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UW institute to get as much as \$100 million to study atmosphere, ocean

The National Oceanic and Atmospheric Administration has selected the University of Washington as a key partner for expanded, in-depth study of some of the most pressing environmental challenges involving the oceans and the atmosphere.

The Joint Institute for the Study of the Atmosphere and Ocean, part of the UW's new College of the Environment, potentially will receive \$100 million, as much as \$20 million per year for five years, with an option to extend the partnership for another five years.

The joint institute is among the five largest of some 20 NOAA-funded cooperative institutes nationwide. The award, the result of a secret competitive process, extends a partnership that has been in place since 1977 and supports 120 UW science and staff positions in Seattle, as well as associated costs that include instrument development and time on research vessels around the world.

The region stands to benefit from the continued strong partnership between the UW and NOAA's marine, fisheries and environmental laboratories, said Dennis Hartmann, interim dean of the College of the Environment.

"The partnership provides benefits to the region, both in terms of jobs and in the expertise we bring to our critical issues," Hartmann said. "We will build on our long history of cooperation to provide excellent training and research regarding our atmospheric and marine environments, and their risks and resources."

The research partnership will focus on 10 core areas critically important to the long-term health of the planet, said Thomas Ackerman, director of the joint institute. Those areas are climate and its impacts; polar regions; atmospheric particles called aerosols; environmental chemistry; ocean acidification; geological and other processes that occur on the seafloor; marine ecosystems; protecting and restoring marine resources; tsunami observations and modeling; and

ocean and coastal observations.

Two of those areas – ocean acidification and protecting and restoring marine resources – are new focal points for the institute, but they reflect work already going on at the UW and issues to which NOAA is devoting more attention, Ackerman said. He added that the ongoing partnership with NOAA helps extend the institute’s history of environmental research in the public interest.

“We need to be more deeply engaged in the issues of Puget Sound, such as marine areas where there is no oxygen or low oxygen, and we need to work more closely with the marine reserves out in the north Pacific,” he said.

“This new award will expand our ability to carry out research on issues of vital importance to the citizens of the Pacific Northwest and the nation.”

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Highlights of specific areas of research to be carried out by the Joint Institute for the Study of the Atmosphere and Ocean

- **Climate Research and Impacts:** One key research area is climate variability in the Pacific Northwest, including the effect of climate change on water for irrigation, electrical generation and fish.
- **Polar Research:** The Arctic is a major research area for the joint institute, and includes a focus on declines in sea ice related to climate change and associated impacts on marine ecosystems, including mammals and fish.
- **Aerosol Research:** A particular current focus is the effects of black carbon aerosol or soot, on snow. Burning fossil fuels release soot into the atmosphere, some of which returns to Earth in snowfall. Additional soot in the snow makes the snow melt faster, decreasing overall reflectivity (and thereby increasing temperature) of Earth. The goal is to understand past changes in soot content and its climate impact and then predict future changes in soot content and impact.
- **Environmental Chemistry:** This broad research area includes a major focus on

understanding the role the ocean plays in Earth's carbon cycle. Currently, approximately half of the carbon dioxide emitted by burning fossil fuels is absorbed in the surface waters of the Earth's oceans. The question is whether the oceans will continue to take up this carbon dioxide and how it is mixed into the deep ocean

- **Ocean Acidification:** The increased carbon dioxide mixed into the surface waters increases ocean acidity. The goal is to develop a global ocean monitoring network to understand the effects of ocean acidification on the biology of the ocean. Planned research includes the construction of mesocosms – tanks built in the ocean to test effects of acidity on ocean organisms under real-world conditions.
- **Seafloor Processes:** This deep-ocean research, carried out in one of the most remote frontiers on Earth, locates, characterizes and quantifies underwater venting of heat and gases from the Earth's core. The ocean environment around these seafloor volcanoes can also be used to study impacts of local ocean acidification. The joint institute has one of the world's leading research groups investigating underwater vents and the otherworldly creatures that call these hostile environments home.
- **Marine Ecosystems:** A complex set of mechanisms links the climate to ocean properties and ultimately ecosystem structure and function. Fisheries are important to the Pacific Northwest; research areas include how climate change might affect Pacific Northwest salmon, as well as walleye pollock, crab and other commercially valuable species in the Bering Sea and Gulf of Alaska.
- **Protection and Restoration of Marine Resources:** This new research area will focus on conditions in Puget Sound and how the Sound may be affected by climate change, since precipitation changes will change patterns of runoff and fresh water inflow. Possible effects include an increased frequency of harmful algal blooms and larger areas with anoxic (oxygen-less) conditions.
- **Tsunami Observations and Modeling:** The joint institute is a world leader in modeling and forecasting tsunamis, as well as deploying an observation network of buoys to gauge wave height and motion. The program also works to develop effective tsunami warning systems, and trains other nations in tsunami science and preparedness.
- **Ocean and Coastal Observations:** This research involves deploying moored buoys in the tropical oceans to monitor El Niño and other phenomena, and using observations and models to assess and improve global ocean observing system. Efforts include measuring air-sea exchanges of energy and moisture in real time and communicating these to the world research community, and then analyzing and modeling the effects of changes in the tropical oceans on global climate.