

## **Quantifying Collaboration in the Earth Sciences as a Result of the EarthCube Project**

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The authors present this paper to Commission F as they are connected to that Commission, but in truth this research could fit anywhere in the URSI-NRSM, and nowhere. This is not a paper detailing progress updates on a field campaign, nor is it the unveiling of a novel algorithm that can achieve some goal better than any previously released research. Instead, this research looks at the overarching need in the earth sciences for collaborative work between different research groups. Advances in high performance computing, data science, internet-methodologies, connection speeds, and in many other areas in the research pipeline have led to an explosion of available tools and computing power, and leveraging those advances in a way that is beneficial to all of earth science is critical going forward. Additionally, funding agencies continue to emphasize the importance of collaborative research in grants, researchers must prioritize involving themselves in inter-disciplinary projects to find collaborators, as well as to set the tone for future standards in these collaborative research projects.

The EarthCube Project is one such collaborative research project. The NSF-funded effort is a System-of-Systems approach to redefining the research pipeline, in order to avoid redundant research, while propelling earth science methodologies into the internet age. It is a collection of groups focused on many topics, including real-time data services, data storage and discovery mechanisms, and web- and mobile-apps to assist researchers at present and in future. One of the main goals of this project is to meet the needs described above by bringing researchers together on these projects, and so doing, allow new networks to form and new interdisciplinary projects to spawn.

This paper will present a quantification of the effect of EarthCube on the earth science research community by introducing measures designed to capture the collaboration on NSF-funded grants. Such measures include measuring degrees-of-separation statistics including institutional distance, inter-researcher distance, and various densities and distributions related to the vast NSF grant research network. The method of choice for this paper in organizing the data is a graph database, which allows for intuitive representations of networks, and measurement of connectivity therein.