ENERGY &
ENVIRONMENT

Manage wildlife habitat. Design efficient engines. Improve air quality. The solutions to significant, interrelated global energy and environment sustainability issues such as these significantly increase demand for computational modeling, simulation and analysis. The Ohio Supercomputer Center supplies the researchers working towards these important outcomes – sampled on the following pages – with the resources they need to power their data-rich projects.

ANIMAL MOVEMENT

Bohrer studies climatic impacts for habitat management

Animals are in constant movement across the surface of the earth, and climate affects their movements, especially for migrating and flying animals. Understanding animal movement is pivotal to predicting and ensuring the survival of populations in the face of rapid global changes to climate, land-use and habitats. Understanding the mechanisms of animal movement can improve forecasting for the future needs of endangered species and can allow more effective planning for habitat management in national wildlife refuges.

As part of a NASA-funded project, an Ohio State University research team led by Gil Bohrer, Ph.D., assistant professor of civil, environmental and geodetic engineering, has been working with Ohio Supercomputer Center staff to develop an online portal to effectively tie animal tracking data to a variety of weather and land surface data. To ensure relevance and effectiveness, the portal and its toolboxes are being designed in collaboration with wildlife biologists from the U.S. Fish and Wildlife Service, National Parks Service and Geological Survey.

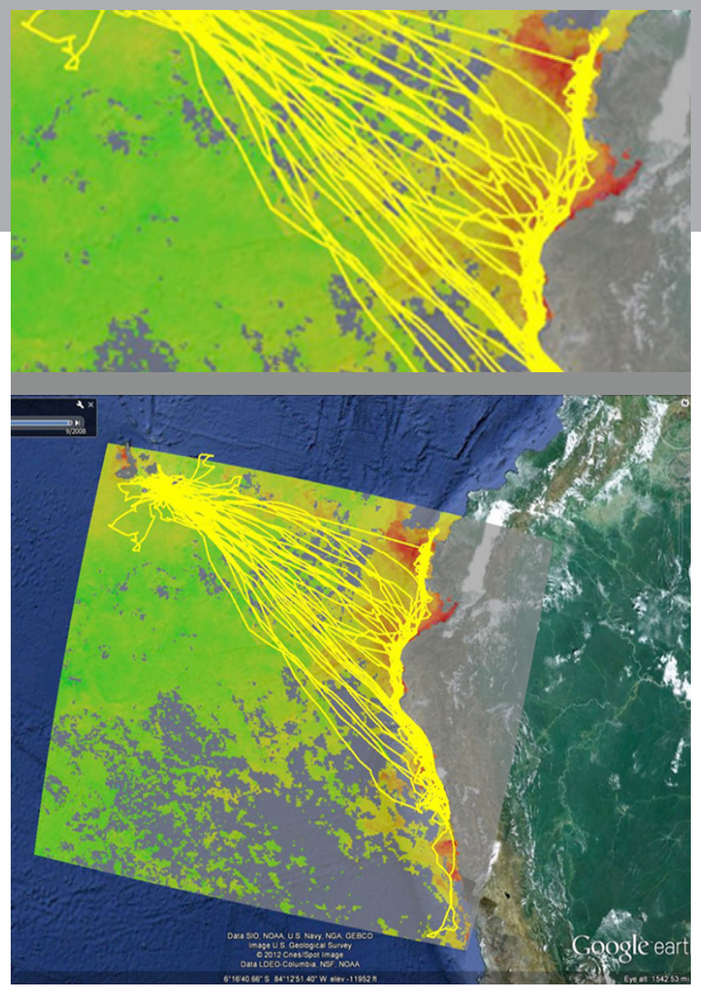
The infrastructure developments will improve and expand Movebank.org, an existing free and sustainable online portal, run by the Max Planck Institute of Ornithology in Germany, which currently houses more than 51 million data points from 185 species archived by hundreds of registered users.

The environmental data will be obtained from satellite remote sensing products, as well as from high-resolution weather reanalysis projects. Wildlife migrations are presently tracked using satellite-based systems such as GPS.

"The size and format of several of the datasets form a particular challenge," Bohrer said. "Processing all the data over the network would be unsustainably slow. Additionally, users must figure out the format and processing of each dataset."

An efficient server process that analyzes and standardizes the data will need to either download high-resolution global snap-shots for the periods of the processed study or use locally stored data. Mirroring all of NASA's earth-surface moderate-resolution data so that processing can be done locally would require up to 100 terabytes of storage. Adding other datasets would double that requirement.

Bohrer is mirroring subsets of environmental data limited only to the variables and time periods most commonly needed, with an expected total storage size of 25 terabytes. He is collaborating with OSC staff to develop a server process that will receive requests from Movebank.org and process the environmental data locally, returning the compact, processed results over the network.



Albatross tracks from their nesting site in the Galapagos Islands to feeding grounds near the coast of Peru. The map is overlaid with satellite data of Ocean Net Primary Productivity (NPP), which can be derived from the ocean color (greener means more productive).

Project lead: Gil Bohrer, The Ohio State University
Research title: Discovering relationships between climate and animal movement with new tools for linking movement tracks with remote-sensing land-surface data
Funding source: National Aeronautics and Space Administration
Web site: http://bit.ly/OSC-RR-Bohrer