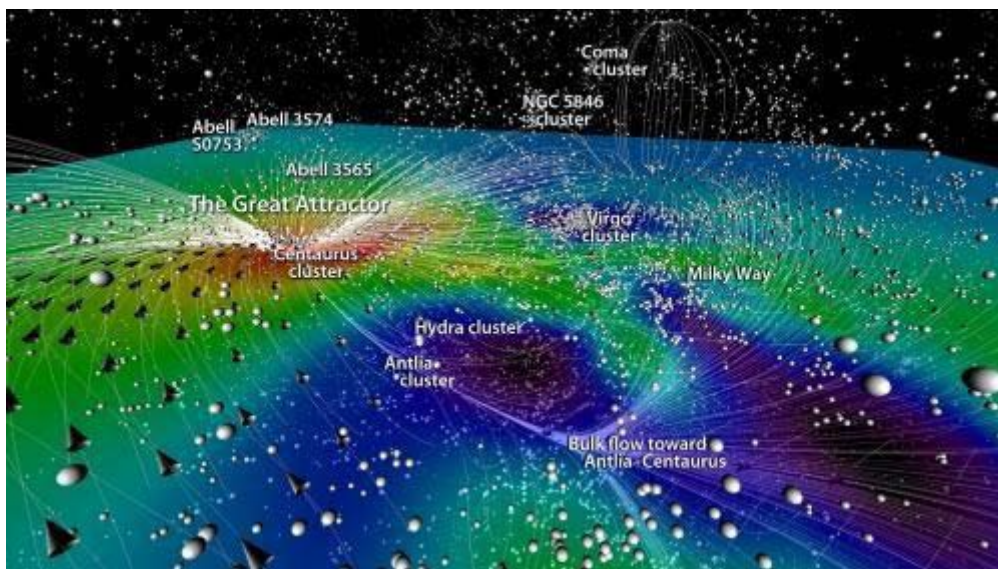


# "Cosmic Flows" --Mapping the Movements of the Galaxies

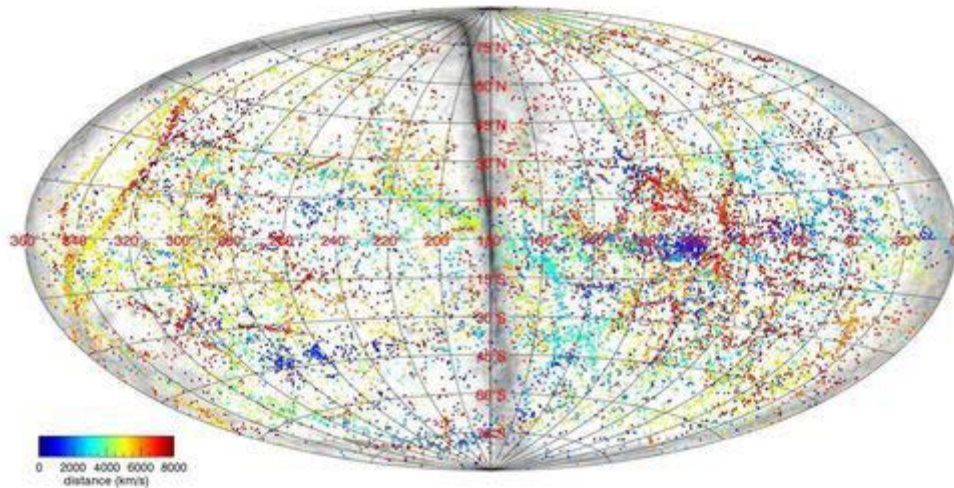
- [dailygalaxy.com](http://dailygalaxy.com)
- Dark Matter
- June 15th, 2013
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An international team of researchers has mapped the motions of structures of the nearby universe in greater detail than ever before. The maps are presented as a video, which provides a dynamic three-dimensional representation of the universe through the use of rotation, panning and zooming.

The Cosmic Flows project has mapped visible and dark matter densities around the Milky Way galaxy up to a distance of 300 million light-years.

The large-scale structure of the universe is a complex web of clusters, filaments, and voids. Large voids—relatively empty spaces—are bounded by filaments that form superclusters of galaxies, the largest structures in the universe. Our Milky Way galaxy lies in a supercluster of 100,000 galaxies.



Just as the movement of tectonic plates reveals the properties of Earth's interior, the movements of the galaxies reveal information about the main constituents of the Universe: dark energy and dark matter. Dark matter is unseen matter whose presence can be deduced only by its effect on the motions of galaxies and stars because it does not give off or reflect light. Dark energy is the mysterious force that is causing the expansion of the universe to accelerate.

The video captures with precision not only the distribution of visible matter concentrated in galaxies, but also the invisible components, the voids and the dark matter. Dark matter constitutes 80 percent of the total matter of our universe and is the main cause of the motions of galaxies with respect to each other. This precision 3-D cartography of all matter (luminous and dark) is a substantial advance.

The correspondence between wells of dark matter and the positions of galaxies (luminous matter) is clearly established, providing a confirmation of the standard cosmological model. Through zooms and displacements of the viewing position, this video follows structures in three dimensions and helps the viewer grasp relations between features on different scales, while retaining a sense of orientation.

The scientific community now has a better representation of the moving distribution of galaxies around us and a valuable tool for future research.

The scientific article, “Cosmography of the Local Universe,” which explains the research behind the video, will be published in a forthcoming issue of The Astronomical Journal. It is now available at <http://arxiv.org/abs/1306.0091>. Founded in 1967, the Institute for Astronomy at the University of Hawai‘i at Mānoa conducts research into galaxies, cosmology, stars, planets, and the sun. Its faculty and staff are also involved in astronomy education, deep space missions, and in the development and management of the observatories on Haleakala and Mauna Kea. The Institute operates facilities on the islands of O‘ahu, Maui, and Hawai‘i.