Written Testimony of

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Committee of Science, Space, and Technology
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Protecting Lives and Property: Harnessing Innovative Technologies to Enhance Weather Forecasting
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Chairman Franklin, Ranking Member Amo, and distinguished members of the Committee, thank you for the opportunity to testify on the important topic of weather forecasting, and the profound impact artificial intelligence (AI) is having in this domain.

My name is Dr. Jayesh K. Gupta, CEO of Silurian AI, a company dedicated to transforming our understanding of weather and making its impact on the physical world more predictable using modern large-scale artificial intelligence. Our trailblazing work in this field was recently published in the prestigious journal, Nature[1].

For years, the field of weather prediction has strictly required massive, government-run supercomputers to produce forecasts. Today, I am here to tell you that this paradigm has shifted. The same AI revolution that created ChatGPT is now coming to forecasting. The advent of large-scale AI foundation models, exemplified by our contributions such as Aurora and the Generative Forecasting Transformer, represent a fundamental breakthrough. For the first time, we have models that learn the integrated physics of the entire Earth system as a unified whole and achieve state-of-the-art results on a variety of environmental forecasting tasks. And we get to save on all the compute costs

[1] Bodnar, C., Bruinsma, W.P., Lucic, A. et al. A foundation model for the Earth system. Nature 641, 1180–1187 (2025). https://doi.org/10.1038/s41586-025-09005-y

by 99% as well because forecasts that took hours on a supercomputer can now be generated in minutes on a single GPU.

Large scale AI based forecasting systems are no longer just a research concept; they are running operationally right now. Public sector institutions, with the most prominent example being AIFS by the European agency ECMWF, and the private sector Generative Forecasting Transformer (GFT) by Silurian AI, are already delivering results today.

Over the last year, my small startup has been able to develop and operationalize[2]:

1. **Global weather forecasts** that outperform the equivalent ECMWF and NOAA forecasts
2. **US Regional Rapid-refresh forecasts** that outperform the equivalent NOAA forecasts
3. **Hurricane track forecasts** which are highly accurate and comparable to getting the official National Hurricane Center (NHC) forecast a day early.
4. **Specialized decision-support products** tailored to our clients' requirements, e.g., forecasting high-impact events like icing on transmission lines to improve grid security and reliability.

Crucially, all our forecasts are available hours before existing systems and these capabilities emerge from a single foundation model that has learned the integrated Earth system.

This technological leap is possible thanks to one invaluable national asset: decades of high-quality, publicly available weather data. The Aurora foundation model was the first large-scale project to combine both European and American data sources, learning to represent the full complexity of the Earth system. The key to Aurora's super performance was its architecture design that allows it to get predictably more accurate as we feed it more data and increase its size. We expect these systems to continue improving as we build a more complete digital representation of our planet, driven by advances in global observation and computing power.

We are deeply grateful for the immense effort various agencies like NOAA and NASA have put into collecting, curating, and, most importantly, making their data—from raw observations to complex reanalysis products—publicly accessible. These comprehensive datasets are the bedrock upon which the entire AI revolution in

[2] https://earth.weather.silurian.ai/

weather is being built. We must understand that for training these models, continuous, long-term data streams are essential; sporadic, short-lived missions, while useful, cannot replace the strategic value of our long-term observational infrastructure. Any reduction in this public data stream would be a direct threat to American innovation, and our ability to lead in this strategic field. We believe it should be a national priority to protect and enhance these datasets for American AI consumption.

While the technology has advanced at a breathtaking pace in the private sector, the frameworks for public-private collaboration have not kept pace. We have found some partners to be curious and interested in new technologies. However, the broader process for evaluating and integrating cutting-edge models from a small business remains slow and opaque. We developed Aurora at Microsoft, and continue with GFT at Silurian. There are a few other companies on this path. As a nation, we need a long-term scientific strategy and the operational stability that only our federal entities can provide, to keep pushing innovation forward.

Current technological shift allows us to redefine public-private partnership to better serve the nation:

- **Maintain Complementary Roles:** Effective partnerships necessitate the recognition of distinct sector strengths. Public agencies are best positioned to provide critical foundational infrastructure and essential public safety services, while private companies excel at developing specialized applications and delivering customer-focused services.
- **Enhance Data Sharing and Interoperability:** The success of foundation models depends on comprehensive, multi-domain data. Improving data sharing protocols and ensuring system compatibility through FAIR principles[3] becomes even more critical when models must learn the full Earth system.
- **Focus on Innovation Funding and Predictable Funding Cycles:** Expanding collaborative funding mechanisms through NOAA can significantly drive innovation across governmental entities, academic institutions, and the private sector.
- **Enable Rapid Application Development:** Foundation models allow quick adaptation to new applications without building new models from scratch. NOAA's investments here can deliver rapid development of applications in key risk areas—from wildfire smoke to atmospheric rivers to grid resilience.

[3] Set of guidelines for making data findable, accessible, interoperable, and reusable (FAIR)

- **Adopt Benefit-to-Investment Criteria:** Innovation in the private sector stems from a larger tolerance for risk, which yields potentially higher benefits.

This leads me to the core of my testimony. To reclaim and extend U.S. leadership, NOAA should evolve from being the primary *producer* of all forecasts to being the primary *enabler and validator* of a competitive, innovative national ecosystem. We must create pathways that leverage the unique strengths of American businesses: our agility, our appetite for risk, and our ability to rapidly develop and deploy new capabilities. Otherwise, we risk falling behind other players.

We propose a forward-looking strategy for partnership built on three key pillars:

1. Empower Innovation through Modernized Partnership and Funding Models: The traditional government contracting process is often too slow to keep pace with AI development. We recommend the Committee direct NOAA to create and expand agile mechanisms specifically designed to engage small, innovative technology companies. This includes expanding programs like Small Business Innovation Research (SBIR) for high-reward modeling projects and, more critically, creating clear ''on-ramps'' so that proven technologies from small businesses can be rapidly integrated into NOAA's operational suite. A single foundation model investment can quickly deliver value across multiple domains, and we must shorten the time it takes to get these tools to the American people.

2. Establish a National Weather Model Testbed: To create a truly competitive ecosystem, innovation must be measured objectively. We urge you to **direct and fund NOAA to establish a public, standardized, and operational framework for the evaluation of integrated Earth system models.** This testbed is not just a report card; it is the foundation of trust and the level playing field upon which innovators compete. It allows agile companies like ours to prove our value on equal footing and gives NOAA the confidence to adopt the best-in-class technologies, regardless of their source. It transforms NOAA's role into the world's gold-standard validator, which is a position of immense strategic importance.

3. Protect and Enhance Our National Data Infrastructure: This is the non-negotiable foundation for the other two pillars. The AI revolution is built on data. AI models learn from historical patterns spanning decades. Before retiring sensors with vast historical archives, the AI community needs to be engaged to understand data continuity requirements. We must continue to treat our nation's environmental data

archives—stewarded by NOAA, NASA, and others—as a strategic national asset. We urge the Committee to ensure these public data streams are robustly protected, modernized for AI consumption, and remain openly and freely accessible to fuel American innovation.

We are at a pivotal moment. The technology to deliver dramatically better weather and environmental forecasts exists today, and it is improving at an exponential rate. The question before us is not about technology, but whether America will lead this transformation. Will we remain tethered to an old paradigm where progress is slow and risk-averse? Or will we embrace a new, collaborative model where the government empowers a dynamic ecosystem of innovators—a model where NOAA sets the standard and leverages the speed and creativity of American businesses to solve the nation's most pressing environmental challenges?

By modernizing partnership pathways, establishing NOAA as the world's gold-standard validator, and protecting our public data, we can unlock the full potential of American ingenuity. The same AI revolution that transformed language understanding through ChatGPT is now ready to transform our understanding of the Earth itself to build a more resilient and prosperous future for all.

Thank you. I welcome any questions you may have.