

Warming up to an El Niño

It's not nice to fool Mother Nature, but that doesn't mean she won't fool us. Six months ago, it seemed all bets were off on an El Niño-Southern Oscillation (ENSO) episode developing in 1986, even though model predictions and earlier measurements had suggested otherwise. The waters off South America's west coast had started to become warmer than normal in January 1986 — one sign of a developing ENSO, in which unusually warm waters in the equatorial Pacific, accompanied by a low-pressure system over Indonesia and Australia and high pressures over the central Pacific, disrupt weather patterns worldwide. But the warming in that region never became very pronounced, and by the end of May it had ceased (SN: 6/7/86, p.357).

Then, in August and September, some of the classic signs of an ENSO began to appear. Warmer-than-normal waters in the central Pacific began to spread eastward. An advisory issued Jan. 12, 1987, by the National Oceanic and Atmospheric Administration's Climate Analysis Center, states that rainfall, fueled by the warm waters, has been heavy in the central Pacific since November. At the same time, the Philippines, Indonesia and northern Australia have been drier than normal. Other ENSO signs are wetter-than-usual Gulf Coast states and warmer-than-normal conditions in the western United States and Canada.

"Some ENSO episodes start out with a bang and are very strong from the beginning," says Vernon Kousky of the Climate Analysis Center in Camp Springs, Md. This one "started off very weakly, and it had most of us wondering whether it would evolve into a full ENSO or not," he says. "Each ENSO is different from the previous ones. We just have to learn with each one."

Compared with the 1982-83 ENSO, which led to the deaths of 1,100 people, killed vast numbers of sea life and caused \$8 billion in damage, this one is very mild. Sea-surface temperatures in the central and eastern equatorial Pacific are now only about 1° to 2°C higher than normal, whereas temperatures in the eastern equatorial Pacific during the comparable stage of the 1982-83 episode were 4°C, and in some places 6°C, warmer than normal, according to Kousky.

If the greater-than-normal warming in the eastern Pacific persists until temperatures reach their peak in March or April, he says, then Peru and Ecuador may be faced with increased rainfall, and warm waters could threaten those nations' fishing industries. "That's the part we don't know yet," he says. "It's very difficult to predict how the ENSO will evolve."

But forecasting capabilities are improving. In March of last year, Stephen E. Zebiak and his colleagues at the Lamont-

Doherty Geological Observatory in Palisades, N.Y., using a coupled ocean-atmosphere computer model, predicted that a small to moderate ENSO would develop (SN: 3/22/86, p.184). "The model predicted a warming earlier and somewhat larger than what has occurred," says Zebiak. "We also predicted that the [event] would get to its mature phase at the present time and die out by the middle of this year. Of course, we don't have the final word on that yet."

The current episode should help Zebiak and others to refine their models of the complex ocean-atmosphere dynamics that create ENSOs, because this one is better monitored than any other,

with research vessels and an unprecedented number of ocean buoys, says Kousky. But until the computer models and monitoring systems are perfected, researchers can still take clues from a very nontechnical source — the animal kingdom.

According to the National Geographic Society of Washington, D.C., large numbers of Galápagos Island iguanas began breeding in September last year — several months earlier than usual. The society reports that unusual breeding behavior last summer and fall of these and other species, including green sea turtles and finches, may indicate that the animals, many of which are highly sensitive to temperature changes, were anticipating bad weather brought on by an ENSO.

— S. Weisburd

Panel would reform U.S. export controls

U.S. rules to restrict the export — directly or indirectly — of militarily critical technologies to Warsaw Pact countries not only are cumbersome, confusing and often ineffective, but also are hurting sales of U.S. high-tech products to military allies, reports a new National Academy of Sciences (NAS) panel. Among measures it recommends to help solve these problems is a reduction in the number of technologies subject to export controls.

Many of the study's findings mirror those of an earlier NAS panel, known as the Corson panel, which focused on export controls applied to basic research (SN: 10/9/82, p.229). Explains Mitchel B. Wallerstein, staff director of the new NAS study, "The Corson panel indicated that there was [a] much larger element of the problem that they had neither the time nor the resources to address — national security controls on the results of applied research." The new report focuses on the effects on those involved in applying U.S. high technology, primarily businesses.

Though the new study finds export controls essential in preventing the diversion of critical technologies to the Soviets, it says most of the benefits "are concentrated in a relatively narrow range of products and technologies" — such as very high-speed computers and equipment for manufacturing high-density semiconductors or specialized metals. However, U.S. controls are currently applied to thousands of other technologies, many of them widely available from non-U.S. sources, including U.S. allies. As a result, the panel observes, these controls fail to prohibit Soviet acquisition of many U.S.-controlled technologies. And the large number of technologies potentially subject to controls makes processing of export permits on U.S. high technology cumbersome and slow. The result is that U.S. firms lose at least \$9 billion yearly in

sales to U.S. allies who can deliver technologies more quickly and reliably.

Though some Department of Defense (DOD) officials have publicly complained that the study's recommendations would trade off national security in order to boost U.S. trade, the agency's official comment is only that the report "is under review."

NAS panel chairman Lew Allen Jr. dismisses the security-tradeoff argument, saying "national security aspects" were "foremost" in the panel's considerations. Moreover, he points out that many panel members are experienced in evaluating national security considerations. For example, Allen, now director of Caltech's Jet Propulsion Laboratory in Pasadena, is a former director of the National Security Agency; Adm. Bobby Inman is former deputy director of the Central Intelligence Agency and Melvin R. Laird is a former Secretary of Defense.

"There's a growing awareness in the Congress, academia and business that existing export controls are far too stringent," says Rep. Don Bonker (D-Wash.), chairman of the House subcommittee with jurisdiction over export controls. Earlier this month, he introduced a bill to streamline those controls and reduce the number of controlled items. Bonker says the new NAS study "helps make our case that these changes are needed."

The Reagan administration has not been very responsive to past suggestions that it reform export controls, according to Stephen Gould, an export controls analyst for the Washington, D.C.-based American Association for the Advancement of Science and a consultant to the new study panel. Realizing that the administration may be similarly unresponsive to this study, Wallerstein says the panel's report was deliberately designed to also serve "as a blueprint for whatever administration comes into office next."

— J. Raloff