UAP. SCAR requests that if such advisory groups are established, the names and addresses of the members be communicated to the Secretary of the Permanent Working Group, it being understood that the Secretary of the Group would not normally circulate documents to members of these groups, but could do so as occasion demanded.

*Geological map of the Antarctic*

The Chairman of the Working Group on Geology reported that it had discussed the problem of colour printing of the 1:5 million Geological Map of the Antarctic but, because of the large number of similar maps now in the course of preparation at different projections and scales, it was not possible at this meeting to reach a reliable assessment of the best means of producing an authoritative SCAR map, although it had been agreed that SCAR should proceed and the Working Group would explore various possibilities and prepare its recommendation with an estimate of the cost at its meeting in 1970.

*Representation on Quaternary Studies Group of Specialists*

It was agreed that, should the permanent Working Group on Geology wish to nominate a representative on the Quaternary Group of Specialists, such nomination be approved, provided no additional financial commitment on SCAR funds was involved.

## SCAR Groups of Specialists

### *Space vehicles*

(a) Nine groups of specialists were now in active existence.

(b) G. R. Laclavère had agreed to serve as Convenor of the Group of Specialists on the Use of Space Vehicles. He had suggested that the group commence its business by correspondence, and possibly convene a meeting on the occasion of COSPAR, Prague, 1969.

*Recommendation X. General-9.* That T. Nagata be nominated to membership of the Group of Specialists on the Use of Space Vehicles.

*Recommendation X. General-10.* That the Group of Specialists on the Use of Space Vehicles should be concerned primarily with seeking means whereby suitable scientific problems might be investigated by means of new space instrumentation, and that it be regarded as a standing group of specialists available for consultation by permanent working groups of SCAR. Matters concerning data from ongoing and planned programmes should be the concern of the appropriate permanent working group of SCAR. The Group of Specialists on the Use of Space Vehicles might propose other functions which would be considered by the Executive.

### *Technical and scientific problems affecting communications*

It was agreed to invite R. C. Kirby, the United States nominee to the Group of Specialists on Technical and Scientific Problems affecting Communications, to serve as Convenor of this Group.

It was expected that the Group would investigate radio propagation, interference, drift static, and other problems affecting radio communications.

It was agreed that Mr Kirby be asked to pursue, by correspondence with those suggested for membership and others, questions of composition and terms of reference of the Group to be submitted to the SCAR Executive for further consideration.

### *Symposia*

(a) *SCAR/SCOR/IAPSO/IUBS Symposium on Antarctic Oceanography, Santiago, September 1966: Publication*

It was noted that SCAR was publishing the proceedings of this Symposium.

*Recommendation X. General-11.* That 800 copies of the proceedings of the Oceanography Symposium be printed, that the selling price be between \$4 and \$5, and that complimentary distribution include one copy for each National Committee, one copy for the author of each review paper, 50 copies for SCOR, 25 copies for IAPSO, and 25 for IUBS.

(b) *WMO/SCAR/ICMP Symposium on Polar Meteorology*

*Recommendation X. General-12.* To express the thanks of SCAR to WMO for the valuable publication *WMO Technical Notes, No 87, Proceedings of the Symposium on Polar Meteorology*.

- (c) *SCAR/IUBS Symposium on Antarctic Ecology, in association with SCIBP, and SCAR/IASH Symposium on Antarctic Glaciological Exploration*

*Recommendation X. General-13.* That the publication of the proceedings of both these Symposia could be undertaken by commercial publishing houses, and the Secretary of SCAR be authorized to conclude suitable agreements.

- (d) *IAPSO Symposium on Antarctic Oceanography*

It was reported that there was a likelihood that IAPSO would be inviting SCOR, IAMAP and CMG of IUGS to convene their general meetings together in 1970, and if this was agreed, IAPSO probably would invite SCAR, perhaps with other bodies, to co-sponsor a two- or three-day Symposium on Antarctic Oceanography.

*Recommendation X. General-14.* That if an invitation be received from IAPSO for SCAR to co-sponsor a two- or three-day Symposium on Antarctic Oceanography in 1970, the invitation be accepted and the Executive be authorized to offer a financial contribution towards supporting attendance of up to \$2000.

#### *Meeting of Working Groups of SCAR*

*Recommendation X. General-15.* To confirm the procedures for the convening of meetings of permanent working groups and groups of specialists as set out in Annex B, and to convey these to National Committees, Permanent Delegates and to Secretaries of working groups with a request for compliance with these procedures.

#### *Election of Officers*

*Recommendation X. General-16.* That SCAR elect G. A. Avsiuk as Vice-President for the period 1968-72.

*Recommendation X. General-17.* That SCAR re-elect G. de Q. Robin as Secretary for the period 1968-72.

The President expressed SCAR's indebtedness to Dr Robin for his valuable work over the past ten years.

The meeting expressed its great appreciation of the work of G. E. Hemmen as Assistant Secretary and hoped that he would continue in this office.

*Recommendation X. General-18.* That should an Officer cease to be a Delegate at any time between full meetings of SCAR, the remaining Officers decide whether he should be requested to continue in office until the next full meeting of SCAR or, if this is not feasible, the remaining two Officers, after consulting National Committees, may co-opt a replacement to serve until the next full meeting of SCAR.

#### *Time and place of next meeting*

*Recommendation X. General-19.* That an invitation from the Norwegian National Committee to hold the next meeting of SCAR in Norway in 1970 be accepted with great pleasure. It was agreed that August would be a suitable time.

*Recommendation X. General-20.* To request National Committees to draw the

attention of their governments to the fact that, because of the needs of the Geology Symposium and the necessity of SCAR holding its meetings at times outside of the Antarctic operating season, a choice had to be made between meeting in twelve months time or in 1970. It was not considered that a fruitful meeting would be practicable in 1969 and therefore SCAR had, of necessity, called its next meeting for August 1970 and requests the governments signatory to the Antarctic Treaty to consider, at their Fifth Consultative Meeting, holding the Sixth Consultative Meeting in 1969 or 1971.

*Recommendation X. General-21.* That, as SCAR has now been operating for more than ten years on procedures established at the outset, at the next meeting of SCAR a thorough examination of the organization and procedures of SCAR should be undertaken and, in order that the Executive, at its meeting in mid-1969, might give preliminary consideration to planning such a review, National Committees and Delegates be requested to submit suggestions on this matter to the Secretary of SCAR by 1 June 1969.

*Contra-Almirante R. N. L. Panzarini*

The President expressed SCAR's deep appreciation for the work of the retiring Vice-President, Contra-Almirante R. N. L. Panzarini, and expressed the hope of SCAR that Admiral Panzarini's long and valuable experience could continue to be available to SCAR. It was unanimously agreed to recommend:

*Recommendation X. General-22.* That Contra-Almirante Panzarini be elected an Honourary Member of SCAR.

**Finance**

S. M. Naudé (Chairman), P. G. Law (Member), L. M. Gould,  
R. N. M. Panzarini, G. de Q. Robin, G. E. Hemmen (in attendance).

The Finance Committee examined the statements of income and expenditure for 1965, 1966 and 1967. It was noted from these that: (a) that the sum of \$7000 granted by ICSU in 1967 for the support of meetings of groups of specialists and representatives of ICSU bodies to attend SCAR meetings and to support meteorologists at IAMRC would not be used for these purposes until 1968 and 1969; and (b) that the IAAC (IAMRC) Special Fund has been closed.

*Recommendation X. Fin-1.* That the thanks of SCAR be expressed to the Accountant of ICSU, G. Bollenbach, for the great pains he had taken to clarify the SCAR financial situation since 1964, which had become confused due to illness of the previous ICSU Accountant.

*Recommendation X. Fin-2.* That the estimates of income and expenditure for the years 1968, 1969 and 1970 be approved.

*Recommendation X. Fin-3.* That SCAR authorize the Executive to examine the financial position of SCAR at its meeting in 1969 and if, at that time, authorized or applied for expenditure under the new heads is of such magnitude as to indicate that a substantial deficit will be incurred in 1970, to seek additional funds for SCAR from any appropriate source.

*Recommendation X. Fin-4.* That national contributions to SCAR be maintained at the present level (totalling \$15000) for 1969 and 1970, but that the complete

review of SCAR operations and procedures that will be undertaken in 1970 include a thorough examination of the SCAR financial situation and the possible need to revise the level of national contributions.

### Geology

Representatives of all member countries, except Chile, attended the meetings. The opportunity of holding joint sessions with the Working Group on Solid Earth Geophysics was welcomed.

### Reports

It was decided that annual reports would be more valuable than at two-year intervals, and a format for these reports was approved. A copy of this format was passed to the Working Group on Solid Earth Geophysics for information.

### *Antarctic minerals list*

In view of the need for a revised list of Antarctic minerals (excluding rock-forming minerals), it was agreed that Professor Duncan Stewart be invited to undertake the compilation in time for the next Working Group meeting and Symposium in 1970.

### *Palaeobotany and Palynology*

There was clearly a world-wide shortage of palaeobotanists and palynologists and most countries had experienced difficulty in having their available material worked up. Member countries that were experiencing difficulties, or had material available for description, were urged to correspond with the Working Group Secretary. Similarly, the names of interested and available palaeobotanists and palynologists should be notified to the Secretary, who would pass on the information to interested members.

### *Palaeontology*

*Recommendation X. G-1.* That the attention of member countries be drawn to the desirability of palaeontological specialists being given the opportunity of examining specific field localities and that sympathetic consideration be given by member countries to any such requests; for instance, it would be of great value to have a South African vertebrate palaeontologist and collector examine good Permian-Triassic localities of the Transantarctic Mountains. Advantage should be taken of expert palaeontologists and an international exchange should be encouraged. The assistance of the Working Group on Logistics should be sought in implementing this recommendation.

### *Quaternary Panel of Experts*

It was decided to nominate T. van Autenboer to represent the Working Group at future meetings of this Sub-Committee.

### *Isotope dating*

Lengthy discussion on methods of dating rocks and the interpretation of the results led to the conclusion that it was necessary to prepare a revised com-

pilation of all Antarctic rock ages as soon as possible. Professor M. G. Ravich agreed to undertake a revised compilation of all Antarctic rock ages to be published in Russian and English, and to include all available information.

### *Classification system for rocks*

No single system for the classification of sedimentary, igneous and metamorphic rocks existed and authors frequently did not indicate what classification was being followed in their work. It was understood that IUGS might be able to advise on this matter and the IUGS representative was asked to make the necessary enquiries and inform the Secretary of his findings.

M. G. Ravich informed the meeting that he proposed to compile an atlas of Antarctic metamorphic rocks, and invited collaboration. He urged the compilation of similar records of Antarctic sedimentary and igneous rocks.

### *Gondwanaland*

Several countries had commenced investigations on different topics relating to the reality of Gondwanaland (eg the USSR on charnochites and the United States on Palaeozoic-Mesozoic stratigraphy). Other countries were urged to participate in such studies.

### *Stratigraphic nomenclature*

A number of codes for stratigraphic nomenclature were already available, but this important question was at present being discussed by the IUGS Sub-Commission on Stratigraphic Terminology. It was decided that establishing a code of stratigraphic nomenclature for Antarctica could not be undertaken in the limited time available and that authors of publications should be requested to state what code they were adopting in publications.

*Recommendation X. G-2.* That in order to avoid duplication of stratigraphic names in the future, each country is urged to submit proposed Antarctic stratigraphic names to the Secretary of the Working Group with a view to the compilation of a *central register* and that Working Group members would be kept informed of additions to the register.

New formations that are published in the literature should be precisely defined in summary form, including the generalized lithology, distribution, type section or area, and where possible the age, thickness and stratigraphical position of the formation.

The Secretary was instructed to obtain sufficient copies of the draft 'International Code', to distribute to members for comment. Since there was such a positive case of international co-operation in Antarctic geology, the Secretary was requested to ask the IUGS Sub-Commission whether it would be prepared to accept a representative from the SCAR Working Group on Geology.

### *Marine geology*

It was understood that IUGS had a Commission on Marine Geology and the IUGS representative was asked to contact IUGS for confirmation.

*Recommendation X. G-3.* That the Working Group on Geology draws to the

attention of member countries the need to pursue both geological and geophysical studies of the sub-Antarctic islands and the surrounding Southern Oceans with a view to understanding the relations of the marine geology of these oceans with the Antarctic continent, and further recommends that links with the IOC Co-ordinating Committee for Southern Oceans be maintained by the SCAR observer keeping the Secretary of the Working Group on Geology fully informed of all decisions of the Co-ordinating Committee.

### *Volcanism*

IAVCEI had invited information on Antarctic volcanism, and the Secretary was accordingly requested to correspond with the Secretary of IAVCEI to discover means of co-operation.

### *Sedimentation in the Indian and Southern Oceans*

There was increasing interest in sedimentation in the ocean basins, and it was decided that this was a matter for the joint meeting of the Working Groups on Geology and Solid Earth Geophysics.

### *Ridges in the Southern Ocean*

It was agreed this was also allied to the discussions of the joint meeting of the Working Groups on Geology and Solid Earth Geophysics.

### *Geophysical methods to yield data useful for geological purposes*

Detailed discussion on this topic enabled a comprehensive agenda to be drawn up for the joint meeting of the Working Groups on Geology and Solid Earth Geophysics.

### *Matters arising from the 1963 Meeting of the Working Group*

*Recommendation X. G-4.* That in view of the immediate need for a stratigraphic lexicon, the representative of each country be urged to complete the compilation of published Antarctic stratigraphic names used by workers of his country up to the end of 1967, and that the Chairman and Secretary of the Working Group undertake final editing for publication.

Since there was no complete bibliography on Antarctic geological publications, each member undertook to list the information available in his country previous to the introduction of *Antarctic Bibliography* and the Library of Congress cards. The USSR member undertook to abstract and translate into English the early literature published in Russian.

The Secretary outlined the situation regarding the compilation of the 1:5 million geological map of Antarctica for the Commission for the geological map of the World. It was agreed to go ahead with the drafting of the topographical base maps and to have the draft geological map available for the 1970 meeting.

The Secretary reported on progress of the Antarctic geological map for the *World Atlas* and informed the meeting of the tectonic and metallogenic map compilations.



*Cartography of the metamorphic belts of the world*

The Working Group on the Cartography of the Metamorphic Belts of the World of the Commission for the Geological Map of the World invited representation from SCAR. M. G. Ravich and the Secretary were nominated.

*Smithsonian Institution Center for Short-Lived Phenomena*

This Center had requested names of reporters and, the Secretary agreed to pass the names of all Working Group members to the Center in case they could assist with observational information.

*Second Symposium on Antarctic Geology*

*Recommendation X. G-5.* That a symposium on Antarctic geology be held immediately prior to the XI SCAR meeting at Oslo in 1970, and that this symposium be jointly supported by both the Working Groups on Geology and Solid Earth Geophysics.

*Urgent problems of Antarctic geology*

It was agreed that each country should give serious consideration to the immediate problems of Antarctic geology and circulate their programmes through the Secretary. Emphasis was placed on the desirability for sheet mapping on all scales, since field observations are of the utmost value.

*Other business*

Owing to the difficulty experienced by some countries in obtaining translations (particularly of papers in Russian) it was agreed that members would advise the Secretary of available translations on Antarctic geology and he would circulate the information, giving the source, availability and terms for copies of such translations.

An informal meeting of interested members discussed detailed problems connected with mapping and interpretation of parts of western Dronning Maud Land. The USSR agreed to accept material from interested countries with a view to examining it for Riffenites.

**Geology and Solid earth geophysics Joint Meeting**

Geology Working Group: R. W. Willett (Chairman), R. J. Adie (Secretary), N. H. Fourcade, I. R. McLeod, T. van Autenboer, J. Nougier, T. Tatsumi, Y. Harada, K. Kizaki, K. Suwa, Y. Yoshida, T. Yoshikawa, L. E. Kent, C. Craddock, M. G. Ravich.

Solid Earth Geophysics Working Group: R. D. Adams (Secretary), I. Tsubokawa, K. Wadati, M. Tazimi, S. Uyeda, S. Miyamura, K. Kaminuma, Y. Tomoda, P. L. Willmore, V. A. Troitskaya.

*Regional gravity surveys*

*Recommendation X. G/SEG-1.* That:

(a) future trans-continental traverses include gravity, magnetic and seismic observations;

(b) member countries who have not yet established primary gravity bases give consideration to establishing such bases. All gravity base stations should be permanently marked;

(c) in order to enable all member countries to be aware of localities and other information of permanent and temporary gravity base stations, a questionnaire be prepared and circulated to all members, the replies to be accompanied by a small locality map for each station. When assembled, this information should be circulated to all member countries;

(d) the linking of the principal gravity bases in Antarctica be considered and that special attention be given to linking base stations of local relative surveys (such as the Borge-massivet and Sør-Rondane surveys) to absolute bases. The Working Group on Logistics should be asked to study the feasibility of such a project on an international co-operative basis;

(e) a United States organization be asked to consider undertaking the compilation of marine gravity work carried out in the Southern Ocean.

#### *Aeromagnetic surveys*

*Recommendation X. G/SEG-2.* In view of the proposals of several member countries to carry out extensive regional aeromagnetic surveys over Antarctica, it is desirable that, in order to establish maximum collaborative effort of all member countries, plans for such surveys, and plans for ground support and base magnetic information, be circulated to member countries as soon as possible and be available for final discussion at the joint Working Group meeting at XI SCAR in 1970.

#### *Deep seismic sounding*

*Recommendation X. G/SEG-3.* That the usefulness, and the great potential, of deep seismic sounding in the elucidation of crustal structure in Antarctica be stressed, and any action towards the fulfilment of such a project is fully endorsed.

#### *Palaeomagnetic studies*

*Recommendation X. G/SEG-4. (a)* That the attention of member countries be drawn to the importance and great potential value of palaeomagnetic studies, and urge member countries to continue this work. It is recommended that those countries with adequate facilities for palaeomagnetic work offer the use of these to member countries lacking such facilities. The Working Groups strongly recommend that any rock samples for palaeomagnetic studies be completely documented and clearly orientated, and be from rocks of known age. If the age is at the time of collection unknown, then duplicate samples should be collected for dating and this dating be done as soon as possible. Basic igneous rocks are most suitable for palaeomagnetic determinations.

(b) The Working Groups would welcome the preparations by IAGA of a manual on the collection of specimens from Antarctica for palaeomagnetic investigations.

*Collaboration between the Working Groups on Geology  
and Solid earth geophysics*

*Recommendation X. G/SEG-5.* In order to strengthen the collaboration between the Working Groups on Geology and Solid earth geophysics begun at X SCAR, it is recommended that:

- (a) the two groups arrange future meetings to coincide with the same SCAR meeting;
- (b) during such meetings the two groups shall arrange for at least one joint meeting;
- (c) future geology symposia be expanded to become joint symposia with the full participation of both groups;
- (d) the Working Groups Secretaries arrange to exchange all circular letters and circulars in order to maintain collaboration between meetings.

**Logistics**

Argentina, C. A. Perticarari, J. F. R. Busico; Australia, D. F. Styles, A. M. Brown, P. G. Law, M. I. Homewood; Belgium, F. E. Bastin (Secretary); France, P.-E. Victor (Chairman), O. Vaugelade; Japan, T. Torii, T. Kawahara, K. Kinoshita, K. Kusunoki, E. Nishibori; New Zealand, R. B. Thomson; Norway, T. Gjelsvik; South Africa, M. J. Coetsee; United Kingdom, V. E. Fuchs, B. B. Roberts; United States, J. L. Abbott, F. J. Bernstein, L. de Goes, P. M. Smith; USSR, E. S. Korotkevich.

*Terms of Reference of SCARLOG*

The group reviewed all past recommendations and updated them. The new set of recommendations, providing for the organization, procedures and programme of work of the Working Group on Logistics is given in Annex C.

*Recommendation X. L-1.* (1) That SCAR approves the revised recommendations as appended to be the terms of reference and programmes of work for the SCAR Working Group on Logistics; (2) that all previous SCAR recommendations related to logistics be considered obsolete.

*SCARLOG file*

*Recommendation X. L-2.* That the distribution of logistics papers in the SCARLOG file sequence be continued as this serves as a continuous exchange of logistic information. That each national member should send the SCARLOG Secretary all factual information for evaluation and distribution for inclusion in the file.

*SCARLOG meeting in Cambridge 1967*

The group examined and discussed the report of the Cambridge meeting. The Secretary reported that:

The Communications exploratory meeting had been organized and held in Brussels in March 1968, and minutes circulated.

The programme of work had not followed the given priority order mainly due to insufficient or fragmentary documentation, however some of the documents

received had been distributed and the information was being compiled on safety measures.

Correspondence with national members had been improving continuously, and had now reached a satisfactory level permitting the timely distribution of logistic information.

*Persons concerned with logistic problems and distribution of SCARLOG documents*

SCARLOG documents are only useful if complete and up to date; it is therefore important that the successive documents or letters reach the interested persons or bodies.

As there are only 100 copies of all SCARLOG papers, distribution has to be limited.

A need was felt for issuing, in the SCARLOG file, a list of persons and/or bodies interested in Antarctic logistics. Such a list should facilitate bilateral contacts, but would not mean that the individuals listed were to receive copies of the SCARLOG documents. Regarding the question of sending documents to Antarctic bases, some felt that, as they could not be kept up to date during a whole year, the information contained might lead to misinterpretation or misunderstanding, while others felt that the file, even if not up to date might prove useful reference for the leaders.

It was therefore felt that the onward transmission of SCARLOG documents is in any case the concern of each individual national committee.

*Recommendation X. L-3.* That annually, before the end of July, each national member of SCARLOG should send the Secretary for publication a revised list of persons and/or organizations interested in Antarctic logistics. The list should include the fields of interest and the address of each of them.

Request for the SCARLOG file should be sent to the Secretary.

That the SCARLOG Secretary should send to each national member or to a person designated by him the required number of copies (approximately five copies per nation plus one copy per operating base).

*Circulation of information under the provisions of the Antarctic Treaty*

*Recommendation X. L-4.* That members of the Working Group on Logistics, in collaboration with their governments, take appropriate steps to ensure that national reports circulated under the provisions of the Antarctic Treaty include more detailed information than at present.

*Fuel*

As maintaining reserve aviation fuel for emergencies at every base in Antarctica was over-ambitious at the present time, a nation planning to land at a base of another nation should organize its fuel supply through bilateral agreement. The Secretary will circulate a fuel equivalency table.

*Logistic problems related to present and future scientific programmes in the Antarctic*

The exchange of information on Antarctic logistics can be divided into two parts: the factual information and research on logistics.

For both parts, it is important that interested bodies be informed of all past, present and future trials, together with their reasons and assessment of results.

Projects requiring new or special solutions should be identified so as to allow for studies or research to be initiated.

From past experience it was realized that scientists did not report on technical support for their project, and both logistic successes and failures were overlooked.

The meeting recognized that SCARLOG's first task was to collect and exchange information concerning logistics but is not to make recommendations involving national resources. SCARLOG is to be a bridge between science and logistics.

*Recommendation X. L-5.* That SCAR should send a letter, as per Annex D, to all SCAR permanent Working Groups, Groups of Specialists and National Committees inviting them to advise SCARLOG of the requirements they may have for logistic support.

*1968 Brussels Communications Meeting*

The group recognized the continuously varying picture of communications in Antarctica and felt that it would be useful to assess the traffic requirements in the near future with a view to providing this information to the authorities concerned with the provision of the Antarctic communications networks.

Such an assessment could be undertaken by the SCARLOG Communications panel.

An *ad hoc* sub-working group was formed under the chairmanship of D. F. Styles, with J. F. R. Busico and T. Kawahara as members, to review the minutes of the Brussels meeting.

*The Antarctic Radio Communications Guidance Manual*

It was recognized that an *Antarctic Radio Communications Guidance Manual* should be published as soon as possible, and that it should keep to facts peculiar to the Antarctic and the Antarctic radio stations, and not necessarily repeat what could be found in standard communication handbooks in general use.

*Recommendation X. L-6.* That the *Antarctic Radio Communications Guidance Manual* be published as soon as possible.

That 300 copies of the manual be printed. That each national member of SCARLOG:

checks, completes and returns the data sheets on his nation's radio stations in Antarctica within the shortest time;

keeps the Secretary of SCARLOG informed of amendments to the above sheets in order to permit the timely publication of up-to-date revisions of information.

That a request for further information about the Chilean stations and ships be made.

*Future scientific use of radio circuits*

*Recommendation X. L-7.* Recognizing that the general use of communications for scientific traffic is expected to increase in the future, that whatever the increase the need to communicate will remain, and that, in order to plan the future use of communications, information on the actual and future requirements is an absolute necessity.

SCAR should request all the permanent Working Groups and National Committees to send to the Secretary of SCARLOG details of their actual use and estimates for the next five years of scientific communication needs.

This estimate needs to be reviewed from time to time.

The Secretary of SCARLOG should keep himself informed and reports to SCARLOG members and telecommunication correspondents on the progress of implementation of the World Weather Watch circuitry.

An assessment of the channel time occupied by meteorological traffic should be made as rapidly as possible, in order to distribute the results before October 1968.

*Communication panel*

The meeting recognized that the scientific use of communications will increase in the future. Therefore, SCAR interest in communications cannot be abandoned.

*Recommendation X. L-8.* That a communications panel comprising engineers, users and operators with Antarctic experience, and a representative from WMO, be formed by the permanent Working Group on Logistics to continue the work begun in Brussels in 1968.

*Next meeting*

The group found that, after the Antarctic Treaty Meeting of Experts on Logistics and the meeting of SCARLOG in Tokyo, there was no need for a meeting of the group in 1969. The next meeting should therefore take place at the time of the general SCAR meeting in Norway in 1970.

At this next meeting, SCARLOG will discuss specific subjects and, in order to arrive at the best results with the minimum of experts, only one or two special items should be discussed apart from normal Working Group business.

The SCARLOG Secretary will call for proposals from the members, and from other working groups, one year before the meeting and circulate a list of the suggested subjects. All members will then vote by correspondence on the priority to be given each subject.

The Secretary will then send the title of the subjects chosen to the members and to the interested working groups.

*Solid earth geophysics*

The Working Group particularly welcomed the opportunity to hold joint meetings with the Working Group on Geology, and a separate report has been prepared dealing with topics of interest to both groups.

In general, the topics covered in this report deal with the observatory type of geophysical measurement, in which readings may be necessary to help complete world coverage in a particular field, or may also be of particular interest at high latitudes. Such observations may also help in the elucidation of local problems of Antarctic structure. The topics discussed jointly with the Working Group on

Geology are mainly those arising from methods of geophysical exploration suitable to be undertaken on land traverses or by aerial or marine surveys.

After detailed discussions on the work already accomplished, the following statements have been prepared concerning the requirements of our various fields of study.

### *Seismology*

Fourteen seismograph stations are at present in operation in southern regions, of which eleven are in Antarctica. Most stations are equipped with short period instruments only.

*Recommendation X. SEG-1.* That, in view of the comparative lack of long-period seismographs on bedrock in Antarctica, such instruments should be included, whenever possible, in existing or projected stations.

A discussion on the role of Antarctic seismograph stations in the global location of earthquakes led to the following recommendation.

*Recommendation X. SEG-2.* That, in view of the shortage of Antarctic data used in the preliminary epicentre programme of the USCGS, Antarctic seismograph stations should be encouraged, whenever possible, to make preliminary readings on site, and appropriate steps should be taken for the transmission of these readings to Washington.

The meeting was advised of the proposal of the Soviet Union to detonate five charges, each of 10 tons, in lakes in the Novolazarevskaya region in the 1968-69 season. It noted with interest that the explosions would be of sufficient size to be recorded over transcontinental distances.

*Recommendation X. SEG-3.* That the firing of large explosions for seismic experiments in the Antarctic should be encouraged. Wherever practicable, additional seismic equipment should be set up to record these explosions, and it would be helpful if countries planning such experiments could give at least one year's notice.

The Working Group on Solid Earth Geophysics does not expect the number of explosions to be large and will make reasonable endeavours to limit the interference with the ecosystem to the minimum and will consult with the biologists when planning such experiments.

A joint resolution with the Geology Working Group (X. G/SEG-3) was passed on this topic.

During a discussion of improved recording techniques (including arrays), the Japanese delegation submitted a paper including the following suggestions:

(1) to add two or three satellite stations telemetered to the base, composing small tripartite or quadripartite stations separated less than 100 km from each other;

(2) to introduce magnetic tape and/or film or paper strip recorders, enabling correlational visual reading of a multi-channel display of the signals from the various seismometers;

(3) to add band-pass frequency filters, making easy separation of near, regional and teleseismic signals.

(4) to equip low- and high-magnification recorders in order not to miss reading amplitude values for the magnitude determination (enlargement of

dynamic range of the recording); and

(5) to add long and medium period instruments together with short period three components (enlargement of recording period range).

In the ensuing discussion it was agreed that large scale, directional arrays were making an increasing contribution to world seismology, but that their potentialities would be difficult to realize on the Antarctic ice sheet. Moreover, an array near the centre of the continent would not be suitably placed to observe events originating over most of Antarctica. The British delegate offered equipment for a pilot project, and suggested that with the co-operation of the Australian authorities, this might well be installed at one of their stations.

*Recommendation X. SEG-4.* That:

(a) Modern methods of seismic recording, such as telemetering, recording on magnetic tape, and improvements to dynamic range should be introduced wherever possible;

(b) a seismograph array on bedrock near the edge of the continent would help to fill the need for world coverage, and could also make an important contribution to the study of any seismic events in Antarctica;

(c) to monitor any possible seismic activity in Antarctica, the operating authorities of seismic arrays, particularly in the Southern Hemisphere, should be asked to direct beams towards Antarctica.

### *Geomagnetism*

Fifteen manned magnetic observatories are in operation at present, providing control for ground, sea and air surveys, and may be used for determination of secular variation. Several other stations are periodically occupied for the observation of secular variation, but more observations in Antarctica are needed to complete world coverage.

*Recommendation X. SEG-5.* That, considering the lack of stations in the Antarctic area at which secular variation may be determined, more temporary magnetic stations should be reoccupied, annually if possible, for the determination of this variation.

The Soviet member reported that her country was prepared to cover up to 25 per cent of the continental area with aeromagnetic surveys at a height of 6-8 km, and invited co-operation in such a survey. The British member expressed interest in this proposal, and stated that given adequate notice, logistic support might be available from Halley Bay.

Joint recommendations with the Geology Working Group (X. G/SEG-2 and -4) were made on aeromagnetic surveys and problems of palaeomagnetism.

### *Heat flow*

Attention was drawn to the programme of the International Symposium on Antarctic Glaciological Exploration which will include papers relevant to geothermal heat flow.

A note was received from the Chairman of the International Heat Flow Committee, referring to the total lack of reliable heat flow measurements in southern



latitudes. The New Zealand delegate reported continuing attempts to obtain heat-flow measurements through the floor of McMurdo Sound, and in the lakes of the dry valleys of Victoria Land.

*Recommendation X. SEG-6.* That efforts should be made to obtain heat-flow measurements wherever possible in the southern oceans, and the problems of making observations on land should be further investigated.

### *Gravity*

A South African request for a gravity link to solid rock near SANAE station was noted.

A joint resolution with the Geology Working Group (X. G/SEG-1) was made concerning gravity measurements.

### *Level changes*

The Japanese delegation expressed interest in determination of sea-level changes and earth tilt.

*Recommendation X. SEG-7.* That more attention should be paid to absolute measurements of sea level around the Antarctic coast, for the determination of secular vertical movement of the earth's crust.

### *Unmanned stations*

Attention of the Working Group was drawn to the interests in this subject of the Working Group on Upper Atmosphere Physics and SCAR expects the Working Group on Solid Earth Geophysics to collaborate fully with all other working groups of SCAR on this matter.

The possibility of unmanned stations, which could either telemeter information via satellites, or record information without attention for a substantial part of a year, was noted with interest.

*Recommendation X. SEG-8.* That the development of unmanned geophysical recording devices should be encouraged as a means of extending observations throughout Antarctica.

### *Continental-oceanic boundary and surrounding oceans*

*Recommendation X. SEG-9.* That the transition between Antarctica and the southern oceans, and the structure of these oceans, particularly the oceanic ridge systems in them, should be investigated by all available geophysical means. The combined measurement of total magnetic field and depth of water is particularly recommended.

### *Future of the group*

It would not be practicable to have full amalgamation between the Working Groups on Solid Earth Geophysics and Geology, but as an outcome of the joint meeting there would be much closer co-operation. The Working Group fully endorses the joint recommendation with the Geology Working Group (X. G/SEG-5) concerning future collaboration.

It would also be desirable for joint meetings of the Solid earth geophysics and Upper atmosphere physics Working Groups to be held periodically, particularly in view of the common problems in the field of geomagnetism.

## ANNEX B

### SCAR Working Groups and Groups of Specialists: procedures for calling meetings

The following procedure will be followed in convening meetings of the Working Groups:

If it has been agreed at an earlier SCAR meeting that a particular Working Group meeting shall be held in association with a SCAR meeting, or with some other meeting or symposium, then the Chairman or Secretary of the Working Group shall inform the Secretary of SCAR that the meeting is still necessary eight months before the date of the meeting and shall inform all members of the group accordingly.

If no prior agreement on the date and place of a Working Group meeting has been reached, the Secretary of the Working Group shall consult the members by correspondence about his proposals for a meeting, and at the same time inform the Secretary of SCAR that this is being done. When he has studied the replies from the Working Group, if it is clear that a meeting is desired, he shall inform the Secretary of SCAR and shall state the reasons for such a meeting and present a draft Agenda.

The Secretary of SCAR shall then place this request before the Executive, who shall then decide whether or not to call a meeting, and the time and place of the meeting.

After decision of the SCAR Executive, the Secretary of SCAR shall inform National Committees and National Delegates of the time and place of the meeting. This shall normally be six months before the date of the meeting.

All details of the meeting will be arranged by the Secretary of the Working Group in consultation with its members. The Secretary of the Working Group shall be responsible for informing its members of the arrangements.

*Ad hoc* informal meetings of Working Groups may be arranged from time to time should convenient circumstances arise, but they shall not have the status of official Working Group meetings. However, any resolutions from such meetings may be confirmed subsequently by the procedures adopted for Working Group meetings held at times other than the occasion of SCAR meetings (*SCAR Manual*, p 19-20).

It must be noted that the above procedures apply to meetings of SCAR Working Groups. The membership of these working groups consists of one member representing each nation and other members as appropriate.

Meetings of Groups of Specialists are not covered by the above procedures.

Such Specialist Groups consist of named individuals, who do not represent National Committees. Their meetings are arranged as appropriate after consultation with the SCAR Executive.

## ANNEX C

### Permanent SCAR recommendations in the field of logistics

SCAR, taking into consideration the fact that logistic matters are a fundamental concern to science; recognizing that the technology of the future scientific investigation in Antarctica will be increasingly demanding on the logistic support of Antarctic expeditions; believing that SCAR, by a study of past, present and future logistic requirements could improve the effectiveness of support for scientific purposes,

Recommend:

#### 1. *SCAR Working Group on Logistics*

That a Working Group on Logistics, to be known as SCARLOG, be formed, and maintained permanently, to become a centre for logistic and operational information.

#### 2. *Purpose, objectives and functions*

That the functions of the Working Group on Logistics be concerned with two main divisions of work:

(1) reconciliation between science and logistics in fields where conflict of interest occurs (i.e. contamination of snow, electromagnetic interference, lighting and auroral observation etc.);

(2) developments in polar logistics and technology.

That the following purposes and objectives be established for the Working Group.

(1) SCARLOG will encourage technical investigation and research on logistics problems that may be expected to arise from present and future scientific programmes. To this end, scientific programmes recommended by SCAR will be continuously reviewed for logistic implications.

(2) SCAR working groups in the various scientific disciplines may be invited to submit problems in the field of logistics, including communications, to the Secretary of SCARLOG for study and suggested solutions.

(3) SCARLOG, through its members, will keep itself informed of advances in techniques and equipment which may be adaptable to Antarctic use.

#### 3. *Membership*

(1) That each National Committee of SCAR and relevant international organization should nominate a member to SCARLOG. SCAR, however, draws to the attention of National Committees the need for appointing people who are active research or technical workers in the field of Antarctic logistics, and who are able to devote time to assisting with SCARLOG problems.

(2) That a chairman and secretary be appointed, the group having autonomous power of organization, including election of officers.

(3) That each member should send a list of persons concerned with logistic problems and their specialization from which a general list could be published for information.

#### 4. *Procedures*

##### (a) *Internal*

(1) That the Chairman and Secretary should be free to make the most effective use of information supplied on techniques, emergencies and logistics generally.

(2) That any resolution affecting the group as a whole must be taken at a meeting or by correspondence; in either case, a majority of seven must agree before the conclusion is accepted.

(3) That a continuous exchange of information should take place by airmail between the Secretary and members of the working group and vice versa. SCARLOG will have to conduct its work mainly by correspondence.

(4) That, as far as possible, members of SCARLOG will undertake to investigate the matters raised and to report back to SCAR. While specific members have been asked to study various problems, information from other sources will be welcomed. It must be emphasized that the work of SCARLOG could not go ahead unless prompt answers are received.

(5) That SCARLOG should feel free to set up subgroups of experts to examine any special problems arising from the work of the group. Such subgroups need not be exclusively drawn from members of SCARLOG.

##### (b) *Meetings*

(1) That the group should endeavour to meet annually, SCARLOG should take advantage of Symposia and similar occasions to hold meetings, it may also meet at SCAR general meetings.

(2) That, in the future, meetings of SCARLOG should be held at which special attention should be given to informal discussion of specific subjects with technological experts in the specific subjects present.

(3) That, in accordance with SCAR resolution, in the cases of SCARLOG meetings other than at SCAR meetings, the following procedure shall be adopted for ratifying resolutions of such meetings:

(a) immediately following the meeting, the Secretary shall refer all resolutions to all permanent members of the group for comment or approval within two months;

(b) following the acceptance of resolutions by the group, the Secretary of SCARLOG shall request the Secretary of SCAR to submit the resolutions to all National Committees for comments;

(c) the SCAR executive is authorized to approve resolutions two months *after* they have been distributed to National Committees, and their comments have been considered.

##### (c) *Liaison with SCAR and National Committees*

(1) that copies of circulars within SCARLOG must be sent to the Secretary of SCAR, and copies of these may be sent through him to Secretaries of National Committees for information.

(2) The SCARLOG Secretary should submit, three months before any SCAR meeting, a report on the activities and plans of his group.

(3) That SCARLOG Secretary be requested to prepare annually statements of the future plans of the group in addition to his usual reports of achievements.

*(d) Liaison with the Antarctic Treaty*

(1) That within the framework of its functions, SCARLOG offers its full co-operation to assist any logistic activities sponsored by governments.

(2) That when necessary, the resolutions of SCAR on Antarctic logistics be brought to the attention of National Committees with a request that they be communicated to their governments in the hope that the findings therein will be of assistance to the governments in their consideration of logistics problems.

*(e) Finances*

That travel, publication and other expenses should be covered by a special fund for which funds should be requested from SCAR and other sources, possibly including contributions from members.

*5. Specific programme of work*

(a) That SCARLOG should make available to Antarctic users information on new materials, techniques and future developments. That in order to do this a SCARLOG document should be published and kept up to date containing easy references, hints, recommendations and documentation on various logistic aspects and problems.

(b) That SCARLOG should study the following subjects:

*(1) Science and logistics*

To enable technical research on logistic problems to be intensified, more precise guidance be given to SCARLOG as to what the scientific requirements might be in five to ten years. If scientists are unable to make such forecasts, it should be realized that the logisticians themselves will have to estimate the requirements, resolve the problems and prepare to meet the needs in the most efficient ways open to them.

Special and future logistic support may include, for example, tall masts, protective wind walls, rocket launching pads and installations, submersibles for under ice work, satellite-supported projects.

*(2) Safety measures*

To compile an accident prevention manual, to include, for example, fire hazards and precautions, search and rescue, issue of ICAO group air signal cards to all field parties, list of unoccupied buildings—huts and caches.

*(3) Air operations*

These include a standard method for the marking of airstrips for universal Antarctic use, the application of hovercraft in the Antarctic, the performance of aircraft of all types in order to inform base commanders of their particular needs and to facilitate eventual cross servicing, the construction of airstrips, the technique of air and parachute drops, air operation support and organization.

(4) *Sea operations*

These include ship operations in ice, technique of supply of coastal stations, handling of cargo in Antarctic conditions.

(5) *Surface operations*

These include the performances of tractors and other types of land vehicles, transport of cargo under Antarctic conditions, technique of supply of inland stations, technique and development of caches for subsequent operations.

(6) *Buildings*

These include design and construction, fire hazards and precautions, mechanical and electrical services, new materials, stressed skin panel construction with object of reducing weight and thickness and improving fire rating, fire precaution methods, water supply, waste disposal, risks of site contamination at Antarctic bases in continuous operation.

(7) *Food and clothing*

These include, food for Antarctic operations, cold weather clothing improvements, new fabrics, new designs and practices.

(8) *Medical emergencies*

SCAR agreed that SCARLOG should undertake the collection of information about medical emergencies. In addition SCARLOG should only consider logistic aspects of medicine. All information of strictly medical or biological nature would be conveyed to the Working Group on Biology.

(9) *Logistic efficiency research and testing*

These include greater efficiency research and testing; the establishment of uniform standards for evaluating of performances and for reporting of tests, the exchange and discussion of tests results; the economics of logistic techniques and systems.

6. *Miscellaneous*

(a) That, as far as possible, all documentation of SCARLOG should conform in size with the proposal contained in *SCAR Circular* No 196: eg 210 × 297 mm (A4 size).

**ANNEX D**

**Specific logistic problems related to the execution of present and future scientific programmes in the Antarctic**

The Working Group on Logistics (SCARLOG) proposes to assemble records of scientific projects which have been successfully supported by new logistic means and also of those which have been unsuccessful. This information would include solutions of new logistic problems, logistic innovations, logistic trials, and logistic research.

The purpose of this will be twofold. First, it may enable SCARLOG to

identify planned or proposed programmes where recent innovations may be introduced with a view to enhancing the research projects. Second such information should enable the scientific working groups to consider projects on the basis of new achievements, and to avoid failure through using means which have proved unsatisfactory.

Therefore, SCARLOG invites any of the scientific working groups to put forward requirements they may have for logistic support for which means do not exist at present.

### ANNEX E

CCIR	International Radio Consultative Committee
CIG	Comité International de Géophysique
CMG	Commission on Marine Geology
COSPAR	Committee on Space Research
IAGA	International Association of Geomagnetism and Aeronomy
IAMAP	International Association of Meteorology and Atmospheric Physics
IAMRC	International Antarctic Meteorological Research Centre
IAP0	International Association of Physical Oceanography
IAPSO	International Association of Physical Sciences of the Ocean
IASH	International Association of Scientific Hydrology
IASY	International Active Sun Years
IAVCEI	International Association of Volcanology and Chemistry of the Earth's Interior
ICAO	International Civil Aviation Organization
ICPM	International Commission on Polar Meteorology
ICSI	International Commission on Snow and Ice
ICSU	International Council of Scientific Unions
IHD	International Hydrological Decade
IOC	Intergovernmental Oceanographic Commission
IQSY	International Quiet Sun Years
IUBS	International Union of Biological Sciences
IUCSTP	Inter-Union Commission on Solar Terrestrial Physics
IUGG	International Union of Geodesy and Geophysics
IUGS	International Union of Geological Sciences
SCARLOG	Scientific Committee on Antarctic Research Working Group on Logistics
SCIBP	Special Committee for the International Biological Programme
SCOR	Scientific Committee on Oceanographic Research
URSI	Union Radio Scientifique Internationale
UAP	Upper Atmosphere Physics
WDC	World Data Centre (See WDC(A), and WDC(B))
WMO	World Meteorological Organization
WMS	World Magnetic Survey

## OFFICIAL ORGANIZATIONS FOR SCIENTIFIC CO-OPERATION IN THE ANTARCTIC BEFORE THE IGY, 1957-58

BY R. N. M. PANZARINI

Since 1955, twelve nations have been co-operating in scientific programmes in the Antarctic, a happy outcome of international conferences and agreements that extend back far beyond the Antarctic Conference of that year which ushered in the International Geophysical Year.

Perhaps the first significant date is 1836, when A. von Humbolt suggested to the British Royal Society the establishment of permanent magnetic stations in various British colonies to participate in a programme of co-ordinated observations organized by K. F. Gauss, of the Göttingen Magnetic Union. The Royal Society, in forwarding this suggestion to the British Government, added recommendations of their own which bore fruit in the British Antarctic expedition of 1839-43 during which James Clark Ross, in *Erebus* and *Terror*, maintained magnetic observations during the circumnavigation of Antarctica.

At the thirty-first meeting of the British Association for the Advancement of Science, held in 1861, a message was read from Commander M. F. Maury, USN, proposing that maritime nations should continue in the scientific exploration of the Antarctic as part of the search for knowledge of the winds and currents of the world's oceans. A copy of Maury's letter was sent to eight of the maritime nations (Austria, Brazil, France, Italy, the Netherlands, Portugal, Russia and Spain).

The first concrete attempt at international organization, however, occurred in connexion with the First International Polar Year, 1882-83. This venture was proposed by Lieutenant K. Weyprecht, an Austrian explorer and naval officer, who suggested that interested governments should establish one or more stations in the polar regions at which scientific observations should be carried out simultaneously according to plan. Conferences of the organizing body, the International Polar Commission, were held at Hamburg in 1879, at Berne in 1880, at St Petersburg in 1881, at Vienna in 1884 and at Munich in 1891, when the Commission dissolved itself at the termination of its activities. Most of the interest and work was concentrated in the Arctic, but a French scientific party worked at Cape Horn in *Romanche*, and a German party, wintered and worked at Royal Bay, South Georgia.

Recommendations from the Seventh International Congress of Geography, Berlin 1899, went some way to standardize the scientific programmes of the British Antarctic Expedition under Commander R. F. Scott, RN, in 1901-03 in the Ross Sea; the German Antarctic Expedition 1901-03, led by E. von Drygalski, in the Indian Ocean sector of the Antarctic; the Swedish South Polar Expedition, 1901-04, under Otto Nordenskjöld in the Antarctic Peninsula area; and the Scottish National Antarctic Expedition, 1902-04, led by W. S. Bruce in the Weddell Sea and the South Orkney Islands. Another outcome of this Congress was the establishment by the Argentine Government of the observatory on one



of the Islas Año Nuevo near Islas de los Estados (Staten Island), which began the recording of magnetic and meteorological data in 1902. In 1904, Argentina also took over the observatory established by Bruce on Laurie Island, South Orkney Islands.

International co-operation in the Antarctic was again debated at the Eighth International Congress of Geography, Washington 1904, on a proposal by H. Arctowski. The following year, a number of notable polar explorers attending the Congress of World Economic Expansion at Mons decided to create an International Association for the Study of Polar Regions. A congress was convened at Brussels in 1906 to work out the constitution and programme of the Association. Fifteen countries were officially represented at the Congress: Argentina, Belgium, Chile, Congo, Denmark, France, Germany, Italy, the Netherlands, Portugal, Rumania, Russia, Spain, Sweden, and the United States. In addition, there were delegates from 119 scientific associations, academies, societies and organizations as well as those from Great Britain, Austria and Hungary not officially represented. The congress set up a new International Polar Commission, the main objects of which were to establish closer scientific relations between polar explorers, to co-ordinate their scientific methods and observations and generally to assist polar expeditions.

The International Polar Commission held another conference in Brussels in 1908 to which twelve countries sent official representatives: Argentina, Australia, Belgium, Denmark, Hungary, Italy, The Netherlands, New Zealand, Rumania, Russia, Sweden and the United States. A Norwegian with no official status also attended. The conference dealt with procedural matters and listened to reports of expeditions and polar problems of general interest. Amongst the reports was one on the International Polar Institute, a Belgian Government-supported bibliographical agency set up in Brussels in 1907.

Another meeting was held in Rome in 1913, with representatives from Austria, Belgium, Chile, Denmark, Great Britain (unofficially represented by the Royal Scottish Geographical Society), Hungary, Italy, the Netherlands, Rumania, Russia, Sweden and the United States. This meeting produced little of interest beyond a report of the demise of the International Polar Institute, after J. Denucé had produced a bibliography of 3225 titles. The original Executive Committee of U. Cagni (Italy), President; O. Nordenskjöld (Sweden), Vice-President; G. Lecointe (Belgium), Secretary, was replaced by M. Tschernyscheff (Russia), President; O. Nordenskjöld, Vice-President, and R. E. Peary (United States), Secretary.

A fourth meeting was arranged for 1916 in St Petersburg, but the First World War intervened and the break which it caused, together with the absence of interest displayed at the Rome meeting, caused the demise of the International Polar Commission.

The Second International Polar Year, 1932-33, had no direct bearing on the Antarctic as there were only two stations in those regions (at South Georgia and the South Orkney Islands), but the principle of scientific co-operation in polar regions was naturally very much in the minds of scientists of many nations.

In 1939 the Norwegian Government invited other interested countries to take

part in an international Congress of Polar Explorers, and a Polar Exhibition, to be held in Bergen in 1940. Unfortunately the project had to be abandoned owing to the outbreak of the Second World War.

After the end of the Second World War, international scientific co-operation in the Antarctic continued at individual level until the suggestion, in 1950, of a third International Polar Year developed into the familiar International Geophysical Year, 1957-58, the organization of which is summarized in the *SCAR Manual*.

### Selected bibliography

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CONGRES INTERNATIONAL POUR L'ETUDE DES RÉGIONS POLAIRES, Bruxelles, 7-11 September 1906. *Rapport d'ensemble*. [The author is indebted to Professor van Mieghem for a micro-film copy of this paper].

## STATIONS OPERATING IN THE ANTARCTIC, WINTER 1968

(Those marked \* are north of lat 60° S)

### *Argentina*

- "General Belgrano", lat 77° 58' S, long 38° 48' W
- "Alferez de Navio Sobral", lat 81° 04' S, long 40° 36' W
- "OrCADAS", lat 60° 45' S, long 44° 43' W
- "Teniente Matienzo", lat 64° 58' S, long 60° 02' W
- "Almirante Brown", lat 64° 53' S, long 62° 53' W
- "Petrel", lat 63° 28' S, long 56° 17' W
- "Esperanza", lat 63° 24' S, long 57° W

### *Australia*

- \*Macquarie Island, lat 54° 30' S, long 158° 57' E
- Mawson, lat 67° 36' S, long 62° 53' E
- "Wilkes", lat 66° 15' S, long 110° 32' E

### *Chile*

- "Capitán Arturo Prat", lat 62° 29' S, long 59° 38' W
- "General Bernardo O'Higgins", lat 63° 19' S, long 57° 54' W

### *France*

- \*Ile de la Possession, Iles Crozet, lat 46° 25' S, long 51° 52' E
- \*Ile Amsterdam, lat 37° 50' S, long 77° 34' E
- \*Port aux Français, lat 49° 21' S, long 70° 12' E
- "Dumont d'Urville", lat 66° 40' S, long 140° 01' E

### *Japan*

- "Syowa", lat 69° 00' S, long 39° 35' E

*New Zealand*

Scott Base, lat 77° 51' S, long 166° 46' E

\*Campbell Island, lat 52° 33' S, long 169° 09' E

*South Africa*

\*Marion Island, lat 46° 53' S, long 37° 52' E

\*Gough Island, lat 40° 19' S, long 9° 51' W

"Sanae", lat 70° 19' S, long 2° 22' W

*United Kingdom*

Stonington Island, lat 68° 11' S, long 67° 00' W

Argentine Islands, lat 65° 15' S, long 64° 15' W

Signy Island, lat 60° 43' S, long 45° 36' W

Adelaide, lat 67° 46' S, long 68° 54' W

Halley Bay, lat 75° 31' S, long 26° 38' W

\*Grytviken, South Georgia, lat 54° 17' S, long 36° 30' W

\*Stanley, Falkland Islands, lat 51° 45' S, long 57° 56' W

*USA*

"Amundsen-Scott", South Geographical Pole

"Byrd Station", lat 80° 01' S, long 119° 32' W

"McMurdo", lat 77° 51' S, long 166° 37' E

"Palmer Station", lat 64° 46' S, long 64° 04' W

"Plateau Station", lat 79° 28' S, long 40° 35' E

*USSR*

Mirny, lat 66° 33' S, long 93° 01' E

"Novolazarevskaya", lat 70° 46' S, long 11° 50' E

"Molodezhnaya", lat 67° 40' S, long 45° 51' E

"Vostok", lat 78° 28' S, long 106° 48' E

"Bellingshausen", lat 62° 12' S, long 58° 58' W

**SCAR EXECUTIVE COMMITTEE**

(Amendment to *SCAR Bulletin*, No. 29, 1968, p. 276)

Vice-President: Dr G. A. Avsiuk, Soviet Committee on Antarctic Research,  
Academy of Sciences of the USSR, U I Vavilova 30a, Moscow B-333.

### **THE POLAR RECORD**

This is the journal of the Scott Polar Research Institute. It is published in January, May and September each year and may be obtained direct from the Scott Polar Research Institute, Lensfield Road, Cambridge, England, or through any bookseller. The subscription is forty-six shillings and sixpence (\$ 7.00) a year, or fifteen shillings and sixpence a copy, post free.