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NGA announces MagQuest Phase 4a winners, launch of final phase

SPRINGFIELD, Virginia – The National Geospatial-Intelligence Agency has announced the winners of MagQuest Phase 4a. Each of the teams successfully demonstrated their techniques for developing novel data collection approaches for the World Magnetic Model, and have been selected to continue to MagQuest Phase 4b&c, the final phase the 7-year, multimillion-dollar competition to advance how to measure Earth's magnetic field.

The teams competing in the final phase of MagQuest are:

- **Compact Spaceborne Magnetic Observatory (COSMO) CubeSat, University of Colorado Boulder**. This team has developed a CubeSat specifically designed and tested for magnetic cleanliness and accurate data from a compact form factor. A compact scalar-vector magnetometer designed specifically for CubeSats enables high-quality collection of magnetic field data.

- **Diamond-Powered Geomagnetic Data Collection from LEO, Spire Global and SBQuantum.** This team has developed a diamond quantum magnetometer system deployed on a CubeSat, combining SBQuantum's magnetometer technology and sensor expertise with Spire Global's infrastructure for satellites, ground stations and data processing.

- **Io-1, Iota Technology.** This team has developed a CubeSat featuring a deployable helical boom, vector fluxgate magnetometer and atomic scalar magnetometer. Iota Technology is working alongside industry partners, combining expertise in sensor technology, deployable structures and mission design.

Phase 4a was conducted on NASA's HeroX platform, during which all teams constructed magnetometers and tested them at NASA's Goddard Space Flight Center. The three teams, who have been awarded millions in funding, will now advance to design, build and launch a satellite to take their magnetometers into orbit and collect data on the earth's magnetic field.

"We are thrilled to celebrate the success of the MagQuest teams, whose remarkable solutions have showcased the potential of these innovative magnetometers," said Mike Paniccia, NGA's program manager for the World Magnetic Model. "MagQuest has been a journey of innovation,

collaboration and boundary-pushing, and we are excited to see how these solutions shape the future of geomagnetic data collection."

MagQuest Phase 4b&c provides the teams with monetary and technical support as they build, test and launch their solutions to collect high-quality geomagnetic data for evaluation against WMM performance specifications. Teams will also have access to experts from NASA's Goddard Space Flight Center and the NOAA National Centers for Environmental Information.

Phase 4b&c will also provide teams access to external mentors with interdisciplinary perspectives spanning magnetic measurement, engineering of space-based technology and mission management.

During phase 4b&c, teams will build their nanosatellites, integrate their magnetometers, conduct final testing and plan for launch and data collection. Following launch, teams will begin magnetic data collection and comparison of their data to the current world magnetic model.

An expert review panel will evaluate progress across key milestones during MagQuest Phase 4b&c, which is anticipated to conclude in September 2026.

About MagQuest

MagQuest is driving innovation in geomagnetic data collection to fuel the World Magnetic Model. Earth is a giant magnet, and since geographic and magnetic poles do not align, geomagnetic models like the WMM correct for this difference.

The WMM is a joint product of the NGA and the United Kingdom's Defence Geographic Centre. It is produced by the National Oceanic and Atmospheric Administration and the British Geological Survey at five-year intervals to account for the evolution of the magnetic field structure.

The WMM ensures the accuracy of navigation because it corrects for differences in magnetic forces at a user's location. The model is used by thousands of systems for mobile navigation apps and is critical for military and commercial uses around the world. The current WMM relies on data from an aging satellite system and the types of technologies demonstrated in MagQuest aim to replace this outdated system.

To improve resilience and sustainability of production of the WMM, NGA proactively launched MagQuest to identify and accelerate new technologies that could capture high-quality geomagnetic data; many of the technologies identified also demonstrate potential to advance space exploration more broadly.

Since the MagQuest competition opened in 2019, NGA has worked with innovative experts in spaceborne, aerial and terrestrial solutions to identify and accelerate the most promising new methods to capture magnetic field data for the WMM.

"Through MagQuest, NGA and our partner agencies have accelerated the development of unique solutions for capturing critical WMM data," said Mike Paniccia, NGA WMM program manager. "With the WMM being used by citizens and military around the globe, developing resilient infrastructure for the decades to come is critical for U.S. and allied partner competition and security."

The results of MagQuest will inform NGA's acquisition strategy for a WMM global magnetic field data collection capability, with an expected procurement that can provide operational capacity to support production of the WMM 2030.

To learn more about the global competition and meet the teams, visit MagQuest.com.

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NGA is a unique combination of intelligence agency and combat support agency. It is the world leader in timely, relevant, accurate and actionable geospatial intelligence. NGA enables the U.S. intelligence community and the Department of Defense to fulfill the president's national security priorities to protect the nation.

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