president until the conference in 1923. Prof. E. van Everdingen was elected vice president, and Dr. Hesselberg, Director of the Meteorological Institute, Christiania, secretary.

It was agreed, on the invitation of Prof. E. van Everdingen, that a conference of directors of meteorological institutes and observatories should be held in Utrecht in 1923, either in the spring or autumn, as may be found the more convenient.

AMERICAN MEMBERS OF INTERNATIONAL COMMISSIONS.

The following names are those of American meteorologists who are members of the various commissions of the International Meteorological Committee:

Prof. C. F. Marvin, Chief of the U. S. Weather Bureau, Washington: International Commission for Meteorological Telegraphy; International Commission for Marine Meteorology; Commission du Réseau Mondial et de la Météorologie Polaire; International Commission for the Investigation of the Upper Air.

Dr. H. H. Kimball, Weather Bureau, Washington: International Commission for Solar Radiation.

Prof. J. Warren Smith, Weather Bureau, Washington: International Commission for Agricultural Meteorology.

Maj. W. R. Blair, Signal Corps, Washington: International Commission for the Application of Meteorology to Aerial Navigation.

Dr. C. G. Abbot, Smithsonian Institution, Washington: International Commission for Solar Radiation.

Dr. L. A. Bauer, Carnegie Institution, Washington: International Commission for Terrestrial Magnetism and Atmospheric Electricity.

RELATION OF COASTAL CURRENTS AND WINDS ON THE PACIFIC COAST.[1]

By H. A. MARMER.

[Abstract reprinted from *Jour. Washington Acad. of Sciences*, Oct. 4, 1921, pp. 397–398.]

This paper presented the results of an investigation of the speeds and directions of the current along the Pacific coast of the United States brought about by local winds. The investigation was undertaken primarily for the purpose of aiding the mariner and was based on observations made under the direction of the Coast and Geodetic Survey by members of the crews of the five light vessels stationed along the coast from San Francisco Bay to the Strait of Juan de Fuca. The apparatus used for measuring the speed and direction of the current was necessarily the simplest, and consisted of a 15-foot current pole, a log line graduated to knots and tenths for a run of one minute, a stop watch, and a pelorus. The wind velocity was estimated in accordance with the Beaufort scale.

Since the current as observed is the resultant of a number of different currents due to various causes, such as tides, winds, river discharge, and differences in density, the observations are tabulated with reference to various arguments. Thus by tabulating with reference to time of tide at a near-by port for periods of 29 days, the tidal current is derived. This current on the Pacific coast, offshore, is of the rotary type, the direction of rotation being clockwise, and shows considerable diurnal inequality. The wind current is derived by tabulating the observations with reference to winds of particular velocity and direction; then by summing for each such wind a large number of observations, the tidal current may be considered as very nearly eliminated.

In the present investigation the observations were tabulated with reference to winds from a given direction divided in groups covering a range of wind velocity of 10 miles. The results derived show that on the Pacific coast, at a distance of from 4 to 10 miles from the land, winds from 10 to 70 miles per hour will give rise to currents from one-fourth of a knot to over a knot; and this current will set, not in a direction of the wind, but in a direction of about 20° to the right of the wind. This has an important bearing on navigation, since winds blowing parallel to the coast or even away from the coast may give rise to currents tending to set a vessel on shore.

In the results presented for each of the light vessels the effect of fresh-water run-off at the light vessels stationed off San Francisco, Columbia River and Swiftsure Bank was sufficiently large in some cases to change the direction of the current brought about by winds of moderate velocity from the characteristic deviation of 20° to the right of the wind direction. But with increasing wind velocity the direction of the current approximated toward the direction of 20° to the right of the wind.

[1] Presented before Philosophical Society of Washington, May 21, 1921.

RESISTANCE OF AIR TO THE MOVEMENT OF SPHERES AND THE ASCENSIONAL RATE OF PILOT BALLOONS.

By C. E. BRAZIER.

[Abstracted from *Comptes Rendus* Oct. 17, 1921, pp. 644–646.]

Formulæ for the computation of the ascensional rate of pilot balloons are of the general form $V = m[A/(A+B)^{2/3}]^n$ in which A and B are the ascensional force and weight of the balloon respectively. But ascensional rates computed from formulæ based upon various determinations of m and n differ widely from one another. In order to determine some criterion for the correct values of these constants, the author has compared data obtained from ascents made by Rouch, Porte, Cave, and Dines, with certain aerodynamical studies made by Eiffel and Maurain upon spheres in moving air as observed in the wind tunnel.

In the equation $R = \frac{K\rho\pi D^2 V^2}{4\rho(15°\text{C.}, 760\text{mm.})}$, in which R is the resistance of the sphere, K the coefficient of resistance, ρ the specific weight of the air, D the diameter of the sphere, and V the speed of the air current, the value of K varies according to the Reynold's number which is defined as $N = VD\rho/\eta$ (η being the viscosity of the air). Between the limits $N = 100 \times 10^3$ and 300×10^3, K is in a large measure a function of the turbulence in the current of air.

It was desirable to compute the values of N and K from two and three theodolite balloon ascents and see if the laboratory relations between the two terms hold in the free air as well as in the wind tunnel. This study involved five assumptions: (1) That the balloon was spherical; (2) that the specific weight of hydrogen is 0.1 kg. per liter; (3) that one may neglect (*a*) the influence of water vapor on the specific weight of air, (*b*) the volume of the balloon envelope, (*c*) the pressure due to the tension of the balloon, (*d*) the difference in temperature between the gas in the balloon and the ambient air, and (*e*) the loss of ascensional force due to diffusion through the rubber; (4) that the mean ascensional speed is reached