

How Industry May Change Climate

The amount of carbon dioxide in the air will double by the year 2080 and raise the temperature an average of at least 4 per cent. The burning of about two billion tons of coal and oil a year keeps the average ground temperature somewhat higher than it would otherwise be. If industrial growth extended over several thousand years instead of over a century only, the oceans would have absorbed most of the excess carbon dioxide. Seas circulate so slowly that they have had little effect in reducing the amount of the gas as man's smoke-making abilities multiplied during a hundred years.

All this and more came out in the course of a paper that Dr. Gilbert N. Plass of Johns Hopkins presented before the American Geophysical Union. He found that man's industries add six billion tons of carbon dioxide to the atmosphere.

Heat is Retained

Like glass in a greenhouse, carbon dioxide in the air prevents the escape of long-wave radiation (heat) from the ground but allows short wave-length radiation from the sun to pass through. When the amount of the gas increases, the atmospheric blanket holds more heat near the earth's surface. At the same time, the tops of clouds are prevented from losing heat into space as rapidly as before. The drop in temperature variation between the top and bottom layers of clouds prevents the formation of strong convection cur-

rents necessary for the onset of precipitation. This may mean less rainfall and cloud cover, so that still more sunlight can reach the earth's surface. Thus man tends to make his climate warmer and drier; should there be a decrease in carbon dioxide, a cooler and wetter climate would result.

Theory Applied to Glaciers

All this reinforces a theory advanced in 1861 that decreases in carbon dioxide explain the growth and advance of glaciers at various intervals in the earth's history. Dr. Plass finds the theory plausible. If the theory is correct, millions of years of mountain-building preceded each glacial period. During these long periods large quantities of exposed fire-made rock weathered during the uplift of the land, with the result that the amount of free carbon dioxide in the air was greatly reduced. If reduction amounted to only a factor of two, the gas in the atmosphere would have been reduced five-fold. The consequences have been heavier rainfall and a temperature drop of more than seven degrees.

As the weathering process slowed down, mountains were leveled and gas from inside the earth made its way into the atmosphere, the temperature rose, the climate became drier and the glacier receded. In the future, as in the past, important changes in temperature and rainfall will result from variations in the supply of carbon

dioxide.

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