Researchers Establish Common Seasonal Patterns Among Bacterial Communities in Arctic Rivers

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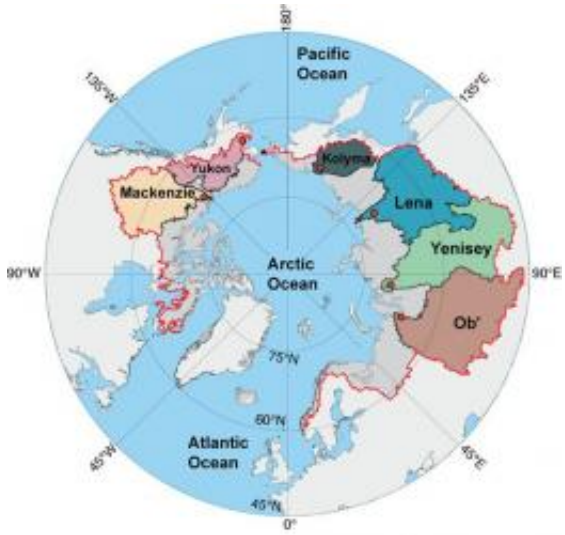

Courtesy Proceedings of the National Academy of Sciences, USA

(PhysOrg.com) -- New research on bacterial communities throughout six large Arctic river ecosystems reveals predictable temporal patterns, suggesting that scientists could use these communities as markers for monitoring climate change in the polar regions. The study, published this week in the *Proceedings of the National Academy of Sciences* Early Edition, shows that bacterial communities in the six rivers shifted synchronously over time, correlating with seasonal shifts in hydrology and biogeochemistry.

The research team documents these patterns through a three-year, circumpolar study of planktonic bacterial communities in the six largest rivers of the pan-arctic watershed: the Ob', Yenisey, Lena, Kolyma, Yukon, and Mackenzie Rivers.

"Our results demonstrate that synchrony, seasonality and annual reassembly in planktonic bacterial communities occur on global scales," said lead author Dr. Byron Crump of the University of Maryland Center for Environmental Science Horn Point Laboratory. "Since bacterial communities in big arctic rivers shift predictably with circumpolar seasonal changes in environmental conditions, they may serve as sensitive indicators of climate change in the Arctic."

"The six river systems studied are comparable in size to the Mississippi River in the United States," said coauthor Rainer Amon of Texas A&M University at Galveston. "One of the things we learned is the bacteria communities in all six of them seem to be very similar. There are many questions still to be answered, such as how these bacteria communities might respond to a continued increase in temperature."

This synchrony indicates that hemisphere-scale variation in seasonal climate sets the pace of variation in microbial diversity. Moreover, these seasonal communities reassembled each year in all six rivers, suggesting a long-term, predictable succession in the composition of big river bacterial communities.

Divergence from this synchronous pattern may provide an early signal of climate change in some regions of the Arctic, and may result in changes to river microbial communities and the biogeochemical transformations that they carry out.

Data for this study was collected through the PARTNERS program, a collaboration among scientists from the U.S., Canada and Russia

examining the largest rivers of the pan-arctic watershed. By including five of the world's 25 largest rivers in the study, the results provide a unique perspective on global-scale patterns in bacterial diversity.

More information: The article, “Circumpolar synchrony in big river bacterioplankton,” appears in the *PNAS* Early Edition the week of November 23, 2009 and is authored by Drs. Byron Crump, Bruce Peterson, Peter Raymond, Rainer Amon, Amanda Rinehart, James W. McClelland and R. Max Holmes.

Source: University of Maryland (news : web)