



## Rear Admiral David Titley

Whether you are military or civilian, whenever you sit down for that midterm counseling and they start talking about other things that you could be doing, you should feel pretty certain that things are going to change. So perhaps Ms. Sherri Goodman has been talking with the Chief of Naval Operations and what comes next is pack your bag. Your badge does not work here anymore. You guys listened to me for probably too long before lunchtime, so I am going to make this fairly brief.

First, I was remiss in my earlier remarks by not publicly thanking my colleagues at the Office of Naval Research (ONR) because ONR is putting real money both into Arctic research and into improving our understanding of that very, very hard part of climate change, the part where we go from today's weather to something significantly different in just 70 years. We are doing as much as we can to enable our resource sponsors to get the answers that they need when they ask us to tell them what the risks are when they delay their programs by 1 year or by 2 years. The work that ONR is doing is going to help inform that risk analysis. Over the next 5 years, ONR will be spending about \$40 million to support this very important work.

You cannot do much better than the Vice Chief's guidance that we need to look at this in a deliberate way and make investments at the right time based on the right analysis. I thought that was a tremendous message, and we will keep going on that. I wish climate change were not happening, but it is happening, and unfortunately, as long as we keep accelerating the rate at which we are putting greenhouse gases into the atmosphere, we in the Navy at least will need to continue to develop adaptation strategies and probably more aggressive adaptation strategies as the decades go on. I hope that is not true. I hope that either there will be some tremendous fix or we are missing a huge piece of the science, but until we see that,

we are going to have to continue to plan based on what we now know. So, it is great to hear about the studies that N86 is sponsoring with Naval Sea Systems Command. Those efforts will provide the next level of detail so that we can start influencing programs.

Let me mention three things about the Arctic. First, it is an ocean. I think everyone here understands that. That is why the United Nations Convention on the Law of the Sea is important. That is why the Bering Strait is important because, although the Arctic is an ocean, it is also essentially the world's biggest estuary. If you look down on the Arctic region, you see that there is a lot of water around Greenland through the Fram Strait down to Europe. On the opposite side, everything goes through the Bering Strait. By the middle of this century, it is likely that a large part of the Arctic will be relatively ice-free for 8–12 weeks each year. The big shippers tell me that is when they will get really interested in trans-Arctic routes. At that time, the Bering Strait could start taking on the characteristics of both the Strait of Malacca with its two-way trade and the Strait of Hormuz, with significant hydrocarbon resources coming out of the Arctic. I am not saying that this is going to happen, but I think it is plausible within the next 35 or 40 years. It is not that far off, and there are a lot of issues that we will need to deal with. What kinds of ships do we want? How does the Navy work with the Coast Guard? What role does the Arctic play in maritime domain awareness?

My third point about the Arctic is that we will not be able to operate there as if it were a vacuum. We will need partnerships and cooperative arrangements similar to those that we have at the middle latitudes. Admiral James Stavridis, the current Commander of the U.S. European Command, told me that he would like to see at least the European component of the Arctic as a zone of cooperation.

To close, I would like to again remind you that we humans are one of the most adaptable species on Earth. We can certainly deal with changes, but the faster those changes occur and the more unpredictable they are, the harder and harder it will be for mankind to adapt. So, as you pay attention to the science over the next several years, think about the rate of change and how that change is going to occur. Do not focus exclusively on whether the change is 1° or 3°. By themselves, those numbers do not mean a whole lot, but how we get there means an awful lot.