The Science, Technology, Engineering, and Mathematics Education Institute (STEM Ed), the Climate System Research Center (CSRC), and additional scientists and engineers involved in polar research at the University of Massachusetts Amherst (UMass) propose to create IPY STEM Polar Connections: A three region initiative to integrate the study of Polar Regions and activities associated with the International Polar Year into the middle and high school curriculum..

STEM Ed has been a leader in teacher professional development in STEM fields since 1986. The CSRC brings together UMass graduate students, post-docs, research scientists, and faculty interested in different aspects of the climate system. IPY STEM Polar Connections will build on the experience of STEM Ed, the CSRC, and additional science and engineering faculty at UMass as it promotes the teaching of polar science in the New England, Mid-Atlantic, and Great Lakes Regions. .

IPY STEM Polar Connections is a curriculum development and professional development program. It includes residential summer institutes with academic year online communication for in-service teachers who are involved in professional development of their colleagues. During each summer institute, teachers will be introduced to sets of STEM Polar Connections Modules that will emphasize the process of scientific inquiry and will explore a variety of proven techniques for effective teaching, including inquiry based teaching, cooperative learning, and methods for formative assessment of student learning. The summer institutes at UMass will be designed to advance the knowledge that STEM teachers have of the characteristics of and processes that occur in Polar Regions so that they can effectively field test curriculum modules and disseminate final versions of the modules at the local, regional, and national level.

The activities of the STEM Polar Connections Modules will be aligned with the National Science Education Standards and with state standards for each state in the three participating regions and will emphasize the value of advancing society's understanding of the nature and possible causes of changes in the physical environment and ecosystems of the Polar Regions and the relationship of those changes with other physical environments and ecosystems. The interdisciplinary activities of STEM Polar Connections Modules will be also designed to acquaint middle and high school students with the many avenues of polar research, the extent of international collaborations in polar research, and opportunities they will have to participate in that research. The modules will utilize several formats in order to maximize the range of middle and high school STEM programs into which the modules can effectively be integrated.

Teachers will be actively engaged in the process of producing final versions of the STEM Polar Connections Modules initially drafted by the STEM Polar Connections staff. A strong educational research component will assess the effectiveness of providing local and regional contexts for conducting research that results in an understanding of Earth's global systems that are influenced by and interact with the physical environments and ecosystems of Polar Regions.

The Intellectual Merit of STEM Polar Connections includes the opportunities it affords teachers and their students to conduct authentic environmental research in association with the staff and faculty at UMass who are conducting polar research in Polar Regions and the access teachers and their students gain to international teams of researchers in Polar Regions. The Broader Impact is that the materials developed and the dissemination program will have the potential to improve science education for large numbers

of students in many areas. The Relevance to the IPY is that teachers and their students will gain an understanding of the importance of Polar Regions for everyone.