



The NASA Earth Exchange (NEX)

Cindy Schmidt, BAERI/NASA Ames Research Center

Ramakrishna Nemani (PI), NASA Ames Research Center

Jennifer Dungan, Piyush Mehrotra, Andrew Michaelis,, Ryan Spaulding, Glenn Deardorff, Sangram Ganguly, Jeff Becker, Marc Cotnoir, Forrest Melton

May 23, 2017



What is the NEX Capability?



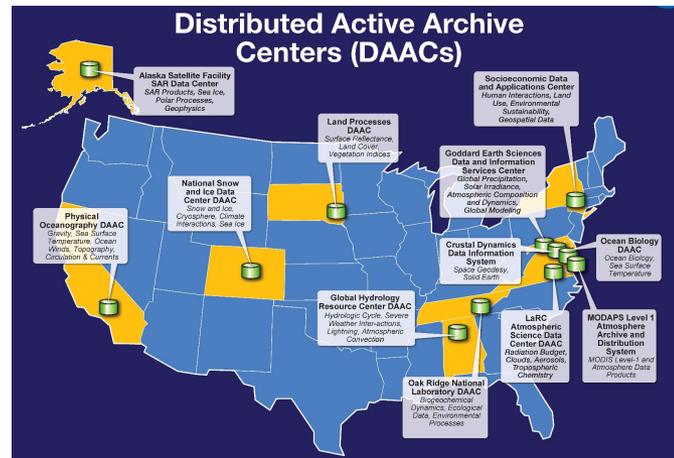
- **Reduce the amount of time investigators spend moving and manipulating large data sets**
- **Stage these large datasets alongside High Performance Computing to allow analysis of large regional, continental, or global analyses**
- **Share common codes, intermediate results and workflows**



NEX Infrastructure



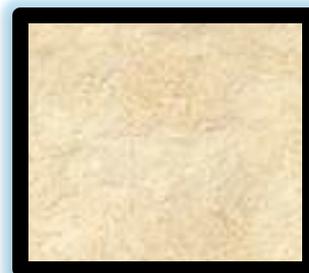
Web-based collaboration portal



Data pool – 2PB+ from DAACs and other sources



Computing at NAS (High-performance computing, GPUs, primarily on Pleiades)



Computing on the “NEX Sandbox” (a 96-core machine for prototyping)



The cloud at Amazon Web Services (OpenNEX)



Who can use NEX?



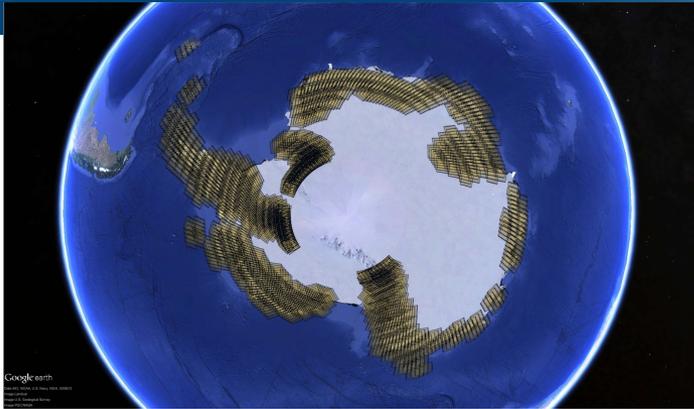
- The NEX Portal is a public website
- NEX Portal membership available to the NASA Earth Science community
- NAS resources only for NASA-supported teams
- OpenNEX uses Amazon Web Services and is open to the world (but not free)



Welcome to the NASA Earth Exchange (NEX)

NEX is a platform for scientific collaboration, knowledge sharing and research for the Earth science

Lynch Lab's NEX Experience



Objective: search for undiscovered seabird nesting areas over the entire continent of Antarctica

- Seabirds nest on isolated nunataks up to 250 km from shore
- At-sea population estimates of breeding pairs are much higher—maybe by a factor of 10x—than populations of known breeding areas
- Very likely that many breeding areas remain to be discovered

Search code written in Python and ENVI+IDL

- Python parallelizes the processing on a scene-by-scene basis
- Heritage ENVI code actually performs the analysis

Data sets include Landsat and the ASTER DEM

- 4000 Landsat-8 OLI scenes = ~4TB = ~150 Gpixels
- Data acquired and hosted by NEX staff

Processing on the NEX Pleiades supercomputer

- Used 200 nodes with 8 CPUs per node (20 scenes/node)
- Processed the entire continent in ~2 hours of wall time
- Results are being reviewed

