

*27th Annual Conference of the
American Evaluation Association
October 2013*

Evolution of Virtual Research Collaborations

Arsev Umur Aydinoglu, PhD

NASA Postdoctoral Program Fellow
NASA Astrobiology Institute

Suzie Allard, PhD

Associate Professor
School of Information Sciences
University of Tennessee

Chad Mitchell

Graduate Student
School of Information Sciences
University of Tennessee



Agenda

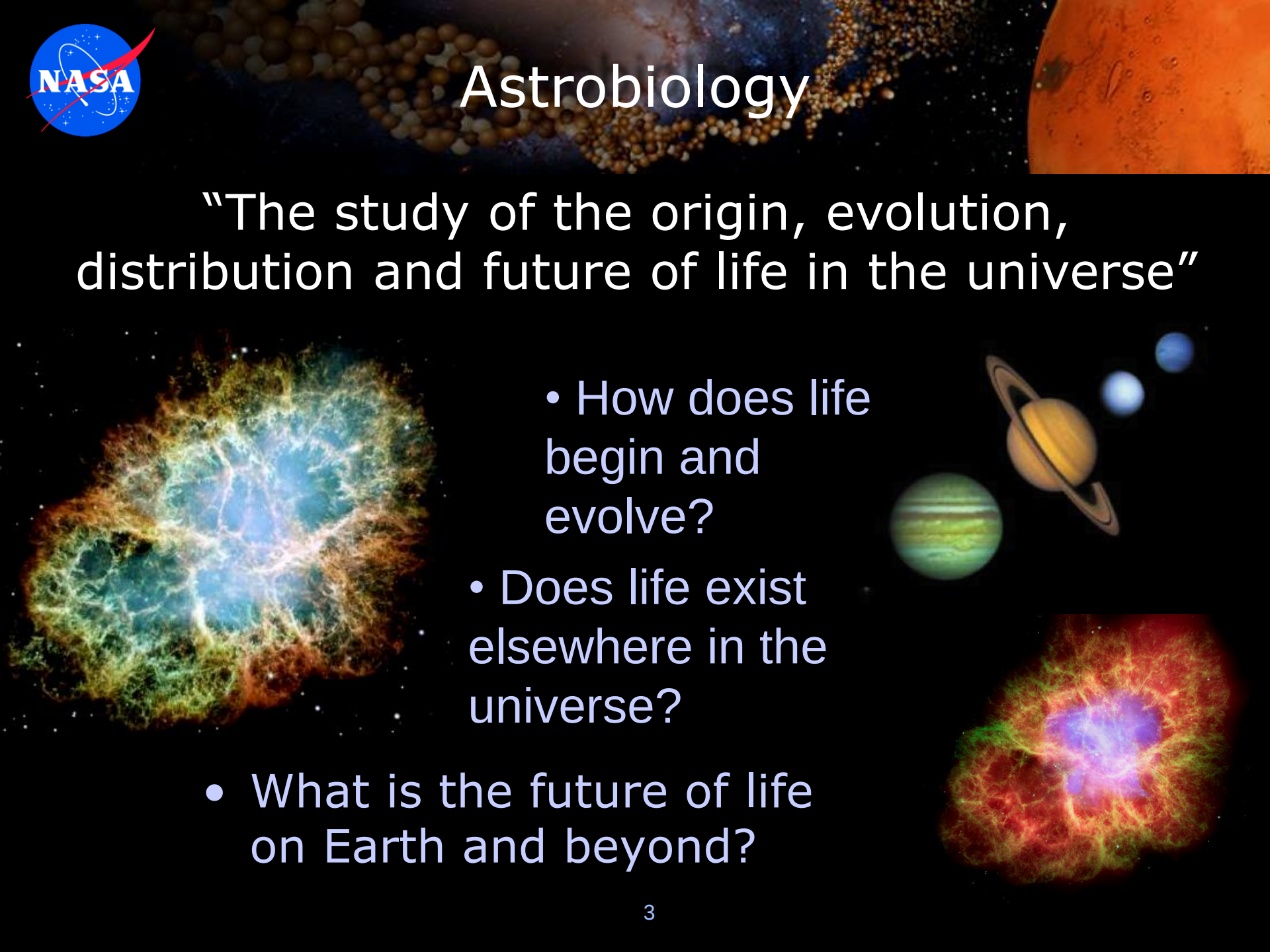
- Background
 - NASA Astrobiology Institute
- Methodology
- Preliminary Findings
- Discussion



Astrobiology

“The study of the origin, evolution, distribution and future of life in the universe”

- How does life begin and evolve?
- Does life exist elsewhere in the universe?
- What is the future of life on Earth and beyond?





COLLABORATION



Evolution

Geography

Earth Science

Geology

Physics

Oceanography

Anthropology

Paleontology

Astronomy

Biotechnology

COLLABORATION

Planetary Sciences

Mineralogy

Chemistry

Biology

Genetics

Microbiology

Planetary Science

Philosophy

Virology



Microbial Ecology

Physical Science

Molecular Biophysics

Infrared Astronomy

Earth Science

Materials Science

Marine Chemistry

Geophysical Sciences

Geomicrobiology

Environmental Fluid Mechanics

Computational Science & Engineering

Solid State Physics

Evolution

Molecular Biophysics

Soil Science

Soil Chemistry

Geography

Earth Science

Genetics

Applied Mathematics

Inorganic Chemistry

Geology

Meteorology

Physics

Remote Sensing

Anthropology

Philosophy

Isotope Geochemistry

Oceanography

Astrophysics

Paleontology

Astronomy

Biotechnology

Bioinformatics

Marine Biogeochemistry

Volcanology

Geochemistry

COLLABORATION

Zoology

Astrochemistry

Ecology

Planetary Sciences

Theoretical Astrophysics

Mineralogy

Astrobiology

Chemistry

Life Sciences

Biology

Marine Biology

Genetics

Paleobiology

Microbiology

Theoretical Physics

Molecular Biology

Biometeorology

Planetary Science

Virology

Philosophy

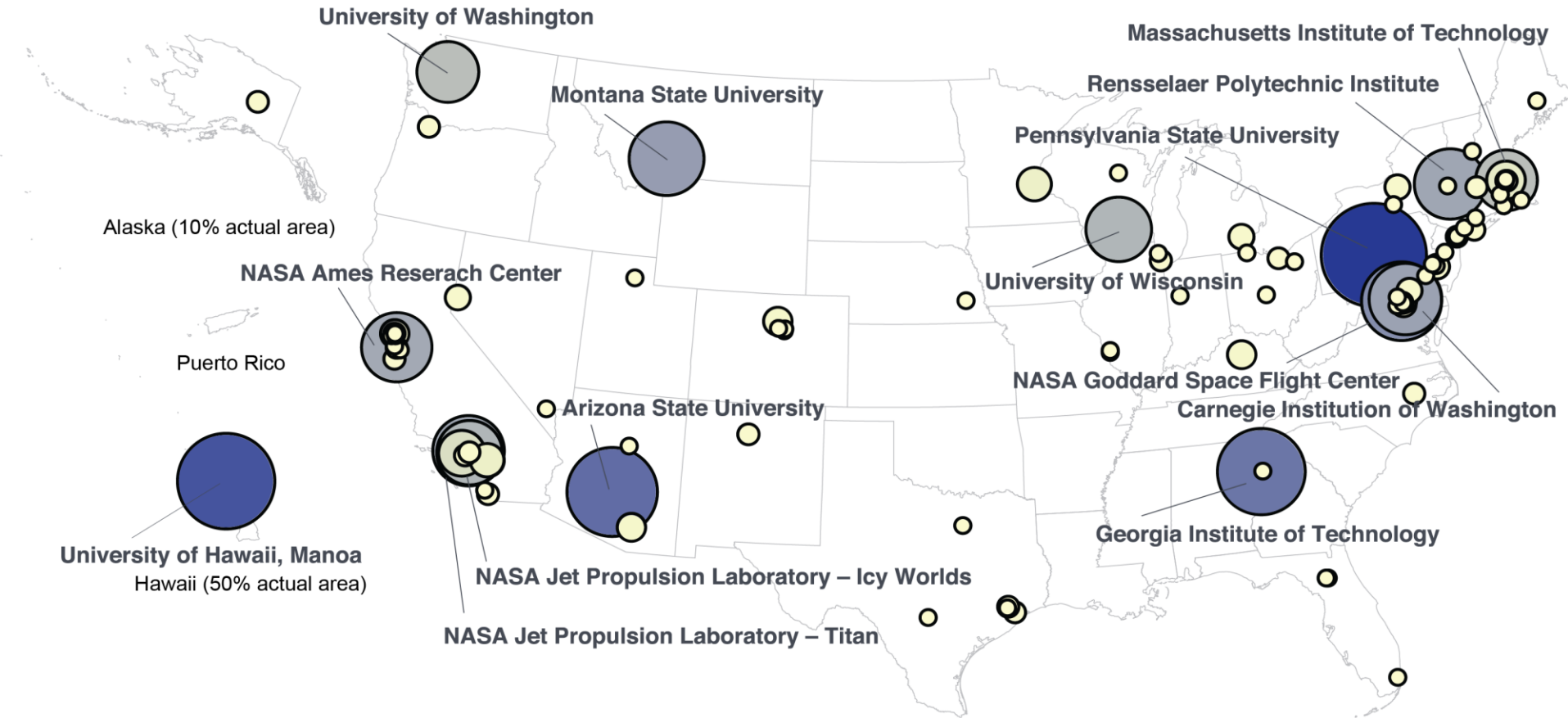
Artificial Intelligence

Astrogeophysics

Organic Chemistry

Experimental petrolo

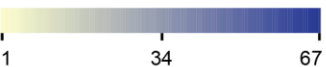
NAI Network for 2012 (only the U.S.)



Legend

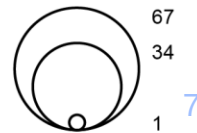
Interior Color (Linear)

of researchers



Area (Linear)

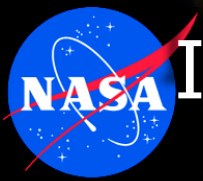
of researchers



CNS (cns.jhu.edu)

How to Read this Map

This *proportional symbol map* shows 52 U.S. states and other jurisdictions using the Albers equal-area conic projection with Alaska, Puerto Rico, and Hawaii inset. Each dataset record is represented by a circle centered at its geolocation. The area, interior color, and exterior color of each circle may represent numeric attribute values. Minimum and maximum data values are given in the legend.



Interdisciplinary Collaborative Practices

The assessment of the effectiveness of interdisciplinary virtual research teams

- Communication behaviors
- Data & Information behaviors
- Interdisciplinary collaboration
- Institutional identity

Methodology

Online Surveys

- Data Sharing
- Communication behaviors

Network Analysis

- Projects
- Publications

Observations

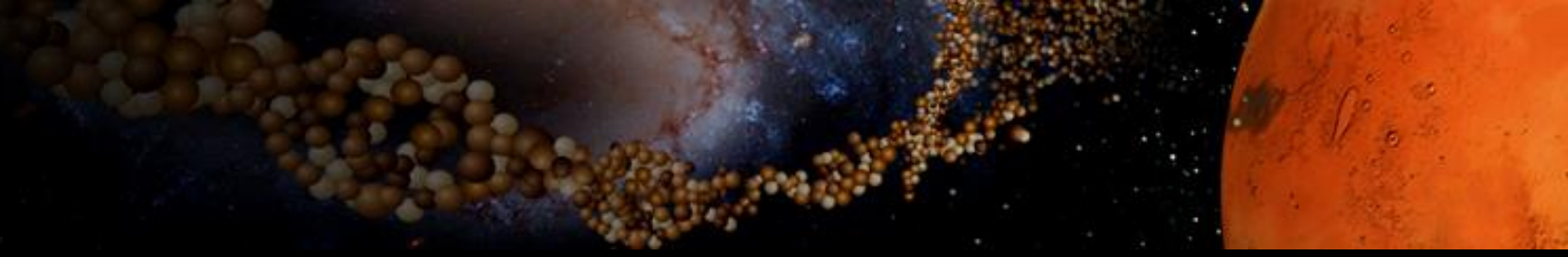
- Meetings, retreats, conferences, workshops, etc.

Bibliometrics

- ~5000 pubs

Semi-structured interviews

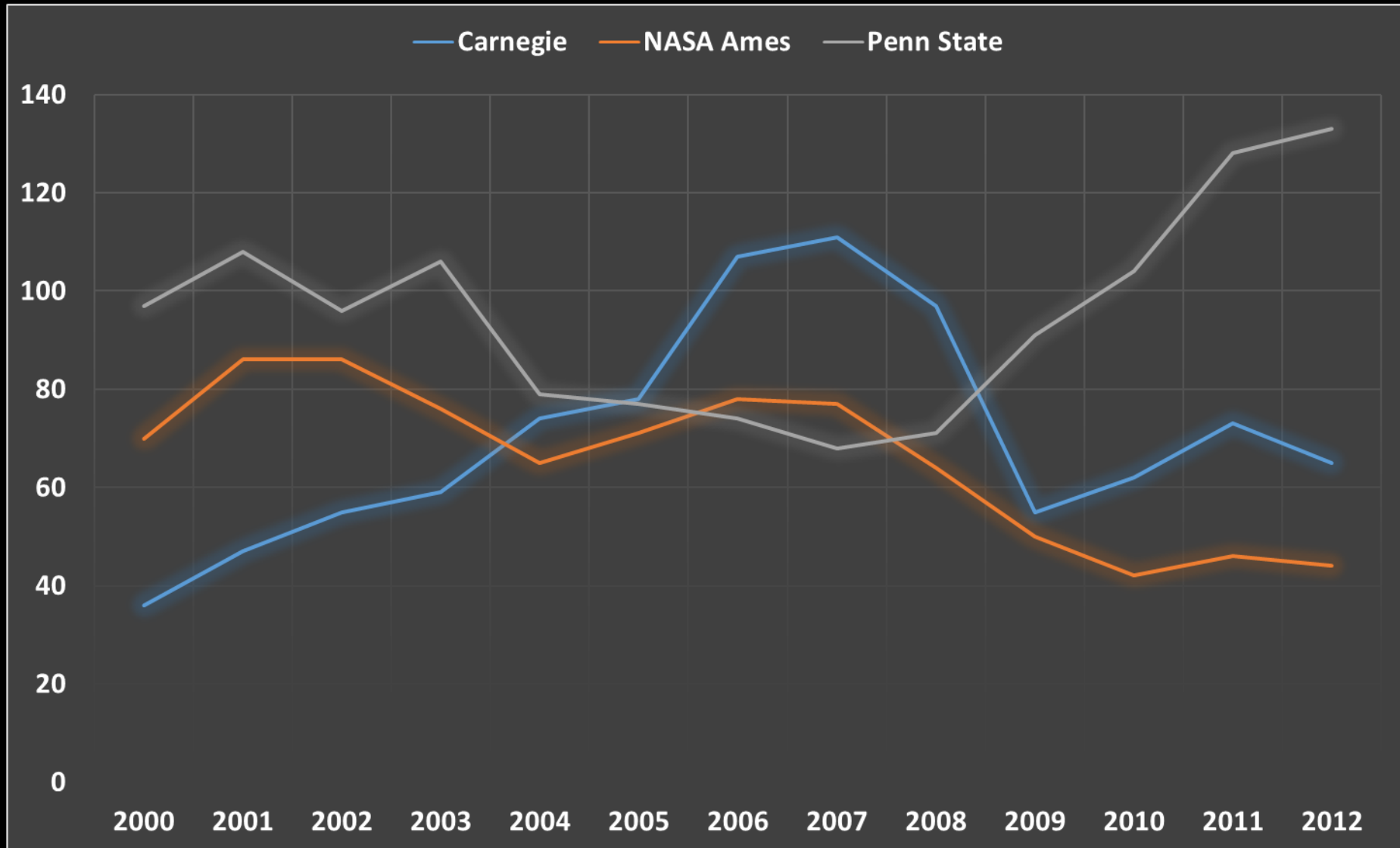
- 150 interviews

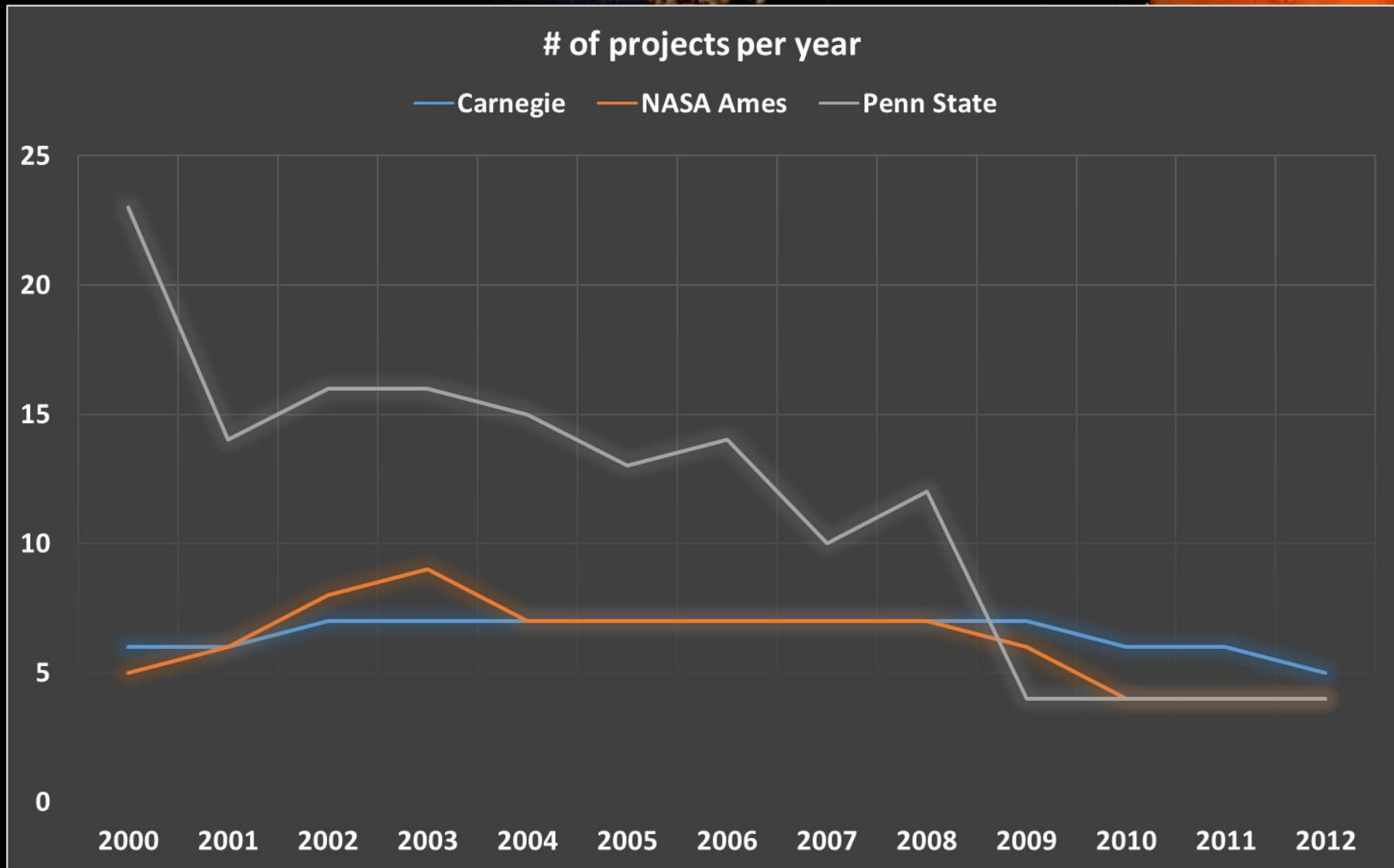


	Carnegie Institute of Washington	NASA Ames Research Center	Pennsylvania State University
Type	Research	Government	Academic
Population	1/3 postdoc	No student	1/3 grad student
Size (as of 2012)	Medium (75)	Small (44)	Big (133)
PI	Changed	Same	Changed
#of projects per year	6.5	6.2	11.4
Topic	Generic	Generic	Biosignatures
Mission involvement	No	Yes	No



Population







Disciplinary Diversity

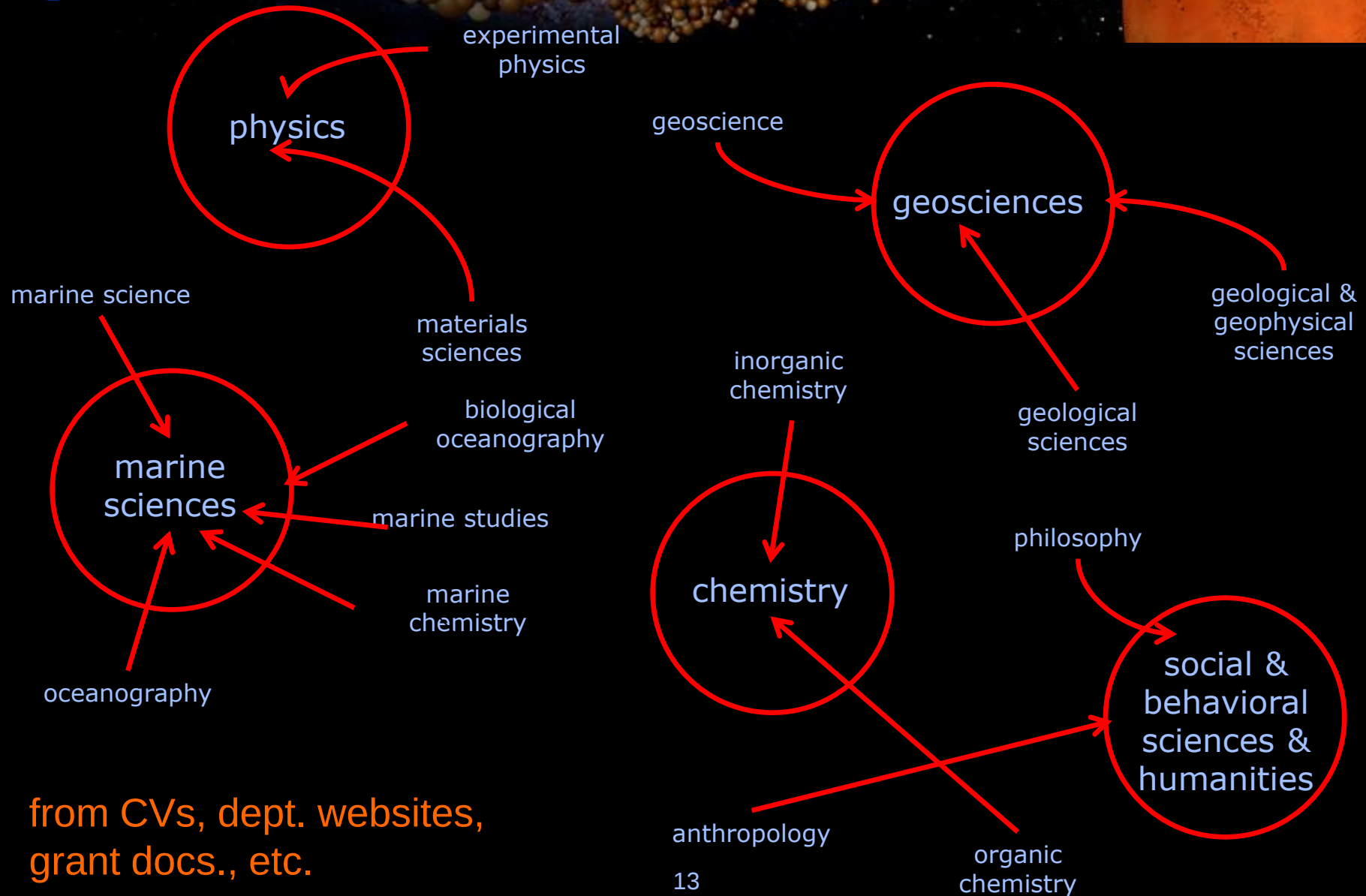
Shannon's Entropy

$$H = - \sum_{i=1}^R p_i \log p_i$$

p_i is the proportion of individuals belonging to the i th species in the dataset of interest.

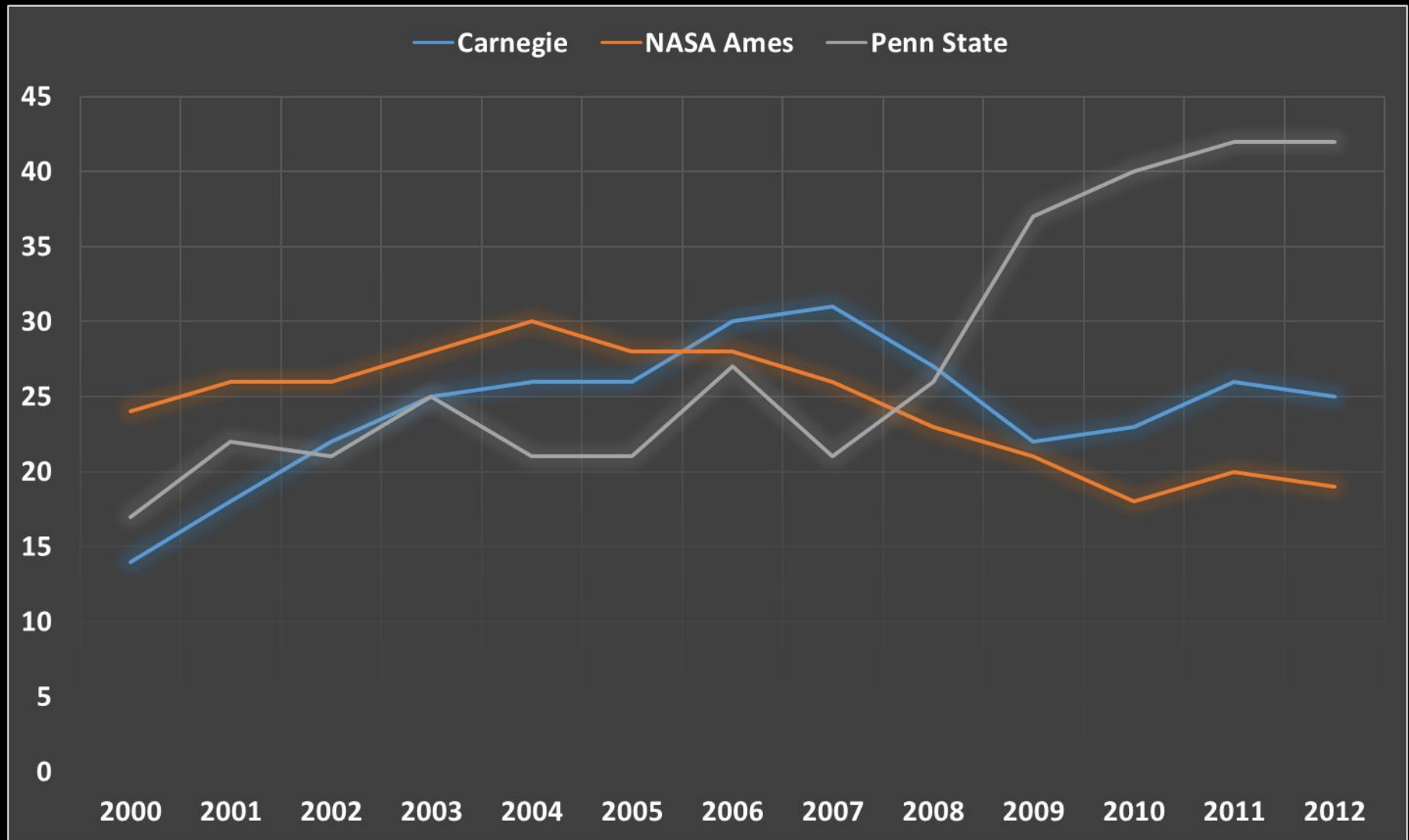


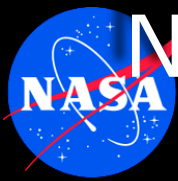
Grouping Disciplines (representation)



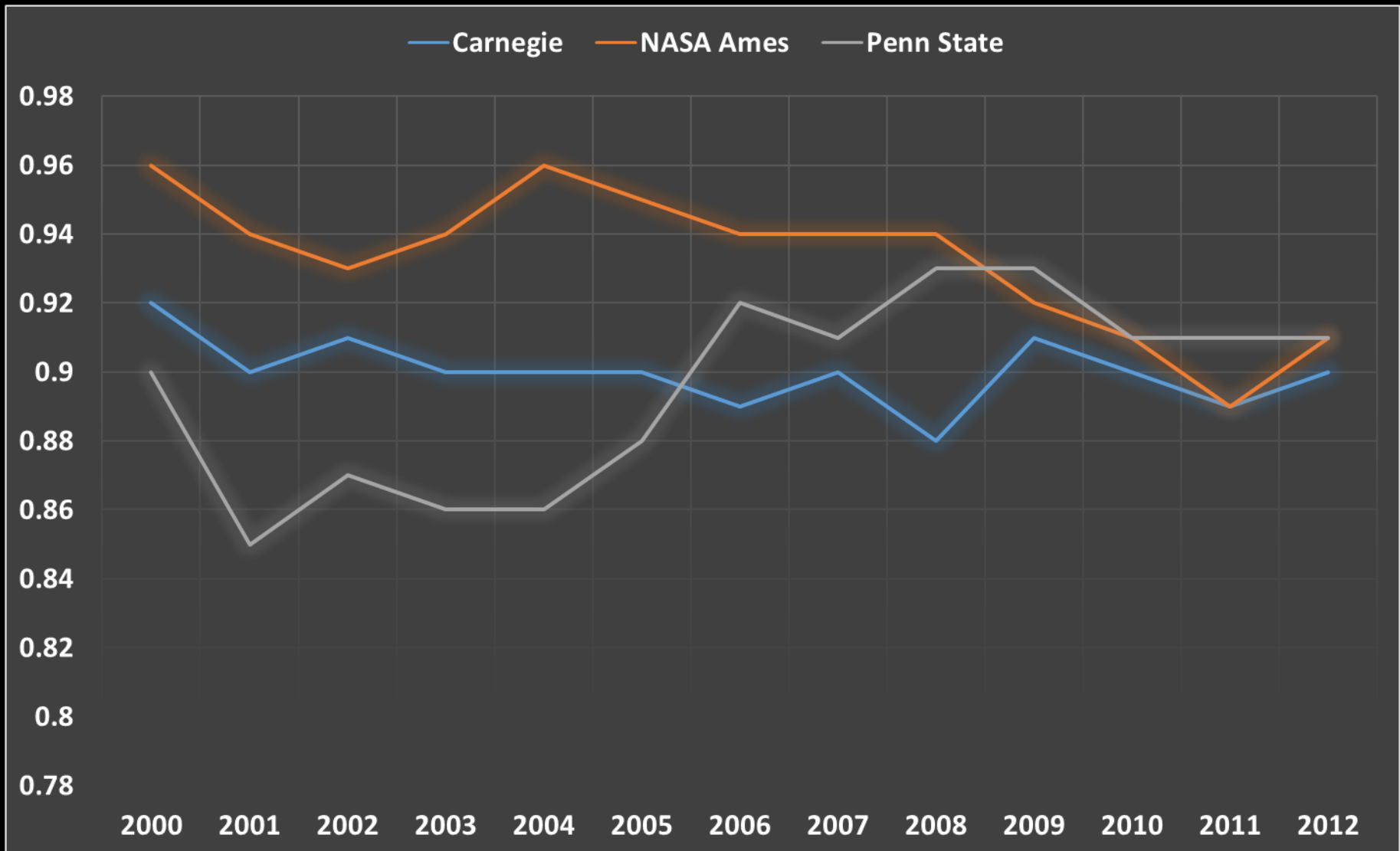


Richness



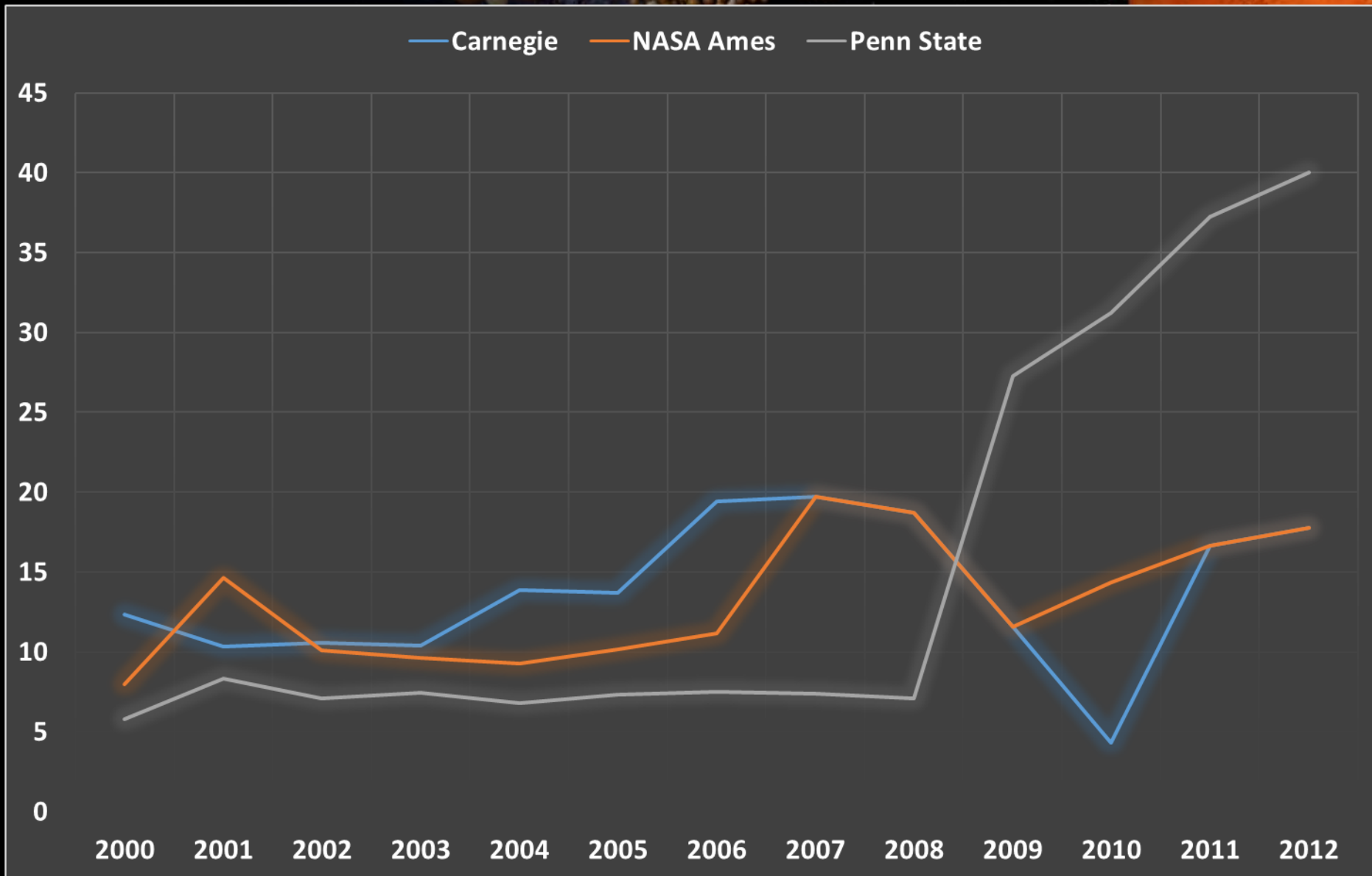


Normalized Shannon's Entropy based on team members' Ph.D. degrees



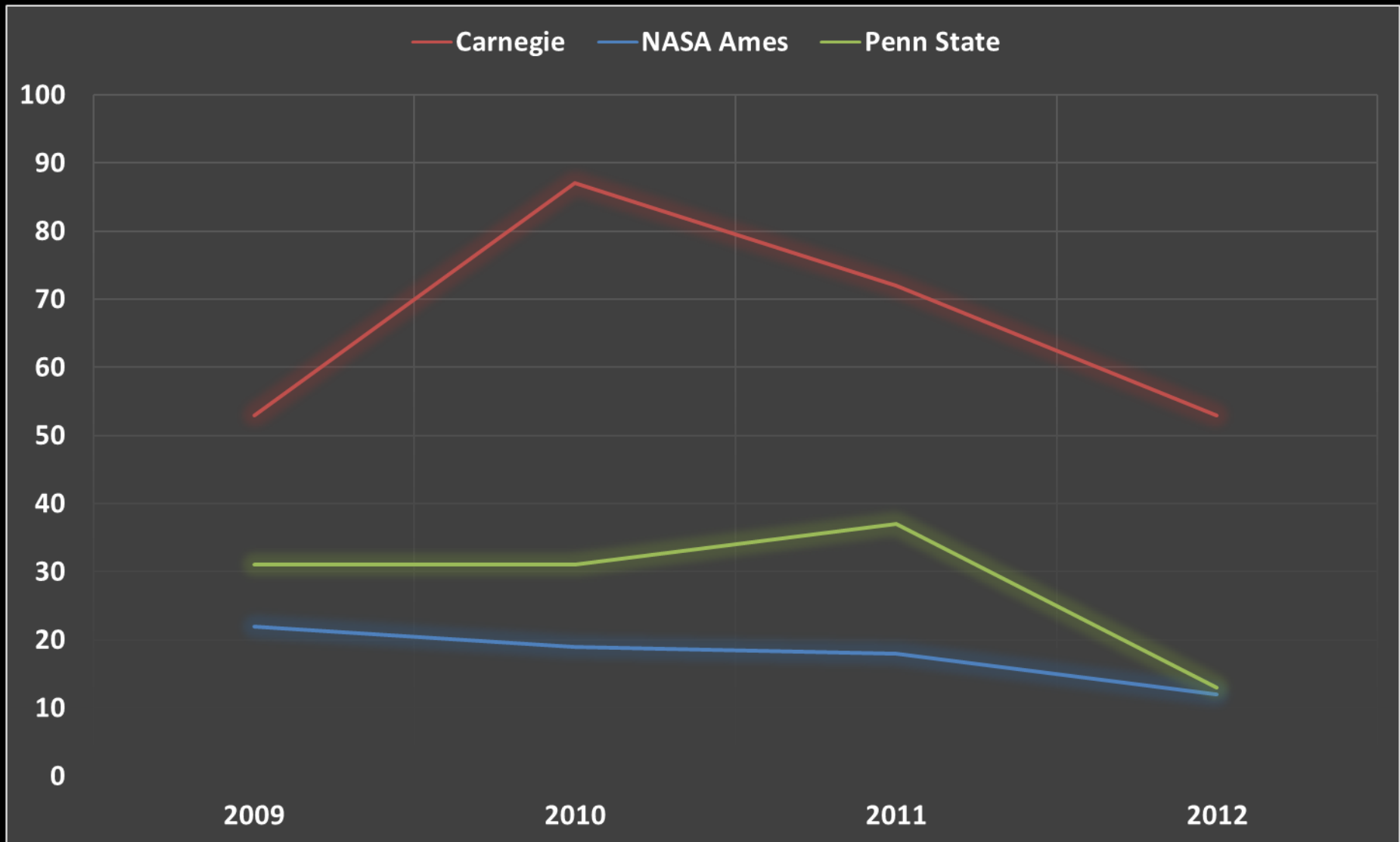


Average project team size





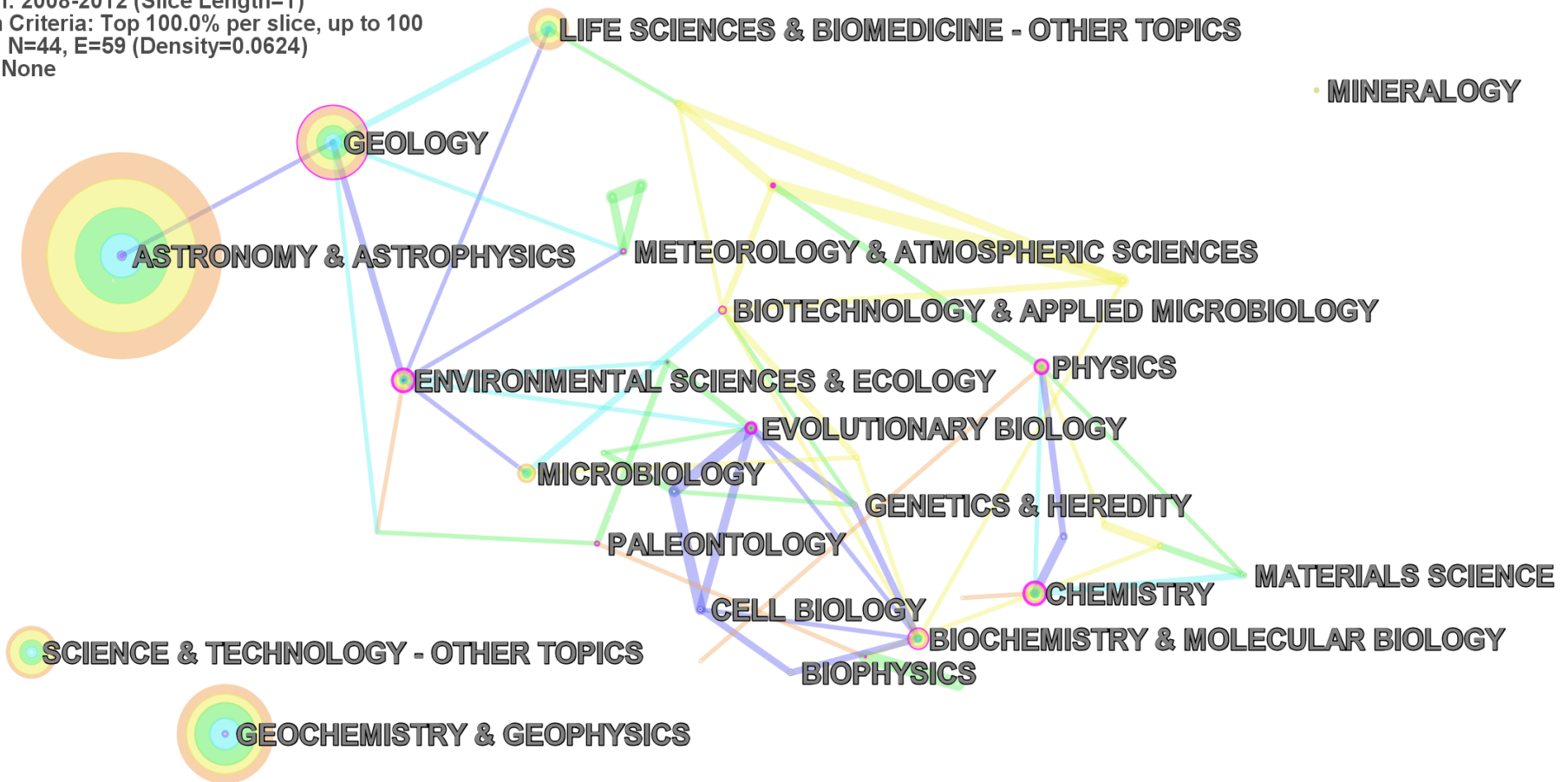
Publications 2008 - 2012





Interdisciplinarity based on 2008-2012 publications (WoS categories)

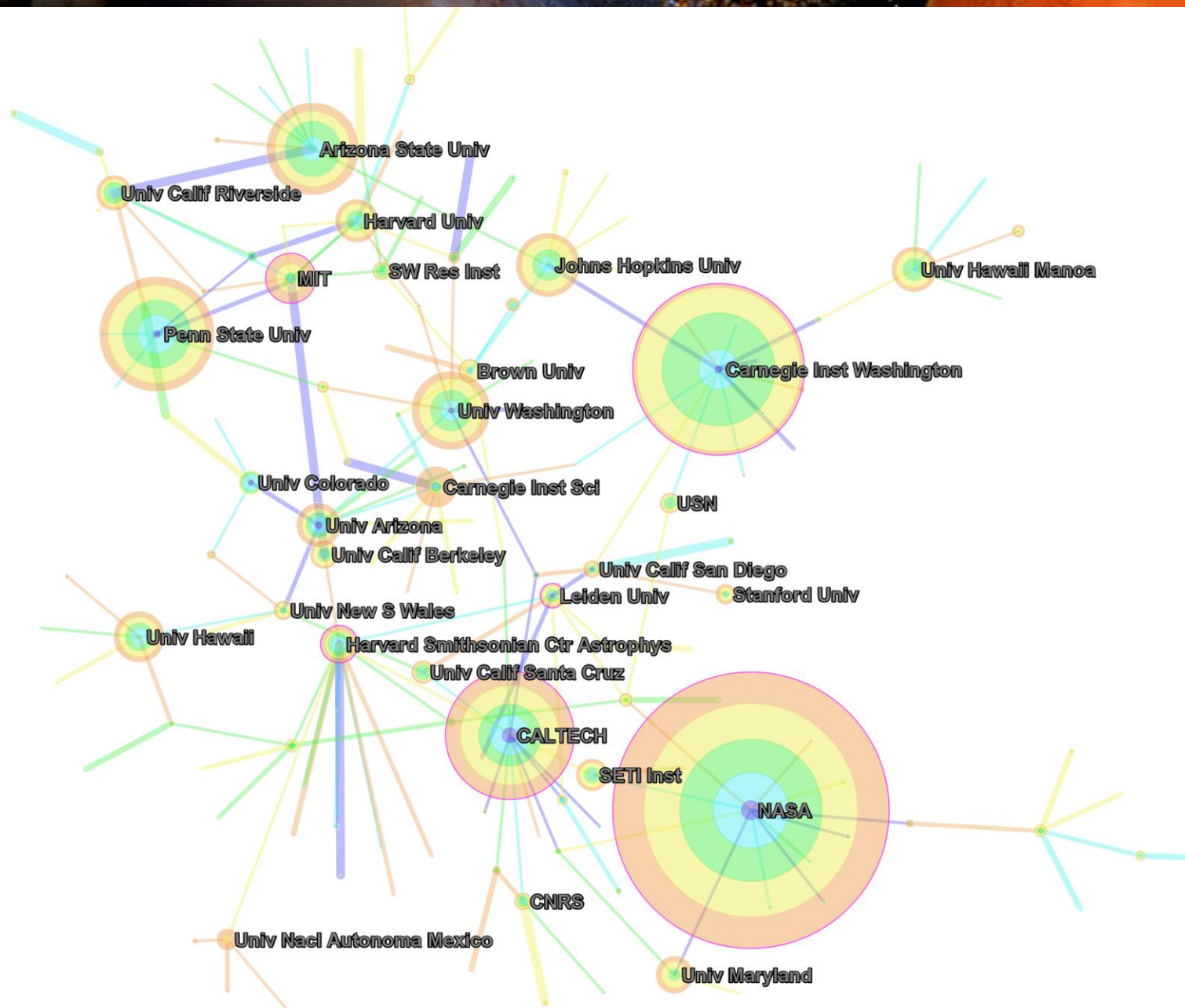
g, v. 3.7.R5 (64-bit)
er 22, 2013 6:07:18 PM EEST
izehra\Desktop\NASA\DATA
n: 2008-2012 (Slice Length=1)
Criteria: Top 100.0% per slice, up to 100
N=44, E=59 (Density=0.0624)
None





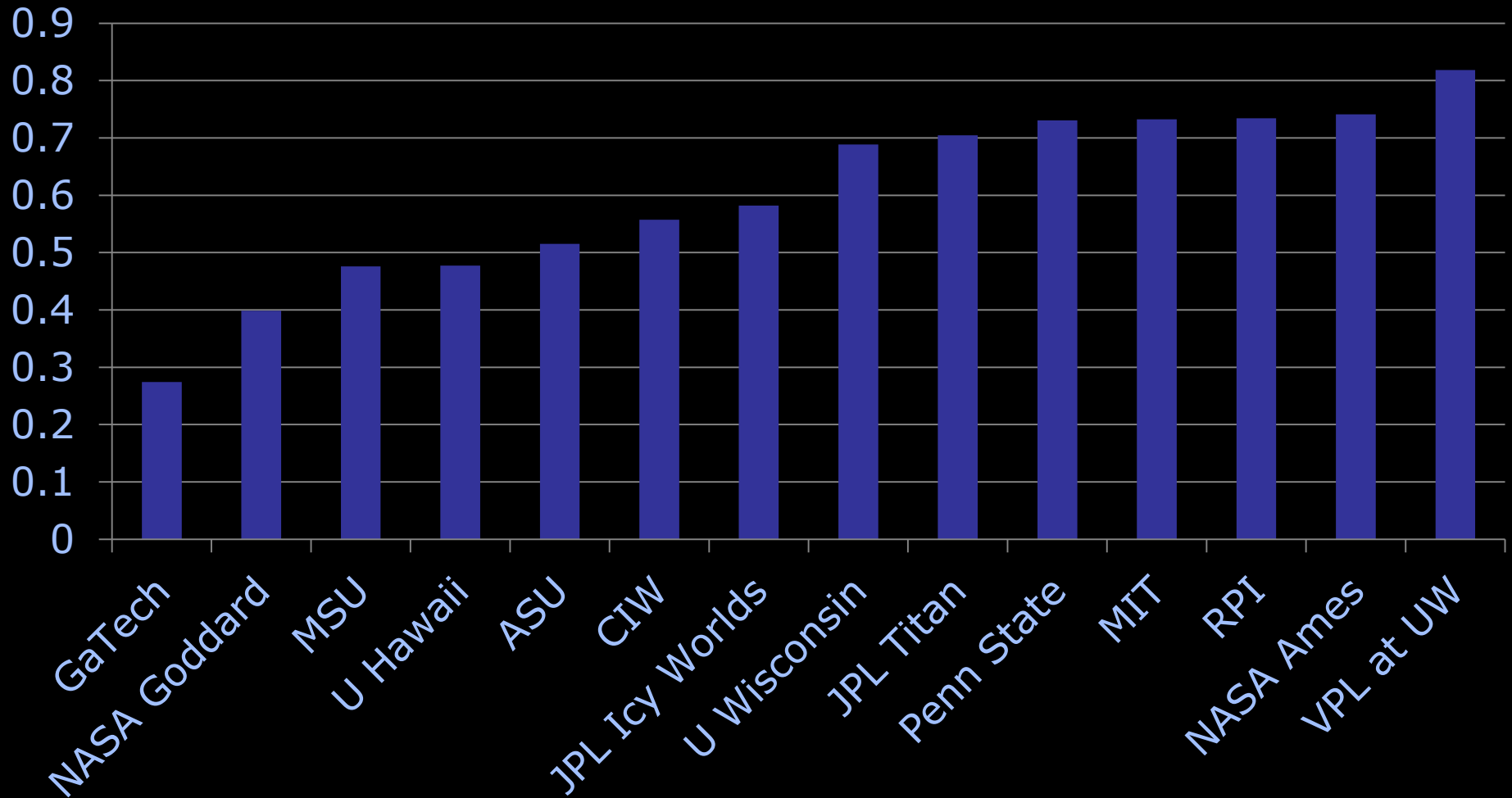
Most critical to the network

- Harvard
- Smithsonian Center for Astrophysics
- Carnegie*
- Caltech*
- Leiden U
- Johns Hopkins Univ*
- MIT
- U Washington*
- UCSD
- U Arizona



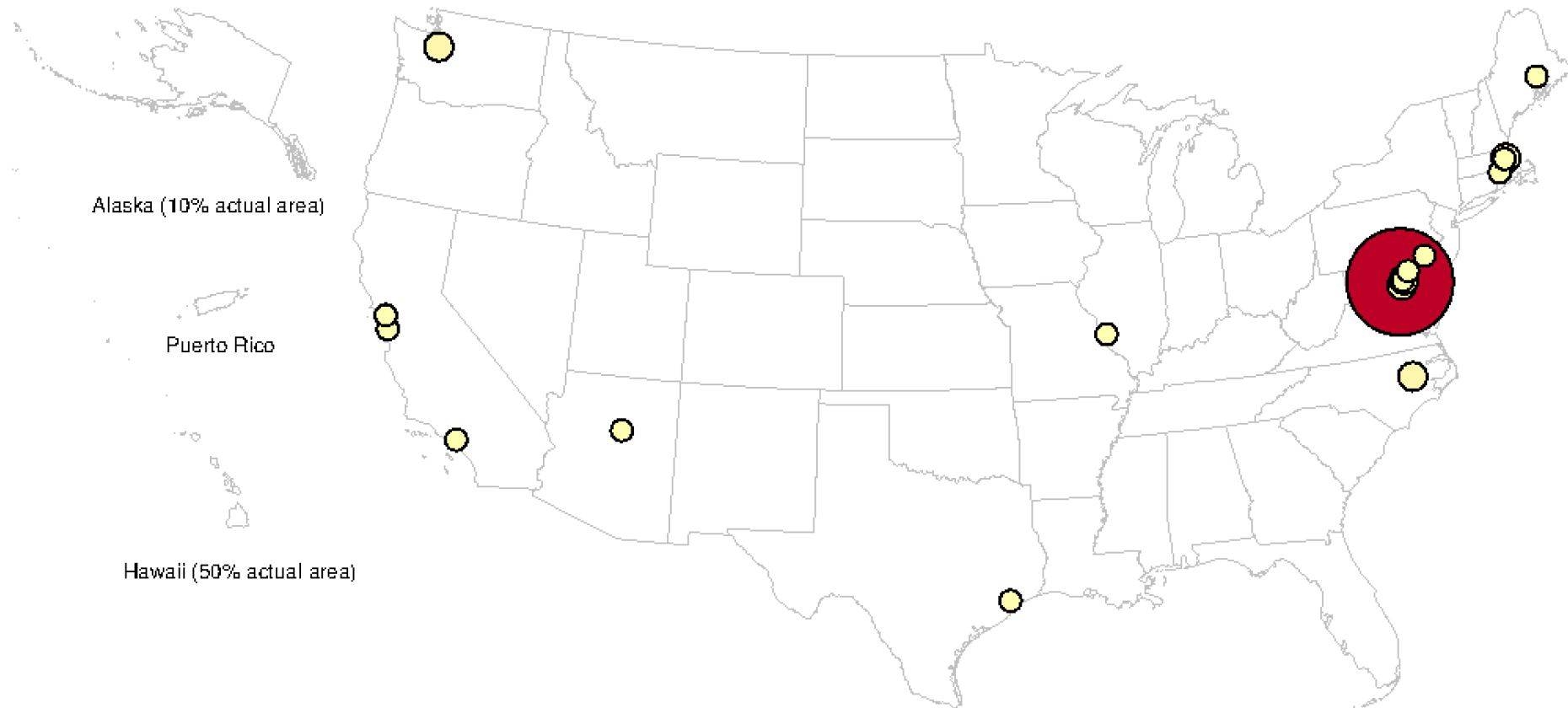


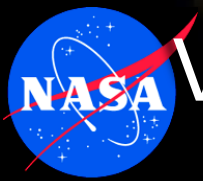
Geodiversity in 2012





Carnegie 2012



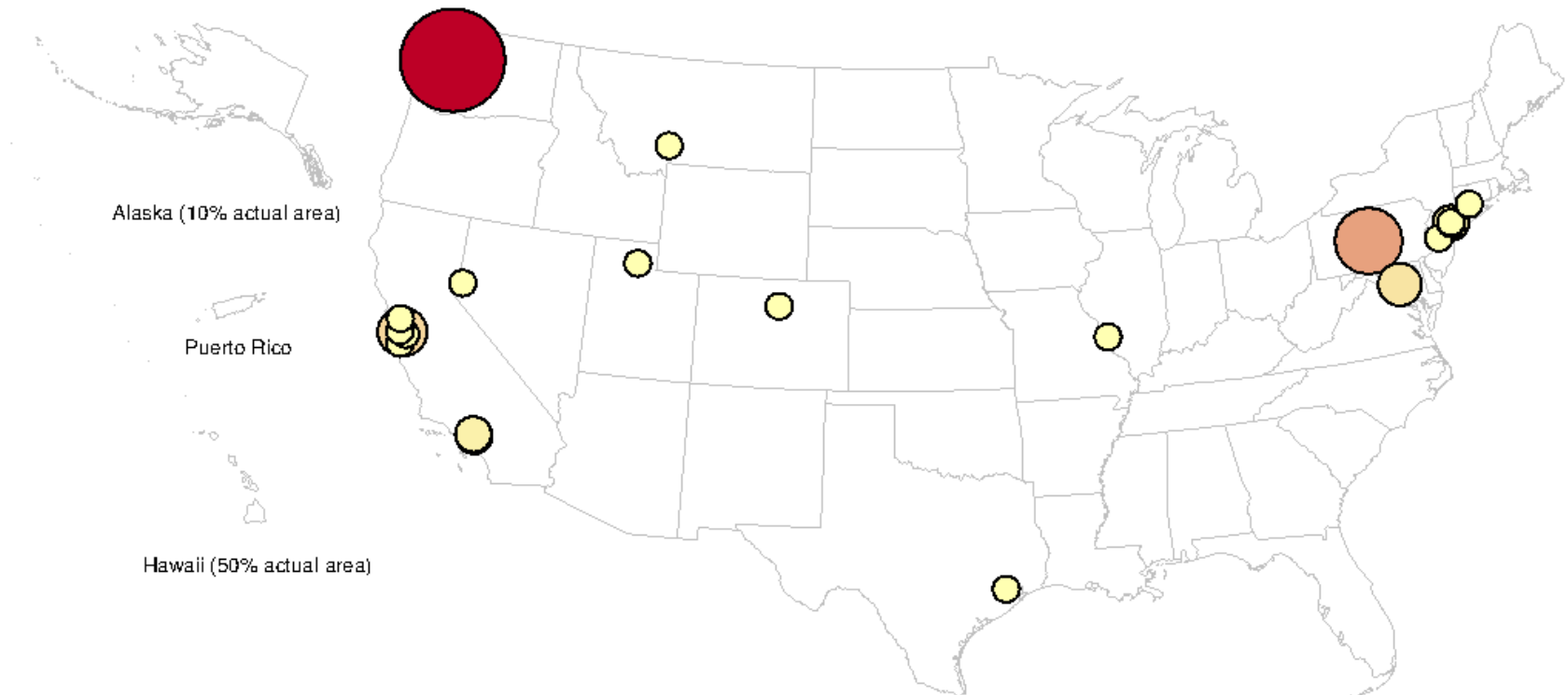


Virtual Planetary Laboratory @UW

Geospatial Visualization (Proportional Symbol Map)

Generated from CSV file: C:\Users\kaydinog\AppData\Local\Temp\1\temp\Preprocessed-vpl-6676225690929934993.csv

Jul 19, 2013 | 11:48:36 AM PDT



Legend

Interior Color (Linear)

of researchers



Area (Linear)

of researchers

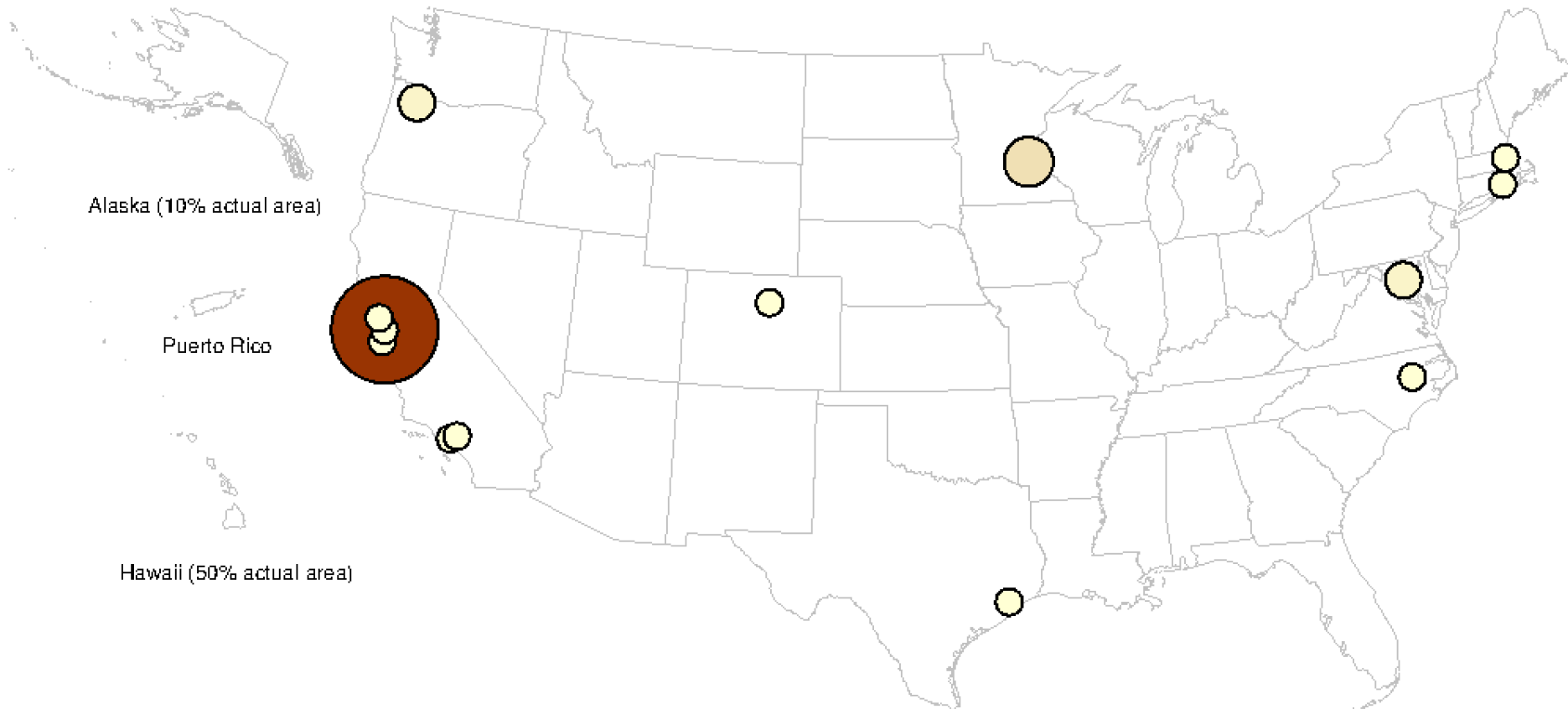


How to Read this Map

This *proportional symbol map* shows 52 U.S. states and other jurisdictions using the Albers equal-area conic projection with Alaska, Puerto Rico, and Hawaii inset. Each dataset record is represented by a circle centered at its geolocation. The area, interior color, and exterior color of each circle may represent numeric attribute values. Minimum

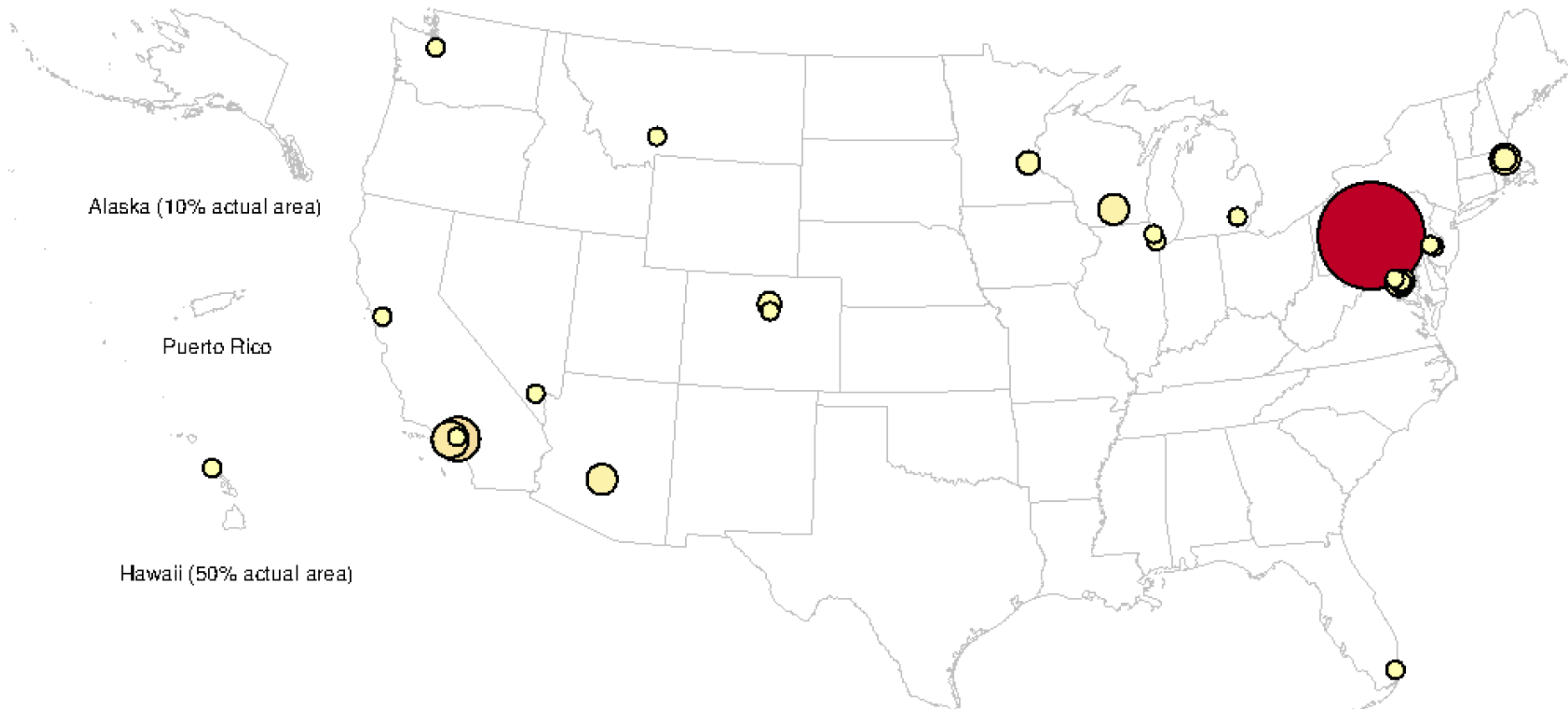


NASA Ames 2012





Penn State 2012





Preliminary results correlations between...



	Carnegie Institute of Washington	NASA Ames Research Center	Pennsylvania State University
Richness & NSE	-.69	.79	.51
Richness & Size	.91	.81	.62
NSE & Size	-.70	.67	-.12
NSE & Productivity	-.47	.23	.19
NSE & Project Team Size	-.49	-.50	.43

QUESTIONS?

arsev.u.aydinoglu@nasa.gov

arsevu@gmail.com



u r b i et o r b i