

Frederick S. Pardee Center
for International Futures

ANNUAL REVIEW

2022–2023



Josef Korbel School
of International Studies
UNIVERSITY OF DENVER

“Our mission is to enhance human wellbeing through the use of data and quantitative tools and the cover illustration of this Annual Review reflects the multifaceted and interconnected character of our work.”

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FROM THE DIRECTOR

Dear Colleagues,

The Pardee Center’s mission is to enhance human wellbeing through the use of data and quantitative tools. Our research requires that we foster a long-term dialogue among three distinct entities—the scientific community, the policy-making community, and the modeling/data community—each possessing its own interests and perspectives.

The *scientific community* brings an institutional approach to knowledge creation, drawing from diverse disciplines with unique norms and governed by rigorous peer-review processes. The *policy-making community*, on the other hand, focuses on immediate challenges with real-world implications, often driven by pressing concerns arising from political processes. The *model-based community*, in turn, concentrates on what can be measured, analyzed, and projected, guided by questions related to verification and our capacity to comprehend the past, present, and future.

Our research is built on an iterative process across these three groups, harnessing the academic community’s rigor, the policy community’s pressing questions, and the insights derived from modeling. For instance, we recently published a peer-reviewed article titled “Blessed are the Peacemakers” which examines a projected increase in poverty resulting from civil wars. This publication fills a knowledge gap by establishing a connection between civil war and poverty, initially prompted by the need to comprehend the impact of civil war in Yemen. In this work we used modeling techniques to estimate the indirect costs of conflict, thereby informing policy strategies and generating policy-relevant knowledge.

A similar approach was undertaken in the field of international relations. Recent efforts have focused on expanding the IFs model to forecast a range of bilateral indicators—including a novel aggregate measure inspired by academic research on weaponized interdependence—to capture formal bilateral influence

capacity. We used these indicators to forecast the future of geopolitical influence and presented our findings in a joint publication with the Stimson Center. In this endeavor, we actively engaged with policy-makers during the measure’s creation, utilized the IFs model to inform our scenarios and projections, and are now finalizing a manuscript for submission to an academic journal.

Another domain in which we apply this iterative process involves efforts to understand how climate change might impact long-term patterns of human development and adaptation. To this end, we recently submitted a study for review that examines the number of people who will fall into poverty due to climate change. This research, with funding from USAID and UN Women, originated from policy-maker inquiries regarding the comparative impact of COVID-19 and other global challenges on human development. Eventually, these policy-driven discussions were integrated into our modeling efforts, enabling us to connect our work with existing academic literature, thus infusing peer-reviewed rigor into the initial policy-driven puzzle, all guided by our model and data.

We consider it a privilege to facilitate and contribute to these ongoing dialogues, recognizing that each of the three communities represents a unique perspective that sharpens our inquiries and enhances the reach and impact of our research. I have come to believe that it is these dynamic conversations that imbue our work with its distinct character and impact.



A handwritten signature in black ink, appearing to read "JDMoyer".

JONATHAN D. MOYER
Pardee Center Director

PARDEE CENTER UPDATES

As we have done in the past, we begin our Annual Review with some key metrics about our activities and personnel over the past year.

We use this section also to tell you about important developments within the Center. This year we focus on two signature items. One is the release of the 8th generation of the International Futures modeling software. The other is an introduction to Pam Hoberman who joined us in December as Director of Operations, a newly created position within the Center. We conclude the section with a roster of our current core staff and, of great importance to us, an additional recognition of the generosity of Frederick S. Pardee, for whom the Center is named.

In the photograph on this page, we acknowledge also our academic home, the University of Denver's Josef Korbel School of International Studies.



PARDEE BY THE NUMBERS

\$1.6M
SPONSORED
RESEARCH
VOLUME

16 SPONSORED
PROJECTS
7 CLIENTS

2 COURSES
TAUGHT BY
PARDEE FACULTY

2 JOURNAL
ARTICLES

6 REPORTS
AND POLICY
BRIEFS



10 THIRD-
PARTY
PUBLICATIONS

8 COMMENTARIES
25 EVENTS

15 CORE TEAM
MEMBERS

84 RESEARCH
AIDES



EIGHT GENERATIONS OF IFS

This past year marked a significant milestone for the International Futures (IFs) model as it entered its eighth generation of development. The model has come a long way since its inception in the early 1980s, starting with the first generation written in FORTRAN and distributed by the University of Iowa. By 1985, a simplified version of it had migrated to the DOS platform, making it accessible for personal use on computers.

The third generation, which began in 1993, saw the introduction of IFs as a full-scale modeling system, accompanied by books that provided more detailed information about the project. The fourth generation, starting in the 2000s, focused on incorporating IFs into policy analysis, particularly through projects like the National Intelligence Council's Global Trends reports and the European Commission's TERRA project. Usability improvements became a core characteristic during this phase, including the release of a web-based version.

In the fifth generation, efforts were made to enhance both the model itself and its user interface. The software became more institutionalized as reflected, for example, in major contributions to the UNEP's 4th Global Environment Outlook. The sixth generation

concentrated on using IFs for the Patterns of Potential Human Progress series, which produced books on various aspects of the future, including poverty, education, health, infrastructure, and governance.

The seventh generation coincided with an organizational transition from dependence primarily on funding from Frederick S. Pardee to a largely soft-money model. During this period, the model saw significant expansions for both policy and academic audiences. Subnational analysis was increased, bilateral modeling work was extended, and various submodules were strengthened.

The new eighth generation of IFs is primarily characterized by a transition to a new coding language, VB.NET, led by our Lead Systems Developer, José Solórzano. The model now features a browser-based user interface that provides enhanced flexibility and centralizes our modeling efforts around a single interface and core model structure. Additionally, with significant input from Yutang Xiong, the Center's Lead Data Operations Manager, we have migrated from an Access database to a SQL database, further improving the efficiency and effectiveness of our work.



“IFs plays a key role in the history of global systems modeling, and by focusing on human development it occupies a unique niche in contemporary analysis of global change issues.”

—BRIAN O'NEILL, EARTH SCIENTIST AND LABORATORY FELLOW, PACIFIC NORTHWEST NATIONAL LABORATORY

“I believe the primary charge of operations is to move good work forward. As I think ahead to how we can grow in tandem with our opportunities, much of my focus centers on our staff and how we can ensure their success.”

PAM HOBERTMAN, PARDEE CENTER
DIRECTOR OF OPERATIONS



MEET PAM HOBERMAN

Pardee Center Director of Operations

During the past year the Center's administrative functions were centralized in a new Director of Operations position. The person in this position is expected to work in close partnership with the Center Director not only on day-to-day operations but also on strategic initiatives. Pam Hoberman joined the Center in this role in December.

We hope you enjoy learning about Pam and her vision for her role in the responses she provided to the interview prompts below.

Q: How would you describe your role?

A: I believe the primary charge of operations is to move good work forward. This means both resourcing the day-to-day and also strengthening the Center's infrastructure and capacity to take on projects that can secure it a thriving future. I oversee the Center's human capital, financial, technological, space, communications, and other assets. The nature of nonprofit work—being driven by a research mission over profits—demands that I be nimble and that I creatively direct these resources for maximum impact.

Q: What triggered your interest in the position?

A: This opportunity connects with many of my professional and personal passions. I've run the business operations of academic research centers for nearly a decade, and I love policy. In fact, my pathway to this career started with a deep-seated interest in policy. In college I studied government and political science and then received an MPA with a specialization in public policy. In my early professional work I researched and analyzed policy. Then, soon after joining a small, NYC-based nonprofit as a researcher, I began to help run its operations. From that experience I discovered a hidden passion for operations that I have since fully embraced.

Q: Now that you've been with the Pardee Center for about 9 months, can you describe some of the challenges and opportunities associated with your position?

A: I joined the Pardee Center at a pivotal point in its business lifecycle. It had grown from a startup to an established research center with repeat engagements with important governmental, intergovernmental, and nongovernmental organizations. Pardee was ripe for adjustments to its policies and practices that could sustain that growth; I welcomed the challenge. Pardee is known for its signature integrated assessment model, International Futures (IFs), as well as unique data-building projects that support geopolitical analysis. Our team of highly specialized and support professionals power these tools and their many applications. As I think ahead to how we can grow in tandem with our opportunities, much of my focus centers on our staff and how we can ensure their success.

Q: Have there been surprises?

A: Ha! Yes, I've learned that's the nature of operations. Each day is a new adventure. I constantly shift focus from one domain to another and always find myself learning something new in the process. My world continues to grow. That's one of the aspects I like most about my job.

Q: What is something about you that your colleagues might not know?

A: I played rugby for several years in college. #9 scrum half. I joined to make friends and stayed because I loved it. People don't usually see that coming since (a) I know next to nothing about most sports, and (b) I'm noticeably—and inescapably—petite.

CORE PARDEE TEAM

As of end of 2022–2023 Academic Year

JANET R. DICKSON

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Development Analysis
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With Gratitude Again to Frederick S. Pardee

The philanthropic contributions of Frederick S. Pardee, as well as his “hands-on” participation in past projects, have played a vital role in the advancement of the International Futures (IFs) model. As we noted in last year’s Annual Review, Fred’s passing just over a year ago is a significant loss for our research community.

In a continuation of his generous spirit, Fred provided a bequest to the Center from his estate. This addition to our endowment will be used in a variety of ways to expand our expertise in model development and software engineering. We are immensely grateful.



OUR CURRENT RESEARCH

As the Director’s letter explained, our work sits at the nexus of three distinct communities—the academic community, the policy community, and the modeling and data community.

In our projects we seek to build connections across these communities that are driven by distinct logics and cultures in order to make meaningful contributions to all three, with the ultimate goal of helping to improve human wellbeing.

Internally, our work is organized into two major areas—development analysis and geopolitical analysis—with significant and increasing interconnections between the two areas and teams. In the pages that follow, we first describe major initiatives in each of these areas over the past year and then provide brief descriptions of other important projects in each area.

We hope these descriptions facilitate understanding of the scope and nature of what we actually *do* within the over-arching framework of long-term, integrated, macro-level analysis.





DEVELOPMENT ANALYSIS

BY TAYLOR HANNA, ASSOCIATE DIRECTOR OF DEVELOPMENT ANALYSIS

Although much research among modeling communities has focused on measuring very specific climate change/human development connections, surprisingly little work has focused on understanding and quantifying the broad effects of climate change on human development globally.

While the International Futures (IFs) model has long included an environmental subsystem, an important focus for our work over the past year has been improving our understanding and extending our representation of the long-term effects of climate change. In particular, we have been, and are, engaged in a number of projects whose focus is a deeper understanding of how climate change might affect human development over the long run. The various projects, although united by this common focus, explore different aspects of the issue and involve differing research strategies.

UN WOMEN

In ongoing work with UN Women, we combined three academic approaches to assessing climate change risks by

1. Building scenarios which combined the Representative Concentration Pathways (RCPs)
2. Simulating different climate futures, with damage functions to reflect broad economic effects of those futures
3. Modeling interventions to reflect the effects of hitting certain negative environmental tipping points.

Through this work, which attempts to assess the combined broad effects of climate change, we are able to explore a range of futures which help to both highlight the uncertainty about and the risks inherent in climate change, with a special focus on risks to women and girls.

UNDP YEMEN

Another approach, rather than attempting to assess the combined broad effects of climate change, is to outline the more specific pathways through which climate change is likely to affect human development. This is the approach we have taken in ongoing work funded by UNDP Yemen, where we are working with climate scientists to identify the specific risks to the country from climate change and then identifying how those risks are likely to affect human development. For example, one focus of our work for Yemen is how changing precipitation patterns and increased flooding may affect crop yields, resulting in reduced agricultural income, higher food prices, and dependence on imports, leading to increased poverty and food insecurity as outcomes. While more dependent on the context of the specific country in question, this approach allows for better identifying targeted policy interventions which could mitigate the damage occurring through specific pathways.

UNDP GUINEA-BISSAU AND UNDP REGIONAL BUREAU FOR AFRICA

Our work does not stop at estimating the effects of climate change. We are also considering questions of how countries can adapt to its risks and challenges. This includes exploring what different environmentally-focused development pathways might mean for specific countries and regions. For example, in research funded by UNDP Guinea-Bissau and published in late 2022 (see p. 27 of the Publications section of this report), we explored the question of a green-growth orientation for the country. Guinea-Bissau is highly dependent on the environment and natural resources not only for agriculture and fisheries, but also in the potential for growth through industries like tourism. While our research points to benefits to both from a green-growth orientation, Guinea-Bissau is also highly resource constrained and fully harnessing the power of green growth will require building an enabling environment, meaning providing sufficient support also for education, health, and poverty reduction.

Similarly, we have just begun exploring a project funded by UNDP's Regional Bureau for Africa on the opportunities but also the limitations of a renewable energy-focused strategy for the Sahel region.

GLOBAL ENVIRONMENTAL OUTLOOK (GEO-7)

At a broader level, we are working to model transformative strategies to address climate change as participants in the Global Environmental Outlook (GEO-7) process that will culminate in a large-scale global assessment report planned for early 2027. The GEO-7 process is bringing together top scientists and modelers from around the world to better understand the future of climate change and how profound systems change might help us address the triple planetary crises of climate change, biodiversity loss, and pollution. The report will involve exploring different global transformations and their implications for environmental and human outcomes. Our participation in the GEO-7 process will allow us to bring the IFs model—unique in combining a global country-level coverage with integration of environmental, economic, and human development components—together with world-class environmental models to further the understanding of global paths of change and their implications.

We have been keenly aware throughout these projects of the great uncertainty that characterizes the future of climate change and responses to it. In an effort to reduce this uncertainty, we have mapped pathways through which these changes are likely to occur and, where gaps exist, are developing the IFs model to better represent those pathways. We are also incorporating in our analyses the responses and policy strategies that are often put forth as foundations for further human and social development in a world constrained by climate change. While much remains uncertain, we look forward, through projects led by Senior Research Associate Stellah Kwasi and Research Associate Deva Sahadevan, to continuing to improve our understanding and help other researchers, policymakers, donors, and individuals make sense of the future.

Taylor Hanna, Associate Director of Development Analysis, Pardee Center for International Futures



OTHER DEVELOPMENT ANALYSIS PROJECTS ACTIVE DURING THE PAST YEAR

AUDA-NEPAD

This project with the African Union Development Agency is focused on providing a methodology for setting targets for Agenda 2063's Second Ten-Year Implementation Plan for Africa.

EC Uganda

This project, funded by the European Commission and conducted in partnership with the Economic Policy Research Centre, focused on subnational development and policy-relevant work in Uganda (see page 27 of the Publications section of this Annual Review for policy briefs on early marriage and on the connection between water and sanitation and child malnutrition published in conjunction with this project).

UNDP Electrification

This project with UNDP explores the costs and benefits of global universal electricity access and how electricity access expansion can complement other development interventions.

UNDP Sahel

This project with the UNDP Regional Bureau for Africa in support of a Human Development Report for the Sahel region involves modeling of differing renewable energy transition scenarios and their implications for human development.

USAID Egypt

This project for the Egypt Learning Activity led by the Egypt Q2 Impact group explored and presented differing development trajectory scenarios at a Mission of Leaders retreat. Its purpose was to support “taking stock” of Egypt’s current Country Development Cooperation Strategy (CDCS) and to stimulate thinking about Egypt’s next CDCS.

USAID Food Security

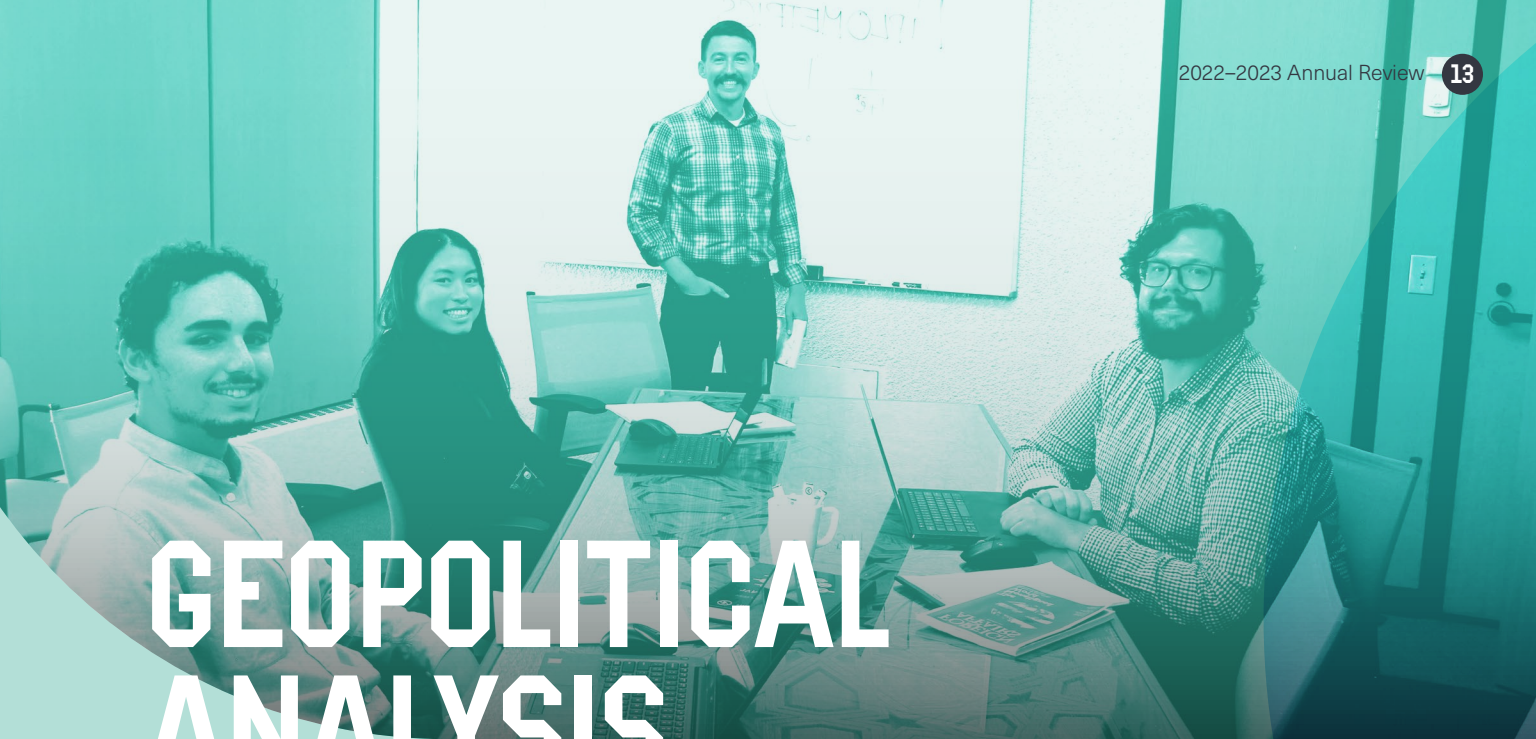
This project with the Research Technical Assistance Center for USAID explored different global futures with a focus on food security (see page 27 of the Publications section of this Annual Review for a report from this project focused on the economic production, inequality, and poverty effects of climate change).



USAID Uganda

This project, led by the Uganda Q2 Impact group as part of USAID’s Uganda Learning Activity initiative, explored the long-run effects of the school closures caused by COVID-19 on education and development in Uganda (see page 27 of the Publications section of this

Annual Review for the report focusing on the impact of COVID-19 on learning).



GEOPOLITICAL ANALYSIS

BY COLLIN MEISEL, ASSOCIATE DIRECTOR OF GEOPOLITICAL ANALYSIS

Through data-building, tool-building, and analysis, researchers at the Frederick S. Pardee Center for International Futures seek to quantify, track and, increasingly, to forecast political, cultural, economic, and security-related trends within and across countries.

Our work often begins with a look toward the past as a foundation for better understanding of possible futures, frequently involving long-term, large-scale, original data collection projects. Ongoing projects of this type range from tracking international travel by world leaders—work led by Research Associate and Project Manager Kylie McKee—to data that allow us to measure national power and influence through data constructed and maintained by Research Associate Adam Szymanski-Burgos.

PERCEIVED MASS ATROCITIES DATASET (PMAD)

An exciting and relatively recent addition to our data collection projects is the Perceived Mass Atrocities Dataset (PMAD). PMAD provides one-of-a-kind, country-year measures of both lethal and less-lethal atrocity crimes worldwide, allowing for the

1. Systematic comparison of the occurrence and magnitude of a variety of atrocity types
2. Group-perpetrated violence against women and LGBTQI+ groups
3. Aggregate atrocities indices for 195 countries from 2018–2022.

Built in response to the congressional mandate outlined in the Elie Wiesel Genocide and Atrocities Prevention Act of 2018, PMAD is intended to assist both academics and policymakers in tracking—and potentially forecasting—atrocity campaigns around the world.

Already, PMAD has begun to pay dividends. Having been disseminated across the U.S. government and shared with international partners, practitioners are leveraging PMAD for their analyses and assessments of the effectiveness of existing atrocity risk assessment and prevention frameworks. Meanwhile, our geopolitical analysis team has tentatively identified connections between atrocity prevalence and neopatrimonial rule, political (dis)empowerment of women, and political polarizations—factors that connect with a host of issue areas central to the study of contemporary international relations. We hope to introduce these findings into the academic literature soon, all while continuing to build data for 2023 and beyond.

FORMAL BILATERAL INFLUENCE CAPACITY (FBIC) INDEX



The original data building and index construction that we recently completed for PMAD is representative of the broader geopolitical analysis and related work conducted at the Pardee Center. A more longstanding contribution in this vein is our Formal Bilateral Influence Capacity

(FBIC) Index, a measure of the capacity for weaponized interdependence between countries. The initial concept for the FBIC Index was developed more than a decade ago by the Pardee Center's director, Jonathan Moyer. In the past year, we made a large and significant step forward, using the International Futures model to produce long-term country-level forecasts of the FBIC Index through the year 2045. Model Development Research Associate Caleb Petry was central to this effort, building on invaluable and foundational contributions from our former colleague David Bohl.

We introduced our long-term forecasts of the FBIC Index in a report that the Pardee team produced in collaboration with the Stimson Center in spring of this year. The report, *Spheres of influence in the coming decades: Four alternative scenarios*, is to our knowledge

the world's first long-term, global, quantitative forecast of bilateral and networked geopolitical influence across alternative scenarios. Following in the footsteps of Pardee Center Founder Barry Hughes and continuing in the spirit of the generous gifts made by our center's namesake, Frederick S. Pardee, the data and model used to produce this truly unique work are freely available.

OTHER ONGOING GEOPOLITICAL ANALYSIS PROJECTS

Core Diplometrics

The "Core Diplo" project is comprised of four ongoing data collection efforts: diplomatic exchange via embassies; international governmental organization memberships; signing and ratification of multilateral treaties; and counts of diplomats sent by all countries to the United Nations (UN) headquarters in New York.

Country Organization and Leader Travel

The COLT project tracks every known, observed overseas trip taken by heads of government and state from roughly 200 countries from 1990 through the present. The database currently includes nearly 100,000 trips involving more than 3,000 world leaders.

National Power

Our team maintains several composite indicators measuring national power and influence, including the Global Power Index and the more recently created Diplomacy, Military, Economy (DiME) Index.

United Nations Voting

This project tracks recorded votes of resolutions in the UN General Assembly, the UN Human Rights Council, and the UN Security Council, calculating voting coincidence scores between countries and voting blocs in aggregate as well as for specific issue areas. The data are freely available for analysis and download via a Tableau dashboard hosted on the Pardee Center's website.

STUDENTS AND THE PARDEE CENTER

One of the things we enjoy most is our connection with students.

These connections happen in two ways. The first is through students' employment as aides at the Center. The second is through courses developed and taught by Pardee Center appointed and affiliate faculty in the Josef Korbel School curriculum. In this section, we provide current information about both.

We begin with information about Pardee Center student aides and their roles at the Center and then present the students who served this year, and those who will begin next year, as Project Leads for student research teams. We end the information about student aides with a recognition of the Pardee aides who received competitive scholarships and fellowships in 2022 and 2023. We are deeply indebted to our cadre of talented and committed student aides; their participation in our work significantly extends what we would otherwise be able to do.

We end the section with information about our offerings in the Korbel School curriculum this past year and the ways in which they impact students.



STUDENT AIDES

Since last September, 84 students have been employed as Pardee Center aides, some for just a quarter or two but most for the full academic year. The great majority were master's degree students enrolled in the Josef Korbel School of International Studies, the Pardee Center's academic home.

As in most years, a small number were enrolled in other University of Denver colleges and schools. This year those included the Daniel L. Ritchie College of Engineering and Computer Science, the Daniels College of Business, University College, and the College of Arts, Humanities, & Social Sciences. Past aides have also come from the Graduate School of Social Work and the College of Law. While most Pardee Center aides have been graduate students, there is also typically a cadre of talented undergraduate students among them.

We relish the opportunity to work with both undergraduate and graduate students and with students from diverse academic backgrounds, and we deliberately seek those opportunities, such as through university-wide student job fairs. However, it is clearly within the various master's degree programs of the Korbel School that we have the most impact. In fact, over twenty percent of all master's degree students at the Korbel School this past year were employed at some time during the year by the Pardee Center.

We are able to provide such a large number of student positions because of our sponsored research projects. This is especially the case for the coding and data-building activities that have created the foundation for our geopolitical analysis work. Large student teams, each with a student serving as Project Lead, support the various geopolitical analysis projects. While there are fewer student positions on the development analysis side of our work, significant numbers of students have played important roles via literature reviews for projects, data gathering, analysis, writing, and project management. In addition to these research aides, a small number of student aides are also involved in communications projects, including supporting aspects of the production of this Annual Review.

Our goal with aide positions is to offer students important opportunities for professional development, both through "hard" skills via learning and using quantitative

methodologies and tools and through "soft" skills from their participation in teams with other students and with professional research staff. When they leave the Center, we hope they take with them an understanding of the research process—including appreciation for what goes into the delivery of a final research product—and the ways that quantitative methods can inform and support policy strategies.

LOOKING AHEAD: THE PARDEE FELLOWS PROGRAM

This fall the Center is initiating a new program for a small group of exceptional students who have a strong interest in long-term integrated assessment modeling, quantitative research methods, and the work of policy-engaged research centers. Through the program, Fellows will receive intensive training in the usage of the International Futures tool, in literature review techniques, and in various research methodologies. Fellows will have the opportunity to collaborate on funded research projects in direct interaction with policy-making organizations. In some cases, Fellows may have the opportunity to participate in paid internships with these organizations.

The primary objective of the program is to deeply involve highly capable students in learning advanced research methods and applying them to real-world research. The experience is intended to enhance the professional capabilities of the Fellows while simultaneously contributing to the work of the Pardee Center.

“Working for Pardee has given me exceptional real-world experience while supplementing my education in a very valuable way. My time as a Project Lead on the COLT team has opened doors for me to jumpstart my career after I graduate.”

—SKYLER WILKEY, RESEARCH AIDE

RESEARCH AIDE PROJECT LEADS

Project Leads are student research aides who have applied and been selected to assist in managing the work of project teams and in mentoring their peers at the Center. In this role they delegate research tasks, monitor research progress, and act as subject matter experts for the teams that they lead. Their contributions are central to the work of the Center and we are deeply appreciative of all that they do.

Graduating Project Leads | Spring 2023



CHARLIE LEMKE-BELL

BA International Studies
and Public Policy

Pardee Project: Core
Diplometrics Team



CELINE PALMER

MA International Development
with a Certificate of Specialization
in Humanitarian Assistance

Pardee Project: International
Futures Data and Resource Team



KERENT BENJUMEA

MA International Studies

Pardee Project: Perceived
Mass Atrocities Dataset Team



GRANT POWELL

MA International Studies with
a Certificate of Specialization
in Public Diplomacy

Pardee Project: Country Organization
Leader Travel Team (Africa and
the Americas cohort and Historical
Back-coding cohort)



DANIEL CIERASZYŃSKI

BA Business Analytics & International
Studies; MA Global Economic Affairs

Pardee Project: Data Visualization Team



ANDRES PULIDO

MA Global Finance, Trade,
and Economic Integration

Pardee Project: International
Futures Data and Resource Team



KALI KYO

MA International Studies

Pardee Project: Country Organization
Leader Travel Team (Europe cohort)



BRENDA SEMERENKO

MA International Development with a Certificate of Specialization in Humanitarian Assistance

Pardee Project: Literature Review Team



TIFFANY ZHANG

MS Data Science

Pardee Project: International Futures Data and Resource Team



SKYLER WILKEY

MA International Security

Pardee Project: Country Organization Leader Travel Team (Asia, Oceania, and IGOs cohort)

Incoming Project Leads | Fall 2023



LIAM CORSUN

BA and MA International Studies

Pardee Project: Country and Organization Leader Travel Team (Africa and the Americas cohort)



HOLLY RYAN

MA International Studies with a Certificate of Specialization in Homeland Security

Pardee Project: Country Organization Leader Travel Team (Europe cohort)



PHOEBE CRIBB

MA in Global Environmental Sustainability with a Certificate of Specialization in Environmental, Social, and Corporate Governance

Pardee Project: Perceived Mass Atrocities Dataset



LUKE VENEZIA

BA International Studies

Pardee Project: Core Diplometrics Team



ANNA ZAPATA

BA in Sociology

Pardee Project: Country Organization Leader Travel Team (Asia, Oceania, and IGOs cohort)



RECOGNIZING STUDENT AIDE RECIPIENTS OF FELLOWSHIP AND SCHOLARSHIP AWARDS

We extend congratulations to the 2022–2023 student aides who received competitive scholarships and fellowships in 2022 and 2023.

KERENT BENJUMEA

Outgoing Perceived Mass Atrocities Dataset Team Lead, received a 2023 Fulbright award to conduct research in Jordan on the effects of the Abraham Accords on Jordan's position as a peace broker in the Middle East.

LYNN CHLELA

International Futures Data and Resource Team member, received a 2023 Fulbright award to conduct research on identifying channels of funding for terrorist and non-state actors in the Middle East and North Africa.

DANIEL CIERASZYNSKI

Outgoing Data Visualization Team Lead, received a 2023 Truman Scholarship and will be interning at the Colorado Department of Transportation in the Office of Process Improvement and Information Management.

SAMUEL COLVETT

International Futures Data and Resource Team member, received a 2022 Critical Language Scholarship to participate in a language and cultural immersion program.

PHOEBE CRIBB

Incoming Perceived Mass Atrocities Dataset Team Lead, received a 2023 Urban Leaders Fellowship and participated in a seven-week urban leadership program with a focus on policy and practice.

GRAHAM EVERETT

International Futures Data and Resource Team member, was selected as a 2022 Presidential Management Fellowship finalist.

CHARLIE LEMKE-BELL

Outgoing Core Diplometrics Team Lead, was chosen to be a 2022 Rangel Scholar in the Rangel Summer Enrichment program in international affairs for undergraduate students at Howard University.

SOPHIA MCGRATH

Country Organization Leader Travel Team member, received a 2022 Fulbright Research Award to research the evolution of Turkish democracy at Koç University's Center for Research on Globalization, Peace, and Democratic Governance in Istanbul.

CELINE PALMER

Outgoing International Futures Data and Resource Team Lead, received the Hughes-Dickson endowed scholarship for academic years 2021–2022 and 2022–2023 in support of her studies at the Josef Korbel School.

ANDRES PULIDO

Outgoing International Futures Data and Resource Team Lead, received a 2022 ThinkSwiss Research Fellowship to research the green bond market at the Center for Economic Policy Research at the Graduate Institute of Geneva in Fall 2022.

EMILY SLUSSER

Country Organization Leader Travel Team member and Project Management Aide, received a 2022 EDF Climate Corps Fellowship for a summer program that embeds graduate students in organizations to accelerate clean energy projects and strategies.

REBECCA STEPHAN

Project Management Aide, is a 2023 finalist for both a Presidential Management Fellowship and the John S. McCain Defense Fellowship. She is pursuing a position in the Legislative Affairs Office of the Department of Defense through the McCain Fellowship.

BARBARA STONE

Country Organization Leader Travel Team and IFs Data and Resource Team member, received a 2022 Fulbright Research Award.

PARDEE IN THE JOSEF KORBEL SCHOOL CURRICULUM

We connect with students not just through student aide positions and opportunities, but also through contributions to the Korbel School curriculum. Over the years, courses have focused on various aspects of global change, global trends, forecasting, the International Futures system, and also combinations of these topics (e.g., “Development Forecasting with IFs”).

This past year, Jonathan Moyer taught two new courses closely connected to the issues and methodologies that drive our world view and our work. One, for undergraduate students, was called “Introductory Integrated Modeling for Policy: Development, Environment, and Security.” The other, a seminar for graduate students, was called “Advanced Integrated Modeling for Policy Strategy: Development, Environment, and Security.”

For some students, these curricular offerings provide an introduction to thinking about the interconnected nature

of global challenges and opportunities over a long-time period and a new appreciation for the role of quantitative approaches in understanding of global issues. For others, they reinforce and deepen an understanding that already exists and provide tools for further analysis. And for some, like undergraduate student Kathryn Handler, they awaken an intense interest in our work and serve as an entry point for a closer connection to the Pardee Center. After taking Jonathan’s course Winter Quarter, Kathryn applied for a student aide position at the Center where she is now an enthusiastic and valued team member.

In the coming year, Jonathan will again offer these two courses. In addition, Josef Korbel Teaching Professor and Pardee Center Faculty Affiliate Keith Gehring will be offering his undergraduate “hands-on” International Futures course.

We are pleased to be able to enrich the Korbel School curriculum with these academic offerings.

“When I was introduced to the IFs model in Professor Moyer’s class, I was amazed by how much the tool could offer in an academic, research, or professional setting. During this course, we explored and learned about the model and utilized it to make sense of global issues and events. After taking this course, and now working at the Pardee Center, I have a far greater understanding of pressing global challenges and, hopefully, ways they might be addressed.”

—KATHRYN HANDLER, PARDEE CENTER COMMUNICATIONS AIDE



PARDEE IN THE WORLD

We close this year's Annual Review with a reference back to its starting point—namely, the opening message from Jonathan Moyer, the Pardee Center Director.

Just as conversations across communities guide our work, so too do they provide the opportunity for our research to advance both knowledge and policy strategies and also to contribute to the field of global integrated assessment modeling.

Our avenues for these conversations include publications and presentations, conferences, meetings, and events. In this section we provide information about these outward-facing activities over the past year.



PRESENTATIONS, CONFERENCES, MEETINGS, AND EVENTS

SEPTEMBER 2022

- **Collin Meisel, Alexandra Kurkul, and Yutang Xiong** attended the **University of Denver Student Job Fair** to share information about the Pardee Center with prospective Research Aides.
- **Doordenkers**, a limited-series podcast from **Cardano, Netherlands**, featured an interview with **Collin Meisel** on the geopolitical ramifications of arms transfers.
- **Collin Meisel** visited **The Hague Centre for Strategic Studies (HCSS) in The Hague, Netherlands**, to present ongoing Pardee Center research, introduce HCSS team members to the International Futures tool, learn about ongoing HCSS research, and discuss potential areas of future collaboration.
- **Collin Meisel** presented on forecasting the threat of war at the **Future of War Conference in Amsterdam, Netherlands**, hosted jointly by the **Netherlands Defence Academy** and **Oxford University's Changing Character of War Program**.



OCTOBER 2022

- **Jonathan Moyer** presented at the “**State of the science of ‘political futures’**” conference hosted by the **German Institute of Development and Sustainability in Bonn, Germany**. The focus of the conference was exploring how to improve the representation and usability of socio-political factors in climate scenarios.

Collin Meisel, Associate Director of Geopolitical Analysis, Pardee Center for International Futures





NOVEMBER 2022

- **Jonathan Moyer, Collin Meisel, Adam Szymanski-Burgos, Caleb Petry, and Kylie McKee** hosted sponsors of the **Center's Diplometrics** work at the **University of Denver** to discuss ongoing Pardee research and explore possible future geopolitical analysis research topics.
- **Adam Szymanski-Burgos** presented Pardee Center research using the **Formal Bilateral Influence Capacity Index** at the **56th North American Meeting of the Peace Science Society** hosted at the **University of Denver**.
- **Mohammad Irfan** presented in-person on long-term projections of access to water and sanitation for urban and rural populations for the Shared Socioeconomic Pathways (SSPs) at the **Integrated Modeling Consortium Annual Meeting** in **College Park, Maryland**. He also did an online presentation on SSP projections of schooling flows.



DECEMBER 2022

- **Taylor Hanna** and **Stellah Kwasi** participated in a half-day event in **Bissau** launching the second report in a series written by Pardee researchers in collaboration with **UNDP Guinea-Bissau**. The focus of the series is exploration of alternative futures of development in Guinea-Bissau and the topic of the second report is **"The Cost of Not Going Green."**
- Following the report launch event in Bissau, **Taylor Hanna** and **Stellah Kwasi** led a four-day advanced training on the **International Futures model** with a targeted group of participants from the **Guinea-Bissau Ministry of Finance's General Directorate of Forecasting and Economic Study**.



FEBRUARY 2023

- **Collin Meisel** visited **Diplometrics sponsors** in **Washington, DC**, to continue the discussion of ongoing Pardee research and exploration of possible future geopolitical analysis research topics.
- Excerpts from interviews with **Jonathan Moyer** and **Collin Meisel** on previous Pardee Center research published with **Austin Matthews** in the *Journal of Contemporary China* were presented in the winter 2023 issue of the **University of Denver Magazine**.
- **Jonathan Moyer, Audrey Pirzadeh, Taylor Hanna,** and **José Solórzano** represented the Pardee Center at an expert group meeting hosted by **UN Women** in **Bangkok**. Titled “**Modelling the Gendered Effects of Climate Change to Inform Evidence-based Environmental Decision-Making,**” the meeting was attended by researchers, development practitioners, and delegations from Asia Pacific countries.
- **Jonathan Moyer** and **Taylor Hanna** participated in a retreat of the **USAID Egypt Mission** in **Cairo** to assess Egypt’s current **Country Development Cooperation Strategies (CDCS)** and begin planning for the next CDCS period.
- The Pardee Center hosted a delegation from our long-time partner, the **Institute for Security Studies**, a pan-African organization focused on enhancing human security for Africa’s citizens. The visit was organized to provide advanced training in the use of the International Futures model. ISS staff also served as panelists for a presentation to the Korb School on issues that affect the future of Africa’s development.



MARCH 2023

- **Collin Meisel** presented at a roundtable at the **Stimson Center** in **Washington, DC**, at which recently-developed Pardee Center forecasts of spheres of geopolitical influence across alternative scenarios were discussed.
- Having been invited by the **UN Environment Programme (UNEP)** to contribute to the GEO-7 assessment as an author of the Outlooks chapter, **Taylor Hanna** represented the Pardee Center at a **GEO-7 meeting** in **Bangkok**.



Keith Gehring, Josef
Korb Teaching
Professor and Pardee
Center Faculty Affiliate

APRIL 2023

- **Jonathan Moyer** and **Taylor Hanna** attended workshop sessions in **Nairobi** with members of the **African Union Technical Working Group** on the creation of the **African Union's Agenda 2063 Second Ten Year Implementation Plan (STYIP)**.
- **Taylor Hanna** participated in an event titled “**Investing in Human Capital Development in Uganda: Insights Using International Futures Estimation**” in **Kampala**. The event focused on a joint Pardee Center/Economic Policy Research Centre (EPRC) project funded by the European Commission and included the launch of two policy briefs written by Pardee Center and EPRC teams.
- Using the International Futures model, Josef Korbek School Teaching Professor/Pardee Center Faculty Affiliate **Keith Gehring** presented post-invasion recovery scenarios for Ukraine's future to a **delegation of mayors from Ukraine** at the **University of Denver**.



JUNE 2023

- **Jonathan Moyer, Collin Meisel, Adam Szymanski-Burgos, Caleb Petry,** and **Kylie McKee** hosted sponsors of the Center's geopolitical analysis research at the **University of Denver** to discuss ongoing projects and topics for potential future projects.
- **Taylor Hanna** presented possible scenarios for the future of Finland and its key neighbors to a delegation visiting the **University of Denver** as part of an ongoing science and technology collaboration between the **State of Colorado** and the **Republic of Finland**.



MAY 2023

- **Collin Meisel** was interviewed on **The Insider**, a War on the Rocks podcast, about a recent commentary he wrote to help readers better understand deterrence calculations in the context of the present war in Ukraine.
- **Jonathan Moyer** was an expert participant and speaker at the **Climate Security Risk in Central America workshop** hosted by the U.S. National Academies of Sciences, Engineering, and Medicine in **Washington, DC**.

JULY 2023

- **Barry Hughes** and **Jonathan Moyer** represented the Pardee Center **at a workshop attended by members from large global modeling groups** whose work focuses on modeling related to the Sustainable Development Goals. The purpose of the workshop, hosted by the **University of Leiden** at the **Lorentz Center, Netherlands**, was exploration of a potential intermodal comparison project across these groups.

AUGUST 2023

- **Jonathan Moyer** and **Stellah Kwasi** led a three-day IFs training for the **African Union Development Agency's NEPAD staff** in **Midrand, South Africa**. Following that, they went to **Namibia** to pilot a program connecting the second 10-year implementation plan of **Agenda 2063** to Namibia's national planning document.

PUBLICATIONS

SEPTEMBER 2022–AUGUST 2023

Journal Articles

Blessed are the peacemakers: The future burden of intrastate conflict on poverty.

World Development, 165, 106188.

Jonathan D. Moyer. (May 2023).

Multidecadal dynamics project slow 21st-century economic growth and income convergence.

Communications Earth & Environment, 4, 220.

Matthew G. Burgess, Ryan E. Langendorf, Jonathan D. Moyer, Ashley Dancer, Barry B. Hughes, and David Tilman. (June 2023).

<https://doi.org/10.1038/s43247-023-00874-7>

Reports and Policy Briefs

Climate change, economic production, inequality, and poverty. Working Paper. USAID Research Technical Assistance Center.

Jonathan D. Moyer, Audrey Pirzadeh, and Barbara Stone. (January 2023).

https://www.climatelinks.org/sites/default/files/asset/document/202305/USAIDClimateChange_EconomicProduction_Inequality.pdf

The effect of meeting NDP III targets for water and sanitation on child malnutrition in Uganda. Policy Note No. 14. Economic Policy Research Centre.

Taylor Hanna, Linda Nakato, and Corti Paul Lakuma. (April 2023).

<https://eprcug.org/publication/the-effect-of-meeting-ndp-iii-targets-for-water-and-sanitation-on-child-malnutrition-in-uganda/>

Guinea-Bissau: Exploring alternative futures of development—The cost of not going green.

Trends Report 02. UNDP Guinea Bissau and Frederick S. Pardee Center for International Futures.

Willem Verhagen, Mark E. Meziere, David K. Bohl, Bailey Howe, and Jonathan D. Moyer. (November 2022).

https://korbel.du.edu/sites/default/files/2022-11/DU_UNDP-GBReport2_English_Final_Digital.pdf

Impact of COVID-19 on learning: Scoping alternative scenarios for Uganda's education sector. USAID Uganda Learning Activity.

Stellah Kwasi, Taylor Hanna, and Mohammad T. Irfan. (January 2023).

https://pdf.usaid.gov/pdf_docs/PA00ZV1S.pdf

Implications of early marriages on development outcomes in Uganda. Policy Note No. 15. Economic Policy Research Centre.

Deva Sahadevan, Mohammad Irfan, Taylor Hanna, Linda Nakato, and Corti Paul Lakuma. (April 2023).

<https://eprcug.org/publication/implications-of-early-marriages-on-development-outcomes-in-uganda/>

Spheres of influence in the coming decades: Four alternative scenarios. Strategic Foresight Hub Program Report. The Stimson Center.

Collin J. Meisel, Caleb L. Petry, Jonathan D. Moyer, and Mathew Burrows. (May 2023.)

<https://www.stimson.org/2023/spheres-of-influence-in-the-coming-decades-four-alternative-scenarios/>

Commentaries

Failures in the “deterrence failure” dialogue. *War on the Rocks*

Collin Meisel. (May 8, 2023).

<https://warontherocks.com/2023/05/failures-in-the-deterrence-failure-dialogue/>

In defense of bean counting: Why material measures of national power matter. Modern War Institute at West Point.

Collin Meisel. (May 11, 2023).

<https://mwi.usma.edu/in-defense-of-bean-counting-why-material-measures-of-national-power-matter/>

The Pentagon is the wrong agency to lead the new U.S. deterrence strategy. *Defense One*.

Collin Meisel (July 19, 2023)

<https://www.defenseone.com/ideas/2023/07/pentagon-wrong-agency-lead-new-us-deterrence-strategy/388676/>.

The Russian invasion of Ukraine is boosting the potential for U.S. Influence Abroad. *Lawfare*.

Collin Meisel, Caleb Petry, Jonathan D. Moyer, and Mathew J. Burrows. (August 6, 2023).

<https://www.lawfaremedia.org/article/russian-invasion-ukraine-boosting-potential-us-influence-abroad>

The trouble with labeling China an ‘enemy.’ *The Hill*.

Collin Meisel and Kylie McKee. (August 2, 2023).

<https://thehill.com/opinion/international/4131578-the-trouble-with-labeling-china-an-enemy>

Ukraine’s long-term road to recovery. *War on the Rocks*

Collin Meisel. (December 28, 2022).

<https://warontherocks.com/2022/12/ukraines-long-term-road-to-recovery/>

The US is losing the Global South: How to reverse course. *The Hill*.

Collin Meisel, Jonathan Moyer, and Mathew J. Burrows. (June 13, 2023).

<https://thehill.com/opinion/international/4046182-the-us-is-losing-the-global-south-how-to-reverse-course/>

Why many Nigeriens want Russia in and the West out. *Time*.

Collin Meisel and Adam Szymanski-Burgos. (August 3, 2023).

<https://time.com/6301177/niger-african-support-russia>

Third-party Publications and Citations

Could Canada lead the formation of a new global geoengineering regime? *Canadian Foreign Policy Journal*, 28(3), 328-336.

Elizabeth L. Chalecki. (October 2022).

<https://doi.org/10.1080/11926422.2022.2111587>

Chalecki cites the Pardee Center’s Formal Bilateral Influence Capacity Index in the article.

Dare to fight: Xi Jinping unveils China’s new world order. *Financial Times*.

Joe Leahy, Kathrin Hille, Andy Lin, and Michael Pooler. (March 30, 2023).

<https://www.ft.com/content/0f0b558b-3ca8-4156-82c8-e1825539ee20>

The authors use the Pardee Center’s Diplometrics Diplomatic Representation data to illustrate China’s diplomatic advantage over Western countries in Africa and the Middle East.

The diffusion deficit in scientific and technological power: Re-assessing China’s rise. *Review of International Political Economy*.

DOI: 10.1080/09692290.2023.2173633

Jeffrey Ding. (March 2023).

Ding cites the Pardee Center’s Global Power Index.

Economic integration and the transmission of democracy. Discussion Paper. Centre for Research and Analysis of Migration, University College London.

Marco Tabellini and Giacomo Magistretti. (February 2023).

https://www.cream-migration.org/publ_uploads/CDP_02_23_1.pdf

The Pardee Center’s Formal Bilateral Influence Capacity Index is used in this discussion paper.

Foreign contributors to democratic backsliding: The effects of linkages with China on media self-censorship in transitional regimes. *Canadian Foreign Policy Journal*.

Benjamin Toettoe and Diya Jiang. (September 2022).

<https://doi.org/10.1080/11926422.2022.2106501>

The authors use the Pardee Center's Formal Bilateral Influence Capacity Index to measure international linkages.

Getting strategy and force design wrong: Failing to appreciate the weiqi model. *The National Interest*.

Keith T. Holcomb. (February 13, 2023).

<https://nationalinterest.org/feature/getting-strategy-and-force-design-wrong-failing-appreciate-weiqi-model-206209>

Holcomb uses the Pardee Center's Formal Bilateral Influence Capacity Index to assess the present state of great power competition.

Great-power competition and conflict in the 21st century outside the Indo-Pacific and Europe. RAND Corporation.

Raphael S. Cohen, Elina Treyger, Irina A. Chindea, Christian Curriden, Kristen Gunness, Khrystyna Holynska, Marta Kepe, Kurt Klein, Ashley L. Rhoades, and Nathan Vest. (2023).

https://www.rand.org/pubs/research_reports/RRA969-1.html

The report cites the Pardee Center's Diplometrics Diplomatic Representation dataset.

Partner country characteristics as factors in foreign policy behaviour: Germany's relations with developing countries. *European Review of International Studies*, 9(2) 165-209.

Tim Hoflinger. (August 2022).

<https://brill.com/view/journals/eris/9/2/eris.9.issue-2.xml>

The Pardee Center's Diplometrics Diplomatic Representation dataset is cited in this journal article.

Rumbles of thunder: Power shifts and the danger of Sino-American war. Columbia University Press. ISBN: 9780231208451

Steve Chan. (2022)

The book cites the Pardee Center's Formal Bilateral Influence Capacity Index.

U.S. foreign military sales to Australia, Japan, and India amidst U.S.-China strategic competition from the Quad's founding to AUKUS, 2004–2021.

Publication AAI30310907 [Doctoral dissertation, Salve Regina University].

Raymond Dennis. (2023).

<https://digitalcommons.salve.edu/dissertations/AAI30310907>

The Pardee Center's Formal Bilateral Influence Capacity Index is cited in this dissertation.

“Our research requires that we foster a long-term dialogue among three distinct entities—the scientific community, the policy-making community, and the modeling/data community.”

**Frederick S. Pardee Center
for International Futures**



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