June 11, 2021

The Honorable Gary Gensler
Chair
U.S. Securities and Exchange Commission
100 F Street, NE
Washington, DC 20549

Dear Chair Gensler:

This letter is submitted in response to the Request for Public Input on Climate Change Disclosures issued on March 15, 2021. AIR Worldwide appreciates the opportunity to offer our perspective as a leading provider of analytics for managing extreme event risk. Over 400 organizations rely on AIR's models and software, and our tools have become the standard through which insurers, reinsurers and other market participants assess and manage catastrophe risk - from natural and manmade catastrophes to cyber-attacks, pandemics, and climate change.

We share the goal of developing consistent, comparable, and reliable information on climate change risk. Our comments below address questions related to climate change impacts on weather events, the measurement and assessment of climate change risks, and the business decisions that climate change analytics can inform. Our primary focus is on the physical risks from climate change, based on our expertise and research on climate change and our decades of experience developing tools and helping our clients prepare for and recover from extreme events.

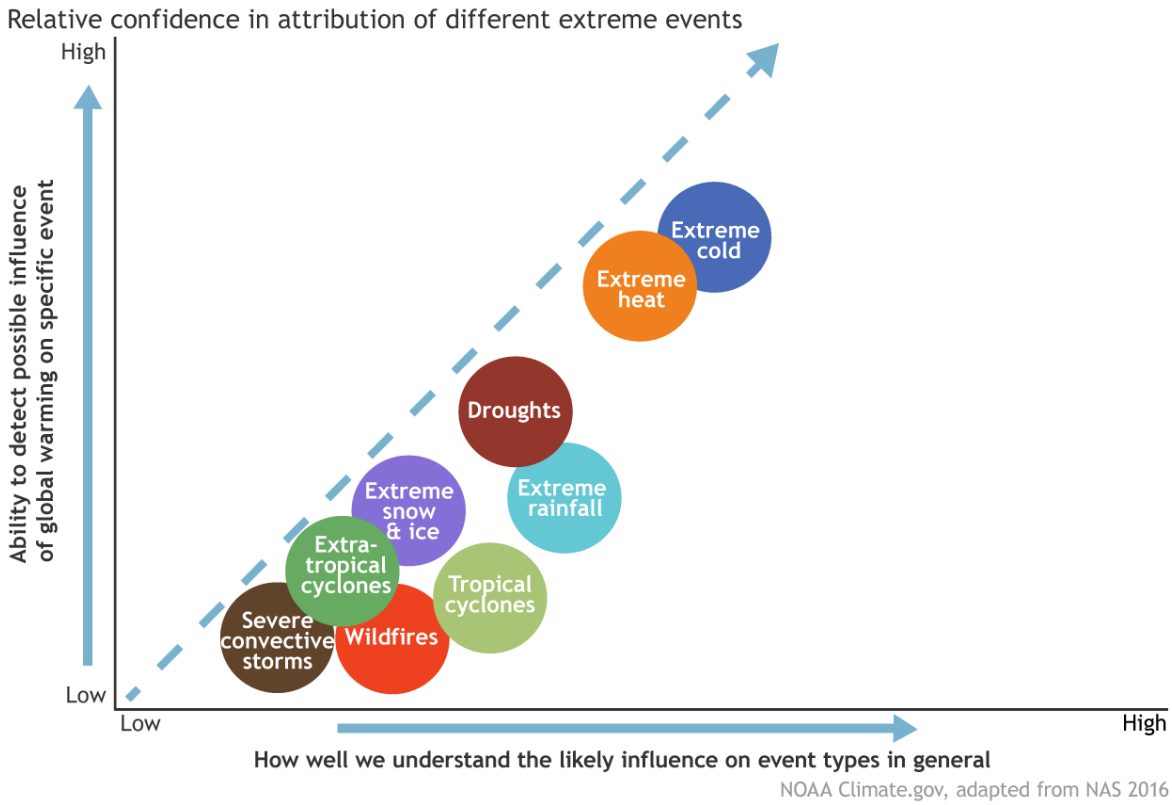
We hope that these comments will contribute to the development of guidelines for climate change disclosures, enhance the understanding of what can be quantified and measured, illustrate current methods and inform how business decisions can consider climate change risk.

Climate Change Impacts on Extreme Weather

Today, large-loss weather events frequently produce headlines attributing them to climate change, and in many cases, there is growing justification to make some connection. However, it is useful to consider the confidence with which we can assess the influence of climate change and the role of natural variability in the occurrence of these events.

Detecting and attributing climate change impacts on various weather phenomena is a relatively new branch of climate science that is growing in demand and sophistication. Attribution confidence depends on many factors, including: whether the climate models agree with each other; whether there is a detectable trend in the historical data that agrees qualitatively with the modeled future result; and how well we can physically connect and understand the modeled or observed effect of climate. The figure below shows the relative degree of confidence that climate change is impacting various weather phenomena.

The further away a type of event is from the origin, the greater degree of confidence scientists have that climate change is influencing the event. Temperature phenomena are most confidently assessed because of the direct physical connection between increasing carbon dioxide (and other greenhouse gases) and a warming atmosphere.



Relative degree of confidence that climate change is impacting various weather phenomena

There is also a high degree of confidence in the impact of sea level rise (not shown), which originates from a combination of melting glaciers and ice sheets and thermal expansion of warming seawater. Sea level rise contributes to chronic ("sunny-day") and acute flooding through coastal storm surges. Wildfires, too, are increasingly accepted to be heavily influenced by climate change and may be more confidently assessed than the graphic above implies.

There is less confidence that climate change is impacting other perils, including some of the most costly (tropical cyclones) and most frequent (severe convective storms and floods). The reasons for this low confidence include:

- The relative infrequent occurrence
- A historical record with changes in observational uncertainty over time
- The inherently nonlinear physics driving these events
- The small physical scale relative to the geographic resolution of many climate models

While an extensive discussion of individual perils is outside the scope of this response, the main point is it is important to distinguish where the impacts of climate change are most certain from those where scientists have lower confidence.

In addition, while climate change is happening, natural variability may suggest a stronger trend than what actually exists. Scientists have identified natural cycles that influence hurricane activity, for example the El Niño-Southern

Oscillation ("ENSO") and the Atlantic Multidecadal Oscillation ("AMO") as well as potential man-made influences such as sulfate aerosol pollution. Whatever the cause, the signal from climate variability may exceed any signal from climate change, at least in the short term. Thus, we should not be surprised to see periods of increased activity followed by less active periods – the most recent example being very active 2004 and 2005 hurricane seasons, with 8 hurricanes of major strength (category 3+) making landfall in the US followed by a nearly 13-year "drought" of major hurricane landfalls until Hurricane Harvey in 2017. Such periods of activity may be influenced by climate change, but other factors may play a role.

A principles-based disclosure framework should consider that while climate change will influence extreme events, the uncertainty in the models and data and likelihood of variability from one year to the next should be recognized by companies and investors alike. Market participants should evaluate longer term trends, with caution towards overweighting any one year's event activity.

Approaches for Assessing Climate Change Impacts

The challenge of accounting for climate change risk and the impact on assets and investments is driving creation of internal climate resilience expertise in some companies and spawning new solutions providers to serve them. This, in turn, results in a growing set of analytics aimed at quantifying climate change risk. The relative strengths and weaknesses of the various approaches is a topic of considerable debate[1], and below are some general observations about how climate risks can be quantified and measured.

Climate projections created by the Intergovernmental Panel on Climate Change (IPCC) are developed by models organized by the Coupled Model Intercomparison Project (CMIP). While the latest generation of climate models is increasing in sophistication, these General Circulation Models (GCMs) still only capture variables at scales which are typically not at the geographic resolution needed for business decisions and do not capture all variables of interest (e.g., two-inch hail, tornadoes, etc.). Methods aimed towards "downscaling" the results are being continuously refined, but these can introduce biases that can limit the usefulness of location-specific projections. In short, while downscaled GCM model results might be precise, they may not be accurate – particularly for extreme events.

This is not to discourage the use of models – to the contrary, climate models are valuable tools and will continue to improve over time. However, application of these tools requires detailed understanding of the science, limitations of the models, and the underlying exposures at risk in order to avoid the problem of false precision and arrive at actionable and useful information. Hybrid methods that are tied to information from the GCMs are typically required. One such approach is to use GCMs to adjust current climate frequencies and intensities of events to reflect future climate scenarios. A recent example employs this method to adapt widely used risk models from the insurance industry[2]. Other methods include coupling higher resolution models directly with GCMs or extracting statistics from GCMs to drive higher resolution models, methods that have been successfully used for tropical cyclone simulations[3]. The GCMs by themselves are generally unsuitable to quantify business-specific risks.

[1] Fielder, et. al., 2021. Business risk and the emergence of climate analytics, *Nature Climate Change* https://doi.org/10.1038/s41558-020-00984-6
[2] AIR Worldwide, 2020. *Quantifying the Impact from Climate Change on U.S. Hurricane Risk*. Available online
[3] Emanuel, 2021. Response of Global Tropical Cyclone Activity to Increasing CO2: Results from Downscaling CMIP6 Models. *Journal of Climate*. https://doi.org/10.1175/JCLI-D-20-0367.1

When tailored to the problem at hand, existing methods can inform which assets and investments may be at risk, which can be useful information for investors. Coupled with agreed upon standards and disclosure frameworks, these assessments can provide a measure of *relative* risk, and serve as a useful method of comparison. The *absolute* risk may be more difficult to quantify and will require continuous improvement in models and tools to achieve the goal of fully informing financial risk. Disclosure requirements can and should evolve as climate science and assessment tools evolve.

Business Applications

Given the uncertainty in climate projections and the evolving maturing of risk analytics, companies should be allowed to assess the materiality of risk in their climate disclosures, using information used to drive business decisions today. Rather than being solely driven by a rigid, rules-based framework, companies should be allowed to make informed judgments about the significance of specific climate risks to their businesses. When coupled with adequate and transparent discussion of the methods and data used, such materiality assessments will allow the companies and investors alike to recognize existing risks, prioritize data collection efforts, plan resilience investments, and iterate in a cycle of continuous improvement.

Businesses, investors, and regulators recognize the risks posed by climate change and are acting swiftly to make reliable information available for decision making, in the short and long term. Rather than a data collection and measurement exercise, the ultimate goal should be more informed risk management and governance processes, better data and tools to inform those process, and more climate-aware market participants across all industries.

We thank you for the opportunity to provide our perspective.

Thank You

Roger Grenier, Ph.D.
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AIR
A Verisk Business