

Astronomers release largest digital survey of the visible Universe

December 19 2016



This compressed view of the entire sky visible from Hawai'i by the Pan-STARRS1 Observatory is the result of half a million exposures, each about 45 seconds in length, taken over a period of four years. The shape comes from making a map of the celestial sphere, like a map of the Earth, but leaving out the southern quarter. The disk of the Milky Way looks like a yellow arc, and the dust lanes show up as reddish brown filaments. The background is made up of billions of faint stars and galaxies. If printed at full resolution, the image would be 1.5 miles long, and you would have to get close and squint to see the detail.

Credit: Danny Farrow, Pan-STARRS1 Science Consortium and Max Planck Institute for Extraterrestrial Physics

The world's largest digital survey of the visible Universe, mapping billions of stars and galaxies, has been publicly released.

The data has been made available by the international Pan-STARRS project, which includes scientists from Queen's University Belfast, who have predicted that it will lead to new discoveries about the Universe.

Astronomers and cosmologists used a 1.8-metre telescope at the summit of Haleakalā, on Maui, Hawaii, to repeatedly image three quarters of the [visible sky](#) over four years.

Three billion sources

The data they have captured in the Pan-STARRS1 Surveys is made up of three billion separate sources, including [stars](#), galaxies, and other space objects.

This immense collection of information contains two petabytes of computer data - equivalent to one billion selfies or one hundred times the total content of Wikipedia.

Pan-STARRS is hosted by the University of Hawaii Institute for Astronomy, which is releasing the data alongside the Space Telescope Science Institute in Baltimore, USA.

The international collaboration also includes Queen's University Belfast and the Universities of Durham and Edinburgh and is supported by NASA and the National Science Foundation. Durham's contribution was

funded by a generous donation from the Ogden Trust and Durham University.

Luminous distant explosions

Queen's University Belfast Professor Stephen Smartt, who is Chair of the Pan-STARRS1 (PS1) Science Council, said: "We've worked on this project for more than five years at Queen's and have found the most luminous distant explosions in the Universe and also nearby asteroids in our solar system.

"It was a fantastic team effort and now we hope the whole science community will benefit from this public release of our data."

Digital survey

In May 2010, the Panoramic Survey Telescope & Rapid Response System, or Pan-STARRS, observatory embarked on a digital survey of the sky in visible and near infrared light.

This was the first survey with a goal of observing the sky very rapidly over and over again, looking for moving objects and transient or variable objects, including asteroids that could potentially threaten the Earth.

Dr Ken Chambers, Director of the Pan-STARRS Observatories, at the University of Hawaii, said: "The Pan-STARRS1 Surveys allow anyone to access millions of images and use the database and catalogues containing precision measurements of billions of stars and galaxies.

"Pan-STARRS has already made discoveries from Near Earth Objects and Kuiper Belt Objects in the Solar System to lonely planets between the stars; it has mapped the dust in three dimensions in our galaxy and

found new streams of stars; and it has found new kinds of exploding stars and distant quasars in the early Universe."

Static sky

The roll-out of the survey data is being done in two steps.

Today's release is the "Static Sky" which provides an average value for the position, brightness and colour for objects captured in the sky at individual moments in time.

In 2017, a second set of data will be released including catalogues and images from each of the individual snapshots that Pan-STARRS took of a given region of sky.

The [data](#) from the Pan-STARRS1 surveys will be available online at panstarrs.stsci.edu.

Provided by Queen's University Belfast

Citation: Astronomers release largest digital survey of the visible Universe (2016, December 19)
retrieved 9 April 2024 from
<https://phys.org/news/2016-12-astronomers-largest-digital-survey-visible.html>

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