CLIMATE CHANGE

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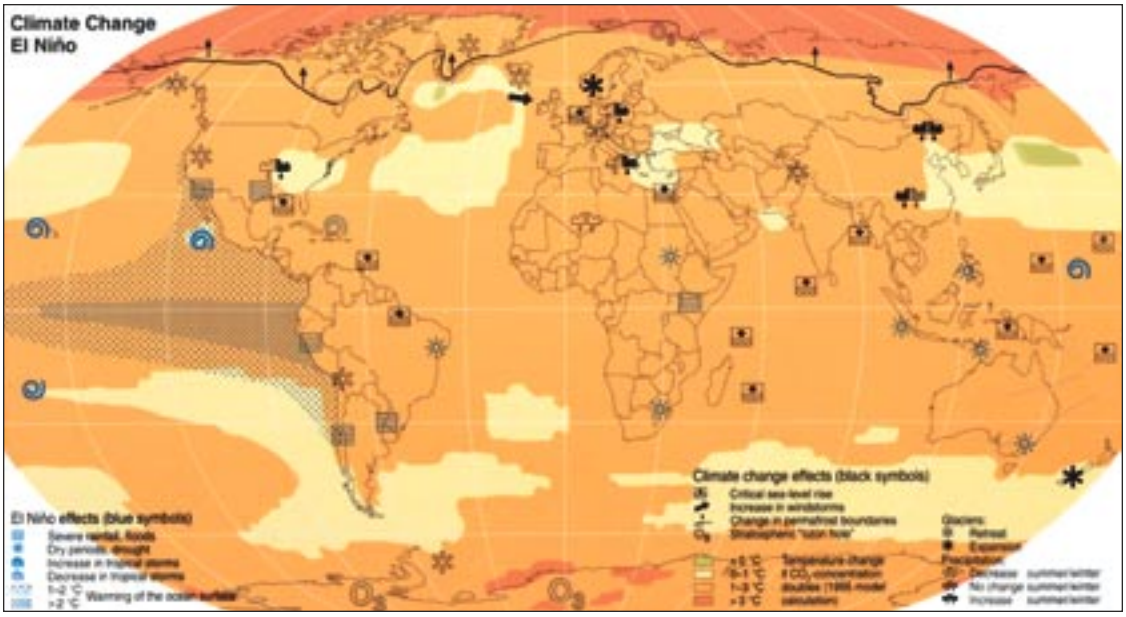

Map courtesy of Andreas Sieberl, Munich Reinsurance Company.

The daily weather or meteorological map that we are all familiar with is transformed here into a map of climate change, showing areas where weather patterns have been altered above and beyond normal daily fluctuations. The data illustrated here is the result of a decade's worth of research into the effects of El Niño ocean warming.

Definition

An alteration of long-standing weather patterns—as opposed to daily fluctuations—above and beyond natural climate variability observed over comparable time periods; changes in the composition of the global atmosphere that can be attributed directly or indirectly to human activity.

Description

Human activities are accelerating the release of greenhouse gases into the atmosphere. Carbon dioxide, for instance, is produced both when fossil fuels are used to generate energy and when forests are cut down and burned. Methane and nitrous oxide are natural by-products of agricultural activities, but rates and quantities of emission are rising sharply as new technologies, denser concentrations of livestock, and single-crop megafarms change conditions and techniques that are thousands of years old. Industrial processes are adding halocarbons (CFCs, HFCs, PFCs) and other long-lived gases such as sulphur hexafluoride (SF_6) to the mix.

By absorbing infrared radiation, these gases control the way natural energy from the sun flows through the atmosphere and is distributed by the chemical processes of weather. World climate has already begun to change as the planet adjusts itself to this new thicker blanket of greenhouse gases and attempts to maintain the balance between energy arriving from the sun and energy escaping back into space. Observations show that global temperatures have risen by about 0.6° C during the last one hundred years, with most of that change happening in the last fifty years.

Climate models predict that the global temperature will rise by about 1.4°–5.8° C by the year 2100. This change would be much larger than any climate change experienced over at least the last ten thousand years.

Such a radical change is likely to have a significant impact on the global environment. In general, the faster the climate changes, the greater the risk will be to sustainable living conditions. The mean sea level is expected to rise 9–88 centimeters by the year 2100, which would cause flooding of low-lying coastal areas and increase the damage potential from storms. Other effects could include an increase in global precipitation and changes in the severity or frequency of extreme events, such hurricanes, droughts, and tornadoes. Climatic zones could shift both north and south, as well as east and west, displacing current locations of forests, deserts, rangelands, and wetlands, and causing a decline in the health of some ecosystems, as well accelerated species extinction.

Human society will face new risks and pressures. Some regions are likely to experience food shortages and hunger. Water resources will be affected as precipitation and evaporation patterns change around the world. Towns and roads will be damaged, particularly by sea-level rise and increasingly severe storms. The consequences to the physical and economic health and welfare of humankind could be catastrophic.

All attempts to improve the situation will require dramatic changes in the way we use energy, as well as in our general understanding of ecological systems.

The international community is tackling this challenge through the United Nations Framework Convention on Climate Change. Adopted in 1992 and with more than 185 member nations, the Convention seeks to stabilize atmospheric concentrations of greenhouse gases at safe levels. It commits all countries to find ways to limit their emissions, gather relevant information, develop strategies for adapting to climate change, and

cooperate with each other. It also requires developed countries to take measures aimed at returning their emissions of greenhouse gases to 1990 levels.

The Kyoto Protocol (an extension of Convention agreements, which outline ways to proceed) requires governments to take even stronger action. In 1997, the Parties to the Convention agreed by consensus that developed countries should accept a legally binding commitment to reduce their collective emissions of six greenhouse gases by at least 5 percent compared to 1990 levels by the period 2008–2012. The Protocol also establishes an emission trading regime and a "clean development mechanism." As of the date of this publication, the Protocol has received the signatures of eighty-four countries (a signature indicates acceptance in principle) and forty-six ratifications (a ratification indicates willingness to be legally bound by the agreement). It will enter into force as international law when countries responsible for 55 percent of the world's carbon dioxide emissions have ratified it.

Many options for limiting emissions, however, are available to all nations in the short- and medium-term. Policymakers can encourage energy efficiency and other climate-friendly trends in both the supply and consumption of energy by providing an appropriate economic and regulatory framework, as well as by informing and educating consumers and investors. This framework should promote cost-effective actions, the best current and future technologies, and "no regrets" solutions that make economic and environmental sense irrespective of climate change. Taxes, regulatory standards, tradable emissions permits, information programs, voluntary programs, and the phase-out of counterproductive subsidies to oil and gas industries can all play a role. Changes in practices and lifestyles, from better urban transport planning to personal habits such as turning out the lights and riding a bicycle, are also critically important.

It will be necessary to balance concerns about risks and damages with concerns about economic development. The prudent response to climate change, therefore, is to adopt an international portfolio of positive and cooperative actions aimed at controlling emissions, adapting to new conditions and consequences, and encouraging scientific, technological, and socioeconomic research.

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