GETTING A MEASURE OF THE OCEANS' WARMING:

Climate scientists can sleep a little better at night, thanks to Tim Barnett and his colleagues at the Scripps Institution of Oceanography and Lawrence Livermore National Laboratory in California. Their results, Barnett said last month, "should wipe out much of the uncertainty about the reality of global warming."

What his team did was to find and track the missing greenhouse heat in the world oceans that other, slightly less sophisticated climate models had been unable to find.

Up to this stage, the most interesting climate game has been hide and seek. Geologists, ecologists, oceanographers, physiologists, glaciologists, atmospheric physicists and planetary scientists have all been searching the hiding places for carbon and heat and watching them move from place to place.

A different, but familiar, climate game is now moving to center stage. This one is more like the reality-television show "Survivor." This one will be played more by the economists, engineers, diplomats and lawyers than by the natural scientists. The name of this game, of course, is climate politics.

Hide and seek with the global carbon cycle began about 50 years ago when researchers discovered that the carbon dioxide and methane content of the Earth's atmosphere was increasing steadily, even in remote, unpolluted air. Rather quickly, atmospheric scientists discovered the sources of that carbon: our gasoline tanks, home heating systems, coal-fired power plants, deforested lands and rice paddies. Curiously, more carbon was leaving these sources -- especially auto exhaust pipes and smokestacks -- than was accumulating in the atmosphere. The extra carbon had to be hiding somewhere.

"Ready or not, here I come," shouted the other scientists. Each discipline ran off to its own favorite place, searching for missing carbon. Biologists headed for Earth's biomass, finding their share in forests, wetlands, grasslands, lagoons and organic soils. Oceanographers found their share in the alkalinity of the surface ocean and in the shells and reefs of lime-secreting creatures. Geochemists found their share hiding in sediments and the residues left by the chemical weathering of rock to soil.

Step by step, all the hiding places for carbon in the air, forests, shells, water and soils were found out, as well as the movements of carbon from one place to another. As this happened, climate modelers were able to predict the greenhouse effect with greater confidence. Their improved models showed that the Earth wasn't as warm as it should be, based on the known strength of the greenhouse effect. Extra heat had to be hiding somewhere.

"Ready or not, here I come." Geographers, looking for that extra heat, rushed to the archive of global temperature measurements. Astronomers searched the luminosity of the sun. Geologists calculated the heat required to melt the permafrost and to warm deep caverns and boreholes. Ecologists watched plant and animal communities adapt, correlating observed migration with temperature changes. Planetary scientists looked down from satellites, taking the temperature of the atmosphere (troposphere) at its outer edge. Every discipline found its share of greenhouse heat, but the sum total was still short of expectations.

This is where Tim Parker and his colleagues came in. It's long been known that the world oceans hold and release enormous quantities of heat. Hence, climate researchers have long suspected that extra heat has been hiding in all seven seas. What they did not have, up to this point, were sufficient
measurements and the computer power to track the flow of heat from one basin to another at different levels. What Parker's team did was to use these new temperature data sets, then exhaustively reanalyze that data in state-of-the-art computer models. Three of their results are reassuring to climate scientists:

First, water mass temperatures have risen, even in the deep oceans. Second, the warming of the upper several hundred feet of the ocean greatly exceeds that expected under natural conditions. Third, the shape of the temperature profile for the ocean matches model predictions.

Now is the time to balance the global sleep budget. As the climate scientists get to sleep more, the politicians will have to sleep less.