The Thirty Years' Climate Warming:
Climate Change, Security, and the Responsibility to Prepare

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Introduction

The end of the Cold War coincided with the beginning of global awareness about the risks of climate change. This paper analyzes a thirty-year period beginning with the establishment of the Intergovernmental Panel on Climate Change (IPCC) in 1988 and the fall of the Berlin Wall in 1989, and ending in the present year of 2018. This period is characterized by unprecedented social, political, economic and climatic shifts, as well as first-time technological change-including improvements in our ability to predict future changes in the climate and their implications for international security.[1] Importantly, while some of these changes have caught the international security community off-guard, we have seen the climate risks coming for many decades. The combination of unprecedented risks and foresight underscore a "Responsibility to Prepare." This involves taking all possible steps to avoid an unmanageable climate, and climate-proofing of our security institutions at national, regional and international levels.

Geological Context: Welcome to the Anthropocene

Two recently-released reports paint a dire picture of the potential future of life on earth, and the unparalleled conditions that may underpin our future geostrategic landscape. While these reports represent some of the latest findings, their message and warning remain fairly consistent with the reports that have trickled out over the last thirty years. The Intergovernmental Panel on Climate Change (IPCC) looked specifically at the differences in risks that would emerge between a future world that warms by 1.5C (2.7F) degrees above pre-industrial levels and a world that warms half a degree Celsius more to 2C(3.4F).[2] Over the last 115 years, the world has already warmed by 1C (1.8F) and is on track for 1.5C(2.7F) by as early as 2030. While seemingly insignificant – a few degrees on a thermometer – the implications of these changes are already scaling-up into higher order human and national security risks and are projected to increase significantly over the course of this century. The geostrategic landscape has already shifted and will continue to do so throughout the foreseeable future.

A second report looked at the possibility of a "Hothouse Earth" scenario for the planet where irreversible climate thresholds could be crossed and life on

Earth would become nearly unmanageable. Specifically, the study found that:

> *…social and technological trends and decisions occurring over the next decade or two could significantly influence the trajectory of the Earth System for tens to hundreds of thousands of years and potentially lead to conditions that resemble planetary states that were last seen several millions of years ago, conditions that would be inhospitable to current human societies and to many other contemporary species.*[3]

Though this scenario may be considered a low probability risk by the broader scientific consensus, it is still plausible. From a risk management perspective, low probability risks happen often, and should therefore be planned for. Further, though it is a low probability scenario, it is a very high consequence one, likely to include extreme stress to governance systems across the world, and potentially unmanageable, catastrophic security risks. In this context, it is important to remember that the major social and political disruptions of the past occurred prior to the development of nuclear weapons. In short, we cannot afford such major disruptions anymore. The consequences could be existential.

The findings of these two reports are just the latest in a series that have almost become commonplace. Record-breaking heat and record-breaking extreme weather events are increasingly the norm. What could be neglected amidst the news is the uncommon nature of these changes for human civilization. While there have been droughts, floods, and other weather extremes in the past, the concentration of carbon dioxide (CO2) in the atmosphere surpassing the 410 parts per million (ppm) threshold is unprecedented.[4] For context, the CO2 concentration in the Earth's atmosphere was between 170 ppm – 280pmm for the last 800,000 million years and did not exceed 300 ppm until the industrial age.[5] The stable climatic conditions that existed for the entirety of human civilization are no longer present. This period of a sui generis rate of climate change is sometimes referred to as the Anthropocene. By many measures, this period began in 1945 with what some refer to as "The Great Acceleration," when human-driven activity began to alter ecosystems.[6]

Drastic though these scenarios may seem to be, these are not new risks recently presented to the world for the first time. Rather, they are warnings that have been on the world stage for the last thirty years.

1988: Thirty years ago, on December 6, 1988, the world received a particularly authoritative warning on climate change, with a convergence of findings

from a broad range of climate scientists that came together in United Nations General Assembly Resolution 43/53.[7] That resolution called for the creation of an Intergovernmental Panel on Climate Change (IPCC) to "provide internationally co-ordinated scientific assessments of the magnitude, timing and potential environmental and socio-economic impact of climate change and realistic response strategies."

In 1988, the basis for the creation of the IPCC – the warning signs – were already evident. As stated in Resolution 43/53:

> *Concerned that certain human activities could change global climate patterns, threatening present and future generations with potentially severe economic and social consequences,*
>
> *Noting with concern that the emerging evidence indicates that continued growth in atmospheric concentrations of "greenhouse" gases could produce global warming with an eventual rise in sea levels, the effects of which could be disastrous for mankind if timely steps are not taken at all levels,*
>
> *Recognizing the need for additional research and scientific studies into all sources and causes of climate change.*[8]

This resolution followed on the heels of testimony by James Hanson of the NASA Goddard Institute for Space Studies to the United States Senate Committee on Energy and Natural Resources in June of 1988.[9] Hanson's principal conclusions were:

> *"1. The earth is warming in 1988 faster than at any time in the history of instrumental measurements, 2. Global warming is now sufficiently large that we can ascribe with a high degree of confidence a cause and effect relationship to the greenhouse effect, and 3. In our computer climate simulations the greenhouse effect now is already large enough to begin to affect the probability of occurrence of extreme events such as summer heat waves; the model results imply that heat wave/drought occurrences in the Southeast and Midwest United States may be more frequent in the next decade than in climatological (1950-1980) statistics (Preface, Page 2)."*[10]

June of 1988 also witnessed the "World Conference on the Changing Atmosphere: Implications for Global Security," which included participation

from over 300 scientists and high-level political leaders from 46 different countries. The Conference Statement drew clear links between a changing atmosphere and a changing security landscape:

> *The Earth's atmosphere is being changed at an unmatched rate by pollutants resulting from human activities, inefficient and wasteful fossil fuel use and the effects of rapid population growth in many regions. These changes represent a major threat to international security and are already having harmful consequences over many parts of the globe. Far-reaching impacts will be caused by global warming and sea-level rise, which are becoming increasingly evident as a result of continued growth in the atmospheric concentrations of carbon dioxide and other greenhouse gases…The best predictions available indicate potentially severe economic and social dislocation for present and future generations, which will worsen international tensions and increase the risk of conflicts among and within nations* (Summary, p. 292).[11]

While 1988 was an important year for climate warnings, in that they reached the global stage in a significant way, the science behind the warnings goes back much further.[12] For example, an early climate model from 1967 is still quite accurately tracking current climate conditions, which shows how robust our predictive capacities are about a changing climate.

1989: The geopolitical conditions set by the Cold War between the United States and the Soviet Union affected nearly everything that happened in the world for four decades, and in 1989, that system began a rapid thaw that was met with cheers by many worldwide, and was accompanied by a wave of unprecedented international cooperation. The IPCC emerged during this time of optimism about the democratic project, and growing cooperation between nations on major issues of security, trade and the environment. On June 1, 1988, the United States and the Soviet Union agreed to eliminate their intermediate-range and shorter-range missiles through mutual ratification of the INF Treaty,[13] signaling a dramatic de-escalation in hostilities. In April of 1989, unrivaled cooperation on trade brought 123 nations together within the General Agreement on Tariffs and Trade (GATT) framework to agree on improved trade dispute settlement rules and procedures,[14] a critical step which laid the groundwork for the establishment of a cooperative global trade regime - the World Trade Organization (WTO). On August 26, 1989, the Montreal Protocol, a global agreement involving 197 countries designed to save the depleted Ozone layer, entered into effect, ultimately

resulting in the protection of the Ozone layer and avoidance of what could have been a catastrophic event, particularly for human health.[15] That same month, Tadeusz Mazowiecki entered office as the first non-communist Prime Minister in Eastern Europe,[16] and on October 23, Hungary adopted a constitution enshrining a multi-party system and competitive elections.[17] On November 9, 1989, eleven months after the creation of the IPCC, the first segment of the Berlin Wall crumbled, setting the stage for the managed collapse of the Soviet Union and the reunification of Germany.

This wave of optimism, however, soon gave way to harsh and complex realities. Governments were not, in many ways, prepared for the more unpredictable changes to the international system that were in store. Amidst the clamor of a new post-Cold War world, it was easy for the warnings about climate change from the previous winter to be drowned out. That did not, however, mean that those changes were not proceeding apace.

After 1988: Understanding Climate Change Grows

> *Global climate change is the most far-reaching environmental issue of our time. If the climate change within the range of current predictions actually occurs, the consequences for every nation and every aspect of human activity will be profound… we cannot wait until all the uncertainties have been resolved before we act to limit greenhouse gas emissions and to plan for whatever climate change we are already committed to.* – Memorandum, State Department Bureau of Environment, Health and Natural Resources to Secretary of State James A. Baker III, February 13, 1989.[18]

Since the creation of the IPCC in 1988, the world's understanding of climate change has reached a scientific consensus enshrined in the IPCC's Assessment, Special and Methodology Reports,[19] the U.S. National Climate Assessments,[20] and numerous assessments by intelligence agencies,[21] and militaries[22] across the globe[23] and a broad range of other scientific and political bodies. This is in part a result of increasingly sophisticated tools and techniques for understanding the intersection of climate change and human systems, as well as an increase in the observable impacts of climate change.

First, our computational capabilities for modeling, which have improved from very good to better, are on the verge of another leap in the form of Artificial Intelligence. The first scientifically-legitimate climate change model was created in 1967, and largely, the climate is changing as

the model predicted.[24] Further technological and scientific developments have laid the groundwork for more complex models that have produced increasingly accurate projections.[25]

Second, the predictive tools scientists, analysts and government officials utilize to project social, economic and political change are improving and include a greater integration of environmental factors into those tools.[26] A social scientist from 1989 would be astounded by the strength of the tools available to analysts for assessing the complex connections between the physical and social sciences. In the area of predicting the instability levels of nation-states, for example, three different tools used by U.S. defense and intelligence agencies – Fuzzy Analysis of Statistical Evidence (FASE), Integrated Crisis Early Warning System (ICEWS) and the Political Instability Task Force (PITF - CIA) have by available measures been assigned a success rate of 80%.[27]

Lastly, climate change impacts are no longer just projections in future models. They are happening now and in significant ways.[28] If anything, studies show that past models have underestimated the rate and severity of climate change.[29]

Despite this growth in understanding driven by the scientific and security communities, competing rapid developments in geopolitical affairs since 1989 rendered it difficult to secure international action on climate change commensurate to the consensus understanding of the risks.

After 1989: Dramatic Geopolitical Changes Divert Attention

After the fall of the Berlin Wall in 1989, the international security environment changed rapidly and in largely unpredictable ways, diverting attention from perceived long-term, non-traditional risks such as climate change. Though a wave of democratization occurred in the aftermath of the Cold War, reinforced by the expansion of the European Union and the NATO Alliance in Europe, booming economies in Asia, and the failure of autocratic governments in South America, the promise of an "end of history" gave way to a much more complex and unstable reality.[30] This complex reality included a wave of ethno-nationalist violence that led to mass atrocities in the heart of the European subcontinent [31] and Africa,[32] a rise in the scope and scale of terrorist activities from non-state actors such as al-Qaeda and ISIS, stalled democratization in Russia and revanchist actions in its neighborhood,[33] the economic success of China followed by a reassertion of authoritarian governance, the acquisition of nuclear weapons by the rogue regime North Korea, spikes in population growth and urbanization coupled

with dramatic developments in access to information through the internet and social media, popular uprisings in the Arab world, and a rise in the political fortunes of populist nationalists in democratic countries such as Hungary,[34] Italy,[35] Poland,[36] Brazil,[37] the Philippines,[38] Turkey[39] and even the United States.[40] These political dynamics either caught the international community by surprise, or were very difficult to respond to.

Perhaps in part due to these dramatic changes in the geopolitical landscape, the early warnings about climate change from 1988 were not fully heeded, despite the materialization of global agreements such as the Kyoto Protocol, the UN Framework Convention on Climate Change, and its most recent output, the Paris Accords. Governmental actions to curb this increasingly dangerous international security risk remain voluntary, and have slowed in recent years. Though market forces may be overtaking policy-makers in creating incentives for decarbonization, this may be happening at too slow a pace, given the security implications of current emissions trajectories.[41]

While this inability to match government actions with the scope and scale of risk is not necessarily unique to climate change, it is particularly defined in this case, not least as it is a risk shared by all nations. This inability to advance robust actions has a number of causes including (1) the aforementioned issue competition from other risks in the geopolitical landscape, (2) short election cycles in democratic countries that rendered long-term decisions difficult, (3) powerful special interests who oppose policy actions to reduce climate change, and (4) a poor understanding of the issue among publics, which have reduced incentives for policy-makers to advance comprehensive policies for addressing these challenges. Differences in risk tolerance among countries, particularly between wealthy nations and the most vulnerable, has also helped to stymie progress which has led many governments to put off difficult policy decisions, and to instead rely on hopes of technological breakthroughs for preventing a future where all nations would be significantly affected.

Fast Forward to 2018: Security Risks of Climate Change Materialize

Thirty years after the creation of the IPCC and the first clear warnings about the implications of climate change for global security, some of the projected security risks are coming to fruition in significant ways. The Arctic is rapidly melting, creating a new ocean with new geopolitical dynamics following closely behind, as China, for example, asserts itself

as a "near-Arctic" nation.[42] Sea levels are rising and are set to continue to rise, increasing storm surge and water insecurity in low lying countries and coastal areas, ranging from the Hampton Roads region of the United States, which hosts the greatest concentration of military capability in the world,[43] to small island nations in the Pacific, where sea level rise is presenting an existential threat to their sovereignty.[44]

Evidence is also growing that climate change has already played a role in disrupting regional and global security in a number of ways. For example, three studies conducted from 2012-2015 found considerable evidence of climate change being implicated in an extreme drought that helped displace nearly 2 million farmers and herders in Syria from 2007-2010, which contributed to political unrest in the country prior to the outbreak of the civil war.[45] In 2016, a major study of global data sets conducted by researchers at the Potsdam Institute found that climate change significantly increased the likelihood of conflict in ethnically-fractionalized countries.[46]

At the same time, intergovernmental structures appear more fragile than they have since they were created, putting pressure on their ability to function in general, never mind in the face of a rapidly-changing climate. Brexit and the rising fortunes of ethno-nationalist political forces are challenging the European Union and democratic nations worldwide. The leaders of founding members of NATO, such as the United States, are openly questioning its future,[47] a concept that would have seemed inconceivable just a few years ago. In grappling with existential threats, these institutions have significantly reduced their own capacities to adequately prepare for and reduce future risks, particularly non-traditional security risks like climate change, which have to date not been fully incorporated into these intergovernmental systems.

In this context, the unprecedented changes we are facing in 2018 are greater than they were in 1988, but the unparalleled foresight we possess today is also greater than what it was in 1988. This reinforces a "Responsibility to Prepare," a responsibility that must be fulfilled in the next few years if we are to avoid the unmanageable security implications of climate change, and manage the unavoidable.

Beyond 2018: A Responsibility to Prepare

The "Responsibility to Prepare" framework was debuted on the global stage at a meeting of the UN Security Council (UNSC) in December of 2017.[48] The framework calls on national governments, as well as regional and international security institutions, to adopt and implement a series of

core principles for managing the unavoidable security risks wrought by a changing climate, while reinforcing the need to avoid the unmanageable security risks that could result from significant increases in greenhouse gases. This responsibility includes, as its primary goal, "the climate-proofing of security institutions at all levels of governance – local, national, regional and international – in order to increase the capacity of states to absorb and reduce climatic stresses." The roadmap for this "climate-proofing" includes six core principles for nations, regional and international security institutions. From the Center for Climate and Security's 2017 Framework Briefer, these include:[49]

Routinizing: Climate change is happening now and affects nearly all aspects of society, yet that reality is not reflected in the routine activities of governance bodies responsible for security. Doing so would help break climate change out of its traditional cage within environment and development ministries and broaden the aperture of security institutions to include this complex risk. Routinizing attention to climate in security institutions could range from providing regular intelligence briefings on the subject to decision-makers, to consistently holding dialogues and forums on the subject. At the UN Security Council, for example, a commitment to more regular dialogues on the subject, more consistent and broadly-applied measures for information flow and monitoring of critical climate and security hotspots (such as Resolution 2349 (2017) on the Lake Chad Basin),[50] as well as more robust statements and resolutions that build on past actions on climate and security from 2007-2017,[51] would help ensure that the issue is resilient to changing political winds, and always on the UNSC radar.

Institutionalization: How climate change impacts security is not deeply understood within and across governments. In this context, the issue requires institutional centers to conduct climate security analysis and inform decision-makers. As was illustrated previously in the case of the 2007-2010 drought in Syria, the international community is often unprepared for risks, including climate-driven risks, not necessarily because of a lack of information, but because that information is not being delivered to decision-makers in a systematic way and they are not aware of its relevance to their remit.[52] Had, for example, the scattered reports of drought and mass displacement of peoples in Syria during that time period been fed into an institution committed to warning of these trends, the country's political instability might have been foreseen and, possibly, mitigated. Creating multiple institutional centers to collect and interpret information, using the best analytical tools available, and then regularly delivering

recommendations for action to decision-makers would go a long way in increasing preparedness for such eventualities and strengthen efforts for conflict prevention. Institutionalizing attention to the issue is also important for closely monitoring slow-onset stresses related to climate change that could gradually erode state stability and might be more difficult to detect than more dramatic or episodic changes. At the international security level, for example, the establishment of semi-independent "Climate Security Crisis Watch Centers," staffed by expert analysts watching for climate and security hotspots, and issuing regular recommendations for action to the Security Council, could ensure that the intergovernmental security community is more prepared for both slow- and quick-onset climatic changes affecting security. These Climate Security Crisis Watch Centers could also be replicated at the regional level (at institutions such as NATO and the African Union) and at the national level, and within or across defense, intelligence and foreign affairs institutions. At each level, these centers could either be new structures, or integrated into existing early-warning systems.

Elevation: In some cases, warnings related to nontraditional security risks are delivered to governments by analysts, but not at a high enough level. This is often based on a particular issue not being prioritized within a government or intergovernmental institution, or the issue not being presented in a fashion that appropriately contextualizes the risks as they pertain to other geostrategic priorities. In this context, elevating such issues within governing bodies is critical for ensuring preparedness. Within the UN system, for example, the establishment of a senior Climate Change and Security position, reporting directly to the UN Secretary General (SG) and communicating regularly to the Security Council, would go a long way toward ensuring that these issues were heard at the highest levels. Such an individual could be responsible for overseeing the work of the aforementioned Climate and Security Crisis Watch Centers, and delivering recommendations to the UNSC. Equivalent positions at regional and national levels would also be important.

Integration: In order to ensure that climate and security issues are not treated as a special-interest concern, security institutions should integrate climate change trends into their analyses of other critical security priorities. This is the "just add climate" approach, justified by the nature of the threat and the simple fact that changes in the climate, acting as a threat multiplier, will affect the entire geostrategic landscape. For example, the questions of how climate change intersects with health security, conflict, international terrorism, nuclear proliferation, and maritime security, are all critically important, but may be missed if such analysis sits solely

in the kind of specialized centers described above. Practically, this could involve embedding climate and security analysts across issue silos within governments and intergovernmental institutions or creating interagency structures to facilitate such integration.

Rapid response: Though the approaches above are designed to facilitate preventative solutions, there will undoubtedly be future cases of climate-exacerbated dynamics that demand immediate attention from the security community. Developing scaled warning systems that identify long, medium and short-term risks, and that include clear "triggers" for emergency action on climate and security, would help ensure that foreseeable events are acted upon with commensurate levels of urgency. This is particularly important for anticipating low probability/high impact risks, and creating a governance capacity to prepare for "unknown, unknowns" or "black swans."[53] The aforementioned Climate Security Crisis Watch Centers, for example, could employ such a rapid response system when communicating to the UNSC. Regional security institutions and national governments could also consider adopting these mechanisms, separately or in coordination with the international centers.

Contingencies for unintended consequences: Despite best efforts, unintended consequences of solutions to these risks may inevitably arise. Governments should seek to identify these potential eventualities and develop contingencies for addressing them. For example, emissions reductions commitments could increase incentives for the development of nuclear power in regions of the world with limited regulatory infrastructure, which could, in turn, increase nuclear proliferation risks. Unilaterally-deployed geoengineering solutions, particularly in the absence of international norms to regulate their use, could also result in new and unpredictable disruptions to climate, water, food and energy systems. These are foreseeable possibilities that security institutions can identify and attempt to prevent sooner rather than later. Facilitating or institutionalizing cross-sectoral/ interagency coordination to hedge against these unintended consequences, as suggested in the "integration" section above, would be a good start.

While implementing these principles will not be easy, as existing institutions can be sticky, this is not a Herculean task. The recipe is quite simple: just add climate. Assess what the priorities of a given security institution are, assess how climate change will affect those priorities, and then adjust those institutions accordingly.

Conclusion

In the thirty years following the fall of the Berlin Wall, and the

subsequent collapse of the Soviet Union, a geopolitical landscape that had been frozen in a Cold War for four decades thawed. That thawing led to a series of highly unpredictable social, political and economic changes that we are still grappling with today. The same thirty years has also presented human civilization with the thawing of a climate system that had persisted for at least 15,000 years, a time period that encompassed the advent of agriculture and the establishment of the worldwide web. Both changes have been understandably difficult for human systems to grapple with. However, in the case of a changing climate, our foresight abilities have been significant. The world's leaders have known for at least thirty years that these unprecedented changes were coming, that these changes may have significant or even catastrophic security implications, and that we have the capacity to both halt those changes that are not baked in, and to adapt to those changes that are inevitable. Given this knowledge, and the considerable security implications of not acting, a "Responsibility to Prepare" is simply common sense. This means avoiding emissions trajectories that would result in unmanageable security consequences (a 2C degree world would be very close to that), and climate-proofing our security institutions at national, regional and international levels for those changes that are likely to occur.

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Today, Forbes, and the New York Times, among others. Francesco holds a master's degree form the London School of Economics and Political Science.

Notes

1 Carl-Friedrich Schleussner, Jonathan F. Donges, Reik V. Donner, Hans Joachim Schellnhuber, "Enhanced conflict risks by natural disasters," *Proceedings of the National Academy of Sciences* 201601611 (2016) DOI:10.1073/pnas.1601611113 http://www.pnas.org/content/early/2016/07/20/1601611113.

2 V. Masson-Delmotte, P. Zhai, H. O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J. B. R. Matthews, Y. Chen, X. Zhou, M. I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, T. Waterfield (eds.). "Global warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty," *IPCC,* 2018. http://www.ipcc.ch/report/sr15/.

3 Will Steffen, Johan Rockström, Katherine Richardson, Timothy M. Lenton, Carl Folke, Diana Liverman, Colin P. Summerhayes, Anthony D. Barnosky, Sarah E. Cornell, Michel Crucifix, Jonathan F. Donges, Ingo Fetzer, Steven J.Lade, Marten Scheffer, Ricarda Winkelmann, Hans Joachim Schellnhuber. "Trajectories of the Earth System in the Anthropocene," *Proceedings of the National Academy of Sciences* 115 (33) 8252-8259 (2018) DOI:10.1073/pnas.1810141115 http://www.pnas.org/content/115/33/8252.

4 C. D. Keeling, S. C. Piper, R. B. Bacastow, M. Wahlen, T. P. Whorf, M. Heimann, and H. A. Meijer, "Exchanges of atmospheric CO2 and 13CO2 with the terrestrial biosphere and oceans from 1978 to 2000." *I. Global aspects, SIO Reference Series*, No. 01-06, Scripps Institution of Oceanography, San Diego, 88 pages, 2001. http://escholarship.org/uc/item/09v319r9.

5 Kevin Loria. "CO2 levels are at their highest in 800,000 years," *World Economic Forum*, May 9, 2018. https://www.weforum.org/agenda/2018/05/earth-just-hit-a-terrifying-milestone-for-the-first-time-in-more-than-800-000-years; 6 Steffen, Will, Paul J. Crutzen, and John R. McNeill. "The Anthropocene: Are Humans Now Overwhelming the Great Forces of Nature?" *Ambio* 36, no. 8 (2007): 614-21. http://www.jstor.org/stable/25547826.

7 General Assembly resolution 43/53, "P*rotection of global climate for present and future generations of mankind"*, A/RES/43/53 (6 December 1988), available from http://www.un.org/documents/ga/res/43/a43r053.htm.

8 http://www.un.org/documents/ga/res/43/a43r053.htm.

9 *The Greenhouse Effect: Impact on Current Global Temperature and Regional Heat Waves,* 100 th Cong. (1988) (statement of James E. Hanson, Director, NASA Goddard Institute for Space Studies). https://climatechange.procon.org/sourcefiles/1988_Hansen_Senate_Testimony.pdf.

10 Hanson,

11 *The Changing Atmosphere Implications for Global Security*, Toronto, Canada, 27-30 June 1988, Conference Proceedings, WMO No. 710. http://cmosarchives.ca/History/ChangingAtmosphere1988e.pdf https://climatechange.procon.org/sourcefiles/1988_Hansen_Senate_Testimony.pdf

12 History of Climate Change Science. *Wikipedia*. (2018) https://en.wikipedia.org/wiki/History_of_climate_change_science.

13 The Intermediate-Range Nuclear Forces (INF) Treaty at a Glance. *Arms Control Association*. October 22, 2018. https://www.armscontrol.org/factsheets/INFtreaty.

14 A Handbook on the WTO Dispute Settlement System, Second Edition, Prepared by the Legal Affairs Division and the Rules Division of the WTO Secretariat, and the Appellate Body Secretariat. Decision of 12 April 1989 on improvements to the GATT dispute Settlement rules and procedures. *World Trade Organization*. https://www.wto.org/english/tratop_e/dispu_e/disp_settlement_cbt_e/a3s1p1_e.htm (2018).

15 The Montreal Protocol on Substances That Deplete the Ozone Layer. The United States State Department. https://www.state.gov/e/oes/eqt/chemicalpollution/83007.htm (2018)

16 Jan Cienski. Tadeusz Mazowiecki, postwar Poland's first non-communist leader. *The Financial Times*. October 28, 2013. https://www.ft.com/content/e315079a-3fdc-11e3-a890-00144feabdc0.

17 Patricia Koza. Hungary declares itself a republic. United Press International, INC. October 23, 1989. https://www.upi.com/Archives/1989/10/23/Hungary-declares-itself-a-republic/1072625118400/.

18 Memorandum, State Department Bureau of Environment, Health and Natural Resources (OES/E), Environmental Issues, Page 7, February 15, 1989. https://nsarchive2.gwu.edu/NSAEBB/NSAEBB536-Reagan-Bush-Recognized-Need-for-US-Leadership-on-Climate-Change-in-1980s/documents/Document%209.pdf.

19 Intergovernmental Panel on Climate Change. Reports. (2018) https://www.ipcc.ch/publications_and_data/publications_and_data_reports.shtml#2.

20 U.S. Global Change Research Program. Resources, Data, & Multimedia (2018) https://www.globalchange.gov/browse.

21 Climate and Security Resource Hub. *Climate and Security Resources: U.S. Government, Intelligence*. The Center for Climate and Security (2018) https://climateandsecurity.org/resources/u-s-government/intelligence/.

22 Climate and Security Resource Hub. *Climate and Security Resources: U.S. Government, Defense*. The Center for Climate and Security (2018) https://climateandsecurity.org/resources/u-s-government/defense/.

23 Climate and Security Resource Hub. *Climate and Security Resources: Other Governments and Regional Institutions*. The Center for Climate and Security (2018) https://climateandsecurity.org/resources/other-governments-and-regional-institutions/.

24 Ethan Siegel, 'The First Climate Model Turns 50 and Predicted Global Warming Almost Perfectly,' *Forbes*, March 15, 2017, available at: https://www.forbes.com/sites/startswithabang/2017/03/15/the-first-climate-model-turns-50-and-predicted-global-warming-almost-perfectly/#5b3a8afa6614.

25 Cowtan, K., Z. Hausfather, E. Hawkins, P. Jacobs, M. E. Mann, S. K. Miller, B. A. Steinman, M. B. Stolpe, and R. G. Way (2015), 'Robust comparison of climate models with observations using blended land air and ocean sea surface temperatures,' *Geophys. Res. Lett.*, 42, 6526–6534, doi:10.1002/2015GL064888. Cited in, Nuccitelli, D. 'Climate models are even more accurate than you thought,' *The Guardian*, July 31, 2015, avail-

able at: https://www.theguardian.com/environment/climate-consensus-97-per-cent/2015/jul/31/climate-models-are-even-more-accurate-than-you-thought.

26 Fetzek, S., B. Mourad, C. Briggs, K. Lewis. 'Why and how to use foresight tools to manage climate security risks,' *Planetary Security Initiative & The Center for Climate and Security*, April, 2017, available at: https://www.planetarysecurityinitiative.org/sites/default/files/2017-.

27 J. Eli Margolis, 'Estimating State Instability,' *Studies in Intelligence*, Volume 59, Number 1, March 2012, pp. 13-24.

28 Camilo Mora, Daniele Spirandelli, Erik C. Franklin, John Lynham, Michael B. Kantar, Wendy Miles, Charlotte Z. Smith, Kelle Freel, Jade Moy, Leo V. Louis, Evan W. Barba, Keith Bettinger, Abby G. Frazier, John F. Colburn IX, Naota Hanasaki, Ed Hawkins, Yukiko Hirabayashi, Wolfgang Knorr, Christopher M. Little, Kerry Emanuel, Justin Sheffield, Jonathan A. Patz & Cynthia L. Hunter. Broad threat to humanity from cumulative climate hazards intensified by greenhouse gas emissions. *Nature Climate Change*. November 19, 2018. https://www.nature.com/articles/s41558-018-0315-6.

29 Oliver Milman. Climate change models underestimate likely temperature rise, report shows. *The Guardian*. December 21, 2013. https://www.theguardian.com/science/2014/jan/01/climate-change-models-underestimate-likely-temperature-rise-report-shows.

30 Francis Fukuyama. The end of history and the last man. New York: *Free Press*. 1992.

31 Yugoslavia (Former). *Yale University Genocide Studies Program*. 2018. https://gsp.yale.edu/case-studies/yugoslavia-former.

32 Rwanda genocide: 100 days of slaughter. *BBC*. April 7, 2014. https://www.bbc.com/news/world-africa-26875506.

33 Vitalii Rybak. Ten Things You Should Know about Russian Involvement in Ukraine. *The Atlantic Council*. January 11. 2017. http://www.atlanticcouncil.org/blogs/ukrainealert/ten-things-you-should-know-about-russian-involvement-in-ukraine.

34 John Lloyd. Commentary: Orban and the autocratic spring. *Reuters*. April 13, 2018. https://www.reuters.com/article/us-lloyd-hungary-commentary/commentary-orban-and-the-autocratic-spring-idUSKBN1HK2F2.

35 Jason Horowitz. Italy's Populist Parties Win Approval to Form Government. *The New York Times*. May 31, 2018. https://www.nytimes.com/2018/05/31/world/europe/italy-government-populists.html.

36 Dalibor Rohac. Hungary and Poland Aren't Democratic. They're Authoritarian. Foreign Policy. February 5, 2018. https://foreignpolicy.com/2018/02/05/hungary-and-poland-arent-democratic-theyre-authoritarian/.

37 Omar G. Encarnación. Bolsonaro Can't Destroy Brazilian Democracy. *Foreign Policy*. November 1, 2018. https://foreignpolicy.com/2018/11/01/bolsonaro-cant-destroy-brazilian-democracy/.

38 Daniel R. Coats. Statement for the Record. Worldwide Threat Assessment of the US Intelligence Community. Office of the Director of National Intelligence. February 13, 2018. Page 19. https://www.dni.gov/files/documents/Newsroom/Testimonies/2018-ATA---Unclassified-SSCI.pdf.

39 Marc Pierini. Turkey's Perfect Path to Autocracy. *Carnegie Europe*. May 8, 2018. http://carnegieeurope.eu/strategiceurope/76278.

40 Stephen M. Walt. Trump Isn't Sure if Democracy Is Better Than Autocracy. Foreign Policy. November 13, 2017. https://foreignpolicy.com/2017/11/13/trump-isnt-sure-if-democracy-is-better-than-autocracy/.

41 Caitlin Werrell, Francesco Femia, Shiloh Fetzek, John Conger. A Security Analysis of the New IPCC Report: Prevent 2°C, Prepare for 1.5°, and Do So Responsibly, *The Center for Climate and Security*. Briefer No 39. October 18, 2018. https://climateandsecurity.files.wordpress.com/2018/10/a-security-analysis-of-the-new-ipcc-report_prevent-2degrees_prepare-for-1-5-degrees_do-so-responsibly_briefer-39.pdf.

42 Sherri Goodman and Marisol Maddox. China's Growing Arctic Presence. *China-US Focus*. November 19, 2018. https://www.chinausfocus.com/finance-economy/chinas-growing-arctic-presence.

43 Ronald Keys, John Castellaw, Robert Parker, Ann C. Phillips, Jonathan White, Gerald Galloway. Military Expert Panel Report: Sea Level Rise and the U.S. Military's Mission. 2nd Edition. *The Center for Climate and Security*. February 2018. Pages 44-45. https://climateandsecurity.files.wordpress.com/2018/02/military-expert-panel-report_sea-level-rise-and-the-us-militarys-mission_2nd-edition_02_2018.pdf.

44 Mohammed Waheed Hassan. Climate Change in the Maldives. *The World Bank*. April 6, 2010. http://www.worldbank.org/en/news/feature/2010/04/06/climate-change-in-the-maldives.

45 Francesco Femia and Caitlin Werrell. Syria: Climate Change, Drought and Social Unrest. *The Center for Climate and Security.* Briefer No. 11. February 29, 2012. https://climateandsecurity.files.wordpress.com/2012/04/syria-climate-change-drought-and-social-unrest_briefer-11.pdf; ; 46 Carl-Friedrich Schleussner, Jonathan F. Donges, Reik V. Donner, Hans Joachim Schellnhuber, "Enhanced conflict risks by natural disasters," *Proceedings of the National Academy of Sciences* 201601611 (2016) DOI:10.1073/pnas.1601611113 http://www.pnas.org/content/early/2016/07/20/1601611113.

47 Dan De Luce, Robbie Gramer, Emily Tamkin. Trump's Shadow Hangs Over NATO. *Foreign Policy*. January 29, 2018. https://foreignpolicy.com/2018/01/29/trumps-shadow-hangs-over-nato-transatlantic-alliance-europe-defense-deterrence-europe-mattis-jens-stoltenberg/.

48 Caitlin Werrell. Prepare Remarks: A Responsibility to Prepare. UN Security Council Arria Formula Meeting. December 15, 2017. https://climateandsecurity.files.wordpress.com/2017/12/werrell_responsibility-to-prepare_unsc.pdf.

49 Caitlin E. Werrell, Francesco Femia, Sherri Goodman, Shiloh Fetzek. A Responsibility to Prepare: Governing in an Age of Unprecedented Risk and Unprecedented Foresight. *The Center for Climate and Security*. Briefer No. 38. August 7, 2017. https://climateandsecurity.files.wordpress.com/2017/12/a-responsibility-to-prepare_governing-in-an-age-of-unprecedented-risk-and-unprecedented-foresight_briefer-38.pdf.

50 UN Security Council. 'Security Council Strongly Condemns Terrorist Attacks, Other Violations in Lake Chad Basin Region, Unanimously Adaption Resolution 2349 (2017),' *UN Press*, March 31, 2017, available at: https://www.un.org/press/en/2017/sc12773.doc.htm.

51 Search, UN Security Council, The Center for Climate and Security website, accessed on August 5, 2017 at: https://climateandsecurity.org/?s=Un+Security+Council&submit=.

52 Caitlin E. Werrell and Francesco Femia and Troy Sternberg. "Did We See It Coming?: State Fragility, Climate Vulnerability, and the Uprisings in Syria and Egypt." SAIS Review of International Affairs 35, no. 1 (2015): 29-46. https://muse.jhu.edu/ (ac-

cessed November 19, 2018).

53 Francesco Femia, Christine Parthemore, Caitlin Werrell. 'The inadequate US response to a major security threat: Climate change,' *The Bulletin of the Atomic Scientists*, July 20, 2011. http://thebulletin.org/inadequate-us-response-major-security-threat-climate-change.