

# **Catalyzing Collaboration Over Competition: A Pan-American Science Diplomacy Framework for Developing AI Solutions for Climate Change in the Americas**

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## **Abstract**

As the dual crises of climate change and rapid artificial intelligence (AI) development converge, the Americas stand at a critical juncture. While AI offers transformative potential for climate mitigation and adaptation, ranging from advanced environmental monitoring to smarter disaster response, nationalistic policies and fragmented data governance threaten to undermine regional and global progress. This article proposes a Pan-American Science Diplomacy Framework designed to catalyze collaboration over competition in developing AI solutions for climate change. Drawing on comparative analyses of the United States, Canada, Brazil, and Chile, we highlight both the strengths and limitations of current national approaches to AI and climate action. We argue that harmonizing data standards, sharing infrastructure, and fostering inclusive governance, particularly by integrating Indigenous and local knowledge, are essential for equitable and effective AI-driven climate solutions. The framework centers on four pillars: infrastructure, data, talent, and governance, emphasizing the need for interoperable data protocols, pooled resources, and trust-building mechanisms. By leveraging existing regional institutions and diplomatic platforms, the Americas can model a new era of science diplomacy that accelerates innovation, bridges capacity gaps, and ensures that the benefits of AI for climate action are shared equitably across the hemisphere.

Keywords: Science Diplomacy, Artificial Intelligence, Climate Change,

Artificial intelligence (AI) technology has come a long way from recognizing cats and dogs to uprooting modern culture and influencing policy. Recent advancements in natural language processing and machine learning have led to advanced chatbots and generative media tools. Confronted with an unprecedented technological landscape, the promise of dual-use AI technologies is complicated by increasingly protectionist and nationalist postures (Lawrence & Seger 2024). The result? A divide between nationalistic priorities and international collaboration, resulting in exacerbating geopolitical tensions, further hindering joint scientific ventures. It is against this backdrop that policymakers must strive for global cooperation by leaning on the soft power of science diplomacy to broker collaborations in the face of global challenges that *require* multilateral collaboration.

Given differential capacities of nations, diverse stakeholders, and competing business interests, the increasing pressure of global climate change is driving multilateral action. AI technologies have the potential to address and scale climate solutions globally, advancing mitigation and adaptation actions. There are promising AI technologies being applied in the climate space, such as utilizing AI deep-learning to develop detailed maps to monitor and model environmental changes (Hartley 2021) and assessing damage from increasingly frequent natural disasters to aid in emergency response and infrastructure preparedness (Ashby 2023). Many of these AI technologies require multi-stakeholder collaborations across national and continental boundaries. However, often lost in this discussion is the need for a globally equitable and diplomatic approach to leverage AI innovations for climate solutions. The Americas can provide a model framework for international collaboration on AI, given the robust yet imbalanced access to AI technology and data, interconnected environmental and political ecosystems, and established diplomatic relationships.

### **AI for Climate Solutions**

On one hand, AI has the potential to help develop the tools necessary to address the multifaceted challenges of climate change. Among its most promising applications are the discovery of new materials for renewable energy and energy storage, the development of smart electric grids, and the integration of renewable sources into existing infrastructure. AI also enhances our ability to model and predict climate impacts, support emergency response systems, and analyze vast and complex environmental datasets. These capabilities can significantly increase energy efficiency and improve decision-making at local, national, and global levels.

Conversely, the deployment of AI in climate contexts is not without risks. That is, the energy demands for AI could be so extreme that AI adoption accelerates climate change. For example, the energy consumption associated with training and operating large-scale AI models can be substantial, potentially offsetting some of the environmental gains. Even if demands are met with renewables or nuclear energy, there are still concerns about the development of relevant and accurate climate foundation models. AI models are only as accurate and comprehensive as the

data they are trained on, so it goes to reason that an effective global model will need high-quality global training data, as inaccurate or incomplete models may lead to mistrust, misinformed policies, and wasted resources. Furthermore, proprietary models and data silos can hinder the equitable sharing of actionable insights, particularly with communities most affected by climate change.

A critical challenge lies in the need for real-time, on-demand data sampling across diverse geographies to ensure models remain accurate and up to date. This will require robust international collaboration frameworks, which are currently underdeveloped. Moreover, the lack of standardized data protocols – both nationally and internationally – complicates efforts to harmonize AI-driven climate initiatives. Addressing these issues through science diplomacy will be essential to ensure that AI contributes meaningfully and equitably to climate resilience worldwide.

### **Science Diplomacy in North-South Contexts: Opportunities and Challenges**

Growing nationalism and isolationism surrounding critical technologies have amplified the need for science diplomacy, particularly in North-South contexts. Science diplomacy can bridge geopolitical divides by fostering collaboration on global challenges such as climate change, biodiversity, and sustainable development. However, common challenges hinder its effectiveness. These include entrenched inequalities, national data sovereignty, and the lack of trust between nations. Developing countries often face limitations in international negotiations due to disparities in scientific capacity, funding, and institutional support. Additionally, conflicting national priorities, such as nation states' focus on domestic security and economic interests, can overshadow broader collaborative goals.

Collaboration is further complicated by technical barriers such as the absence of universal data frameworks and interoperability standards. Without standardized protocols for data sharing and integration, scientific ventures struggle to align methodologies and mitigate inconsistencies. Differential capacities within regions exacerbate these challenges; nations with varying goals and resources may find it difficult to harmonize efforts toward shared objectives.

Moreover, the inclusion of diverse stakeholders, such as Indigenous communities, adds complexity but also immense value. Indigenous knowledge systems offer holistic perspectives that complement modern scientific approaches. Meaningful engagement requires overcoming systemic biases and ensuring equitable decision-making power for Indigenous communities. To address these barriers, science diplomacy frameworks are helpful by aligning global priorities with national policies, prioritizing trust-building mechanisms and fostering interdisciplinary approaches that integrate diverse knowledge systems.

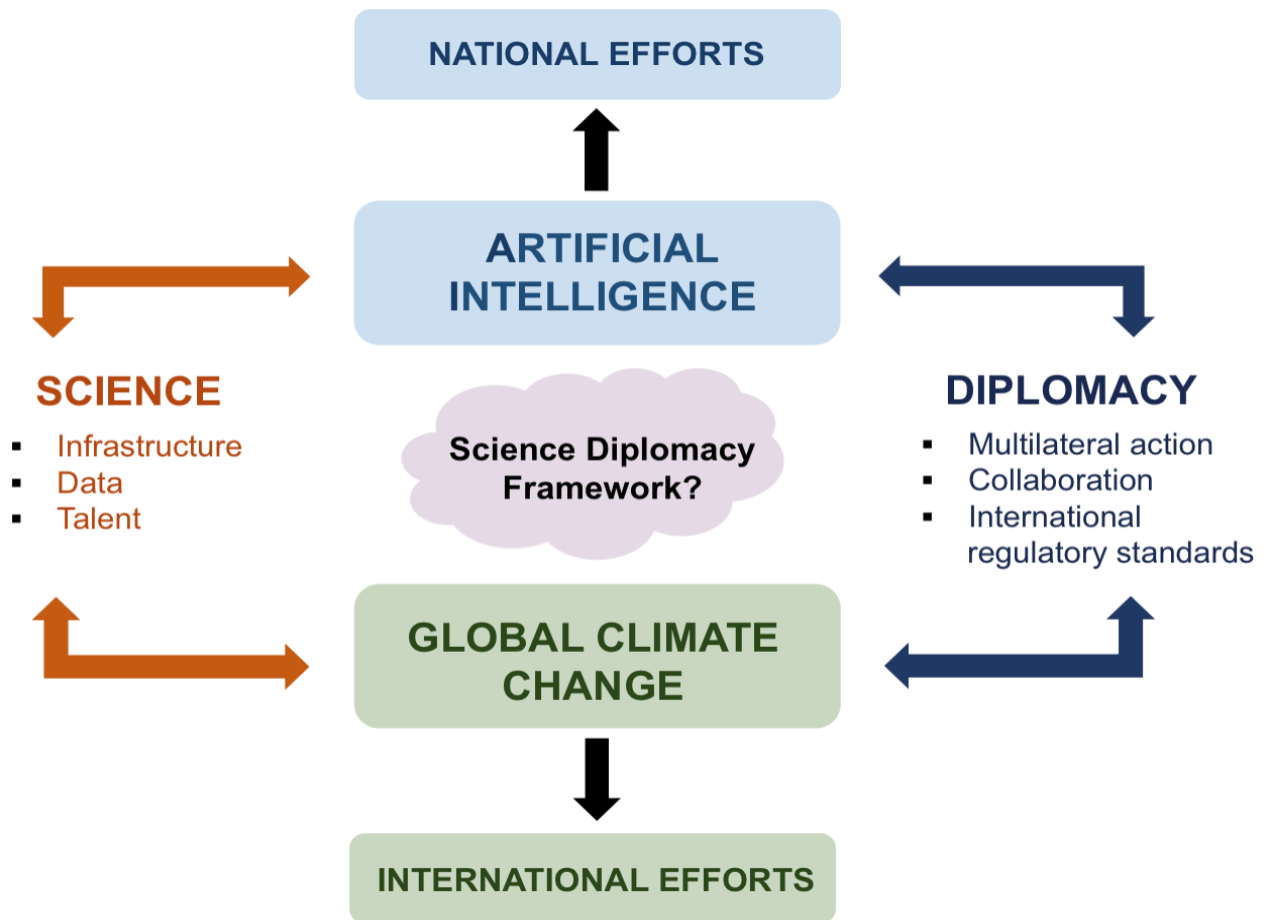


Figure 1: Science diplomacy framework combines the essential features of scientific capabilities (infrastructure, data and talent) with diplomacy (multilateral action, collaboration and international regulatory standards) to address issues in global climate change, despite national and international efforts in opposite directions.

### Why the Americas?

The Americas present a unique opportunity for regional science diplomacy due to shared vulnerabilities and interdependencies. Both North America and Latin America and the Caribbean (LAC) face common threats such as climate-related disasters, pandemics, and environmental degradation. Migration patterns and ecological linkages further link the regions, creating human and environmental connections that transcend national borders.

Regional collaboration offers mutual benefits. North America possesses advanced technological infrastructure and research capacity, while LAC holds rich biodiversity, valuable environmental data, and significant renewable energy potential. These complementary assets can be leveraged through coordinated efforts to develop AI-driven climate solutions. Moreover, existing political

and institutional frameworks, such as the Organization of American States, the Inter-American Institute for Global Change Research, and the Community of Latin American and Caribbean States, can serve as platforms for fostering regional cooperation.

Ultimately, resilience in the face of climate change and other systemic risks requires coordinated action. Regional science diplomacy can facilitate the sharing of resources, harmonization of data standards, and joint development of technologies, ensuring that all countries, regardless of size or capacity, can contribute to and benefit from collective solutions.

## Stakeholder Analyses

### STRENGTHS

(Internal aspects that make your proposal strong)

- Timely topic given the international interest in AI;
- The intersection with climate change aligns with the IAI's objectives;
- AI can (potentially) address many data integration challenges across the region - and offer opportunities to monitor and address climatic shifts.
- The field is nascent enough that this is the correct time to be discussing where AI efforts should be focused to actually have impact in the space

### WEAKNESSES

(Internal aspects that make your proposal weak)

- The impacts of artificial intelligence have primarily been a priority for North Americans, and less so in the LAC countries;
- LAC countries might not possess the capacity to compete within the AI space;
- AI utilizes significant energy, which may have climate change implications.
- Less understanding of the tangible

### OPPORTUNITIES

(External aspects that may positively affect your proposal)

- There hasn't been too much analysis in this area so far;
- A science diplomacy framework could foster collaborations between countries in the Americas;
- Beyond nationalistic focus, AI could be a tool for capacity building and consensus formation in this context of climate change.

### THREATS

(External aspects that may negatively affect your proposal)

- The impacts of artificial intelligence have primarily been a priority for North Americans, and less so in the LACs;
- Isolationist and protectionist political inclinations might pose a threat against international collaborations.;
- How to bridge the digital divide between developed and developing countries;
- How does energy consumption from data servers counterbalancing emission reductions resulting from AI?
- There is significant public opposition to both climate change and AI, so combining them could be even less popular

Name of the stakeholder	Importance (high / medium / low)	Influence (high / medium / low)	Specific aspects about the stakeholder
National Economic Development agency (ISED in Canada), Environment and Climate Change Canada	Medium	Medium	Likely to be involved in monitoring the development of AI policy and AI-related companies
National Environmental Protection agency (USA)	High	Low	Within the USG they are a small voice, and in the AI conversation they are basically silent. Threading the needle on who in the USG is involved and who will lead is incredibly difficult.
Department of Energy (USA)	Medium	Medium	Have extensive work already on climate modeling through work with NOAA and NSF. They are one of the only places in the USG with access to the compute necessary for this detailed of a foundation model. They don't have a written climate equity though.
Data server corporations	Low	Low	Data servers require significant energy demands, and sharing of data across international borders may be subject to international data sharing regulations.
AI analytic corporations	Medium	High	AI corporations are generally looking at opportunities for financial gain, and this isn't necessarily a lucrative opportunity; however, their tech and buy-in will be

			necessary for progress as the thought is one country's government shouldn't be sole owner of this type of model.
Corporations that can benefit from enhanced climate data analytics (e.g. renewable energy sector, agri-food sector)	High	High	Policy tends to follow the money and if more industry was pushing for action on AI and climate change, action could follow. Companies could also more easily work across borders than governments possibly.
Indigenous communities From the USA, Canada and the LAC countries	High	Low	They have knowledge that could theoretically be data to train these AI systems, but it is unlikely these communities are even thinking about AI for climate change
General Public	Low	Low	Climate change is going to impact everyone, but there is not unified public opinion on climate change or AI for that matter. They could be very powerful if there was a public outcry/demand for this kind of technology, but that is incredibly unlikely
Intergovernmental bodies (IAI, UNESCO)	High	High	While these bodies don't have the teeth to enforce collaboration on the development of AI for climate change, they have a history of convening the right people to make progress on issues of scientific collaboration. A big concern is that their members/stakeholders are not the ones with AI expertise (even if they are climate experts)
Academia/LAC academia	High	Low	A lot of the useful datasets and analyses (as well as the labor) could come from academia, but they are pretty federated. Could be best to engage through professional societies.

### **Current Landscape: A Case Study of United States, Canada, Brazil, and Chile Approaches to AI and Climate Action**

A comparative analysis of the United States, Canada, Chile, and Brazil reveals both the diversity and complementarity of national approaches to AI and science diplomacy in the context of



climate action. While each country has made significant strides in developing AI strategies and engaging in international scientific cooperation, efforts remain largely fragmented and nationally focused, underscoring the need for a coordinated regional framework.

The United States has established a strong national AI strategy, exemplified by the Global AI Research Agenda and the Presidential Guidance on AI Innovation. These initiatives emphasize U.S. leadership and security, reflecting a selective approach to global engagement. The country benefits from world-class computing infrastructure, a deep talent pool, and robust industry partnerships. However, challenges persist in data standardization and coordination across its federated system, which can hinder cohesive international collaboration.

Canada has developed a robust AI ecosystem, supported by a national AI strategy and the proposed Artificial Intelligence and Data Act. It actively participates in international initiatives such as the Global Partnership on AI and maintains strong bilateral relationships.

Canada's strengths lie in its research infrastructure, standardization efforts, and AI talent. Recent policy updates, such as the creation of the Canadian AI Safety Institute and new guidance on generative AI and privacy, demonstrate greater integration into public policy and improved national coordination on data governance, although full implementation of these frameworks is ongoing.

Chile stands out for its strong public sector leadership and commitment to ethical AI, being the first country to complete UNESCO's AI Readiness Assessment. Its national AI policy and legislative efforts reflect a commitment to multilateralism and public sector leadership. However, Chile faces significant constraints in infrastructure and economic capacity, limiting its ability to scale AI initiatives independently.

Brazil has articulated an ambitious vision through its National AI Strategy and the 2024–2028 Strategic Plan for Artificial Intelligence. The country is investing in AI technologies and engaging in legislative discussions to shape its AI governance. Brazil's strengths include its large population, biodiversity, and growing innovation ecosystem. Yet, its strategy lacks clear targets, formal governance structures, and mechanisms for monitoring and evaluation, which could impede effective implementation.

Each of these countries brings unique strengths to the table. The United States offers technological scale and global influence; Canada contributes research excellence and ethical leadership; Chile provides governance innovation and access to critical environmental data; and Brazil brings demographic scale, ecological diversity, and growing innovation capacity. However, these strengths remain siloed in the absence of a coordinated science diplomacy framework.

A coordinated approach may unlock synergies by harmonizing data standards, enabling shared infrastructure for climate modeling, and fostering inclusive governance that integrates Indigenous and local knowledge systems. Such a framework would not only enhance the effectiveness of AI-driven climate solutions, but also build trust and capacity through equitable partnerships. In this context, the total is indeed greater than the sum of its parts.

### **A Pan-American Science Diplomacy Framework on AI for Climate Change**

Our world is experiencing significant geopolitical shifts, including technological advancements, increased securitization of science, rising nationalism, misinformation, and conflicts between nations. These dynamics necessitate a reimagined approach to science diplomacy that can navigate these complexities and foster open, trusted international collaboration. In an era of such turmoil, the Americas could set an example of global science diplomacy leadership through a Pan-American Framework for AI. Core principles guiding this framework may include:

1. Collaborative Innovation: Partnerships across government, industry, and academia, with targeted funding for research in key sectors like healthcare and climate science.
2. Readiness and Capacity: Focus on equipping public servants and policy makers with the necessary AI specific training tools, data, and skills for secure AI use.
3. Responsible Governance: New regulatory measures require risk assessments, transparency, public feedback channels, and oversight to protect against AI-related harms.
4. Human-Centred Design: AI must enhance accessibility, fairness, inclusivity, and respect human rights, with rigorous audits to prevent bias.

Given the above backdrop, a universal data framework, interoperability of data and mitigation strategies are required. There are four enabling pillars necessary for the development of AI foundation models for many applications including climate change that are opportunities for international collaboration: *infrastructure*, *data*, *talent*, and *governance*. While each pillar may have a pre-existing focus at the national level, unilateral AI model development and deployment will be insufficient and ineffective to tackle global climate change.

*Infrastructure* refers to the compute power necessary to digest enormous datasets for the building and continuous training of AI foundation models. There is a disparity in access to computing resources that power AI, with Canada and the U.S. leading the field in investments and their less resourceful allies, such as those in Latin America and the Caribbeans, falling behind (Indice latinoamericano de inteligencia artificial n.d.; Tortoise n.d.; Samar et al. 2022). Cloud computing offers a potential method for countries with greater computing/computational resources to support their international allies; however, without formalized resource pooling, this could be a prescriptive process as resource-laden countries choose whom to share with.

The foundation models that identify, track, and effectively react to climate change will require diverse and detailed *data* that capture the complexity of global climate and its impact. Data from every region (country, locality, and community) is valuable and critical as increased data granularity can lead to improved outcomes, as was shown during the COVID-19 pandemic response (Dong et al. 2020). Nations should collect and contribute data to shared and accessible repositories that will train foundation models, but international data and metadata standards must be established and adopted to ensure data interoperability and usability.

Collecting, aggregating, and utilizing robust data requires financial resources and, importantly, human capital or *talent*, to which certain countries like Canada and the U.S. have better access to (Tortoise n.d.). Most government AI strategies in Latin America prioritize the development of local AI talent and many private companies are stepping up to provide the necessary training and upskilling (Patel et al. 2022). While democratizing compute resources may be complex, unifying access to AI talent to develop these models and standardizing the data that powers AI may be possible via non-governmental organizations, international bodies, and formal international partnerships. To foster the next generation of AI leaders, global research funders could also facilitate joint funding partnerships. Individual efforts are also underway to democratize access to AI expertise and training (National Science Foundation n.d.), but these opportunities could be made more available internationally.

Lastly, to ensure that AI is used responsibly to tackle climate change, nations must commit to comparable and compatible tenets of safe and responsible development through shared *governance*. In addition to ensuring AI is developed responsibly, there must be international agreements established regarding intellectual property and the mechanisms of international research collaboration, especially with the necessary involvement and support of large multinational corporations. For example, there are a multitude of international safety standards for nuclear technology that significantly disrupted diplomatic relations. Similarly, the United Nations is actively working towards a treaty on pandemic prevention and pathogen monitoring (World Health Organization 2024).

## SOLUTION: PAN-AMERICAN FRAMEWORK

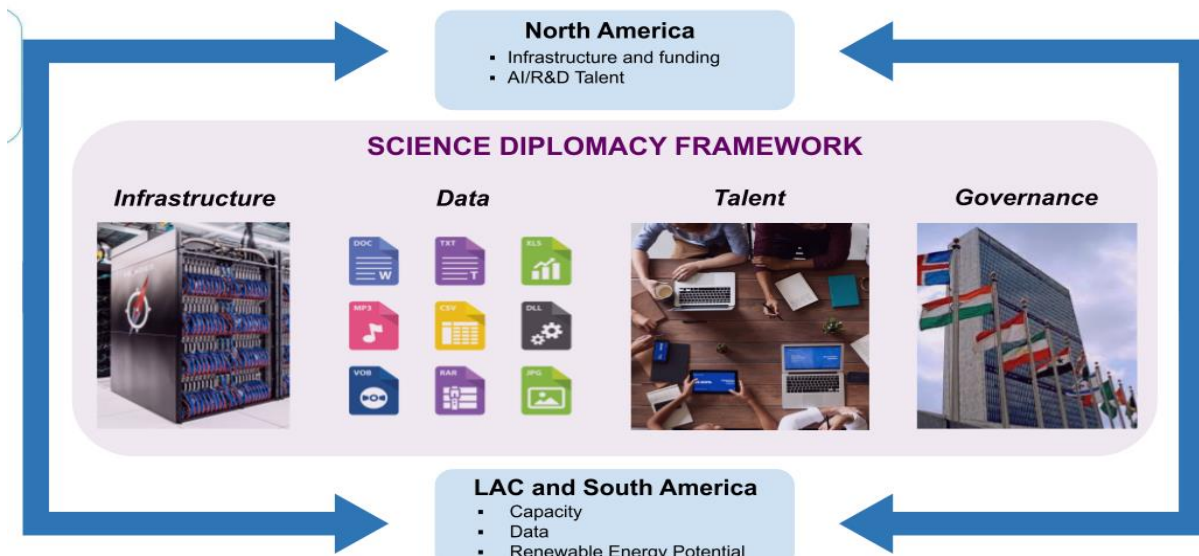


Figure 2: The proposed science diplomacy framework centers on four pillars of infrastructure, data, talent, and governance, emphasizing the need for interoperable data protocols, pooled resources, and trust-building mechanisms between the two regions of North America and LAC and South America.

### Some considerations

- Different Security Concerns of Countries in the Western Hemisphere:** Diverse National Priorities and Geopolitical Tensions: Countries in the Americas face distinct security concerns shaped by their geopolitical contexts. The United States emphasizes technological leadership and national security in AI development, reflecting a protectionist stance that can limit international cooperation. Latin American countries, such as Brazil and Chile, focus more on governance, ethical AI, and leveraging biodiversity and environmental data for climate resilience. These differences create a fragmented security landscape where national interests sometimes overshadow collaborative climate goals.
- Data Sovereignty and Infrastructure Disparity:** A significant security concern is national data sovereignty, where countries prioritize control over their data, limiting cross-border data sharing essential for AI-driven climate solutions. This sovereignty, combined with unequal scientific capacity and infrastructure, especially in Latin America and the Caribbean (LAC), exacerbates mistrust and hinders joint efforts. The disparity in computing infrastructure and talent between North America and LAC countries poses security and capacity challenges. Countries with less access to AI infrastructure risk

being left behind in climate adaptation and mitigation, potentially increasing regional vulnerabilities

### **Ushering a New Era of Diplomatic Collaborations on Critical and Emerging Technologies**

Over the last two decades, there have been major advancements and changes in both the scientific and policy realms. The unique characteristics of critical and emerging technologies like AI pose several novel challenges, as international regulators must grapple with its expediency, urgency, and disruptive potential across sovereign national, regional, and international boundaries. As such, diplomacy for science frameworks must evolve to remain responsive to the new era of critical and emerging technologies. There is a need for multilateral, multi-stakeholder regulation to promote responsible development and deployment of AI, which is in stark contrast to the current individual, nationalistic efforts around AI development. The need for a global framework for collaborations around AI is warranted, and this article explores and proposes a potential model.

A novel Pan-American Framework would enable leveraging AI for climate diplomacy across the Americas, facilitating AI for real-time data analysis for disaster prediction and preparedness, modeling, and forecasting to support climate negotiations, and policymaking. This is a unique opportunity for countries across the Americas to co-develop AI governance and utilization approaches by overcoming challenges arising from North-South power asymmetry, infrastructure, talent, capacity imbalances, and differences in regional needs. This collaborative platform is needed to foster international partnerships in the pursuit of addressing climate change for which unilateral action will be insufficient and ineffective.

Crucial lessons can also be drawn from recent efforts of national AI Safety Institutes (Government of Canada 2024). Alas, these efforts are almost solely driven by advanced economies, and nationalistic desires are still driving action (Government of United Kingdom 2023). To establish an effective science diplomacy framework on AI and climate change, collaboration ought to be driven by or hosted within a new or existing science diplomacy organization that has the authority and expertise to engage with the private and public sector entities critical to this effort. Science diplomacy facilitates the integration of North America's technological infrastructure with Latin America's rich biodiversity and environmental data, fostering equitable partnerships that maximize regional assets. Establishing a Pan-American platform for sharing data, AI models, and best practices can democratize benefits and foster innovation. This platform would require formal agreements and trust-building mechanisms, which science diplomacy is uniquely positioned to negotiate. Negotiate agreements that respect national data sovereignty but enable data pooling under agreed protocols to enhance AI model accuracy.

Global cooperation around AI technology development and deployment is needed to help promote trust, transparency, safety, and common ethical standards to facilitate collaborations across borders. AI will not be the last emerging technology that requires global collaboration. As we continue to face humanity's greatest challenges, the proposed framework serves as a model for future international engagements on critical and emerging technologies. The analysis presented above shows that science diplomacy is essential to harmonize diverse security concerns and climate understandings in the Western Hemisphere by fostering equitable, inclusive, and coordinated AI-driven climate solutions. The "how" lies in building shared infrastructure, data standards, talent networks, and governance through trusted diplomatic channels that bridge national divides and empower all stakeholders.

## References

1. Lawrence, David., Seger, Elizabeth. 2024. GB Cloud: Building the UK's Compute Capacity. *Day One*, May 20, 2024. Available at: <https://ukdayone.org/briefings/gb-cloud-building-the-uk-s-compute-capacity>
2. Hartley, Kimberly. 2021. Reveal: Seeing Near Real-time Changes on Earth with New AI Map. *Esri Blog*. August 26, 2021. Available at: <https://www.esri.com/about/newsroom/blog/seeing-near-real-time-earth-change>
3. Ashby, Steven. 2023. PNNL Researchers Using AI to Aid Disaster Response and Recovery. *Pacific Northwest National Laboratory News Release*. September 25, 2023. Available at: <https://www.pnnl.gov/news-media/pnnl-researchers-using-ai-aid-disaster-response-and-recovery>
4. Indice latinoamericano de inteligencia artificial, n.d. Latin American Artificial Intelligence Index. Accessed June 28, 2024. Available at: <https://indicelatam.cl/home-en/>
5. Fatima, Samar., Dawson, Gregory., Desouza, K., Denford, J. 2022. How Countries Are Leveraging Computing Power to Achieve Their National Artificial Intelligence Strategies. *Brookings*, January 12, 2022. Available at: <https://www.brookings.edu/articles/how-countries-are-leveraging-computing-power-to-achieve-their-national-artificial-intelligence-strategies/>
6. Tortoise, n.d. The Global AI Index. Accessed March 1, 2023. Available at: <https://www.tortoisemedia.com/intelligence/global-ai/>
7. Dong, Ensheng., Du, Hongru., Gardner, Lauren. 2020. An Interactive Web-based Dashboard to Track COVID-19 in Real Time. *The Lancet*, 20 (5), 533-534. [https://doi.org/10.1016/S1473-3099\(20\)30120-1](https://doi.org/10.1016/S1473-3099(20)30120-1)
8. Patel, Aadit., Bahsen, Alejandro., Espanol, Armando., Santiso, Carlos., Mont, Constanza., Campero, Christina., Guridi, Jose., et al. 2022. Seizing the opportunity: the future of AI in Latin America. *Economist Impact*, May 23, 2022. Available at: <https://impact.economist.com/perspectives/sites/default/files/seizing-the-opportunity-the-future-of-ai-in-latin-america.pdf>
9. National Science Foundation, n.d. National Artificial Intelligence Research Resource Pilot. Accessed March 1, 2023. Availabl at: <https://new.nsf.gov/focus-areas/artificial-intelligence/nairr>
10. World Health Organization. 2024. WHO Member States Agree Way Forward to Conclude Pandemic Agreement. *WHO News Release*, May 28, 2024. Available at: <https://www.who.int/news/item/28-05-2024-who-member-states-agree-way-forward-to-conclude-pandemic-agreement>
11. Government of Canada. 2024. Seoul Declaration for Safe, Innovative and Inclusive AI by Participants Attending the Leaders' Session of the AI Seoul Summit, 21st May 2024. Available at: <https://www.pm.gc.ca/en/news/statements/2024/05/21/seoul-declaration-safe-innovative-and-inclusive-ai-participants-ai-seoul-summit>

12. Government of United Kingdom. 2023. Prime Minister's Speech on AI: 26 October 2023. Accessed August 9, 2024. Available at:  
<https://www.gov.uk/government/speeches/prime-ministers-speech-on-ai-26-october-2023>