Image and video captions for Gaia Data Release 1

EMBARGOED until 12:30 CEST, Wednesday 14 September

Files:
https://cloud.cosmos.esa.int/public.php?service=files&t=15d3b57ed00f0a75562776d423e484cb

Gaia's first sky map

An all-sky view of stars in our Galaxy – the Milky Way – and neighbouring galaxies, based on the first year of observations from ESA's Gaia satellite, from July 2014 to September 2015.

This map shows the density of stars observed by Gaia in each portion of the sky. Brighter regions indicate denser concentrations of stars, while darker regions correspond to patches of the sky where fewer stars are observed.

The Milky Way is a spiral galaxy, with most of its stars residing in a disc about 100 000 light-years across and about 1000 light-years thick. This structure is visible in the sky as the Galactic Plane – the brightest portion of this image – which runs horizontally and is especially bright at the centre.

Darker regions across the Galactic Plane correspond to dense clouds of interstellar gas and dust that absorb starlight along the line of sight.

Many globular and open clusters – groupings of stars held together by their mutual gravity – are also sprinkled across the image.

Globular clusters, large assemblies of hundreds of thousands to millions of old stars, are mainly found in the halo of the Milky Way, a roughly spherical structure with a radius of about 100 000 light-years, and so are visible across the image.

Open clusters are smaller assemblies of hundreds to thousands of stars and are found mainly in the Galactic Plane.

The two bright objects in the lower right of the image are the Large and Small Magellanic Clouds, two dwarf galaxies orbiting the Milky Way. Other nearby galaxies are also visible, most notably Andromeda (also known as M31), the largest galactic neighbour to the Milky Way, in the lower left of the image. Below Andromeda is its satellite, the Triangulum galaxy (M33).

A number of artefacts are also visible on the image. These curved features and darker stripes are not of astronomical origin but rather reflect Gaia's scanning procedure. As this map is based on observations performed during the mission's first year, the survey is not yet uniform across the sky.

These artefacts will gradually disappear as more data are gathered during the five-year mission.

High resolution versions of the Gaia map, with transparent background, are available to download from: http://sci.esa.int/gaia/58209

Credit: ESA/Gaia/DPAC

Acknowledgement: A. Moitinho & M. Barros (CENTRA – University of Lisbon), on behalf of DPAC

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Gaia's first sky map, annotated

An all-sky view of stars in our Galaxy – the Milky Way – and neighbouring galaxies, based on the first year of observations from ESA's Gaia satellite, from July 2014 to September 2015.

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File:
https://cloud.cosmos.esa.int/public.php?service=files&t=0e55cec0bc282c6d1a0553e3595274b9

Pluto occultation

On 19 July 2016, Pluto passed in front of the faint star UCAC4 345-180315, offering a rare chance to study the atmosphere of the dwarf planet as the star first gradually disappeared and then reappeared behind Pluto.

The image shows an image of the star and Pluto, five minutes before the event (top), then Pluto passing in front of the star (centre), then again the star and Pluto, five minutes after the event (bottom).

This stellar occultation was only visible from a narrow strip stretching across Europe, similar to the totality path that a solar eclipse lays down on our planet's surface. Precise knowledge of the star's position was crucial to point telescopes on Earth, so the exceptional early release of the Gaia position for this star, which was 10 times more precise than previously known, was instrumental to the successful monitoring of this rare event.

Astronomers observed the event using telescopes across Europe, Middle East and northern Africa. To further analyse the data, they were also aided by an improved determination of Pluto's orbit after NASA's New Horizons mission flew by the dwarf planet in 2015.

Early results hint at a pause in the puzzling pressure rise of Pluto's tenuous atmosphere, something that has been recorded since 1988 in spite of the dwarf planet moving away from the Sun, which would suggest a drop in pressure due to cooling of the atmosphere.

Credit: B. Sicardy (LESIA, Observatoire de Paris, France), P. Tanga (Observatoire de la Côte d'Azur, Nice, France), A. Carbognani (Osservatorio Astronomico Valle d'Aosta, Italy)

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Video file:
https://cloud.cosmos.esa.int/public.php?service=files&t=2d77de3e3640c0f059705b9d6085896a

From the Solar System to the Hyades cluster

A virtual journey, from our Solar System through the Milky Way, based on data from the first release of ESA's Gaia satellite.

The journey starts by looking back at the Sun, surrounded by its eight planets. We then move away from the Sun and travel towards and around the Hyades star cluster, the closest open cluster to the Solar System, some 150 light-years away.

The 3D positions of the stars shown in the animation are drawn from the Tycho-Gaia Astrometric Solution (TGAS), which combines information from Gaia's first year of observations with the earlier Hipparcos and Tycho-2 Catalogues, both based on data from ESA's Hipparcos mission.

This new dataset contains positions on the sky, distances and proper motions of over two million stars. It is twice as precise and contains almost 20 times as many stars as the previous reference for astrometry, the Hipparcos Catalogue.

The journey continues showing the full extent size of the stars contained in the Tycho-Gaia Astrometric Solution, all relatively near to the Sun, in the overall context of our Milky Way galaxy.

The final Gaia catalogue will contain the most detailed 3D map ever made of the Galaxy, charting a billion stars – about 1% of the Milky Way's stellar content – to unprecedented accuracy.

Credit: ESA/Gaia/DPAC

Acknowledgement: T. Sagristà Sellés & S. Jordan (Zentrum für Astronomie der Universität Heidelberg)