Name: ______________________  Section: ______________________

Homework Assignment #3 (Due in Sections Week of Feb. 14)

1) A frictionless projectile is fired from the North Pole and is aimed along the prime meridian. It takes 3 hours to reach its landing point, halfway to the equator. Where does it land? (Give latitude and longitude). If the same projectile is fired from the Equator due East, under the same circumstances, where does it land? (Give latitude and longitude).

2) If we were to look at sea surface height across the North Atlantic basin, there would be a "hill" to one side with a steep slope on the western side of the basin, and shallower slope on the eastern side. Explain (a) why there is a “hill”, and (b) why it isn’t centered in the middle of the basin.

3) Read the article from the San Diego Tribune (on the back of this sheet), then find the Science paper by Joughin and Tulaczyk (there’s more than one…you want the 2002 article). Read the Science paper. Based on the paper versus the editorial, do you think the editorial is accurate? Why or why not?

4) From the Joughin and Tulaczyk article, explain what might happen to global circulation (water formation) patterns, and discuss what impact you think that might have on the Earth.

5) If the production of North Atlantic Deep Water were severely reduced, what changes would you expect to find in the (a) Gulf Stream flow; (b) upwelling the Pacific ocean; (c) world sea surface temperatures?

6) In Homework 2, you compared the geology of the California coast with the geology of the Northwest African and Iberian (Spain and Portugal) coasts. Based on the material we covered on atmospheric and oceanic circulation, what regions of the planet would you expect to be similar oceanographically (biology, physics, chemistry) to California? Why?

7) If the earth were to spin at twice its current velocity (once every 12 hours), and the shape of the earth was cylindrical instead of spherical, describe the large scale current patterns for the North Atlantic (hint: think about what would happen to geostrophic flow, ekman pumping, coriolis, and vorticity).

Extra Credit: Choose ONE of the following extra credit questions. You must answer the entire question correctly to get the extra credit.

1. (3 points) What is the Coriolis parameter? How does it vary from the equator to the North Pole? What is the Coriolis parameter at 0°, 30°, 60°, 90°, and Santa Cruz? How does the Coriolis parameter relate to vorticity?

2. (2 points) Draw a map of the Pacific Ocean and name the major currents. You must include at least 10 currents for a complete answer.
Scientific findings run counter to theory of global warming
Joseph Perkins
San Diego Union-Tribune
January 25, 2002

Oh dear. What will the doomsayers say now? How will they explain away yet two more scientific studies that clearly contradict the global warming orthodoxy?

For much of the past 14 years, since the United Nations created its Intergovernmental Panel on Climate Change, we've been warned that human activity is overheating the planet. And nowhere is that supposed to be more evident than in Antarctica, the proverbial bellwether for planetary climate change.

Indeed, in recent years there have been any number of scary reports claiming that the White Continent is warming up and shedding its ice shelves at a startling rate. Which has led to the most ominous forecasts by environmental advocacy groups such as the National Resources Defense Council.

"Glaciers and polar ice packs will melt," it direly predicts, in its global warming "fact sheet." "Sea levels will rise, flooding coastal areas. Heat waves will be more frequent and more intense. Droughts and wildfires will occur more often. And species will be pushed to extinction."

So how do the climatory Cassandras on the environmental left explain the new study, appearing in the current edition of the journal Nature, that shows a net cooling, rather than warming, on the Antarctic continent between 1966 and 2000?

What particularly amazes is that the cooling trend has actually gotten more pronounced since the mid-1980s. Air temperatures recorded continuously over a 14-year period ending in 1999 declined by 0.7 degrees in Antarctica's polar desert valleys.

The study's lead author, limnologist Peter T. Doran of the University of Illinois at Chicago, was almost apologetic about the results produced by his team of scientists. "This is an unexpected twist," he said, tacitly acknowledging that his data is inconsistent with global warming theory.

It's the same thing with the study, published in a recent issue of the journal Science, which concludes that the giant West Antarctic Ice Sheet is actually getting thicker, rather than melting. Authored by Ian Joughin, a geologist with the Jet Propulsion Laboratory at the California Institute of Technology and Slawek Tulaczyk, a professor of earth sciences at the University of California Santa Cruz, the study found that the ice sheet is gaining 26.8 billions tons of ice a year.

Much like Doran, Joughin sounded almost regretful about his scientific findings, recognizing that it contradicts the global warming orthodoxy. "It could be this part of the ice sheet is not necessarily sensitive to global warming," he said.

There is a curious thing going on in the scientific community. Scientists who produce research that does not comport with accepted wisdom on global warming -- like Doran and Joughin -- feel compelled to disavow their findings. Or, at least, to suggest that their results are aberrational. Indeed, a few years back, the Climate Prediction Center, a division of the National Oceanic and Atmospheric Administration, released a study that found the continental United States has actually gotten cooler, rather than warmer, over the past third of a century.
Yet, the scientists who produced the center's study went to great lengths to assure that their findings did not undermine prevailing notions about global warming.

Then there was the study by scientists at Scripps Institution of Oceanography in La Jolla. They took Antarctic ice core samples from the last three glacial cycles (the transitional periods between ice age and planetary warming) to ascertain the relation between rises in atmospheric levels of carbon dioxide and increases in planetary temperature.

Based on global warming theory, there should first have been a rise in carbon dioxide levels followed by a rise in temperature levels. But, in fact the opposite actually occurred. Yet, the Scripps scientists insisted that their results were not inconsistent with global warming theory.

It seems clear that much of the scientific community is in denial about global warming. That scientists are so empathetic to the IPCC, the NRDC and other global warming doomsayers that even those scientists who produce research that contradict the global warming orthodoxy are unwilling to admit as much.