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GENTLE.NEWS

In Today's Edition

"There is no mistaking a real book when one meets it. It is like falling in love."

— Christopher Morley

NASA’s Chandra Examines Milky Way at Arms’ Length

5 min read NASA’s Chandra Examines Milky Way at Arms’ Length To view this video please enable JavaScript, and consider upgrading to a web browser that supports HTML5 video This sequence begins with an artist’s concept showing the Milky Way galaxy as seen from above, with the estimated positions of spiral arms based on previous data. Next is an updated artist’s concept of the Milky Way, where the positions of the two spiral arms most distant from the center of the galaxy have been adjusted based on newly processed X-ray data from NASA’s Chandra X-ray Observatory and ESA’s XMM-Newton. Both arms may be more distant than previously thought. NASA/CXC/A. Hobart A new result using NASA’s Chandra X-ray Observatory shows that the outer spiral arms in the Milky Way galaxy may reach wider than previously thought. This finding may lead astronomers to adjust their understanding of our home galaxy’s structure. A team of astronomers made this discovery by making precise measurements of distances to dust clouds in the Milky Way’s spiral arms using data from both NASA’s Chandra and XMM-Newton, an ESA (European Space Agency) mission with NASA contributions. The results are described in a new paper published Wednesday in the Astronomy & Astrophysics journal. The researchers determined the distances by studying rings around gamma-ray bursts, some of the brightest bursts of light in the universe, which arise from the collapse of massive stars or the

Source: NASA

merger of neutron stars. They are located at enormous distances, well beyond the confines of our galaxy. An artist’s concept showing the Milky Way galaxy as seen from above, with the estimated positions of spiral arms based on previous data, in blue. Overlaid on this is an updated view of the Milky Way showing different positions for the two outermost spiral arms, shown in red and bordered by dashed lines. Both arms may be more distant than previously thought, based on newly processed X-ray data from Chandra and XMM. NASA/CXC/SAO/M.Weiss This distance measurement technique capitalized on the phenomenon of light echoes, where the light from the gamma-ray burst bounced off dust clouds in the spiral arms. The diameters of the rings in X-rays give the distances to Earth, with larger rings being generated by dust clouds closer to us. “This is a very direct way – relying only on geometry – to precisely measure distances to the Milky Way’s spiral arms,” said Beatrice Vaia, who led the study while a PhD student in a joint program between Scuola Universitaria Superiore IUSS Pavia and University of Trento in Italy. “Most other methods rely on assumptions about how the Milky Way rotates, which become increasingly uncertain in the outer regions of our galaxy.” Despite a century of awareness of the Milky Way’s spiral arms, astronomers are still working toward precise characterization of its arms because of Earth’s position within one. Dust and gas also block the view to other arms. The researchers used three different gamma-ray bursts to determine the distances to three spiral arms in the Milky Way. In order of increasing distances from the Galactic Center, they are the Perseus, the Outer, and the

Source: NASA

Outer Scutum-Centaurus arms. Along the direction of one of the bursts, they found that both the Outer and Outer Scutum-Centaurus arms are about 10% more distant than astronomers previously thought. “The differences are small, but any revision of these distances is important because they are so fundamental for understanding our galaxy,” said co-author Ilaria Fornasiero, who was a PhD student in the same program as the leading author. “For example, this could mean that astronomers have to revise estimates of the mass of the galaxy, because that affects how wide the arms stretch.” The images include X-ray data from Chandra and optical data from Pan-STARRS. The composite image shows X-ray rings generated by a gamma-ray burst (GRB), a bright X-ray source located outside our galaxy. In a phenomenon called light echoes, the X-rays from the GRB bounced off dust clouds in the spiral arms of our galaxy. The diameters of the rings in the Chandra data give the distances of the dust clouds to Earth, with larger rings being generated by dust clouds closer to us. The GRB is located at the center of the circles defining the rings, to the left of the X-ray data outlined by the white square. X-ray: NASA/CXC/INAF/B. Vaia et al.; Optical: Pan-STARRS; Image processing: NASA/CXC/SAO/N.Wolk & P.Edmonds The team also used their data to estimate that the dust cloud in the most distant arm is about 3,500 light-years wide. These findings show that their measurements apply to the full thickness of the spiral arm, rather than a random, isolated dust cloud that may not fully be representative of the arm’s location. While this technique provided major improvements in accuracy according to the researchers, it

Source: NASA

may be difficult to use it for further measurements because bright gamma-ray bursts that are visible through the plane of the galaxy are rare. “We’re relying on the universe to provide us with these events, and so far, over 25 years, we’ve only found a handful that we can use,” said co-author Andrea Tiengo of Scuola Universitaria Superiore IUSS Pavia. “That said, we will continue to be on the lookout for more.” NASA’s Marshall Space Flight Center in Huntsville, Alabama, manages the Chandra program. The Smithsonian Astrophysical Observatory’s Chandra X-ray Center controls science operations from Cambridge, Massachusetts, and flight operations from Burlington, Massachusetts. Read more from NASA’s Chandra X-ray Observatory To learn more about Chandra, visit: https://nasa.gov/chandra To learn more about NASA’s Chandra mission, visit: https://nasa.gov/chandra Visual Description This release features a short video and a series of images, all related to an updated understanding of our home galaxy’s structure. By studying rings of X-ray light echoes, researchers now believe that two of the Milky Way’s spiral arms may be more distant from the center of the galaxy than previously thought. The updated understanding of the structure of the Milky Way is highlighted in a short video, which compares two artist concept images. In both images, our spiral Milky Way galaxy is shown face-on. It has a bright white core with several arms that spiral out from the center, like long thin clouds corkscrewing counter-clockwise. The two longest arms make a full rotation of the spiral galaxy, and curve all the way around to the upper right of the images. The first image in the video shows the previous understanding of the Milky Way.

Source: NASA

Here, the two longest arms are curled around the core in a fairly tight spiral. In the second image, which represents the updated understanding, the two longest arms are more loosely spiraled. Visually, this means there is more open space between the curving arms, which are further away from the bright galaxy core. The video fades back and forth between the two artist concept images to illustrate the structural differences between the two understandings. These findings are further shown by a static image which overlays the new understanding on top of the earlier understanding. In this artist's concept illustration, dotted lines and different colors are used to differentiate between the two. A team of astronomers made this discovery by studying gamma-ray bursts that bounce off of dust clouds in the galaxy's spiral arms. The resulting rings of X-rays, known as light echoes, were detected and mapped by NASA's Chandra X-ray Observatory and ESA's XMM-Newton. In a supplemental data image, the light echoes resemble concentric arches of neon blue dots trailing across a speckled sky. Identifying the position of the Milky Way's spiral arms through X-ray light echoes has allowed astronomers to use geometry, rather than assumptions about galaxy rotation, to better understand the structure of our galaxy. Share Details Last Updated Jul 02, 2026 Editor Lee Mohon Contact Joel Wallace Megan Watzke Location Marshall Space Flight Center Related Terms Chandra X-Ray Observatory Astrophysics Galaxies Marshall Astrophysics Marshall Space Flight Center The Milky Way The Universe Share Details Last Updated Jul 02, 2026 Editor Lee Mohon Contact Joel Wallace Megan Watzke Location Marshall Space

Source: NASA

Flight Center Related Terms Chandra X-Ray Observatory Astrophysics Galaxies Marshall Astrophysics Marshall Space Flight Center The Milky Way The Universe Explore More 7 min read NASA’s Chandra Reveals ‘Red, White, Blue’ Universe for US 250th Article 2 days ago 5 min read NASA’s Chandra Discovers Possible Supernova Remnant in Galactic Center Article 3 weeks ago 5 min read NASA Finds Young Stars Dim in X-rays Surprisingly Quickly Article 3 months ago Keep Exploring Discover More Topics From NASA Chandra X-ray Observatory James Webb Space Telescope Webb is the premier observatory of the next decade, serving thousands of astronomers worldwide. It studies every phase in the… Hubble Space Telescope Since its 1990 launch, the Hubble Space Telescope has changed our fundamental understanding of the universe. Solar System

Source: NASA

NSF Discovering Our Universe' gallery to open July 1

NSF News NSF Discovering Our Universe' gallery to open July 1 July 1, 2026 The new "U.S. National Science Foundation Discovering Our Universe" gallery is opening to the public July 1 at the Smithsonian's National Air and Space Museum in Washington, D.C., in celebration of the museum's 50 th anniversary . The gallery illuminates how the development of new, more precise tools transformed our understanding of the origin, content and fate of the universe. "Humanity has wondered at the cosmos throughout our history. NSF is thrilled to partner with Smithsonian to showcase how basic research investments throughout decades and across the country spark our imagination, inspire generations, impact our everyday lives and enable incredible scientific breakthroughs," said Brian Stone, performing the duties of the director. "This exhibit encapsulates that tremendous impact." Through a variety of artifacts, museum guests can explore the history of astronomical discovery and what exciting opportunities await us. The exhibit examines how we find answers in astronomy, how research methods have changed over time, and how each discovery opens new mysteries to be solved. The exhibit features artifacts from: The Event Horizon Telescope, which created the first image of a black hole. The Laser Interferometer Gravitational Observatory, which detected the first gravitational waves. The spectrograph instrument Vera Rubin used to yield evidence for the existence of dark matter. A neutrino

Source: National Science Foundation

detector used to find neutrinos from outside our galaxy. And so much more. The gallery is also a place to learn. It is designed so museum experts and educators can broadcast lessons to classrooms anywhere in the world. New features include a hands-on Discovery Cart, exhibits you can touch and audio descriptions, making it easier for everyone to enjoy and engage with the exhibits. The NSF gallery is one of five new galleries opening on the museum's 50 th anniversary, and in time for the nation's 250 th birthday. How to get there The National Air and Space Museum in Washington, D.C., is located at 650 Jefferson Drive S.W. and is open every day except Dec. 25 from 10 a.m. to 5:30 p.m. Admission is free, but timed-entry passes are required to visit.

Source: National Science Foundation

Kootenai National Wildlife Refuge Seeks Public Comment on Compatibility Determinations

Kootenai National Wildlife Refuge Seeks Public Comment on Compatibility Determinations Jul 1, 2026 Written By Shannon Ehlers Kootenai National Wildlife Refuge is seeking public review and comment on its Draft Compatibility Determination for an underground powerline right-of-way project . Northern Lights, Inc. has requested to relocate the existing above-ground power line within the Refuge by burying it beneath the county road right-of-way. This measure aims to mitigate fire hazards and decrease incidents involving wildlife. Under USFWS policy, compatibility determinations for existing uses on National Wildlife Refuges must be periodically reviewed and updated. The Service will accept comments received or postmarked on or before July 15, 2026. The Service prepares Compatibility Determinations to ensure that public and economic uses of National Wildlife Refuges do not interfere with or detract from the purposes for which each refuge was established. Compatibility Determinations also describe how these uses would contribute towards achieving Refuge purposes and the mission of the National Wildlife Refuge System. The following Draft Compatibility Determinations are available for review online: Draft Compatibility Determination for Underground Powerline Utility Right-of-way, Kootenai NWR You may submit comments or requests for additional information through any of the following methods:

Source: U.S. Fish & Wildlife Service

Email: FW1KootenaiNWR@fws.gov , Include “Kootenai NWR Compatibility Determinations” in the subject line of the message. U.S. Mail: U.S. Fish and Wildlife Service, Attn: Refuge Manager, Kootenai National Wildlife Refuge, 287 Westside Road, Bonners Ferry, ID 83805 All comments received from individuals become part of the official public record. The Service’s practice is to make comments, including names and home addresses of respondents, available for public review during regular business hours. Individual respondents can request that we withhold their home address from the record, which we will honor to the extent allowable by law. If you wish to have your name and/or address withheld, you must state this prominently at the beginning of your comments. More Media from this Story Name Draft Compatibility Determination for Northern Lights Inc., Underground Powerline Project Utility Right-of-Way, Kootenai National Wildlife Refuge PDF Jun 30, 2026 Story Tags Wildlife refuges Written By Shannon Ehlers Published Jul 1, 2026 Edited By Joshua Contois Get Involved Media Contacts Megan Nagel Facilities Kootenai National Wildlife Refuge Related Stories Land Management U.S. Fish & Wildlife Service seeks public comment on Draft Compatibility Determination for Right-of-Way permit for Riverside Road Jan 30, 2025 Latest Stories Current Road Conditions at Pocosin Lakes National Wildlife Refuge Jul 1, 2026 Habitat Restoration Reintroductions and habitat restoration improve the odds for Houston toad Jun 30, 2026 Temporary Closure of Gravel Road Jun 30, 2026

Source: U.S. Fish & Wildlife Service

Volcano Minute — Fifty lava fountains: Hawaii Five-O

Volcano Minute — Fifty lava fountains: Hawaii Five-O Volcano Minute By Hawaiian Volcano Observatory July 2, 2026 Last Saturday, June 27th, marked a golden milestone—Hawaii’s 50th lava fountaining episode in the ongoing Halemaʻumaʻu eruption at Kīlauea’s summit. Volcano Minute is a weekly audio activity or science update produced by U.S. Geological Survey Hawaiian Volcano Observatory scientists and affiliates. Media Sources/Usage: Public Domain. View Media Details Sources/Usage: Public Domain. View Media Details View Aloha, it's your weekly Volcano Minute, brought to you by the USGS Hawaiian Volcano Observatory. Last Saturday, June 27 th , marked a golden milestone—Hawaii’s 50th lava fountaining episode in the ongoing Halemaʻumaʻu eruption at Kīlauea’s summit. The north vent sent a lava fountain soaring to 1,030 feet into the air—its tallest display since episode 43—thrilling visitors in Hawaiʻi Volcanoes National Park and thousands watching the USGS Kīlauea livestreaming cameras online. Beautiful weather and helpful winds kept most of the tephra drifting into remote areas of the National Park, with just a light dusting of Pele’s hair reaching Pāhala, 18 miles away. It took Kīlauea just 551 days to deliver these 50 fountaining episodes—averaging about one every 11 days—and ranging from just a few hours to nearly six days long. Thirty-two of these episodes featured double fountains , a rarity in Hawaiian eruptions. The south vent has taken 19 episodes off during

Source: U.S. Geological Survey

this eruption, but it holds this eruption's height record at 1,770 feet. That's shy of Kīlauea Iki's 1,900-foot fountain that erupted in 1959. The north vent has erupted a lava fountain in all but one of the episodes, and it's the early bird—kicking off 90 percent of the precursory activity that signals that onset of each new episode. What comes next? Will the south vent fountain again? Could Kīlauea break its fountain height record? And how long will this eruption continue? Stay tuned—because every episode brings new observations…and scientists at the USGS Hawaiian Volcano Observatory are keeping a close eye. Since the end of episode 50, Kīlauea summit region has shown inflationary ground tilt and models currently indicate that episode 51 of lava fountaining could occur between July 8 th and 15 th . Mahalo for listening, I'm Katie Mulliken and this was your weekly volcano minute brought to you by the USGS Hawaiian Volcano Observatory.

Source: U.S. Geological Survey

The Tide Has Turned: Atlantic Mackerel Shows Signs of Improvement

Since 2017, NOAA Fisheries and the Mid-Atlantic Fishery Management Council have been trying to help the Atlantic mackerel population rebuild. The population has been struggling, but a recent stock assessment shows that the population is showing signs of improvement. We manage Atlantic mackerel under the Mackerel, Squid, and Butterfish Fishery Management Plan. In 2017, a benchmark stock assessment found that the mackerel population was dangerously low and overfishing was occurring. As a result, in 2019 we developed and implemented a 5-year rebuilding plan to help the mackerel population recover. That rebuilding plan was extended to 10 years after a 2021 management track assessment indicated the stock could not rebuild within the initial 5-year window. A 2023 management track assessment revealed the stock was no longer experiencing overfishing, but the mackerel population was still struggling to rebound. As a result, commercial possession limits and fishery specifications were reduced further. In September 2025, the Northeast Fisheries Science Center completed another management track assessment for mackerel using updated data through 2024. That assessment indicated the mackerel population is no longer low, and overfishing is still not occurring. Mackerel abundance from the 2024 spring bottom trawl survey was also near a record high. In 2024 egg production in U.S. waters was the highest

Source: NOAA Fisheries

since the 1980s, and estimated recruitment was the highest it’s been since 1983. While the mackerel population is showing signs of improvement, there is a substantial amount of uncertainty. Mackerel assessments have tended to overestimate terminal year recruitment in the past, and the abundance of older, larger fish in the mackerel population is low. However, the 2025 assessment results represent an improvement from the last few assessments. New Commercial Fishing Measures During its December 2025 meeting , the Council reviewed the results of the new assessment and advice from its Committees and Advisory Panels. The Council recommended increasing mackerel fishery specifications in 2026 and 2027 through Framework Adjustment 17 to the Mackerel, Squid, and Butterfish fishery management plan. In April 2026, NOAA Fisheries published an interim final rule implementing Framework 17. The new 2026 mackerel fishery specifications are almost all substantially higher than before. In particular: 2026 acceptable biological catch (15,134 metric tons) is 373 percent higher than 2025 (3,200 metric tons) 2026 annual catch limit (14,634 metric tons) is 368 percent higher than 2025 (3,126 metric tons) 2026 commercial quota (11,237 metric tons) is 1,195 percent higher than it was in 2025 (868 metric tons) Framework 17 also increased the commercial possession limits for vessels issued a federal mackerel permit. Commercial Mackerel Possession Limits by Permit Category Mackerel Permit Category Previous Possession Limit (lb/trip) New Possession Limit (lb/trip) Tier 1 limited access 20,000 lb 200,000 lb Tier 2 limited access 20,000 lb 135,000 lb Tier 3 limited access 20,000 lb

Source: NOAA Fisheries

100,000 lb Category 4 open access 5,000 lb 20,000 lb The increased fishery specifications and commercial possession limits implemented through this action will increase fishing opportunities for the commercial mackerel fleet. They will provide fishermen with relief from the reduced limits that have been in place since October 2023. New Recreational Fishing Measures In addition to increasing the commercial mackerel possession limits, Framework 17 also increased recreational mackerel possession limits. It established separate limits for private and for-hire recreational fishing. Recreational Mackerel Possession Limits Fishing Type Previous Possession Limit (per trip) New Possession Limit (per trip) Private recreational anglers 20 fish/person 25 fish/person For-hire (charter/party) vessels carrying customers 20 fish/person 50 fish/person (including captain and crew) For-hire (charter/party) vessels without customers 20 fish/person 25 fish/person These new possession limits will increase recreational fishing opportunities for mackerel, facilitating harvest of the increased specifications that were implemented for the fishery. The new limits were also responsive to feedback from the recreational fishing community. In particular, the new possession limit for for-hire vessels carrying customers is intended to address industry concerns that the previous limit discouraged people from booking mackerel trips. This resulted in a loss of business opportunities for the party/charter fleet. Next Steps and New Research Partnerships We will check the mackerel stock again in 2027. To address uncertainties in the assessment model and improve our understanding of mackerel population dynamics, we recently

Source: NOAA Fisheries

launched a new cooperative research initiative . Through this program, NOAA Fisheries scientists will partner with members of the fishing industry to collect and analyze data from mackerel through 2028. For more information, contact the Northeast Fisheries Cooperative Research Program.

Source: NOAA Fisheries

Activity Time - Word Search

Find the words below in the puzzle. Words go across or down only.

Words to Find:

T	A	U	M	N	F	B	F	C	X	S
H	O	F	D	L	M	I	E	A	Z	Z
L	G	D	V	F	Y	M	G	I	A	P
L	G	X	V	C	U	T	U	C	L	M
K	U	H	L	Y	W	K	X	L	G	K
D	K	O	F	P	N	G	Y	H	B	O
J	H	I	E	G	L	X	K	A	Y	V
L	Q	Z	H	E	N	W	M	C	Z	Q
M	B	F	A	Y	X	O	V	I	D	S
N	B	L	Z	G	D	F	F	L	I	X
X	J	E	Z	K	K	W	B	Z	G	V