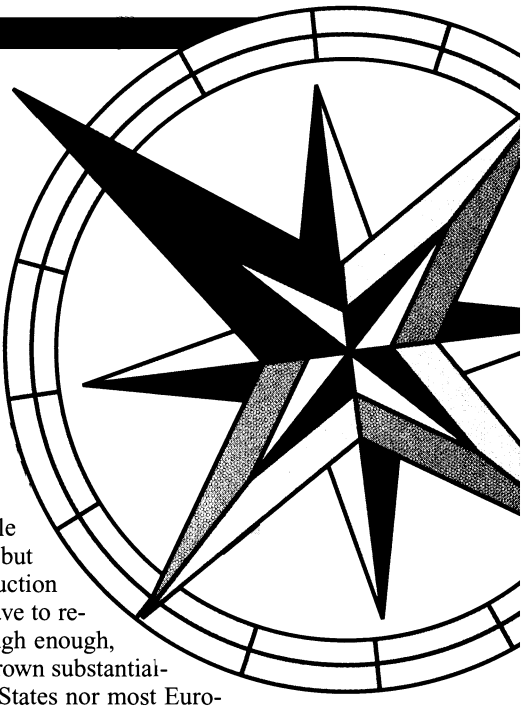

New Climate News

Don Kennedy

The preface of the latest draft report from the Intergovernmental Panel on Climate Change (IPCC) was leaked last week and was widely reported in the press. It seems likely that those who released it may have hoped for some influence on the Sixth Conference of the Parties on the Framework Convention for Climate Change, which is scheduled to get under way next week in the Hague. Be that as it may, the report contained some real surprises. These are worth pondering as we move toward the Hague meeting and the next phase of the climate change debate.

The background is that the conference is widely thought to be in trouble (see *Science*, 3 November 2000, p. 920). The Kyoto Protocol, signed in 1997 but as yet unratified by the U.S. Senate, established carbon dioxide emission reduction targets for each developed country. The United States, for example, would have to reduce its emissions to 7% below 1990 levels by 2008–2012. That sounds tough enough, but population and per capita energy use would, without intervention, have grown substantially by then. Thus, the real reduction target is about 30%. Neither the United States nor most European countries are now expected to approach the marks set at Kyoto, and even those levels would have only slowed the likely climate effects, not mitigated them. Nor do most observers expect much when the parties convene to revisit those targets. Will the new IPCC report change the politics at the Hague? Probably not, but some of its new features could change the dialogue in the longer run. Here are the surprises.

The first is that the global warming estimate itself—at least its upper bound—has received an upward adjustment. The last IPCC estimates, in 1995, put the average global temperature increase by the end of this century at 1.5° to 4.0°C. This newest estimate is 1.5° to 6.0°C. The second surprise is that a firmer association between human activities and climate has emerged. Even the most skeptical climatologist in the IPCC group now concedes that warming bears an anthropogenic handprint. That is important news because reservations about the source of the past century's warming have often been cited effectively in policy debates, usually in support of deferring mitigation actions.

"Here are the surprises."

Perhaps the most important surprise is the one that isn't there—at least yet. A series of investigations, including some published in *Science* over the past several years, have revealed important new features of the history of climate change. We have known since the early 1990s that global temperatures between 90,000 and 10,000 years ago underwent sudden dramatic shifts from glacial temperatures to interglacials nearly as high as today's, and then back to cold in a matter of decades. Some of the newer evidence suggests that these flickers in climate may have been triggered by major shifts in patterns of ocean circulation: the major conveyor of heat from low to high latitudes.

The models that have dominated our risk analyses and our economic estimates of climate change impacts are linear models: computer analyses of ocean-atmosphere relations that project a slow ramp of gradually increasing temperature. The new estimates imply that the likely temperature increase is greater, along with such possible direct impacts as sea level rise. An alternative possibility, already hinted at in the 1995 report, was that these gradual shifts may trigger a sudden dynamic shift that takes the world, or at least the North Atlantic region, into a new temperature regime. In short, we are conducting a global experiment without protocol or hypothesis, and the result is uncertain.

Even without an unpleasant surprise, the new IPCC report raises the prospect of serious risk to a new level. And it's about time: Right now, climate change has drifted off the radar screen, warranting scarcely a glance in this season of electoral politics. We see little support for the new resources that will be required to develop less carbon-intensive fuel sources or to understand the Earth systems that couple oceans to one another and to the atmosphere. Surprisingly, the private sector seems somewhat more active. Wholesale industrial denial has faded, and some companies, such as British Petroleum, have launched ingenious mitigation projects based on emissions trading. These appear to be working. Governments ought to be paying more attention; and if we're lucky, the new report just might goad them into wakefulness.

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