"The consideration that over the open sea the atmosphere rests on a floor or surface with a diurnal range of temperature so small as to render that temperature practically a constant both day and night, leads to the all important conclusion that the diurnal oscillations of the barometer are not caused by the heating and cooling of the earth's surface by solar and terrestrial radiation and by the effects that follow these changes in the temperature of the surface; but that they are primarily caused by the direct and immediate heating by solar radiation and cooling by nocturnal radiation to the cold regions of space, of the molecules of the air and its aqueous vapour through the whole height of the atmosphere.

"The phenomena of the double diurnal barometric tide are given in their simplest form by the observations made in the centre of the Pacific, or in the midst of the largest water surface of the globe. The following are the variations of pressure from the observations made from September 1st to 12th, 1875, in mean lat. 1° 8′ S. and long. 150° 40′ W., the mean pressure for the time being 29·928 inches:—

	inch		inch
2 A.M.	−0·012	2 P.M.	−0·043
4 „	−0·022	4 „	−0·055
6 „	0·003	6 „	−0·028
8 „	0·028	8 „	0·004
10 „	0·032	10 „	0·013
noon	0·006	midnight	0·012

"The noteworthy features in these oscillations are the amplitude of the range from the morning maximum to the afternoon minimum, amounting to 0·087 inch, and the rapidity of the fall from 10 A.M. to 2 P.M., and these features appear in all the means deduced from the observations made at least 12° on each side of the Equator.

"On the other hand, from October 12th to 22nd, 1875, in mean lat. 35° 1′ S. and long. 134° 35′ W., when the mean pressure was as high as 30·298 inches, the difference between the morning maximum and the afternoon minimum was only 0·036; and from July 12th to 19th, in mean lat. 36° 16′ N. and long. 156° 11′ W., when the mean pressure was 30·328 inches, the difference between the morning maximum and the afternoon minimum was only 0·025 inch. Thus, with a mean pressure in the Pacific about lat. 35° to 36° N. and S., much greater than near the Equator, the oscillation is much less, being, in the North Pacific, less than a third part of what occurs near the Equator. Similarly this diurnal oscillation is very small in the analogous high pressure regions of the North and South Atlantic as compared with the same oscillation near the equatorial belt of that ocean. The following are the mean oscillations in the middle regions of the two great oceans about lat. 36° from the morning maximum to the afternoon minimum about the time of the year, in each case, when the sun is highest in the heavens:—South Pacific 0·036 inch, North Pacific 0·025 inch, South Atlantic 0·024 inch, and North