

SCAR

SCIENTIFIC COMMITTEE ON ANTARCTIC RESEARCH

BULLETIN

ARGENTINA AUSTRALIA BELGIUM
CHILE FRANCE JAPAN NEW ZEALAND
NORWAY SOUTH AFRICA UNITED KINGDOM
UNION OF SOVIET SOCIALIST REPUBLICS
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SCAR BULLETIN

No. 10 JANUARY 1962

FIFTH MEETING OF SCAR HELD AT WELLINGTON

9 TO 14 OCTOBER 1961

Present: President: G. R. Laclavère

Delegates: Argentina, R. N. M. Panzarini; Australia, K. E. Bullen; Chile, Gino Bucchi; France, C. Lorius; Japan, T. Nagata; New Zealand, E. I. Robertson; Norway, T. Gjelsvik; South Africa, S. A. Engelbrecht; United Kingdom, G. de Q. Robin; USA, H. Wexler; USSR, Ye. I. Tolstikov; IUBS, E. J. Godley; IUGG, G. R. Laclavère; IGU, R. H. Wheeler; URSI, C. Ellyett; IUPAC, H. M. Pantin.

Observers: WMO, M. A. F. Barnett; SCOR, J. W. Brodie; COSPAR, F. Jacka; IUGG, R. W. Willett

Advisers: Argentina, J. M. Cohen, O. Schneider; Australia, W. R. Baird, R. Carrick, W. J. Gibbs, F. Jacka, B. P. Lambert, P. G. Law; France, R. J. Bost, G. R. Laclavère, A. Lebeau, J. Prévost, P. C. Rolland, Paul-Emile Victor, J. Alt; Japan, T. Torii, H. Uyeda; New Zealand, J. W. Brodie, J. Dickie, T. R. Clarkson, R. H. Clark, C. Ellyett, R. A. Falla, R. P. Gough, M. Gadsden, T. Hatherton, G. W. Markham, J. H. Miller, R. G. Simmers, W. H. Ward; South Africa, C. G. Hide, F. C. Truter, W. C. Watson; United Kingdom, Sir Vivian Fuchs, A. H. Sheffield, B. Stonehouse; USA, D. K. Bailey, R. C. Cross, T. I. Gray, A. B. Ford, T. O. Jones, J. M. Jones, K. Rodahl, C. W. M. Swithinbank, P. A. Siple, D. M. Tyree, G. D. Whitmore, R. C. Peavey; USSR, Y. D. Kalinin, M. J. Ravich.

Structure of ICSU and alteration of title of SCAR

The President reported that ICSU had set up a committee to consider the future structure of its own organization in view of its increasing responsibilities. He said that SCAR should take note and pass any comments on its own position within the ICSU structure to this committee. The Executive Board of ICSU had already decided that the name "Special Committee" was no longer appropriate for committees which had long-term responsibilities, and that such committees should be renamed "Scientific Committees". SCAR has, therefore, become the "Scientific Committee on Antarctic Research". The field of work of SCAR would remain the same.

The meeting recommended that the International Union of Geological Sciences and the World Meteorological Organisation be asked to appoint delegates to SCAR, subject to approval by the Executive Board of ICSU. The Executive Committee was given authority to act as appropriate if an application to join was received from the International Union of Physiological Sciences.

International Antarctic Analysis Centre

The President reported that the Bureau of ICSU had agreed that the IAAC was an international undertaking which had their full support.

Secretary

Dr Robin was re-elected as Secretary for a period of three years.

Change of name of working groups

The group on Cartography was renamed Geodesy and Cartography.

The group on Crustal Geophysics was renamed Solid Earth Geophysics.

Organization of working groups

In order to combat the danger of SCAR becoming too large, a number of proposals for the re-organization of Working Groups were discussed and accepted. These were:

(a) Working Groups would have to conduct their work mainly by correspondence and a Working Secretary for each Permanent Working Group would have to be nominated. The appointments made at the Fifth SCAR meeting would be subject to review after one year.

Copies of correspondence within working groups must be sent to the Secretary of SCAR and copies of important circulars should be sent to Secretaries of National Committees for information.

(b) Each National Committee, and each relevant international organization, should nominate a member to each Permanent Working Group.

(c) Groups should have autonomous powers of internal organization, including election of officers.

(d) Groups should take advantage of Symposia, and similar occasions, to hold meetings. In addition, from two to four Working Groups would meet at SCAR general meetings. The Executive Committee would decide which Working Groups were to meet.

Working group	Working secretary	Suggested time and place of next meeting
Biology	R. Carrick	Antarctic Biological symposium, September 1962
Communications	A. H. Sheffield	Possibly 1962 in conjunction with SCAR or in conjunction with Antarctic Treaty meeting
Geodesy and Cartography	B. P. Lambert	Bonn Conference on International Map of the World, 1962
Geology	R. W. Willett	Not at next SCAR meeting; possibly 1963
Geomagnetism	T. Nagata	Not at next SCAR meeting; possibly at meeting of IUGG, August 1963
Glaciology	C. Lorius (for one year)	Commission of Snow and Ice Meeting at Obergürgl, September 1962
Logistics	D. M. Tyree, G. W. Markham and J. Dickie (joint working secretaries)	In conjunction with next SCAR meeting
Meteorology	W. J. Gibbs	Not in 1962; possibly at IUGG meeting in 1963
Oceanography	M. M. Somov	Not at next SCAR meeting; possibly 1963
Solid Earth Geophysics	E. I. Robertson	Possibly 1963 SCAR meeting
Upper Atmosphere Physics	F. Jacka	Next SCAR meeting with possibility of earlier meeting in April 1962, when COSPAR meets

The above table indicates the existing Permanent Working Groups, the name of the Working Secretary and details of its next meeting.

(e) Secretaries of groups should submit, three months before any SCAR meeting, a report on the activities and plans of his group.

As implied by the table each of the Working Groups listed is now established as a Permanent Working Group. Changes in the numbers of Working Groups and the subjects covered can be made by future SCAR meetings.

Finance

The Finance Sub-Committee reported a balance in hand on 31 December 1960 of \$3,042.24.

Recommendation V.F-1. That, subject to approval by a majority of National Committees before 31 December 1961, the SCAR Secretary be authorized to spend up to \$3,000 during 1962 for executive assistance in the conduct of his duties, in addition to present operating costs.

Recommendation V.F-2. That, in view of the fact that a potential increase in SCAR operating expenses were first presented to national members at the present meeting, there should be no immediate increase in national contributions for 1962. However, the Financial Committee considers that SCAR's income should be increased to \$12,000 by invoking the formula for increased contributions adopted by the First Meeting of SCAR, provided that the total contribution by any national member shall not exceed \$2,000 for any one year.

The committee also expresses the hope that some national members will find it possible voluntarily to increase their contributions to SCAR for 1962 in order that the anticipated deficit can be reduced to a minimum.

Recommendation V.F-3. That, in view of the prospective deficit in SCAR operating funds which may occur for 1962, assistance to union delegates towards expenses for SCAR meetings is not practicable.

Reports and recommendations of working groups

See Annex, p. 93.

Discussion of matters arising from the reports of working groups on Upper atmosphere physics

Distribution of alerts. With reference to V.UA-13 and -14, National Committees are asked to consider whether a system of bilateral arrangements would be satisfactory, and they are also asked to consider the general problem and communicate their views to the Secretary of SCAR for consideration at the next meeting of SCAR. The existing system should continue in force for the present.

Regional Antarctic Seismological Centre

Professor Bullen reported that a meeting of the Editorial Committee of the International Seismological Summary considered that it was desirable to set up Regional Seismological Centres covering the whole earth, and stated that the setting up of an Antarctic Seismological Centre, as proposed by the Fourth meeting of SCAR, would be in line with this. So far no offers to establish a centre had been received from National Committees.

National Reports

The present format and content of National Reports were considered satisfactory. It was agreed that the number of these reports sent to other National Committees be increased from two to twelve, or more if requested.

Antarctic Treaty

A resolution was warmly endorsed "that members of SCAR convey to their respective governments SCAR's appreciation of the fact that the Antarctic Treaty has been ratified by all governments and that the Treaty Powers are now considering ways of implementing the objectives of the treaty. The members of SCAR have noted with appreciation the references to the work of SCAR made at the Consultative Meeting of the Antarctic Treaty Powers at Canberra in July 1961, including recommendation IV-II that SCAR should be encouraged to continue its advisory work".*

Exchange of data

"The Fifth Meeting of SCAR wishes to draw attention to the policy decided at the time of the First Meeting of SCAR that the exchange of observations and information resulting from Antarctic research shall continue as during the IGY. It urges National Committees to ensure that all their results are circulated to the relevant World Data Centres and by other means so that all the results are easily available."

Time and place of next meeting

An invitation for the next meeting to be held in the United States was accepted, and a date in about August 1962 was suggested. A Symposium on Antarctic logistics will also be arranged in the United States about this time.

Acknowledgements

The President thanked the Royal Society of New Zealand for their invitation to hold the meeting in Wellington, also the Government of New Zealand, the Victoria University and numerous other institutions and bodies, for the admirable arrangements made for the meeting, and the hospitality shown to delegates and observers.

ANNEX

Reports and recommendations of working groups

BIOLOGY

R. Carrick (Secretary), R. A. Falla, K. Rodahl, J. Prévost. Advisers and observers: J. W. Brodie, E. J. Godley, C. G. Hide, T. O. Jones, B. Stonehouse. Co-opted members: R. K. Dell and J. C. Yaldwyn.

Symposium on Antarctic biology

This is to take place in Paris, on 3 to 7 September 1962, under the auspices of the Académie des Sciences. Papers may be read on Biogeography and systematics, Marine Productivity, Ecology, Ethology, Physiology (animal and plant), Physiology (human), Medical research and Conservation.

* *Polar Record*, Vol. 11, No. 70, 1962, p. 73.

SCAR programme in biology

Recommendation V.B-1. That National Committees do their utmost to ensure that as many research biologists as possible be given financial assistance by their own country to attend the Symposium on Antarctic Biology.

Recommendation V.B-2. That, where necessary, National Committees should take steps to increase the number of qualified biologists in Antarctic parties, and to secure the active interest of senior biologists in their work.

Closer integration of marine and terrestrial biological research is desirable, and would be assisted by the inclusion of marine biologists (in addition to those studying terrestrial subjects) in national delegations to SCAR meetings.

Recommendation V.B-3. That matters relating to marine biology are within the group's sphere of interest (see *V.O-7*), and close liaison maintained with the Working Group on Oceanography.

Recommendation V.B-4. (a) That the attention of National Committees be drawn to the necessity for proper registration and eventual deposit of biological collections in institutions where they will be permanently located, properly cared for, and readily available for study; (b) that the study and publication of results on existing collections be given high priority, and that adequate provision be made for this in all future collecting programmes; (c) that centralized national registers of Antarctic biological collections should be made.

Considerable geographical gaps still exist in the collection of biological material and survey data, notably:

(1) sector 90° W. to 150° W.—botany, land vertebrates, marine invertebrates; (2) sector 80° E. to 50° W.—marine invertebrates; (3) shallower seas surrounding South Sandwich Islands, Bouvetøya, Prince Edward Islands, Îles Crozet—marine invertebrates; (4) Balleny Islands and Scott Island, Prince Edward Islands—land vertebrates.

Important gaps also exist in scientific knowledge of the ecology and adaptations of common Antarctic and sub-Antarctic species that are readily accessible for study at many stations, e.g. Weddell Seal (*Leptonychotes weddelli*) and Gentoo Penguin (*Pygoscelis papua*).

Species that are studied during their breeding-season on land in summer, e.g. Elephant Seal (*Mironga leonina*), Adélie Penguin (*Pygoscelis adeliae*), remain unstudied at sea and in winter. The food relationships of Antarctic and sub-Antarctic seals and birds throughout the year are very imperfectly known.

It is considered that the opportunity to obtain useful annual data on life-cycles, especially seals and birds, at Antarctic stations now being manned over long periods of time, should be better utilized. Minimum data required for each species include numbers present, first arrival dates, laying or pupping dates, and measurements (length) and sex of animals that are taken for food or are natural casualties.

At present, there is no unnecessary duplication of effort and no section of the biological programme can be discontinued owing to completion.

Conservation

The Group notes with appreciation that the Antarctic Treaty Powers, at the First Antarctic Treaty Consultative Meeting, based Recommendation I-VIII to their governments substantially on the measures drafted at the Fourth Meeting of SCAR.

A list of selected areas to be designated as sanctuaries for the conservation of species or habitats that require special protection is being prepared. A list of species of particular scientific interest or rarity, which are considered to require special protection, will also be prepared. It is considered that the Ross Seal (*Ommatophoca rossi*) and the Fur Seals (*Arctocephalus* spp.) should be so protected throughout their range, and that seals and birds generally should receive similar protection at the margins of, and outside, their normal geographic range.

The Group considers that conservation of flora and fauna in the sub-Antarctic islands does not differ in principle from conservation in Antarctica. The first step toward more effective and consistent measures would be to ask the responsible governments to consider their existing legislation in the light of Recommendation I-VIII of the First Antarctic Treaty Consultative Meeting.

The Group considers that progress by SCAR in the furtherance of research in Antarctic biology would suffer if SCAR becomes too involved in the political and economic aspects of conservation, as distinct from the formulation of principles and recommendations based upon scientific work.

Recommendation V.B-5. The International Union of Biological Science should be asked to nominate a member to the SCAR Working Group on Biology, and that when the International Union of Physiological Sciences has been admitted to SCAR it should also be asked to nominate a member.

Recommendation V.B-6. That Recommendation 8 of the First Antarctic Treaty Consultative Meeting be drawn to the attention of governments responsible for sub-Antarctic islands, with a view to securing consistent measures for the conservation of flora and fauna throughout the Antarctic and sub-Antarctic regions.

COMMUNICATIONS

A. H. Sheffield (Chairman), W. R. Baird, R. J. Bost, R. Cassey, T. R. Clarkson, J. M. Cohen, R. C. Cross, J. M. Jones, P. G. Law, J. Powell, Ye. I. Tolstikov.

Continuation of Working Group on Communications

Recommendation V.C-1. That SCAR's responsibility should be to formulate and co-ordinate the joint communications needs of all scientific disciplines. Where appropriate, international bodies should be asked to assist.

Antarctic Treaty

The relationship of the Group with the meeting of experts proposed in the First Antarctic Treaty Consultative Meeting, Section I-XI, was discussed.

Recommendation V.C-2. That the group should remain in existence as a permanent group of SCAR for the purpose of exercising its co-ordinating functions as expressed in I-I.

Pending action by the Antarctic Treaty governments to call a meeting of telecommunications experts, in accordance with Recommendation I-XI of the Antarctic Treaty meeting held in Canberra, July 1961, it should continue its efforts to arrange adequate communications services for the needs of Antarctic science.

The Group undertakes to provide the meeting of experts, on request, with information, based on its own experience, and to give all possible assistance.

In the event that the SCAR working group is relieved of its operational functions there will be a need to provide for the handling of day-to-day communications operational functions at present performed by the Chairman of the Communications Working Group.

Common radio frequency

Recommendation V.C-3. The Group notes the requirement for a common radio frequency for field safety and invites attention to the recommendation on this matter at Paris, 1956, Namely:

That in addition to the two frequencies of 2182 and 8364 kc./s. recommended in Brussels Resolution XLVIII all mobile and fixed Antarctic IGY stations shall, as far as possible, be equipped to transmit and receive on 3023.5 kc./s. and that this frequency be recognized as the normal contact common frequency; subsequent transmission to be conducted on frequencies to be decided by the operators.

Map of radio stations

Recommendation V.C-4. The Group recommends that a map be drawn up of communications between stations—Antarctic and sub-Antarctic. It suggests that there should be a separate map showing communications necessary for meteorological purposes and another for other communications. This map could circulate immediately among the present members of the Group.

Interference problems

Recommendation V.C-5. The Group, whilst sympathizing with the desire of the members of the Upper Atmosphere Working Group to have a quiet period of 5 min. at half hourly intervals, regret that at some Antarctic stations, if radio communications circuits are closed down for such periods, it would be impossible to provide adequate communications services, since, on each occasion of closing down, circuits would have to be set up anew, a process requiring a period of possibly 15 min. They also comment on the interference to radio communications services by ionospheric sounding apparatus and other electro-magnetic radiations.

The Group reminds the Upper Atmosphere Working Group that most Antarctic radio stations fulfil the international obligation to keep watch for distress signals on 500 and 2182 kc./s. for 3 min. past each quarter hour and it is necessary for these periods that interference by other electronic apparatus be avoided.

The Group, however, recognizes the necessity for designing and operating power supplies and radio communications equipment in such a manner as to reduce harmful interference to the lowest possible level, and recommends that each nation take whatever steps are practicable to reduce harmful interference at each station caused by all electronic and electrical equipment. The requirement has been taken into account as far as is possible in drawing up the Antarctic network schedule programme.

This problem was brought to the notice of the Plenary Session at the Fourth Meeting of SCAR in Cambridge 1960, and it was agreed to direct the attention of radio operators to the need for avoiding interference and for following recognized procedures.

It is hoped that due observance of the advice contained above and in the 1960 suggestion to station leaders by operators and all others concerned will reduce mutual interference between communications and scientific equipment.

Schedules

Recommendation V.C-6. SCAR notes the significant improvement which has taken place in the exchange of meteorological synoptic data within the Antarctic, and between the Antarctic and other places, and urges members, while seeking consideration of the matter by WMO and by the meeting of telecommunications experts recommended by the First Antarctic Treaty Consultative Meeting, I-XI, to arrange to put into effect by 1 January 1962 the revision of the existing schedules as below:

Mirny Collective

Times G.M.T.	Station	Information
01.00	Port Stanley	FICOL Broadcasts
01.15	Mawson	21, 00 SYNOPS, Mawson, Davis, "Wilkes", "Syowa", "Norway" (SANAE)
05.05	Mawson	03 SYNOP 00 UA, Mawson, Davis, "Wilkes"
07.00	Port Stanley	FICOL Broadcasts
07.15	Mawson	06 SYNOP, Mawson, Davis, "Wilkes", "Syowa", "Norway" (SANAE)

Mirny Collective (cont.)

Times G.M.T.	Station	Information
13.00	Port Stanley	FICOL Broadcast
13.15	Mawson	00, 12 SYNOP, Mawson, Davis, "Wilkes", "Syowa", "Norway" (SANAE)
19.00	Port Stanley	FICOL Broadcast
19.15	Mawson	15, 18 SYNOP 12, UA, Mawson, Davis, "Wilkes", "Syowa", "Norway" (SANAE)

McMurdo Collective

01.00	Port Stanley	FICOL Broadcast
03.30	Mawson	18, 00 SYNOP-00, UA, Davis, Mawson "Syowa", "Norway" (SANAE)
04.05	"D'Urville"	00, 03 SYNOP—00, UA
04.15	"Ellsworth"	00, 03 SYNOP, South American Collective
05.05	"Wilkes"	21, 00, 03 SYNOP—00, UA
09.05	Mawson	06, SYNOP 06, UA Mawson, Davis, "Syowa", "Norway" (SANAE)
12.30	"D'Urville"	06, 09, 12 SYNOP 05, UA
13.00	Port Stanley	FIBCOL Broadcast
13.15	"Ellsworth"	06, 09, 12 SYNOP
13.30	"Wilkes"	06, 09, 12 SYNOP 12, UA
16.05	"Wilkes"	15, SYNOP 12, UA
16.45	"Ellsworth"	15, SYNOP 12, UA South American Collective
18.30*	Mawson	12, 18, SYNOP 12, UA, Mawson, Davis, "Syowa", "Norway" (SANAE)
19.00	Port Stanley	FICOL Broadcast
21.15	"D'Urville"	18, 21 SYNOP
21.30	"Ellsworth"	18, 21 SYNOP

Note 1

Mirny-McMurdo Radioteletype exchange four times daily:

Suggested G.M.T. times	
02.05	18, 00 SYNOPS Mirny-McMurdo Collectives including meteorological reports from United States and USSR stations
05.15†	00 UA
14.05	06, 12 SYNOPS
17.30†	12 UA

Note 2

The following additional schedules are in operation:

"Ellsworth"	FICOL Broadcasts, Buenos Aires, Deception and other Argentine Ant- arctic stations, including ship reports
Mawson	Kerguelen, New Amsterdam, Pretoria, Perth, Mirny, "Wilkes"
"Syowa"	Choshi, Davis, Mirny, Halley Bay, "Byrd", Norway" (SANAE), "D'Urville"
Davis	Esperance, "Wilkes"
"Wilkes"	Sydney, "D'Urville", Davis, Mawson
"D'Urville"	"Wilkes", Kerguelen, Mirny, "Syowa"
McMurdo	Washington, Christchurch, South Pole, "Byrd", "Hallett", "Scott", "Gonzales Videla" and ships
McMurdo	Will make CQ broadcasts as necessary
"Scott"	Awarua (NZ), "Hallett"
Mirny	Moscow, "Syowa", "D'Urville", Mawson, Kerguelen, Vostok, Novala- zarevskaya
Mirny	Will make two CQ broadcasts daily at 02.00 and 14.00 G.M.T. in addition to Note 1
Port Stanley	London, Halley Bay, Deception Island and other Falkland Islands Dependency Survey stations and ships

* New suggestions. † Subject to confirmation by USSR.

Note 3

McMurdo-Sydney Radioteletype exchange:

Times
G.M.T.

02.05-08.00*	McMurdo Collectives and International Antarctic Analysis
19.05-21.00*	Center meteorological reports and analyses.

Note 4

Messages containing scientific data other than meteorological information and requests for special schedules may follow immediately after meteorological traffic has been cleared.

GEODESY AND CARTOGRAPHY

G. R. Laclavère (Chairman), Sir Vivian Fuchs, T. Gjelsvik, R. P. Gough, S. Helle, B. P. Lambert, J. H. Miller, R. N. M. Panzarini, Ye. I. Tolstikov, T. Torii, W. C. Watson, R. H. Wheeler, G. D. Whitmore.

Co-ordination of programmes

The Working Group on Geodesy and Cartography was satisfied from reports received from member nations that no serious duplication of activity exists, and recommends bilateral arrangements for co-operation and elimination of minor duplication whenever necessary.

The Group noted the request from France that any country which could conveniently do so should photograph the coast of Terre Adélie and supply prints and data to France.

The group will arrange for production and distribution of diagrams showing Antarctic mapping activities in pictorial form. The USSR offer to map sheets 1, 2, 7, 9 and 10 of the 1:3,000,000 map series will be shown in this pictorial index, as will other maps proposed to be produced by USSR.

New means of obtaining source data

Recommendation V.Gd-1. That member nations should carry out research similar to the work done in the United States in connexion with the development of special photogrammetric techniques for identification of disturbances of snow and ice surface, particularly in the so-called "featureless" area of Antarctica, in order that these forms may be adequately portrayed on 1:1,000,000 scale maps. Also that SCAR seek the advice of the International Society for Photogrammetry in this matter.

Description of base material used in map compilation

Recommendation V.Gd-2. That all Antarctic maps carry a reliability diagram and "history" panel, and that future editions of the map catalogue include a brief description of the base material used in map compilation.

Distribution of map material

Recommendation V.Gd-3. That any member requiring an increased distribution of map material, over that recommended by SCAR at its Third Meeting, inform the Secretary of the Working Group in order that the Secretary may endeavour to make arrangements for this distribution.

* New suggestions.

Antarctic scientific atlases

The Group noted that the USSR has the production of these atlases under way, and that Great Britain and the United States have begun preparatory work in this connexion.

Recommendation V.Gd-4. That member nations planning to produce atlases of scientific information of Antarctica should utilize, to the extent feasible, uniform or similar base sheets, striving by means of international co-operation to attain uniformity in scale, orientation, projection, and other details of map design; while at the same time complying with any applicable recommendations of map specifications adopted by SCAR.

Orientation of "one sheet" maps of Antarctica

Recommendation V.Gd-5. That all one-sheet maps of Antarctica be prepared with the Greenwich zero-longitude meridian pointing vertically toward the top of the map sheet.

Geodetic survey in Antarctica

Recommendation V.Gd-6. That members undertake geodetic surveys in local areas for the purpose of establishing, on ice-free rock outcrops, a framework of permanent marks that can subsequently be used as a basis for accurate ice movement surveys.

Recommendation V.Gd-7. That the possibility of using artificial satellite observations for determination of absolute geodetic position be investigated by members, and the advice of both COSPAR and IUGG be sought in this matter.

Recommendation V.Gd-8. That the Secretary of the Group distribute to members details of the types of "ice markers": (a) proposed by the United States and (b) successfully used by Expeditions Polaires Françaises in Greenland over a period of at least ten years.

Recommendation V.Gd-9. That the Secretary of the Working Group distribute to members reports on practical experience in the use of electronic distance measurement equipment in polar conditions including: (a) reports received from individual members, (b) special reports to be supplied by manufacturers, (c) reports to be sought from Canada.

Conventional topographic map symbols

Recommendation V.Gd-10. That the UNO Cartographic Office be informed of the map symbols adopted by SCAR and be asked to ensure that the symbols used on the 1:1,000,000 scale International Map of the World conform to these in respect of Antarctic areas.

GEOLOGY

R. W. Willett (Chairman), K. E. Bullen, R. H. Clark, A. B. Ford, Sir Vivian Fuchs, T. Gjelsvik, H. M. Pantin, R. N. M. Panzarini, M. J. Ravich, F. C. Truter, R. H. Wheeler.

Progress reports

Reports from member nations show that geological work is proceeding along the lines laid down in the SCAR programme.

Recommendation V.G-1. That a map of Antarctica showing the extent of geological work and the scope by member nations at the close of the 1961-62 season be prepared, together with projected future areas of work, and distributed before the next SCAR meeting.

Translation of Russian papers

Recommendation V.G-2. That the Chairman communicate with member nations seeking lists of translations made of Russian Antarctic geological papers, and that these lists be consolidated and distributed to all member countries.

Structural symbols

The Group discussed the problem of co-ordination and standardization of structural symbols. They agreed to a minimum basic number of symbols for standardization which are necessary for reconnaissance geological survey in Antarctica.

Recommendation V.G-3. That the structural symbols used by each member nation should be placed against each item on an agreed list, and that a consolidated list should be prepared by the Chairman and forwarded to member nations for comment with a view to presenting an agreed list of basic symbols at the next SCAR meeting.

Geological colour schemes

Recommendation V.G-4. That the colours of geological formations shown on Antarctic maps conform as closely as possible to the colour scheme adopted for the International Geological Map of the World. Special attention should be devoted to the provision for differentiation within the Precambrian.

Formation names

A paper was circulated showing all formation names appearing in published geological literature or in MS.

Recommendation V.G-5. That the Chairman should write to the Commission for the International Stratigraphic Lexicon enquiring as to the present state of the Antarctic section of the lexicon, and offering the Group's assistance in preparing such a section. If necessary, the Group is prepared to undertake the complete compilation of the section on Antarctic stratigraphic nomenclature.

Precambrian geology

As much of the exposed rock within Antarctica belongs to the Precambrian era the group agrees that it is desirable to undertake systematic determinations of absolute ages of these rocks from the crystalline basement that may serve for stratigraphic classifications of regional metamorphic units, for recognition of tectonic-magnetic cycles, and the ages of different intrusions within the metamorphic rocks. The group also emphasizes the desirability of regular publication of absolute age data and an annual exchange of results.

Recommendation V.G-6. That the Chairman seek from all SCAR countries a list of absolute ages of rocks collected from the Antarctic continent. This should be circulated in addition to the list already prepared.

Symposium on Antarctic geology

Recommendation V.G-7. In view of the complexity of the problem of stratigraphic and formational names and rock definitions, the Group recommends that a meeting of Antarctic geologists be held in 1963 under SCAR auspices and preferably in conjunction with a SCAR meeting. A preliminary programme for this meeting will be drawn up by the Chairman for circulation before the next SCAR meeting. It is the opinion of the Group that such a meeting should not be in conjunction with any other large geological conference as it is felt that this meeting should be attended by Antarctic geologists only. Also, it is considered that by 1963 a large number of geological maps and publications now being prepared will have appeared, and the extent of geological knowledge of Antarctica should be correspondingly greater, hence the opportunity for profitable discussions would be increased.

Mapping and legends

The Group agreed that a meeting will be necessary to finalize the problems of standardization of symbols, colours and legend of geological maps, and to

enable stratigraphic and formational names to be agreed. In view of the progress of geological mapping and the inevitability of geological maps of the whole of Antarctica being prepared, these questions are now paramount. The Group agreed to seek the views of the Commission on the World Geological Map on a suitable scale for a geological map of Antarctica.

The Group emphasizes the desirability of completing the regional geological mapping of Antarctica as soon as practicable.

Upper Mantle Project

The Working Group on Solid Earth Geophysics referred the geological aspects of the Upper Mantle Project to the Geology Working Group.

Recommendation V.G-8. That the attention of geologists working in the Antarctic be drawn to the geological requirements posed by the IUGG Upper Mantle Project.

GEOMAGNETISM

T. Nagata (Chairman), D. K. Bailey, R. J. Bost, G. Ellyett, M. Gadsden, C. G. Hide, F. Jacka, Y. D. Kalinin, A. Lebeau, E. I. Robertson, O. Schneider, H. Uyeda.

The Working Group on Geomagnetism drew attention to the serious gap in the network of stations making geomagnetic observations caused by the closing, for at least a year, of the Belgian and Japanese stations, "Roi Baudouin" and "Syowa", and by the proposed ending of magnetic observations at Macquarie Island in November 1962.

Recommendation V.Gm-1. That the existing scheme of geomagnetic observations should be continued for at least four years in connexion with the world magnetic survey programme.

Recommendation V.Gm-2. That, if a magnetic observatory is located in an area where large magnetic anomalies exist, a magnetic survey of the surrounding area should be made to determine the undisturbed value of that area.

Recommendation V.Gm-3. That air-borne or ship-borne magnetic surveys over oceanic areas surrounding the Antarctic continent should be encouraged: this would contribute to the Upper Mantle Project and the World Magnetic Survey.

Recommendation V.Gm-4. That any opportunity to re-occupy a magnetic station should be taken; this would give important knowledge of the geomagnetic secular variation, and contribute to the World Magnetic Survey.

Recommendation V.Gm-5. That continuous observation of geomagnetic variation by means of standard variograph in general should be carried on at the existing network in the Antarctic during the International Quiet Sun Year (IQSY) period, because the significance of geomagnetic daily variation in a quiet period especially in the sunlit polar area has been recognized to deserve further detailed studies.

Recommendation V.Gm-6. That at field stations of magnetic surveys attempts should be made to obtain samples of the shape and magnitude of daily variation, in addition to the absolute values of geomagnetic elements, to aid the study of the geographical distribution of variation patterns and as a possible contribution to the Upper Mantle Project; a spacing of the order of 200 km. is considered adequate for this purpose.

Recommendation V.Gm-7. That earth current observations, both with normal and quick-run instruments, should be carried out at as many stations as possible before and during the IQSY period.

Recommendation V.Gm-8. That a Permanent Working Group on Geomagnetism be established.

Recommendation V.Gm-9. That the Working Group on Geomagnetism should be responsible for advising on all geomagnetic observations in the Antarctic.

Recommendation V.Gm-10. That, since the study of the short-period variations of the magnetic field involves close co-ordination with other studies in Upper Atmosphere Physics, this co-ordination be the responsibility of the Working Group on Upper Atmosphere Physics.

Recommendation V.Gm-11. That the Working Group on Geomagnetism should maintain close liaison with the relevant committees of IAGA and with CIG.

Recommendation V.Gm-12. That the secretary of the Working Group on Geomagnetism be T. Nagata.

GLACIOLOGY

G. de Q. Robin (Chairman), T. Hatherton, C. Lorius, H. M. Pantin, P. A. Siple, C. W. M. Swithinbank, T. Torii, R. H. Wheeler.

*Report to Working Group on Geodesy and Cartography**

In response to an enquiry from the Working Group on Geodesy and Cartography about ice-movement measurements, the Working Group on Glaciology agreed that mass balance studies of the Antarctic ice sheet could be greatly improved by a number of accurate measurements of ice movement, surface slope and elevations. The co-operation of geodesists and photogrammetrists should be sought particularly for measurements at great distances from nunataks, where the conventional methods of triangulation familiar to glaciologists are unsuitable.

The most important gap in present knowledge concerns the rate of movement of the larger ice streams and ice shelves. The movement of about ten points spaced evenly across the larger ice streams and ice shelves near the ice front or coastline should be measured to an accuracy of 10 m. over a one-year interval. Less accuracy is acceptable if the interval between measurements is greater.

Further measurements should be systematically spaced over the continent far from nunataks. A minimum network of points has been suggested. Priority should be given to measurements at (a) existing inland stations, (b) approximately along the 90° E. and 90° W. meridians at points spaced about 5° of latitude apart. Markers should be constructed to survive at least 10 years of snow accumulation and should be fixed to an accuracy of 1 m. if the interval between measurements is one year, or proportionately less accurately if the interval is greater. The existing inland bases are already adequately marked, and their positions should be accurately determined as part of this study. If radio aids to geodesy or navigation are being set up on the ice sheet, these should also be used as ice movement points.

Glaciologists would appreciate photogrammetric surveys to determine ice movement in any areas in which reference points are visible. Experience has shown that crevasses frequently provide adequate markers if the time interval between successive measurements is not greater than one year. The two sets of photographs should be taken at the same local time in order to obtain comparable shadows. Close co-operation with glaciologists is advisable in deciding the desirable time lapse in each case.

Particularly round the Antarctic coastline, the development of position-finding techniques using artificial earth satellites could be of great value to studies of the mass balance of the Antarctic ice sheet.

Close co-operation between glaciologists, meteorologists and photogrammetrists is desirable in order to find the size, orientation and permanency of

* This report was prepared by a provisional Working Group on Glaciology.

sastrugi at inland bases. This work should provide the key to the interpretation of air photographs of remote areas.

It is desirable that topographic maps of the ice sheet should show the inland as well as the seaward boundary of ice shelves, the direction and size of sastrugi and crevasses, and the presence of bare ice, depressions, ridges and snow dunes.

Recommendation V.GI-1. That glaciologists should select areas and traverse routes on which studies can be made over a long period of time.

Recommendation V.GI-2. That attention should be drawn to the use of radio waves for determination of ice thickness and that National Committees should be urged to study the possibility of developing this technique for use in the Antarctic. The need is emphasized for rapid dissemination of the results of field experiments.

Recommendation V.GI-3. That attention should be drawn to the need for systematic investigations of isotope dating methods which should be made in consultation with specialists. In particular, the attention of the Joint Commission on Applied Radioactivity of ICSU should be drawn to this subject.

Recommendation V.GI-4. That because of the subjective judgement involved in seismic reflexion shooting, publication or wide distribution of seismic shooting records from the high Antarctic plateau is now necessary. The Group suggests that one record per 100 km. of traverse be published.

Recommendation V.GI-5. That in view of the above recommendations a Permanent Working Group on Glaciology should be established within SCAR. The group should ensure adequate liaison with the Commission on Snow and Ice of the IUGG and see that the appropriate machinery exists for the full exchange of publications and data. M. C. Lorius was appointed as Secretary for one year.

Recommendation V.GI-6. That the Working Group on Glaciology should study ways in which certain glaciological observations in Antarctica can be standardized.

Recommendation V.GI-7. That the Working Group on Glaciology should draw up a list of laboratories interested in radio-active isotope studies in order to encourage close co-operation between field glaciologists and these laboratories.

Recommendation V.GI-8. That the opportunity be taken of holding a meeting of the proposed Working Group on Glaciology at the time of the Symposium of the Commission on Snow and Ice of the IUGG at Obergurgl in September 1962.

LOGISTICS

D. M. Tyree (Chairman), J. Dickie, S. A. Engelbrecht, Sir Vivian Fuchs, P. G. Law, G. W. Markham, J. H. Miller, T. Nagata, N. M. R. Panzarini, R. C. Peavey, P. C. Rolland, P. A. Siple, Ye. I. Tolstikov, T. Torii, P. E. Victor.

The Working group on Logistics considered the various implications of the recommendations of the First Antarctic Treaty Consultative Meeting on the logistic responsibilities of SCAR and the proposed Logistics Symposium. The following recommendations arose from the discussions.

Recommendation V.L-1. That, as there will continue to be logistic matters which are a fundamental concern of science, a working group of SCAR should be maintained.

Recommendation V.L-2. That SCAR should offer its full co-operation to the Antarctic Treaty governments in implementation of Recommendation I-VII of the First Antarctic Treaty Consultative Meeting, by National Committees seeking government concurrence to SCAR holding the proposed Logistics Symposium, at which SCAR would hope for the participation of government specialists.

Recommendation V.L-3. That the proposed Logistics Symposium be held as soon as possible but that September to March inclusive is not practicable.

Recommendation V.L-4. That topics for the agenda of the Logistics Symposium should be selected from the following:

1. Implications of scientific requirements in logistic operations
2. Performance of aircraft. All types—fixed wing, rotary wing, ground effect machines—hovercraft, etc.
3. Construction of airstrips. Long and short term
4. Ship operations in ice
5. Performance of tractors and other types of land vehicles

6. Techniques of supply of coastal and inland stations
7. Transport and handling of cargo in Antarctic conditions
8. Logistics and economics of field operations
9. Design and construction of buildings
10. Fire hazards and precautions
11. Provision of power supplies
12. Food for Antarctic operations
13. Cold weather clothing
14. Communications in the field
15. Health measures
16. Techniques and development of caches for subsequent operations
17. Search and rescue.

Recommendation V.L-5. That the functions of the Working Group on Logistics be concerned with two main divisions of work: (a) reconciliation between science and logistics in fields where conflict of interests occurs, and (b) developments in polar logistics and technology. [Examples of (a) might be: contamination of snow in the vicinity of stations, the establishment of bases in areas of scientific observation, interference between equipments generating electromagnetic radiations, effects of station lighting and smoke on visibility at a station where auroral and other observations are concerned.]

METEOROLOGY

W. J. Gibbs (Secretary), J. Alt, M. A. F. Barnett, S. A. Engelbrecht, T. I. Gray, R. G. Simmers, Ye. I. Tolstikov, H. Wexler.

Continuation of group

Recommendation V.M-1. That SCAR affirms the need for the Working Group on Meteorology to continue its present role of evaluating, co-ordinating and making known the observational, communications, analysis and research requirements in Antarctic meteorology. SCAR welcomes the continued participation of WMO in satisfying these requirements, and urges close working arrangements between SCAR and WMO in Antarctic Meteorology and Communications.

Antarctic Treaty

Recommendation V.M-2. That SCAR notes Recommendation I-V of the Antarctic Treaty Consultative Meeting relating to meteorology in the Antarctic, and asks the Secretary of SCAR to follow developments arising from this recommendation.

Meteorological requirements for Synoptic data (Ref. SCAR 4—Recommendation M1)

Recommendation V.M-3. That SCAR notes that the WMO has canvassed its interested members and found that Recommendation (a) of the Working Group on Meteorology at the Fourth Meeting of SCAR* substantially describes the current meteorological requirements for synoptic data except that:

The USSR states—that Mirny requires surface reports for the 8 synoptic hours daily from all Antarctic stations, and upper-air information for 2 synoptic hours; also, surface data four times daily and upper-air data twice daily from the following adjacent areas: Australia, New Zealand, South Africa, South America. The analyses from IAAC in Melbourne are also required. The other Russian stations have limited requirements, mainly consisting of incidental information for neighbouring stations, and in certain cases weather forecasts and analyses of the Antarctic and adjacent areas.

SCAR further notes that details of IAAC requirements are contained in Appendix 2 of the Report of the Leader of IAAC to the Joint Working Party of the Australian Academy of Science, 2 October 1961, distributed to the Fifth Meeting of SCAR.

International Antarctic Analysis Centre

Recommendation V.M-4. That SCAR notes with gratification:

- (1) the formal endorsement by the International Council of Scientific Unions of the International Antarctic Analysis Centre (IAAC) as an organ of ICSU;
- (2) the formal endorsement of IAAC by WMO;
- (3) the support of Argentina, Australia, France and the United States in providing professional meteorologists to work at the Centre;

* SCAR Bulletin, No. 7, 196, p. 91-92.

(4) the co-operation of members in seeking to provide adequate communication facilities to meet the needs of the Centre;

(5) the progress of IAAC in producing regular coded and facsimilae analysis statements which are being successfully received in New Zealand and Antarctica;

(6) the report of the Leader of the Centre to the Joint Working Party of the Australian Academy of Science, dated 2 October 1961, and congratulates the Leader and international staff of the Centre on their achievements, and, in view of the increasing availability of observational material by routine means and from new devices such as the weather satellites, urges members to make every effort to provide professional staff to work at the Centre so that a strong programme of research may be instituted.

Observing network

Recommendation V.M-5. That SCAR notes with pleasure recent reconnaissance of Bouvetøya and Peter I Øya, and urges members to proceed with the installation of stations on these islands as soon as possible.

Recommendation V.M-6. That SCAR notes with satisfaction the intention of France, dated 2 October 1961, to establish a meteorological station on the Îles Crozet.

Recommendation V.M-7. That SCAR regrets that Belgium and Japan have found it necessary to suspend the operation of their stations at "Roi Baudouin" and "Syowa". Their closing has left a very serious gap in the network of Antarctic meteorological observations in Antarctica. SCAR urges the reopening of these stations as soon as possible.

The success of automatic weather stations in Antarctica was noted, also the spectacular success of the MAMOS weather boat in the Gulf of Mexico. The attention of the WMO committee considering the establishment of weather ships in areas deficient in observations should be drawn to the centre of the South Pacific area (approx. lat. 55° S., long. 120° W.), as one in which a weather ship would be of great use.

Codes and observational procedures

Recommendation V.M-8. That SCAR recommends to its members and WMO that where only one radiosonde and/or radio-wind ascent is made daily in Antarctica this should be made at 00 G.M.T.

Recommendation V.M-9. That SCAR urges WMO to give interim approval to the change in the method of reporting wind direction at the South Pole in accordance with a previous recommendation at SCAR.

Recommendation V.M-10. That: SCAR notes with pleasure that WMO has given tentative approval for the transmission of CLIMAT TEMP WINDS from Antarctica in the form recommended by SCAR, and requests the WMO to urge its members to include these messages in their normal CLIMAT broadcasts.

Summary of meteorological observational programmes

Recommendation V.M-11. That SCAR resolves that a summary of meteorological observational programmes, abstracted from the National Reports and other sources, should be published annually in the SCAR Bulletin.

Meteorological reports from whaling vessels

Recommendation V.M-12. That SCAR notes with pleasure that South Africa continues with her efforts to arrange meteorological reports from whaling vessels operating in Antarctic waters.

Meteorological reports from expedition ships

Recommendation V.M-13. That SCAR notes that some expedition ships operating in Antarctic waters are not making regular meteorological reports available over the normal communication channels, and urges members to ensure that their ships send regular reports.

Meteorological satellites

Recommendation V.M-14. That SCAR notes with pleasure the successful operation of meteorological satellites, and that the United States intends to increase the inclination of the TIROS orbits to the equatorial plane from 48° to 60°, thus enabling a more adequate coverage of high latitude clouds and pack ice.

Punch cards

Recommendation V.M-15. That SCAR notes with satisfaction that most members are committing their meteorological data to punch cards, and that the USA has offered to punch at cost the Antarctic meteorological data of those members without punch card facilities.

Meteorological research programme

It was suggested that SCAR should organize the collection of reports of volcanic dust veils in the atmosphere. It seemed appropriate that the role of volcanic dust (a) as a tracer in the atmosphere, and (b) in its climatic effects after great eruptions, might be included in the list of scientific investigations recommended by SCAR.

Observational difficulties

Recommendation V.M-16. That the Chairman of the Working Group on Meteorology should arrange for the exchange of information regarding the overcoming of difficulties in meteorological observations in the Antarctic, e.g. the difficulties in accumulation of snow in meteorological screens, the blocking of pressure tube anemometers by snow and the difficulties in the accurate determination of humidity.

International Quiet Sun Year

Recommendation V.M-17. That SCAR urges members to prepare for the IQSY by (a) extending the scope of ozone observations, (b) broadening the study of connexions between solar activity, the conditions of the upper atmosphere (200-1000 km.) and in the lower atmosphere, employing together with other data, the observations from rocks and satellites; and (c) providing the means for a comparison of the atmospheric general circulation during the IGY with that during the IQSY.

International Indian Ocean Expedition

Recommendation V.M-18. That SCAR notes that the programme of the International Indian Ocean Expedition includes a comprehensive meteorological programme, and urges WMO to ensure that synoptic meteorological data, particularly in the higher latitudes of the Indian Ocean, be made available without delay through normal meteorological channels.

OCEANOGRAPHY

J. M. Brodie (chairman), K. E. Bullen, C. G. Hide, M. C. Lorius, H. M. Pantin, G. de Q. Robin, H. Wexler.

SCAR programme

Recommendation V.O-1. That SCAR brings to the attention of National Committees the desirability of using the techniques of underwater photography sediment coring and seismic refraction in furtherance of item (a)* of the Physical Oceanography programme, and the desirability of physical observations reported over 24 hours in furtherance of items (d, e).

Recommendation V.O-2. That, in order to complement item (d) of the present Physical Oceanography programme, concentrated multiple ship synoptic studies in several regions of the Antarctic polar front should be carried out, if possible in 1963-64; that, in the interim, the study of this problem should be recommended to the oceanography groups of

* SCAR Bulletin, No. 7, 1961, p. 39.

National Committees; and that SCOR be recommended to consider the possibility of extending the Indian Ocean Project surveys to the Antarctic area as a contribution to the Antarctic Polar Front Project.

Recommendation V.O-3. That the need for continued co-operative meteorological, geological, hydrological, biological and chemical investigations along the meridians 20° E. and 165° E., in furtherance of items (g, h) of the programme, be emphasized to National Committees.

Review of progress

Argentinian expeditions carried out research, including deep sea soundings, in the Weddell Sea, Bellingshausen Sea and Drake Passage.

The Australian National Antarctic Research Expedition carried out hydrographic survey in the area around Mawson, Davis and "Wilkes" stations, and around Macquarie Island. Deep sounds were obtained during the voyages of relief ships between Australia and Antarctica.

French observations were made near Île des Petrels and Pointe Géologie, Terre Adélie.

New Zealand oceanographers made current measurements in McMurdo Sound. A series of hydrological observations were made in the western Ross Sea. Thermosaline observations and deep soundings were taken between New Zealand and Antarctica.

During a voyage from Mirny to Cape Town via Bouvetøya, oceanographical and ice observations and collections of plankton were made by the South African expedition.

British tidal observations were continued at the Argentine Islands station, and intermittent long-wave recordings made. Coastal currents were measured at Halley Bay. A hydrographic survey was made along the western coast of Graham Land, and near Joinville Island.

United States vessels carried out oceanographic research, including ice reconnaissance, in the Pacific area of the Antarctic and in the Bellingshausen Sea between longs. 106° 35' W. and 91° 42' W., also between New Zealand and Antarctica.

The Soviet expedition completed eight deep-water oceanographic stations on the standard cross-section along the 20° E. meridian. Between stations, current observations, continuous echo soundings and ice observations were carried out. Hydrological observations were made from the ice near "Lazarev" station, where eight stations were completed and observations on currents made at 50, 150 and 400 m. depths. During voyages between "Lazarev" and Mirny, routine observations were made at the western end of the West Ice Shelf, in Olaf Prydz Bugta and along the coast of Enderby Land. During the season 118 stations were occupied, bottom cones and plankton samples being collected at most of them.

Recommendation V.O-4. That SCAR should note the need for a concentration of future effort on specific objectives such as the Antarctic Polar Front project.

Formation of permanent Working Group

Recommendation V.O-5. That, in order to stimulate Antarctic oceanographic studies and to provide a permanent means for liaison with other interested groups, a small permanent Working Group on Oceanography should be set up and that the membership of such a group be limited to a reporter and four members, one of whom should be a marine biologist.

Technical discussions

Recommendation V.O-6. That SCAR consider holding meetings on one day following the opening plenary session and before Working Group meetings commenced, devoted to hearing reports of progress in fields of major interest.

Marine biology

Recommendation V.O-7. That the Working Groups on Biology and Oceanography, being both intimately concerned with aspects of marine biology, should take the opportunity at each meeting of SCAR of holding one joint meeting of both working groups.

SOLID EARTH GEOPHYSICS

K. E. Bullen (Chairman), A. B. Ford, Sir Vivian Fuchs, T. Hatherton, C. Lorus, T. Nagata, H. M. Pantin, M. J. Ravich, E. I. Robertson, G. de Q. Robin, O. Schneider, P. A. Siple, F. C. Truter.

Antarctic seismic activities

Reports from five countries indicate activities at approximately the same level as during 1959-60.

Halley Bay records have been re-read in Cambridge and several new seisms added to the list.

No local earthquakes have been reported from "Byrd" or South Pole stations since installation, in spite of some geological expectation to the contrary.

Minor local seismicity is recorded at "Scott base", some of which may arise from the calving of icebergs off the Ross Ice Shelf.

United States scientists have determined twenty epicentres in the belt lying near 50° S. latitude. The more active zones during 1960-61 were south of Australia, and in the vicinities of the Sandwich Islands and Macquarie Island.

Antarctic recordings of distant earthquakes

The United States Coast and Geodetic Survey reports that the azimuth control provided by Antarctic stations has greatly increased the reliability of epicentral determinations of global earthquakes. In particular, this has been of great importance in connexion with studies of 209 after-shocks of the 1960 Chilean series.

Surface seismic wave investigations

Research on surface waves recorded at "Wilkes" station indicates that the Indian Ocean upper mantle structure resembles that of the Atlantic more closely than that of the Pacific.

Seismograms at "Hallett" are being used to investigate properties of oceanic sediments.

Microseisms

United States scientists report that amplitudes are at a minimum during winter months.

Microseismic amplitudes at Mirny and "Scott base" also show marked seasonal variations which depend on the period. Long-period microseisms (period greater than 7 sec.) persist to some extent throughout the winter.

Gravity

During the 1960 season, gravity observations were obtained with Gulf pendulum equipment by United States scientists at Mawson, Davis and Mirny, based on observations at Melbourne. Observations were continued on repeated gravity ties between McMurdo Sound and "Byrd" and South Pole stations, making use of aircraft supply flights.

Gravity observations were taken routinely on the inland glaciological traverses. In addition, gravity measurements were continued at many ice-free areas near the coasts of Antarctica. Detailed measurements were made by Chile in the Deception Island area; by New Zealand in the Koettlitz Glacier area and in the region between the Barne Inlet and Shackleton Inlet; by the United Kingdom in the South Georgia, South Orkney, South Shetland, South Sandwich, and north-west coast of Graham Land; and by Belgium in the western part of the Sør Rondane mountains.

Recommendation V.SE-1. That renewed effort be made to determine the velocities and thicknesses of layers below the ice, down to the Mohorovicic discontinuity, by explosion, seismology and other means; and that similar studies be made along profiles extending from the Antarctic continent into oceans.

Recommendation V.SE-2. That: an offer by the United States Coast and Geodetic Survey to publish a quarterly bulletin on Antarctic seismic data be gratefully accepted;

that National Committees be asked to ensure that the necessary readings of seismograms from all Antarctic stations reach the USCGS as soon as possible for this purpose;

that the transmitted data include arrival times of first phases, and of as many further principal phases as can be contrived;

that the bulletin include details of changes of instruments and instrumental constants, and that National Committees or stations keep the USCGS fully informed on these and related matters;

that the USCGS be requested to send copies of the bulletin to all National Committees and workers on Antarctic seismology;

that National Committees be asked to ensure that the above steps do not lead to any cessation of flow of needed seismological data to the Strasbourg or ISS Centres.

Recommendation V.SE-3. That increased attention should be given to calibrating seismographs at Antarctic stations, so that amplitude and related studies can be effectively carried out.

Recommendation V.SE-4. That heat-flow measurements should be made at a few representative localities on the Antarctic continent and in the surrounding oceans.

Recommendation V.SE-5. That efforts should be continued to ensure the establishment of the best possible absolute values of gravity by repeated ties to first-order stations in other continents.

Recommendation V.SE-6. That renewed effort be put into gravity traverses on the Antarctic continent, and along profiles extending into the oceans.

Recommendation V.SE-7. That attention be drawn to the fact that the Recommendations -1, -4, -6 above are of special relevance to the Upper Mantle Project, which was supported by a detailed resolution of the Working Group on Crustal Geophysics at the Fourth Meeting of SCAR. (*SCAR Bulletin*, No. 7, 1961, p. 99).

UPPER ATMOSPHERE PHYSICS

F. Jacka (Chairman), D. K. Bailey, C. Ellyett, M. G. Gadsden, C. G. Hide, Y. D. Kalinin, M. Lebeau, T. Nagata, E. I. Robertson, O. Schneider, W. H. Ward.

Radio interference

Recommendation V.UA-1. That the design and operation of power supplies and radio communications equipment should be such as to reduce interference to a tolerable level.

Recommendation V.UA-2. That provision be made for a period as quiet as feasible (i.e. with minimum radio communications) of at least 5 min., from 1 min. before each hour and half-hour to 4 min. past it. In particular, it is requested that communication schedules do not begin within this quiet period.

Aurora and airglow

Since the IGY-IGC period, enlarged programmes at some Antarctic stations include the use of (a) auroral and airglow photometers, and (b) colour film in experimental all-sky cameras.

SCAR countries are assisting in the production of a new auroral atlas, sponsored by the IAGA Auroral Committee.

The technical specifications required for the design of an all-sky camera for IQSY were agreed upon.

Recommendation V.UA-3. That the Dominion Physical Laboratory, New Zealand, be asked to complete the design of a suitable all-sky camera to meet the agreed specifications.

The Group drew attention to the importance of standardized photometric measurements of the night sky over the Antarctic.

Recommendation V.UA-4. That night sky photometer measurements be made throughout the IQSY at all upper atmosphere stations in the region centred on 75° S., 125° E. and of radius approximately 35°.

Recommendation V.UA-5. That for the study of some very important problems, standardization of instruments and operating procedures is essential.

Recommendation V.UA-6. That the Chairman of this Group take steps to define suitable specifications of instruments and procedures for general adoption.

The Group drew attention to the value of auroral stations situated approximately along a meridian. The sectors within 30° of the Greenwich meridian, and between 150° and 210° long., are best placed to examine the eccentricity of the geo-magnetically trapped radiation.

Relations with International Unions

Recommendation V.UA-7. That the activities of IAGA in auroral physics do not cover the present requirements of SCAR.

The Secretary of the SCAR Working Group on Upper Atmosphere Physics is instructed to maintain close contact with IAGA and CIG in order to ensure maximum co-ordination of programmes.

Recommendation V.UA-8. That delegates bring this matter to the notice of their appropriate National Committees.

Permanence of Working Group

Recommendation V.UA-9. That a permanent Working Group on Upper Atmosphere Physics be established.

Recommendation V.UA-10. That the group maintain close liaison with the relevant committees of UGGI, URSI, COSPAR and CIG.

Recommendation V.UA-11. That Dr F. Jacka be appointed Secretary.

Ionosphere

The use of Riometers, operating at more than one frequency, was suggested at every ionosonde station, and especially at every neutron monitor station. However, Riometers can only measure total absorption when there are no unknown sources of noise, therefore low-power, low-cost forward scatter experiments should be considered; they can also measure absorption at inaccessible locations.

Recommendation V.UA-12. That interested parties in Australia, New Zealand, France and the United States take steps to construct a series of forward scatter links for the study of solar cosmic rays. Such links should not be shorter than about 1000 km., nor longer than about 2000 km.; "McMurdo", "Dumont d'Urville", Macquarie Island, and Australia or New Zealand are appropriate stations.

Geomagnetism

Attention was drawn to new recording methods for magnetometers. Pen recording enables disturbances to be recognized immediately, magnetic tape allows the most rapid variations to be recorded, and direct digital recording is expected to minimize the tedium of reduction.

The Group noted with concern the proposal to discontinue magnetic recordings at Macquarie Island at the end of 1962. The data thus gained is of importance for conjugate point studies between Alaska and the Southern Hemisphere, also radar and optical auroral observations at Invercargill, Tasmania and "Scott base" rely on detailed knowledge of magnetic disturbance in this area.

Cosmic rays

Ten neutron monitors are being installed to study short term variations in the Cosmic Ray component associated with solar disturbances, an eleventh is installed in a ship ("Dumont d'Urville", Ellsworth, Hallet, Kerguelen, "McMurdo", Macquarie Island, Marian Island, Mawson, Mirny, "Wilkes" and (ship-borne) near "Syowa"). The gaps in this new network are in the vicinities of the geographic and geomagnetic Poles.

Distribution of alerts

Recommendation V.UA-13. That stations requiring warning of disturbance from other observers make appropriate bilateral arrangements.

Recommendation V.UA-14. That the selected stations be strongly urged to co-operate with such arrangements.

Ship observations

Recommendation V.UA-15. That greater attention be given to the study of upper atmosphere phenomena from Antarctic expedition ships.

NOTICE

The SCAR Bulletin is published in England in January, May and September each year as part of the *Polar Record*, the journal of the Scott Polar Research Institute.

Contributions are invited, and should consist of factual notes on the membership, equipment and activities of Antarctic parties; articles on matters of particular interest in connection with these activities are also welcome. Contributions should be sent to the Editor, Scott Polar Research Institute, Lensfield Road, Cambridge, England.

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