science than the prewar establishment, which corsponded rather with the humility induced in its devotees by the study of meteorology.

This unification and expansion means for meteorologists increased opportunities and responsibilities; it does not mean a meteorological millenium in which all difficulties of administration vanish and the secrets of isobaric charts stand revealed.

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By the amalgamation of the army, navy, and air force meteorological services with the parent meteorological office,[1] the new service will be able to combine the teachings of meteorological history with the endeavor to secure simplicity and definiteness in meteorological language, codes, and phenomena. But it will also have unparalleled opportunities for developing the three-dimensional study of the atmosphere.

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Although there never were observation enough, yet there is always a danger of the meteorologist being swamped by the observations and records which pour in upon him; the danger is an increasing one as also is the tendency to regard observations as things of the moment to be thrown away or filed forever, immediately the forecaster has done with them. If the new service is successful in dealing with this problem its contribution to our knowledge of climate in and above the British Isles will be a more enduring monument than the apparently ephemeral achievement of an accurate forecast.

Finally, British meteorology is inseparable from the ocean; the pressing need for economizing our stores of accumulated energy make it desirable that the meteorology of the ocean should be put on a footing from which it can announce the energy practically available in the winds, the rate at which it can be supplied on any route, and the routes on which the maximum per mile can be attained. Warnings of gales, ice and fog, do not represent the only way in which the meteorology of the sea can contribute to the national welfare; but the effective use of the existing and increasing statistics of marine meteorology depends on a close liaison between the meteorologist, the shipping company, and the sailor. With a "meteorologist in every port" this ought now to be practicable.

BRITISH METEOROLOGICAL OFFICE STAFF.

Changes in the meteorological office staff have recently been made, and the following appointments have been announced: Mr. R. G. K. Lempfert becomes assistant director, and takes general oversight of observations and stations contributing observations to the office. Mr. Lempfert entered the meteorological office in 1902, and has been superintendent of the Forecast Division since 1910. Lieut. Col. E. Gold becomes assistant director, in charge of forecasting. Col. Gold graduated as third wrangler in 1902, and was elected fellow of St. John's College, Cambridge, in 1906; he was Schuster reader in dynamical meteorology from 1907 to 1910, and he then became superintendent of statistics at the meteorological office. On the formation of the meteorological section of the royal engineers in 1915 he was appointed to the command of the overseas contingent at general headquarters, France. Capt. D. Brunt is made superintendent of the work for army services. Capt. Brunt was in the meteorological section of the royal engineers during the war, ann acted under Col. Gold. Mr. Carle Salter becomes superintendent on the staff of the meteorological office for the British rainfall organization. Mr. Salter has recently been assistant director of the British rainfall organization, which has now come under the control of the meteorological office.—*Nature (London), Oct. 16, 1919.*

[1] It is announced by the Times that a scheme for the amalgamation of the existing Government meteorological services has been approved, and the details are being arranged. Under the stress of war conditions the meteorological office was supplemented by the addition of three specially organized services, respectively in charge of the Admiralty, the army, and the air ministry, and the coming of peace thus found four more or less overlapping departments. The present scheme brings them together under the directorship of Sir Napier Shaw, who has acted for some time past in the capacity of meteorological advisor to the Government. The new amalgamated service will meet the, requirements of the army, navy, royal air force, of civil aviation, fisheries, engineering, and of all others who require meteorological information. It will * * * bring together information from all parts of the world."—*Symons's Meteorological Mag. Aug., 1919, p. 80.*

THE METEOROLOGICAL RESOURCES OF THE EMPIRE.

[Abstract, presidential address Royal Meteorological Society, Jan. 16, 1918, by Maj. [now Col.] H. G. Lyons.[1]]

When we examine the meteorological organizations of the Empire, we may well be astonished at their extent and development, but as we look further into the matter we shall see that we are still far from utilizing them to the best advantage.

In all countries where there is a meteorological service the network of climatological stations is controlled by one or more first-order stations, or meteorological observatories, at which continuous records or hourly readings of pressure, temperature, wind, sunshine, rain, etc., are taken, but none as yet exists in the great colonial regions of East Africa, West Africa, or in the West Indian Islands, though there are 18 institutions of this class in other parts of the Empire.

The work of the meteorologist does not end with recording pressure, or the temperature, or the monthly amount of rainfall, but meteorological observations, after being taken, must be worked up into the various forms in which they will be most useful for shipping, agriculture, water supply, engineering, sanitation, and health, and now, also, aerial transport. The same form will not suffice for all, and meteorology itself has its own especial needs, but the important thing is that this information, however accurate and detailed it may be, will not be available in exactly the forms that answer to different requirements unless there is a sufficient staff of trained meteorologists to handle it and to supervise its preparation.

Nor is the study of a single region sufficient in itself. India, in preparing the monsoon forecast, draws upon data from Egypt, St. Helena, Brazil, etc. Egypt, in forming each year an estimate of the coming Nile flood, utilizes information from India, Uganda, the South Atlantic, and so on. The East Indian Islands need warnings of their hurricanes from the more eastward islands of their archipelago, and must utilize all that Asia and Africa can tell them about the development and movement of tropical storms before their precautions can be considered to have exhausted all the means available. All lands which lie near the subtropical zones of scanty rainfall are vitally interested in the problems of forecasting the probable sufficiency or failure of their rainy season. The droughts of the pastoral regions of Australia and South Africa are well known, and the same occur in the Sudan, though from its retarded development less has been heard of them up to the present time, but in the future, as the population increases and becomes more settled, the same considerations will demand attention. Similarly, the tem-

[1] Extracts from abstract in Nature (London), Jan. 24, 1918, vol. 100, pp. 416-417.

peratures in the temperate zones find some of their most urgent problems in the adequacy or inadequacy of the summer heat for the ripening of cereal crops.

THE SUPPLY OF METEOROLOGICAL INFORMATION.

By Lieut. Col. H. G. LYONS.

[Abstracted from Aeronautics, Apr. 17, 1919, pp. 412-415.]

While aviation has come to be looked upon as the most important recipient of meteorological information, the fact remains that it is only one of many branches of human activity closely dependent on weather. Observations made for a certain specialized purpose, in the hands of the trained meteorologist, may often be used to further our knowledge of a branch of the science quite different from that for which it was originally intended. So it was with war meteorology—our observations of pilot balloons, of shell-bursts, etc., made for the immediate use of the army may now be employed to contribute to our knowledge of the processes at work in the atmosphere.

With stations so widely distributed as are those of the British Empire, it is absolutely essential that the closest cooperation be maintained. Not only should the methods of observation employed at each station and the instruments used for measurements be absolutely uniform, but as much information as possible should be acquired concerning the local characteristics of each individual station. Hand in hand with the idea of close cooperation among stations goes that of rapid transmission of information and the careful filing and indexing of it. Without the former it will fail in its immediate purpose; and without the latter it will lead to duplication of work, as well as other hinderances to the most efficient consideration of information.—*C. L. M.*

BRITISH EMPIRE METEOROLOGICAL CONFERENCE.

[Abstracted from Aeronautics, New York, Oct. 9, 1919, p. 344.]

The first conference of representative meteorologists from the Dominions held in London the last week in September under the presidency of Sir Napier Shaw included representatives from all the Dominions except Newfoundland, from Ceylon, India, and Egypt.

Col. L. F. Blandy read a paper on arrangements for transmission of meteorological information by wireless. He outlined a scheme covering the whole of Europe, the Mediterranean, and north Africa. The afternoon discussion was directed to the transmission of observations by wireless from ships at sea.

A. D. Spiers opened a discussion on the aerial routes Cairo–Karachi and Cairo to the Cape. The subject was considered from a meteorological standpoint. Subsequently Sir R. F. Stupart (Canada) raised the question of instruments and equipment for upper-air observations by means of pilot balloons. A decision was also reached on the best form of report for aviation purposes. The afternoon was devoted to the selection of stations for the general study of climatology of the globe.

AEROLOGICAL OBSERVATIONS IN POLAR REGIONS.

The Norwegian Meteorological Institute has suggested, in connection with the polar expedition of Roald Amundsen, that various Governments whose territories extend into polar regions, cooperate during the years 1920 to 1922 in the making of certain observations. These observations should comprise, in addition to regular surface meteorological information, pilot-balloon ascents, cloud observations, kites and captive balloon flights, observations of terrestrial magnetism, and photographic observations of aurorae. The stations should be as numerous as possible, and, whenever possible, should be connected by telephone or have radio apparatus, in order that observations of such phenomena as aurorae might be made simultaneously.

THE COMPUTER'S HANDBOOK.

By CAPTAIN E. H. CHAPMAN, R. E.

(Abstract.)

SECTION V. Computations related to the theory of probabilities. 3. A collection of correlation coefficients from Meteorological Papers and a note on the partial correlation coefficient.[1]

In 1915 there appeared subsections 1 and 2 of section V. Subsection 1 dealt with "Errors of observations and variations due to accidental causes with an application to errors of means and normals," by R. Corless, M. A.; and subsection 2, with "The practical application of statistical methods to meteorology," by W. H. Dines, F. R. S. The present subsection is a logical and very valuable continuation of the first two. An introduction by Sir Napier Shaw briefly reviews the history of correlation as applied to meteorology, and states that in order to avoid recomputing the same data all correlation coefficients available that are based on a sufficient number of observations are here brought together. Capt. Chapman has adopted 25 as the normal minimum of the number of pairs of figures to be correlated, although in a few instances, a smaller number has been accepted. In all cases the number of observations is given in the tables. It is pointed out that a preliminary investigation is necessary to determine whether or not the relationship approximates a straight line before the correlation method can be accepted as a proper measure of that relationship. The coefficients are arranged according to subject in the following groups:

1. Upper air.
2. Seasonal correlations.
3. Atmospheric pressure.
4. Temperature.
5. Rainfall.
6. Sunspots.
7. Weather and crops.

Section 7 contains, among others, the results of studies in the United States by T. A. Blair, J. Warren Smith and J. F. Voorhees. A subject index makes it possible quickly to find values in which the reader is most interested and a note at the end of the work describes an alternative method of obtaining partial correlation coefficients to that already given by Dines in subsection 2.—*W. R. G.*

[1] Published by the authority of the Meteorological Committee. London, 1919.