

# PLANETARY COUNTER SIMULATION

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# INTRODUCTION

In January 2023, a surveillance balloon was detected floating above North American airspace. After several days of drifting and a flurry of apprehension, panic and indecision in the media, the United States alleged the balloon was a tool of Chinese military reconnaissance and shot it down. In response, Chinese authorities maintained that the balloon was conducting scientific research and had accidentally blown off its intended course. The incident further exacerbated the already strained relations between the two countries.

Even if the balloon was relatively innocuous, it would be a mistake to assume its nature was apolitical. The ambiguity surrounding its purpose and the resulting mix of anxiety, indecision and ambivalence it inspired are symptomatic of the broader context of **planetary counter-simulation**. The balloon, like satellite constellations, is one in a long series of astro-political artifacts deployed by nation states to reveal and understand the complex processes of the planet and the political entities that pattern its surface.

This event revealed a prevailing geopolitical reality in which nations continuously collect information to model each other's resources, strengths, vulnerabilities, and future actions. At the same time, governments assert that sovereignty implies the right to maintain secrecy. Airspace, imaging restrictions, and state oversight of private satellite companies attempt to limit surveillance from above.

The geopolitical sovereignty of space is the contested high ground for a new kind of planetary monitoring. Considered in their totality, surveillance balloons, satellite systems, climate models, and global markets form an infrastructure of planetary simulation through which governments and other actors attempt to model and mold complex processes far too large and distributed to be analyzed directly.

As these overlapping efforts at modeling and obfuscation feed back into each other, simulation inevitably begets counter-simulation: a set of techniques and strategies for the distortion or disabling of a simulated space.

# SIMULATION AND COUNTER-SIMULATION

Computational, biological, and political agents alike build models of reality to perceive the present and anticipate future action. From predator-prey dynamics amongst animals, to competition and coordination between humans, to large-scale governance systems, dynamics of counter-simulation are an inevitable consequence of multiple actors simulating the same world at once.

For animals, attempting to flee from predators is always an option, but exploiting the vulnerabilities in an adversary's mental model is often more effective. Behavior is hidden behind camouflage, and senses are jammed. For humans, counter-simulation techniques are used to confuse and undermine surveillance. Across geopolitical and economic contexts, counter-simulation is used to contest authority and gain strategic advantage. Tracking algorithms are dazzled and confounded by denial-of-service attacks. Decoys are built to distract attention and hide in plain-sight. Misinformation campaigns proliferate across the landscape, and simulations are hacked to distort worldviews.

If we are to contend with world-systemic problems such as pandemics and climate change, planetary simulation remains a necessary task beyond the parochial interests of geopolitical actors. Nevertheless, competing planetary simulations will inevitably be inflected by the same dynamics.

In matters of public health, such as air pollution, regulatory bodies use simulations to form policies and design systems for compliance and enforcement. In 2014, the EPA discovered a discrepancy between the toxic emissions produced by Volkswagen cars during testing, and their actual emissions under real-world driving conditions. The vehicles contained software that functioned as a defeat device, sensing when it was within the simulated environment of the EPA tests and adjusting performance to reduce emissions of nitrogen oxide. Upon entry into the real world, the software would reconfigure the cars to improve torque and acceleration at the expense of public respiratory health. By deliberately misleading the simulations of the EPA, Volkswagen's "Dieselgate" scandal is emblematic of counter-simulation across geopolitical boundaries.

As our use of technologies that shape our understanding of reality and predict the future increases, counter-simulation arises as a potent set of techniques meant to disrupt and subvert these efforts. This interplay underscores the intricate relationship between constructing representations and the forces that seek to dismantle or manipulate them.

# THE EMERGENCE OF PLANETARY SIMULATION

In 1972, the USSR quietly purchased about one-fourth of the U.S. wheat crop at a bargain price. They exploited a lack of real-time global commodity tracking and limited American knowledge about the severe drought plaguing the Soviet Union, a move later dubbed the "Great Grain Robbery". This historic event accelerated the implementation of global agricultural surveillance, building upon advancements in planetary satellite simulations that could provide accurate and timely data on worldwide crop yields, weather patterns, and commodity flows to prevent such blindsides in the future.

The Great Grain Robbery also illuminated how information asymmetry could be leveraged as an instrument of power – predicting and strategically exploiting global patterns before they become apparent to others. As a result of the urgency to acquire more accurate information at large scale, space emerged as the ultimate high ground for planetary sensing to power simulations, offering an unobstructed, comprehensive view of the Earth's conditions.

The deployment of satellites like LandSat allowed for the collection of diverse, continuous data streams of weather patterns, vegetation health, and human infrastructure, effectively transforming space into a sophisticated sensing apparatus. These observations offered unprecedented insights into global climate systems, trends, and anomalies, providing vital information for environmental policy, and our overall understanding of Earth's complex climate system. This knowledge could only have been acquired through the use of planetary simulations. As remote sensing made it possible to comprehend the Earth as a planetary system, it also revealed the potential for leveraging the same space technologies for scientific and geopolitical influence.

# GOVERNANCE AS SIMULATION

As the world grows increasingly complex and interconnected, effective governance is now contingent on complex simulations of global systems. Simulations are not only a tool for sense-making, but an algorithm for creating policy, redistributing resources, and managing trade-offs.

To govern by simulation, governments must minimize distortions in their sensing apparatuses. As such, states seek to limit counter-simulation within their populations and markets, as well as from other geopolitical rivals. However, police forces, intelligence agencies, and diplomatic entities are all engaged in constant counter-simulation: shielding the intentions of the state, and punishing actors who leak classified information or evade legal restrictions on sensing.

And so states assert their own right to perform counter-simulation, arguing that the demands of geopolitical sovereignty require governments to shield and manipulate information to distort the models of other nations. In this way, they claim a monopoly on the legitimate use of counter-simulation.

# MODES OF PLANETARITY

Planetary counter-simulation can be considered in three modes: the patchwork simulation of markets aggregating localized information to gain competitive advantage, the governing models of nation-states simulating both domestic conditions and the potential futures of their counterparts, and coordinated, singular planetary simulations that extend beyond geopolitical boundaries, such as climate science and epidemiology.

In each domain, the game of simulation and counter-simulation has different inflections, but the stakes are ultimately about governance and sovereignty: who is able to maintain accurate pictures of reality, who can act on those pictures, and who can distort the simulations of other actors to their own advantage.

# PATCHWORK SIMULATIONS

Global markets incentivize a patchwork of institutions and proprietary actors to simulate the world in order to gain competitive advantages within it. Even the ostensibly hyper-local is already embedded within a patchwork of planetary simulations.

For example, a farmer in Ohio is getting ready to plant corn on a small farm:

- The farmer's planting schedule has been optimized based on planetary climate models powering their almanac
- His tractor applies precision fertilizer amounts based on planetary-scale simulations of weather and rainfall.
- His crop-loss insurance is priced based on planetary simulations of blight, pestilence, drought, and flood.
- His buyer is able to offer a sales contract months ahead-of-time by using planetary simulations of grain-demand across markets.

Although these individual simulations may be limited to slices of reality, when viewed in its totality, the market represents a complete, multi-layered simulation of planetary phenomena. Underneath the price of every asset, simulations of global conditions compete to predict the world. For example, a crude-oil futures contract creates an incentive structure for accurate simulations of weather forecasting, manufacturing capacity, subsurface geology, shipping demand, grid electrification and global geopolitical stability. Information ripples through the market, forming an emergent planetarity. Together, competing models by disparate economic actors, form a networked planetary simulation system that we catch glimpses of through reductive metrics such as price signals and GDP.

In general, this pressure of market competition is a double-edged sword. One might hope that the emergent patchwork planetarity of competing simulations converges on an accurate picture of the planet that could inform planetary-scale governance and coordination. However, the simulations of the market are insufficient to contend with planetary-scale problems like climate change or pandemic risk. For systemic problems of this scale, the market simulation reveals itself to be uncoordinated, headless, myopic, and fragmented, with proprietary walls blocking the information flows necessary for market solutions to emerge.

Many of these failures are due to counter-simulation pressures. While market competition produces incentives for simulating new layers of reality, it simultaneously produces incentives to counter-simulate other actors – forcing errors in their models and subsequent actions.

For example:

**Bre-X Minerals (1997):** In 1997, the Canadian mining company Bre-X claimed to have found a massive gold deposit in Busang, Indonesia. This drove their stock prices from pennies to over \$200 per share. The gold samples were later found to be fraudulent, and the company's stock became worthless.

**Enron:** In 2001, the American energy corporation Enron went bust after it was revealed that executives hid debt in complex partnerships, allowing them to pump up share prices and dump their own holdings before the company's massive accounting fraud was exposed

**Lehman Brothers (2008):** In 2008, Lehman Brothers used a little-known accounting trick called Repo 105 to move billions of dollars off its books temporarily before announcing quarterly earnings, masking its poor financial health.

Each of these examples, along with the Volkswagen “Dieselgate” scandal discussed earlier, demonstrates how the private sector distorts collective understanding to gain competitive advantages. Despite attempts to control it, layers of counter-simulation pollute the information landscape and distort the ability of both markets and the governments attempting to contain them.

# GEOPOLITICAL SIMULATIONS

Military power, human migration, economic robustness, complex networks of trade, and international relations all require planetary scale simulation. In the intricate interplay between nation-states, better simulations enable more effective projections of power in economic and military realms. More accurate simulation becomes a new kind of contested high ground from which to govern.

In this world, where out-simulating your geopolitical rivals becomes necessary to survive, pressure to counter-simulate is extreme, with governments not only competing to model the world at large, but also striving to evade the modeling efforts of others. States might obfuscate their own economic conditions whilst simultaneously deploying macroeconomic simulations in an attempt to uncover the real economic activity of other nations, or deploy military decoys while running elaborate simulations of potential invasion scenarios.

In 2011, the Iranian military seized control of an American Sentinel drone by disrupting its communications and spoofing GPS signals. The drone was deceived into landing in Iran, believing it to be its home base. By overriding true GPS signals with false ones, the weapon of war was captured and analyzed through simulative deception.

What results from these games is a lattice of conflicting models of the planet, each inflected by both the ruling dogma of its country of origin and the distortions of persistent information pollution. Thus, counter-simulation between geopolitical rivals hinders efforts to coordinate around planetary problems. Despite this, sophisticated planetary sensing systems reveal truths about our planet that we cannot ignore.

# THE SINGULAR SIMULATION

The emergence of these planetary truths via distributed and often competing planetary sensing mechanisms prompts coordination efforts to create more aligned simulations. Coordinated epidemiology, peer-to-peer digital infrastructure, and the entire project of climate science all attempt to overcome geopolitical strife and enable a single, shared operating image of the world to better deal with planetary problems like global heating and pandemics.

Still, these efforts at coordination remain plagued by the pressures of counter-simulation. For example, the Intergovernmental Panel on Climate Change, or IPCC, is the world's leading institution for planetary-scale ecological simulation. The IPCC sits at the intersection of simulation and governance – attempting to provide a complete and unbiased simulation of how the planet might transition towards a sustainable future.

To build the global simulations on the path to sustainability, The IPCC must build a shared understanding of the impact of climate policies. In doing so, it integrates economic and ecological data with planetary imaging and climate forecasting models. The deep influence of these models across law, policy, and the private sector incentivizes counter-simulation to creep back in. Within this fraught ecology of overlapping interests, counter-simulation manifests through governments withholding or manipulating climate data.

A study published in 2019 found that Brazil had underreported deforestation in the Amazon by 1,000 square kilometers, and was also accused of changing the methodology used to measure deforestation, resulting in lower reported rates.

Geopolitical strife re-emerges as nations attempt to prevent others from degrading the shared simulation, while simultaneously attempting to conceal or distort their own behavior. This tug of war produces questions about the legitimacy and objectivity of the singular simulation. If the conflicts between counter-simulators become too intense, some nations may choose to delegitimize, sabotage, or abandon the project altogether. The inescapability of counter simulation implies that ongoing and future efforts to engage with planetary problems must acknowledge this uncertainty rather than naively assume it can be assimilated into a unified representation of the planet.

# PLANETARY POLLUTION OF COUNTER-SIMULATION

While the view from above has given rise to the possibility of simulating a singular planetarity, the hypervisible Earth observed through the lens of omnipresent satellite constellations demands that the most effective way to counter-simulate is to overwhelm and decoy. With the rise of the decoys, the observable environment becomes oversaturated with information.

- Efforts to maintain biodiversity are challenged by forestry practices that prioritize deceiving remote sensing research over carbon sequestration or ecosystem preservation.
- Economic activity becomes increasingly illegible, camouflaged and dispersed among thousands of shell companies, as they endeavor to evade detection by ESG monitoring systems.
- Counterfeit military sites are staffed and duplicated across terrain to hide real locations in plain sight, while other facilities are hidden underground.
- Cryptic tax regimes are instituted within monetary policies, as governments struggle to maintain sovereignty over their own currency and accuse each other of manipulating currency prices
- Diplomats and intelligence agencies spread false narratives about political agendas and infrastructure projects, while spies simultaneously are deployed into foreign countries to try to see through the deception and understand the true negotiation space.

The proliferation of planetary counter-simulation generates noise, complicating the pursuit of precise representations of the world for all stakeholders. The ubiquity of decoys further exacerbates the challenge of discerning reality from deceptive constructs. This moment – in which our planet has become visible in totality – may be the last time Earth’s surface is legible by default: unpolluted by the pressures of counter-simulation.