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SCAR

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SCAR BULLETIN

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Antarctic Symposium at Buenos Aires, 17-25 November 1959

At the CSAGI Antarctic Conference held in Paris in 1957 the Argentine delegation proposed that a symposium should be held in Buenos Aires soon after the completion of the IGY to enable results obtained during that period to be described and discussed. At the generous invitation of the Argentine Government the symposium was held between 17 and 25 November 1959 in Buenos Aires.

The symposium was attended by fifty-five scientists, including official delegates from Argentina, Australia, Belgium, Chile, France, Japan, New Zealand, Norway, Union of South Africa, United Kingdom, United States and USSR, also from CSAGI, ICSU, IUGG, SCAR and WMO. Office-bearers and chairmen of the scientific sessions were elected at the first plenary session. Office-bearers were: President, Rear-Admiral R. N. M. Panzarini; Vice-presidents, M. M. Somov and J. Tonnesen; Secretaries, T. Hatherton and W. L. Hofmeyer. Twenty-six working sessions were held during which 188 papers were read. At the final plenary session on 25 November chairmen of the scientific sessions presented their reports, which may be summarized as follows.

Exploration and Geography. Chairmen: G. de Gerlache and P. G. Law.

Twelve papers were presented at three sessions. It was generally agreed that large areas of the continent had now been photographed from the air and that maps are now available showing most of the major features. More work is required along the coast of Oates Land and ships have still to penetrate to the coast of the Bellingshausen Sea. Large-scale maps are also needed giving more detail of rock outcrops and completing the contour of the ice sheet. Considerable ambiguity also exists concerning the limits of ice attached to the land along certain sections of the coast.

New maps of coastal areas were presented by Australia, Belgium, Japan and the USSR. A French paper made valuable proposals concerning symbols for representing ice features on maps, and a Russian paper described a new technique for accurate determination of altitude in inland areas of the ice sheet.

Results of gravity observations and seismological soundings were presented from a number of areas on the continent.

Meteorology. Chairmen: W. J. Gibbs, K. Langlo, H. Wexler.

Thirty-five papers were presented at five sessions. These dealt with instruments and methods of observation, surface effects including optical phenomena, katabatic winds and radiation exchanges at the snow surface, statistical studies, synoptic and air-mass problems, questions of general circulation including discussions of cross-sections of mean temperature and wind, strato-

spheric circulations and stratospheric warming, heat budget of the atmosphere, ozone content, and a report on the International Antarctic Analysis Centre at Melbourne.

Papers emphasized the importance of the meteorological programme of SCAR and, in particular, the desirability of obtaining surface and upper air observations from the region between lats. 40° and 65° S., the necessity for observations of katabatic wind and refraction phenomena; also of total ozone, surface ozone, and profile of ozone content from as many stations as possible.

Upper atmospheric physics. Chairmen: S. Chapman and J. Delannoy.

There were three sessions of this group. Nine papers concerned with auroral and spectrographic observations were presented. One by F. Bond and F. Jacka, and another by O. Schneider, gave statistical studies of auroral locations, suggesting a modified location for the Southern Auroral Zone.

A paper by R. W. Knecht discussed ionospheric variations at the South Pole, showing interesting diurnal variations despite the constancy of solar zenith angle.

M. M. Somov gave a survey of Russian work on magnetism, ionosphere, cosmic rays and aurora.

The incidence of polar blackout and storm types of Es in the two hemispheres was discussed by W. R. Piggott, and observations were found to be reasonably consistent when compared at corresponding geomagnetic locations. He also ascribed the "F" layer changes at Halley Bay to horizontal movements in the region.

Some observations of the twilight Lithium line were reported by J. Delannoy and N. J. Oliver. Absolute measurements carried out at "Dumont d'Urville" on the N_2 + ion content in the atmosphere above 200 km. were presented by G. Weill. The mean ratio of N_2 + ions to N_2 molecules was found to lie around 2.5×10^{-6} and a strong latitude dependence was shown. A paper by A. Mrkos reported several aspects of the photo-electric measurements taken at "Mirnyy" and elsewhere. This showed the influence of both twilight and auroral phenomena similar to those discussed by Weill. The influence of changes in meteor activity on the intensity of the sodium D lines 589A were also described.

Results of wind measurements at Mawson from the movement of meteor trails in the 75 to 110 km. region were described in a paper by W. Elford. Considerable gradients of wind velocity with height were evident. Steady, diurnal and semi-diurnal components, were derived.

Geomagnetism. Chairman: T. Nagata.

Fourteen papers were read at two sessions. Seven papers dealt with geomagnetic variations, especially geomagnetic disturbances in relation to other upper atmospheric and cosmic phenomena. One of these, from the United States, described in some detail aspects of geomagnetic polar disturbances in both the Northern and Southern Auroral Zones.

The other papers were concerned with slow variations in the geomagnetic field in relation to the earth's crust and the earth's interior. Data on secular variations were given in Argentine, French and Japanese papers: it was agreed that the intensity of geomagnetic secular variations over and around

Antarctica is considerably greater than that over the Northern Hemisphere. Three British papers discussed rock-samples from the Graham Land area covering the geological period from the Jurassic to the present. A Japanese paper described Pre-Cambrian or Cambrian gneiss from Dronning Maud Land. Data showed some evidence of a drift of the Antarctic continent from lower latitude towards the geographic South Pole.

Cosmic rays. Chairman: H. V. Neher.

Nine papers were presented at two sessions. One paper (A. Fenton and J. Jacklin) described a technique for measuring the behaviour of lower energy primaries using a cosmic ray telescope in such a way that particles which could penetrate 10 cm. of lead were measured, but not those which penetrated 20 cm. The authors reported an interesting increase in meson intensity recorded at Hobart (geomagnetic lat. 55° S.) but not at Mawson (geomagnetic lat. 73° S.). The results of a study of Forbush-type decreases concerned with the change of east-west effect during magnetic storms revealed a hardening of the primaries or a preferential removal of low-energy particles.

Another paper (K. G. McCracken) dealt with the site of the modulation mechanism that causes the diurnal effect and concluded that the modulating mechanism lies outside the influence of the earth or its magnetic field.

Results of neutron and meson measurements during a voyage from Japan across the Indian Ocean to Cape Town and on to the Antarctic were reported (T. Kitamura, M. Kodama, Y. Miyazaki and T. Nagata). These showed that the cosmic ray equator in the neighbourhood of long. 110° E. is about 5° south of the geomagnetic equator, and demonstrated the sharpness and position of the "knee" of the latitude curve which occurred at geomagnetic altitude 37° to 38° S.

A paper was presented on the latitude effect of cosmic rays at high altitudes from geomagnetic lat. 87° N. to 80° S. (H. R. Anderson and H. V. Neher). Other observations were described on quasi-periodic variations and the effects of solar flares and geomagnetic storms on neutron monitors.

Oceanography. Chairman: G. Laclavère.

Eighteen papers were read at two sessions. These were concerned with investigations of the chemistry and biology of the Weddell Sea and the sub-Antarctic Southern Ocean. A report was given (M. Ewing) on the recent observations made from the *Vema* in the Scotia Arc region. Photographs of the ocean floor in this area revealed unexplained features.

Glaciology. Chairmen: G. de Q. Robin, P.-E. Victor.

Thirty papers were read at four sessions. These covered a wide range from the characteristics of falling snow and its transformation into glacier ice to the state of the bottom layers of the Antarctic ice sheet as deduced from seismic soundings.

It appears that the annual net accumulation over the continent has varied during the past few years from a water equivalent of about 7 cm. a year at the South Pole to almost 50 cm. a year at "Norway" station. Other reports indicate a small retreat of ice in recent decades in the coastal regions near the Belgian, Japanese, and Russian IGY stations.

Thicknesses of floating ice up to 1000 m. have been recorded, but 300 to 400 m. appear to be the average. Bottom-melting of the ice shelf in the vicinity of "NAF McMurdo" has been shown to have been considerable.

The section of Antarctica on the Atlantic and Indian Ocean side of a line joining the Ross Ice Shelf and the Filchner Ice Shelf is certainly a continental block to which Graham Land appears to be structurally linked along a line through the Sentinel and Horlick Mountains. To the west of these mountains there is a trough, up to 2500 m. below sea level, running from the southern part of the Ross Ice Shelf towards the Bellingshausen Sea. The coastal structure in the region of this trough has been shown to be that of an island region, and not continental.

Geology and Geochemistry. Chairmen: R. J. Adie and H. Camacho.

Nineteen papers were read at two sessions; ten of these dealing with "East Antarctica".

Although most of the papers were unrelated to each other, it is clear that the general trend in Antarctic geology is directed along the following definite lines: the establishment of stratigraphic successions in different areas and subsequent correlation, the dating of Basement Complex rocks by K-A and Sr-Rb methods, the subdivision of the Basement Complex, detailed petrographic description of igneous and metamorphic rocks, the relationship between geomorphology and tectonics, submarine topography studies, and crustal structure deduced from geophysical studies.

Geophysical work shows that Antarctica is divided into two areas: the main continental shield and Graham Land, and an "island area" in Marie Byrd Land. These are thought to be separated from each other by a deep trough. The geological aspects are more complicated, because they indicate that there are major stratigraphical breaks in the geological succession in these areas. From a stratigraphical point of view the most interesting part of the continent for future work is the region between the Filchner Ice Shelf and the Ross Ice Shelf.

Biology and Physiology. Chairman: H. A. Orlando.

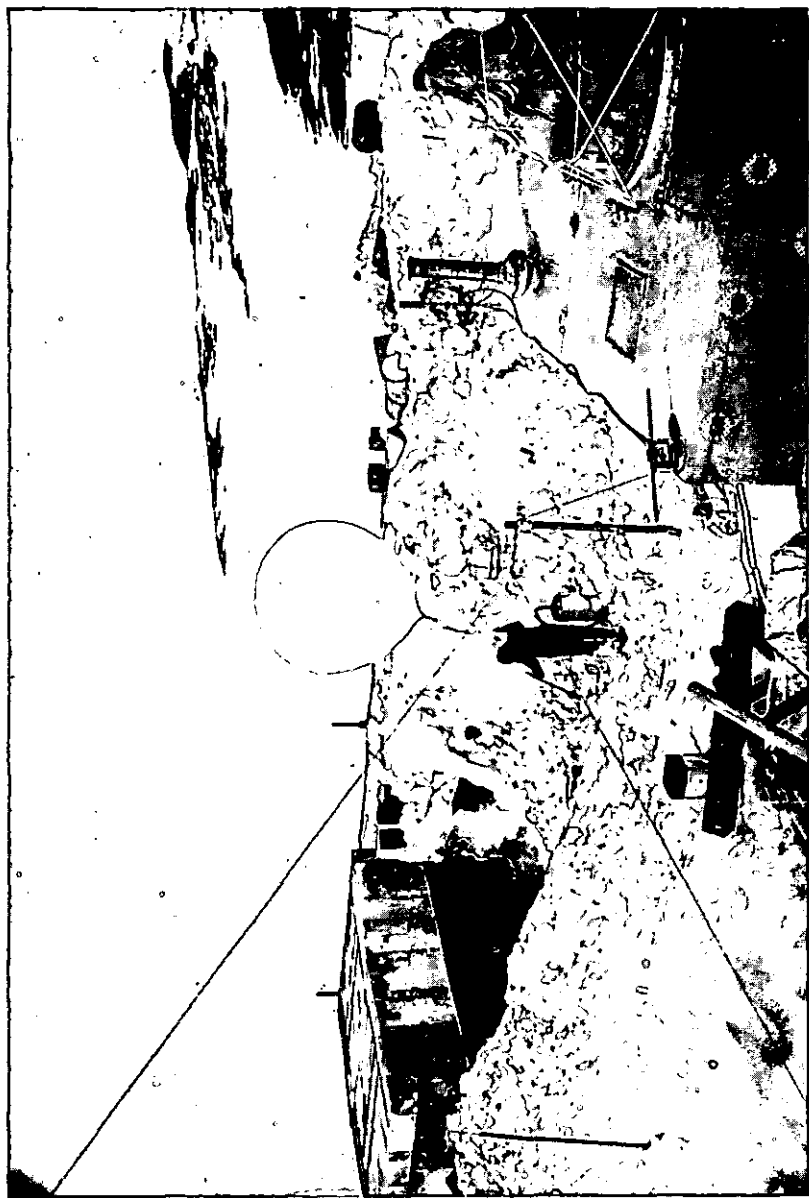
Eighteen papers were presented at three sessions. Under biology there was one paper on botany and a number on vertebrate and invertebrate zoology. There were also a number of papers on various aspects of human physiology and psychology at Antarctic stations (P. G. Law, M. A. Cabeza Quiroga, A. Gesino and A. Antinucci).

Resolutions

At the end of the sessions on meteorology, upper atmosphere physics, geomagnetism, cosmic rays and biology, a number of resolutions were formed and submitted to the final plenary session where they were adopted (see Appendix).

In addition it was suggested that the greetings of the Symposium should be sent to all Antarctic stations.

A vote of thanks was extended to the Argentine Government and to Vice-Admiral Panzarini for making the Symposium possible.



Japanese "Syowa" station, Angul Island, Prins Harald Kyst. Continental land in background.
Aurora camera on building in right foreground.

Conclusions

An abstract of the papers presented at the Symposium will be published in the series of monographs of the IUGG. The full texts of the papers are to be published by the Instituto Antártico Argentino towards the end of 1960.

Appendix

Resolutions adopted at the closing plenary session

Meteorology

(1) The Symposium urges interested countries, the World Meteorological Organization (WMO) and the Special Committee on Antarctic Research (SCAR) to continue their efforts to make the International Antarctic Analysis Centre (IAAC) as effective as possible, in particular by improving the telecommunication arrangements necessary for a proper functioning of the Centre, and by facilitating the assignment of qualified foreign meteorologists.

(2) The meeting considers that the WMO should study the advisability of revising the present method of reporting wind directions at the South Pole.

(3) The meeting notes that some stations in the Antarctic are reporting monthly vector wind directions in the monthly CLIMAT reports and recommends that the WMO should study the advisability of introducing this practice for all stations transmitting CLIMAT reports.

(4) The meeting notes the value of making observations of optical phenomena such as halos, etc., during Antarctic traverses, and considers that expedition leaders should be encouraged to arrange for such observations to be made as a matter of routine. In this connexion the paper by F. R. Blake, entitled "Observations on unusual low altitude solar halos in Antarctica" (No. 14), is considered to be useful.

(5) Considering the appreciable errors which may occur in the values of wind speed measurements by radio-electric means at low angles and at high wind velocities (of the order of 100 knots), the meeting urges that the resolution adopted by the WMO on this subject be more generally adhered to.

(6) The meeting considers it highly desirable that measurements of atmospheric ozone in the Antarctic be continued and intensified. Observations should be made both at coastal and inland stations and should preferably include the measurement of total amount, vertical distribution and surface ozone.

Aurorae

(1) The meeting has analysed the convenience of continuing auroral research in the Antarctic by the different observing and recording techniques. It has confirmed the findings of earlier similar studies that visual auroral observations are a necessary part of every auroral research programme, even if several types of automatic recording instruments (such as all-sky cameras) are run simultaneously, since the present state of such automatic techniques does not give a full coverage of all features involved. It is therefore strongly recommended that visual observations should form a part of every programme of Antarctic research groups.

(2) The meeting, recognizing the need for a uniform international nomenclature and classification of aurorae and for adequate description of auroral forms, colours, and intensities, suggests that SCAR should recommend to the Auroral Committee of the International Association of Geomagnetism and Aeronomy (IAGA) that such an international classification be worked out in the near future, with a view to publishing a new *Atlas of auroral forms* to replace the edition of 1951 which is now out of print.

Such a classification should cover all characteristic auroral forms seen inside, within and outside the auroral zone.

Geomagnetism

(1) In view of the important geographical situation of South Georgia and Bouvetøya for the investigation of secular change in geomagnetism, particularly because of the presence of a secular change focus in their vicinity, the meeting recommends that magnetic repeat-stations be established on those islands. An analogous recommendation is advanced with regard to other such foci existing in high southern latitudes.

(2) In view of the evidence for the considerable difference existing between "East Antarctica" and "West Antarctica" as regards geological history and age, the meeting recommends that Antarctic expeditions and stations should be encouraged to collect orientated and well-identified rock samples from both parts of the continent with a view to radioactive age determinations and palaeomagnetic measurements, as a contribution to a more detailed study of past Antarctic history.

Cosmic rays

The meeting considered that continuous cosmic ray records in the Antarctic are of the greatest value for the determination of the energy spectrum of primary cosmic rays. The meeting therefore recommends strongly that cosmic ray work in the Antarctic should be continued and even increased in the future.

Biology

The delegates to this Symposium are convinced that the time has come to take positive steps towards the protection and preservation of Antarctic wild life.

The nature of a fauna developed through the joint advantages of an unrivalled food supply at sea and the absence of indigenous enemies on land make such steps essential, both because of the unique characteristics of the birds and mammals concerned, and because of their complete lack of means or instinct of self-preservation while out of the water, and their consequent extreme vulnerability to the mischief of unprincipled men and uncontrolled dogs. It is recognized that the killing of seals, penguins and other creatures is sometimes necessary to provide food for men and dogs, and that the judicious collection of biological specimens is likewise fitting and proper.

However, it must be conceded that each season the resupply operations in support of Antarctic scientific bases bring with them into the Antarctic a number of persons, members of ships' companies and others, who possess a minimum of interest in the natural life and its conservation and who, if not supervised and controlled, have made and will continue to cause serious damage to the flora and fauna. Penguins and other colonial forms readily accessible to predation are easy victims and highly vulnerable fauna types.

It is also true that some careless aspects of modern operations such as the flying of helicopters over penguin rookeries and the pumping of bilges by ships close to shore, with no malice intended, can cause tremendous harm to wild-life populations. Well-intended but ill-advised activities which disturb the natural interplay of population densities, such as the destruction of skuas on the theory that this will benefit the penguins, also leave their marks.

Considering all the above and in recognition of the international aspect of Antarctic scientific activities, it is our firm conviction that the several nations supporting Antarctic stations should take joint steps to ensure the preservation of the Antarctic

flora and fauna and its protection from needless persecution and destruction; and further, that the proper agency to co-ordinate such steps is the Special Committee on Antarctic Research (SCAR).

The meeting therefore recommends that these views be made known to SCAR with the request that it prepare standard regulations which will provide the protection necessary to all forms of Antarctic flora and fauna, and that member nations be exhorted to accede to these regulations and agree to their strict enforcement.

Scientific stations in the Antarctic, 1959 (omitted from SCAR Bulletin No. 2)

Chile

Capitán Arturo Prat

Location: lat. 62° 29' S., long. 59° 38' W.

Site: on rock. Method of supply, by sea.

Facilities available: 2 buildings, accommodating 18. Electrical power: 20 kW.

Personnel: Total 9.

Scientific programme: Meteorology, oceanography.

General Bernardo O'Higgins

Location: lat. 63° 19' S., long. 59° 38' W.

Site: on rock. Method of supply, by sea.

Facilities available: 2 buildings accommodating 10.

Scientific programme: Meteorology, seismology.

Presidente Gonzalez Videla

Location: lat. 64° 49' S., long. 62° 51' W.

Site: on rock. Method of supply, by sea. Seaplane dock.

Facilities available: 1 building accommodating 8.

Scientific programme: Meteorology.

Presidente Arguirre Cerda

Location: lat. 62° 56' S., long. 60° 36' W.

Site: on rock. Method of supply, by sea.

Facilities available: 3 buildings accommodating 16.

Personnel: Total 8.

Scientific programme: Meteorology.

France

Iles Kerguelen, Port aux Français

Location: lat. 40° 21' S., long. 70° 13' E., 10 m. above sea level.

Site: on rock. Method of supply, by sea.

Climate: Temperature, mean max. 7.82° C., min. 1.4° C.

Wind, mean annual 10.2 m./s., extreme 70 m./s.

Cloudiness, mean annual 6.1.

Facilities available: 41 buildings accommodating 120.

Electrical power: 50 kW., 60 kW. and 120 kW.

Tractors, etc.: 3 bulldozers, 4 Weasels, etc.

Personnel: Leader. Heurgon.

Total: 17 scientists, 90 others.

Scientific programme: Aurora, biology, cosmic rays, geomagnetism, ionosphere, meteorology, oceanography, seismology, ozone.

Iles Kerguelen, Pointe Molloy

Location: lat. 49° 21' S., long. 70° 04' E.

Site: on rock. Method of supply, by sea.

Climate: Temperature, mean max. 7·8° C., min. 1·4° C.

Wind, mean annual 10·2 m./s., extreme 70 m./s.

Cloudiness, 6·1.

Facilities available: 2 buildings accommodating 4.

Tractors, etc.: 1 Weasel.

Personnel: Total, 1 scientist, 2 others.

Scientific programme: Seismology.

Nouvelle-Amsterdam, Camp Heurtin

Location: lat. 37° 5' S., long. 77° 31' E.

Site: on rock. Method of supply, by sea.

Climate: Temperature, mean annual 14·1° C., max. 24·3° C., min. 2·8° C.

Facilities available: 14 buildings accommodating 30.

Electrical power, 50 kW.

Tractors, etc.: small-wheeled vehicles.

Personnel: Leader, Commandant Aubert.

Total: 7 scientists, 10 others.

Scientific programme: Biology, meteorology, surface and upper atmosphere

South Africa

The South African National Antarctic Expedition, 1959, in *Polarbjørn*, reached the coast of Dronning Maud Land on 8 January 1960 and took over "Norway" station, in lat. 70° 30' S., long. 2° 52' W. on the 12th. The wintering party, led by H. la Grange, consists of five meteorologists, one geologist and geophysicist, one medical officer, one radio operator and an assistant, and one diesel mechanic. The scientific programme includes geology, geophysics, meteorology and physiology.

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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