



FORECASTING ANTARCTIC WEATHER

NSF NCAR'S "DERECHO" SUPERCOMPUTER ENABLES CRITICAL TWICE-DAILY FORECASTS

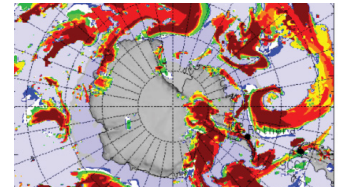
About the Customer

The U.S. National Science Foundation National Center for Atmospheric Research (NSF NCAR) is a world-class research center leading, promoting, and facilitating innovation in the atmospheric and Earth systems sciences. NSF NCAR provides the science community with state-of-the-art resources, including supercomputers, sophisticated computer models, and extensive data sets. Its HPE Cray EX "Derecho" supercomputer — named after a powerful windstorm by an eighth-grade contest winner in Wyoming, where Derecho is located — delivers high-performance computing (HPC) to scientists and researchers at universities across the globe.



The Derecho supercomputer will provide the necessary resources for our scientists to continue expanding their research in the atmospheric and geospatial sciences. To provide this capability, the new supercomputer is designed for highly energy-efficient operations which can be monitored by using Altair® PBS Professional® for collecting and reporting on job energy usage.

Irfan Elahi, HPC Division
Director, NSF NCAR



Their Challenge

At Antarctica's **McMurdo Station**, **extreme weather is a given**. Average temperatures there hover around -1 F (-18 C), but have dipped as low as -58 F (-50 C). Antarctica is the coldest and windiest of Earth's continents — it's also the driest, technically a desert. Snowfall and limited visibility is a constant factor, and winds can whip to 50 mph and beyond. The station hosts a crew of more than 1,000 people at peak season, and teams conduct research in aeronomy, astrophysics and geospace sciences, biology and ecosystems, geology and geophysics, glaciology, geomorphology, ice cores, and ocean and climate systems. It's a scientific gold mine despite its location on the planet's most inhospitable continent. **Accurate weather reports in this harsh Antarctic climate are crucial to ensure that travel is safe and researchers and crew aren't surprised by blizzards or other extreme phenomena.**

Our Solution

NSF NCAR supercomputers, with workload orchestration by Altair PBS® Professional®, provide McMurdo Station and the U.S. Antarctic Program with the twice-daily reports they rely on to stay safe in the harsh polar climate. The Antarctic Mesoscale Prediction System (AMPS) that makes them possible is an experimental, real-time numerical weather prediction capability that provides support for Antarctic science and international Antarctic efforts. **The 19.87-petaflops Derecho system at the NSF NCAR Wyoming Supercomputing Center is the newest powerhouse system behind the complex calculations that produce these critical AMPS reports.** Weather and climate prediction involves an ever-changing host of complex variables, and modeling the Earth's weather and climate is a massive, important challenge that requires powerful HPC systems and software that can handle the most demanding workloads. The fast, powerful PBS Professional workload manager **improves productivity, optimizes utilization and efficiency, and simplifies administration** for clusters, clouds, and supercomputers, including Top500 systems like Derecho. NSF NCAR chose Altair in part because of its long history of providing leading institutions with technology that ensures that climate modeling and simulation workloads run quickly and efficiently and maximize HPC resources.

Results

NSF NCAR's work with McMurdo Station demonstrates how **HPC's impact on weather and climate not only affects our planet on a global scale, but also keeps Antarctic researchers and crew safe, enabling critical science.** NSF NCAR's innovations help us better understand the southern pole and beyond, deepening our knowledge about our ever-changing climate and its impact on people, animals, and ecosystems across the globe. Altair and NSF NCAR continue to collaborate on projects including enabling AMPS forecasting in the cloud.

The crew at Antarctica's McMurdo Station depends on NSF NCAR's twice-daily weather reports to stay safe in the harsh polar climate.