

ANTARCTIC RESEARCH.

Abstract from the Monatskarte für den Nordatlantischen Ozean, March, 1903. Communicated by JAMES PAGE, United States Hydrographic Office.

Four independent expeditions are at present engaged in geographical and scientific research in the neighborhood of the Antarctic Continent.

I.—THE GERMAN EXPEDITION.

The steam schooner *Gauss*, 436 tons net, Captain Ruset, Chief of Scientific Staff Professor von Drygalski, sailed from the mouth of the Elbe August 15, 1901, and arrived at St. Vincent September 11. From September 16 to November 23 the vessel was en route from St. Vincent to Cape Town, the voyage being made principally under sail and along the usual route. Leaving Cape Town December 7, Kerguelen was reached January 1, 1902, having touched meanwhile at Possession Island, in the Crozet Group. The *Gauss* sailed from Kerguelen January 31, 1902, her presumable destination being Termination Land, situated to the southeast of Kerguelen, although of this we have no positive assurance. In consequence of her delay of six weeks, the *Gauss* failed to meet the Lloyd steamer *Tauglin* at Kerguelen, as originally planned, but the supplies carried by the *Tauglin* were in all probability received. The latest advices from the *Gauss* and from the four persons left at the supply station in Royal Sound, Kerguelen, were brought by the steamship *Essen*, which reached Australia April 2, 1902. It is hoped that the *Gauss*, in spite of the delay in her departure for the Antarctic regions proper, has yet found sufficient time for a preliminary study of the distribution of land and water, and that she has likewise succeeded in establishing herself in suitable winter quarters, forestalling the necessity of a drift in the ice, such as was the experience of the *Belgica* in 1898-99. As the vessel has probably already succeeded in emerging from the ice, news of the party may be expected within the next two or three months, and in any case not later than the spring of 1904. The *Gauss* is completely equipped for a 2-years' stay in the ice. In case of failure to hear from her by June 1, 1903, a relief expedition is to be despatched. The crew of the supply station in Kerguelen is supposed to have left the island in March, 1903, upon the steamer *Transport*.

II.—THE BRITISH ANTARCTIC EXPEDITION.

The steam schooner *Discovery*, 483 tons net, Scott, Commander and chief of expedition, sailed from England August 6, 1901, reaching Lyttleton November 28. On the voyage outward a latitude of 63° south was attained and certain ice investigations undertaken. The vessel left Port Chalmers, N. Z., December 24, 1901, bound for the vicinity of Cape Adare, east coast of Victoria Land. The departure thus antedated that of the German vessel *Gauss* by a single month. As Victoria Land has been frequently visited, the English expedition has a relatively safe field of operations and a readily available path of retreat. It may be safely surmised that the line of geographical investigation will extend outward toward the east and along the celebrated ice barrier of Ross. No time has been lost in fitting out a relief expedition, the whaler *Morning*, 297 tons net, having left England July 9, 1902, and arrived in Lyttleton November 16. It is presumed that the relief vessel left Lyttleton bound for Victoria Land during December, 1902. Here she will await news of Captain Scott at certain prearranged points. The instructions furnished Captain Colbeck of the *Morning*, with reference to the search for the main expedition, were a masterpiece of clearness and precision. Captain Colbeck has exclusive command of the relief party on the *Morning*, inasmuch as the latter is equipped solely for nautical work. The corresponding demand for freedom and independence of action on the part of the commander of the proposed German relief expedition appears to be well founded, inasmuch as the purely nautical difficulties to be encountered are likely to demand the highest skill.

Both the *Gauss* and the *Discovery* are wooden vessels, newly built and especially designed for the work in hand.

III.—THE SCOTCH EXPEDITION.

The steam whaler *Scotia*, 214 tons net, Captain Robinson, Chief of Expedition W. S. Bruce, left the Clyde November 3, 1902, bound for the Falkland Islands, from which point the high latitudes of the South Atlantic Ocean are to be explored in the direction of the Weddell Sea. The expedition is not equipped for wintering in the ice, the intention being to retire north of the ice limits during that season. The main object in view is marine investigation, a sort of south Polar deep sea expedition. From this point of view, and in consideration of the fact that the region specified has never hither been investigated, and, indeed, has not even been visited since 1823, we are justified in expecting most valuable results. The delay in the departure of the *Scotia* for the ice region, as in the case of the German expedition, is the sole cause for anxiety.

IV.—THE SWEDISH EXPEDITION.

The steam whaler *Antarctic*, 175 tons net, Captain Larsen, Chief of Expedition Dr. O. Nordenskiöld, is at work in approximately the same region as the Scottish expedition, but has the advantage of one year's start. It is a combined land and sea investigation, taking its starting point from the land known to exist south of Cape Horn, the east coast of Graham Land, or King Oscar Land. The *Antarctic* left Sweden October 16, 1901; reached Port Stanley, Falkland Islands, December 31, 1901, and left for the frozen sea January 1, 1902. Ice conditions were everywhere so unfavorable, however, that the vessel was able to penetrate but little beyond the Antarctic circle. Winter quarters and an observation station were established in latitude 64° 30' south, longitude 57° 10' west, in Admiralty Sound, at the southern extremity of Louis Philippe Land. Six men, among them Dr. Nordenskiöld, were left at this point with supplies sufficient for two years, while the *Antarctic* returned to the Falkland Islands and sailed thence April 11, 1902, for a hydrographic survey in the South Atlantic Ocean. The party visited South Georgia, remaining there from April 22 to June 15, and also visited the German station established in Cumberland Sound during the year 1882-83. The vessel was to have arrived at the land station occupied by the Chief of Expedition, Dr. Nordenskiöld, about January 1, 1903. News of her is awaited with interest.

The simultaneous presence of these four expeditions in different parts of the south Polar regions can not fail to add materially to our geographical and scientific knowledge, even though their efforts be hampered by unfavorable ice conditions, to which many indications point. The magnetic observations are likely to prove of specific interest.

LATEST.

Since the above was written definite information has been received as to the outcome of the British Antarctic Expedition, the relief ship *Morning* having returned to Lyttleton March 25, 1903. She reports finding the *Discovery* on January 23, 1903, in MacMurdo Bay, Victoria Land. Commander Scott sends the following (see Scottish Geographic Magazine for April, 1903, p. 122):

The *Discovery* entered the ice pack January 23 (1902) in latitude 67° south. Cape Adare was reached January 9 (?). A landing was effected on the 20th in an excellent harbor, situated in latitude 76° 30' south. The *Discovery* then proceeded along the barrier within a few cables' length, examining the edge and making repeated soundings. In longitude 165° [west?] the barrier altered its character and trended northward. Soundings here showed that the *Discovery* was in shallow water. From the edge of the barrier high snow slopes rose to an extensive heavily glaciated land, with occasional bare precipitous peaks. The expedition followed the coast line as far as latitude 76° south, longi-

tude 152° 30' [west ?]. The heavy pack formation of the young ice caused the expedition to seek winter quarters in Victoria Land. The ship was frozen in March 24, 1902. The expedition passed a comfortable winter in well-sheltered quarters. The lowest recorded temperature was 62° F. below zero. Sledging commenced September 2, 1902; parties being sent out in all directions. That under the command of the chief of expedition traveled 94 miles to the south, reaching land in latitude 80° 18' south, longitude 163° west, establishing a world's record for the farthest point south. The party found that ranges of high mountains continue through Victoria Land. At the meridian of 160° west, foot hills much resembling the Admiralty Range were discovered. The ice barrier is presumably afloat. It continues horizontal and is slowly fed from the land ice. Mountains ten or twelve thousand feet high were seen in latitude 82° south, the coast line continued beyond, at least as far as 83° 20', nearly due south.

NOTE ON THE BAROMETRIC PRESSURE AT COLON.

By General HENRY L. ABBOT, dated May 30, 1903.

The data for August, September, and October, 1902, at Colon, referred to in the MONTHLY WEATHER REVIEW, March, 1903, p. 143, having been communicated to me in all their details, I am now able to complete the study of the mean barometric pressure at this place at sea level.

Hour.	Millimeter.	Hour.	Millimeter.
1 a. m.	757.99	2 p. m.	757.24
2 a. m.	757.70	3 p. m.	756.76
3 a. m.	757.40	4 p. m.	756.63
4 a. m.	757.34	5 p. m.	756.71
5 a. m.	757.44	6 p. m.	756.91
6 a. m.	757.65	7 p. m.	757.25
7 a. m.	758.02	8 p. m.	757.64
8 a. m.	758.57	9 p. m.	758.05
9 a. m.	758.96	10 p. m.	758.28
10 a. m.	759.06	11 p. m.	758.40
11 a. m.	758.83	Midnight	758.33
Noon	758.41		
1 p. m.	757.74	Mean for the 24 hours.	757.80

First, as to reduction to sea level. Using Guyot's Tables I adopt for Colon (25 feet elevation) a correction of + 0.026 inch. I am informed that "+ 0.02 inch was used for several weeks until + 0.03 was authorized and this is now used." So there is no sensible difference in our methods of reduction. For Alhajuella I adopted (height 43.7 meters or 143 feet) a correction ranging from + 3.74 to 3.78 millimeters according to the corresponding air temperature, say + 0.147 to + 0.149

inch. This, by comparison with the above Weather Bureau figure at Colon, seems to be in good accord. From a note that I wrote at Paris, in 1900, giving, in French units, the full hourly record for eight months in 1898 and 1899 at Colon, I quote the preceding hourly means.

This indicates a correction, to reduce an 8 a. m. reading to the mean for twenty-four hours, of -0.77 millimeter. Referring to each of the eight months I find the differences to be: October, - 0.8; November, - 0.8; December, - 0.8; January, - 0.8; February, - 0.6; March, - 0.8; April, - 0.8; May, - 0.9; mean of the eight months, - 0.79.

Unfortunately October is the only month common to the two series of these Weather Bureau records for 1898 and 1903, but in view of the above uniformity of the value of the reduction from 8 a. m., observations to the mean of the twenty-four hours, I think we may safely adopt a value at Colon of - 0.80 millimeters. Hence, the computation by the Editor on page 143, becomes as given in the following table, in millimeters for sea level:

Year, 1902.		August.	September.	October.
Weather Bureau barometer	Mean, 8 a. m.	757.56	758.18	758.73
	Correction	- 0.80	- 0.80	- 0.80
	Mean, 24 hours	756.76	757.38	757.93
Panama Company's barograph.	Readings	762.51	762.88	763.64
	Corrections	- 5.75	- 5.50	- 5.71

This computation gives a mean correction of - 5.65 millimeters for the barograph. By using the Alhajuella horary curve the Editor found the correction to be - 6.00, while my comparison with the records on the northern shore of South America gave - 3.90 millimeters. These three values for the correction, converted to inches, become: - 0.022, - 0.024, and - 0.015, with a largest discrepancy of 0.0083. I shall adopt - 5.65 millimeters as probably the better value, and the small discrepancies obtained by such different methods make me believe it to be quite satisfactory. The mean reading at sea level at Alhajuella is then 757.86 millimeters, or 29.840 inches. The mean reading of the hourly series made by the Weather Bureau at Colon for eight months in 1898-99 was 29.866 inches.

NOTES AND EXTRACTS.

CLIMATIC FACTORS IN RAILROAD ENGINEERING.

A thesis on the above subject has been prepared by R. M. Brown as a part of his course in general climatology at Harvard University and has been published in the Journal of Geography for April, 1903. The struggle of railroads against climatic conditions has been recorded so fully during the past century as to become exceedingly instructive and the influence of the various climatic factors is presented one by one in Mr. Brown's memoir.

As to heavy precipitation he notes that the rainy seasons are often followed by droughts and this alternation destroys all woodwork either by shrinkage and splintering or by the growth of fungi. Railroad ties decay when there is a good supply of moisture and when the temperature is between 32° and 150°. Data on these points are given for India, South Africa, Central Africa, and Central America.

The diseases that are considered peculiar to climate, such as cholera, malarial fevers, and yellow fever offer difficulties that must be overcome. The experiences of numerous large railroad undertakings are mentioned. The droughts that occur in some locations require the building of huge tanks while in other cases one must go a long distance to obtain pure water. Outdoor work can not well be done in the rainy weather and laborers accustomed to hot dry weather lose many days in the rainy season.

The floods and damages by heavy rains are matters of great importance and "are registered on the books of the construction companies with unceasing regularity. * * * The history of every road that traverses the belt of heavy precipitation is a story of continual struggle against floods." In regions of heavy rainfall land slips are frequent and a long list of these is given by the author.

The ballast on the roadbed appropriate to the long, dry season is not appropriate to the heavy-rain season. In general, the ballast produces dust haze sufficient to obscure the approaching train, the dust also penetrates the machinery, causing hot axles and other damage. In America and England under most conditions, stone ballast is the more expensive but in India the climate reverses this rule.

In regions of moderate precipitation whether of rain or snow, the length and weight of the freight trains is determined by the weather; thus, on the Pennsylvania Railroad west of Pittsburgh, the load assigned to an engine is 1750 tons in good weather and 1225 in bad weather. On the Union Pacific road the snow offers great obstacles, about 2 per cent of the entire expense of the road is credited to the removal of snow and repairs of snow sheds. The Iquique Railroad of Chili reports increased cost of working during fogs which produce slippery rails.

In regions of light precipitation, or drought, railroad ties