CENTER ON GLOBAL TRANSFORMATION

UC San Diego School of Global Policy & Strategy

2016–17 Annual Report

DIRECTORS' MESSAGE

August 2017


Ulrike Schaede


Gordon Hanson

Greetings from the Center on Global Transformation (CGT) at the UC San Diego School of Global Policy and Strategy (GPS). Now in our 11th year of operation, we are happy to report that CGT continues to be a vibrant forum for intellectual discourse, a hub for reflection and action by leaders from the Pacific region, and a launchpad for new and innovative research activities. We thank all of you for your continued generosity and engagement: our founding supporters Joan and Irwin Jacobs, our dedicated staff and colleagues, and our fast-growing community of friends, collaborators and Pacific Leadership Fellows (PLFs).

Our PLF program remains the cornerstone of our activities. To date, we are proud to have welcomed 85 distinguished leaders from 21 countries. These fellows represent leading policymakers, executives, journalists and scholars from around the globe who shape strategy and contribute to important public debates in their countries. During their residencies at GPS, PLFs share insights and challenges with us, thereby elevating our discourse to new levels of depth regarding business, economic and political issues.

During the 2016–17 academic year, we welcomed six PLFs from Brazil, China, Italy, Japan, Pakistan and the U.S. They addressed, among other themes, public policy and advances in biomedical research; governance reform in China; Japanese-U.S. diplomatic relations; the independence of Pakistan's judicial system; the E.U. migration crisis; and the global impact of energy policy in Brazil.

Beyond the PLF program, CGT also grants research awards for new academic initiatives at GPS and across campus, supporting faculty and graduate student research in economics, public policy, international relations and global management. This past year, six grants were awarded, many in partnership with the campuswide Big Pixel Initiative. Projects at the Big Pixel Initiative apply new methods in machine learning to satellite imagery in order to measure urbanization and economic development at a global scale and in close to real time. For example, our scholars are working with the World Bank to map urban land cover in India and Vietnam to help local and national policymakers evaluate the impact of transportation projects on urban development. In other initiatives, CGT in conjunction with GPS's Japan Forum for Innovation and Technology (JFIT) supports research on venture capital and innovation in Japan, as well as researches poverty alleviation in developing countries through GPS's Policy Design and Evaluation Lab (PDEL).

Also with the Big Pixel Initiative, CGT has established partnerships with Google Earth Engine and other technology companies to leverage the power of big data to improve the design and evaluation of public policy. As an extension of this, in February we welcomed Nick Clinton, lead developer advocate at Google Earth Engine, for a presentation on new possibilities in geospatial analysis. As well, Chris Anderson, CEO of 3D Robotics, connected with the center in an October workshop to discuss research possibilities at UC San Diego using advances in drone technology.

We express our continued appreciation and deep gratitude for the generous support from the San Diego community and hope to see you at our many public events this coming year.

(From left) Enrico Letta, former prime minister of Italy, and Peter Cowhey, UC San Diego interim executive vice chancellor for academic affairs

CGT Executive Director Ulrike Schaede greets guests at a San Diego Global Forum, titled 'Japan-U.S. Relations Going Forward.'

YEAR AT A GLANCE

2016–17 highlights

Welcomed six Pacific Leadership Fellows from Brazil, China, Italy, Japan and Pakistan, including prominent public figures from Frazier Healthcare Partners, Peking University, Meiji University, Supreme Court of Pakistan, Paris School of International Affairs at Sciences Po and Federal University of Rio de Janeiro.

Continued collaborations with UC San Diego's Big Pixel Initiative, which is developing geospatial capacity to address the world's greatest challenges at scale. Partnering with Google Earth Engine, the initiative is developing and testing new machine-learning approaches that use high-resolution satellite data to detect and map settlements around the world.

Hosted a range of public talks on topics such as current trends in biomedical research; governance reform in China; brain mapping in Japan; Japanese-U.S. diplomatic relations; geospatial analysis via Google Earth Engine; Pakistan's independent judicial system; changing priorities of the E.U. and the migration crisis; how Americans got left behind in the global economy; and Brazil's role as an energy superpower.

Provided 13 research grants to fund both ongoing and new, innovative research projects by professors and graduate students.

CONTENTS

4 PACIFIC LEADERSHIP FELLOWS

- 5 Activities
- 6 Sir Tadataka Yamada
  Keping Yu
- 7 Yoriko Kawaguchi
  Justice Tassaduq Jillani
- 8 Enrico Letta
  Mauricio Tolmasquim

10-11 ACADEMIC EVENTS

12-13 RESEARCH GRANTS

9 UPCOMING PACIFIC LEADERSHIP FELLOWS

14 BIG PIXEL INITIATIVE

9 SUMMER FELLOWSHIPS

15 STAY CONNECTED

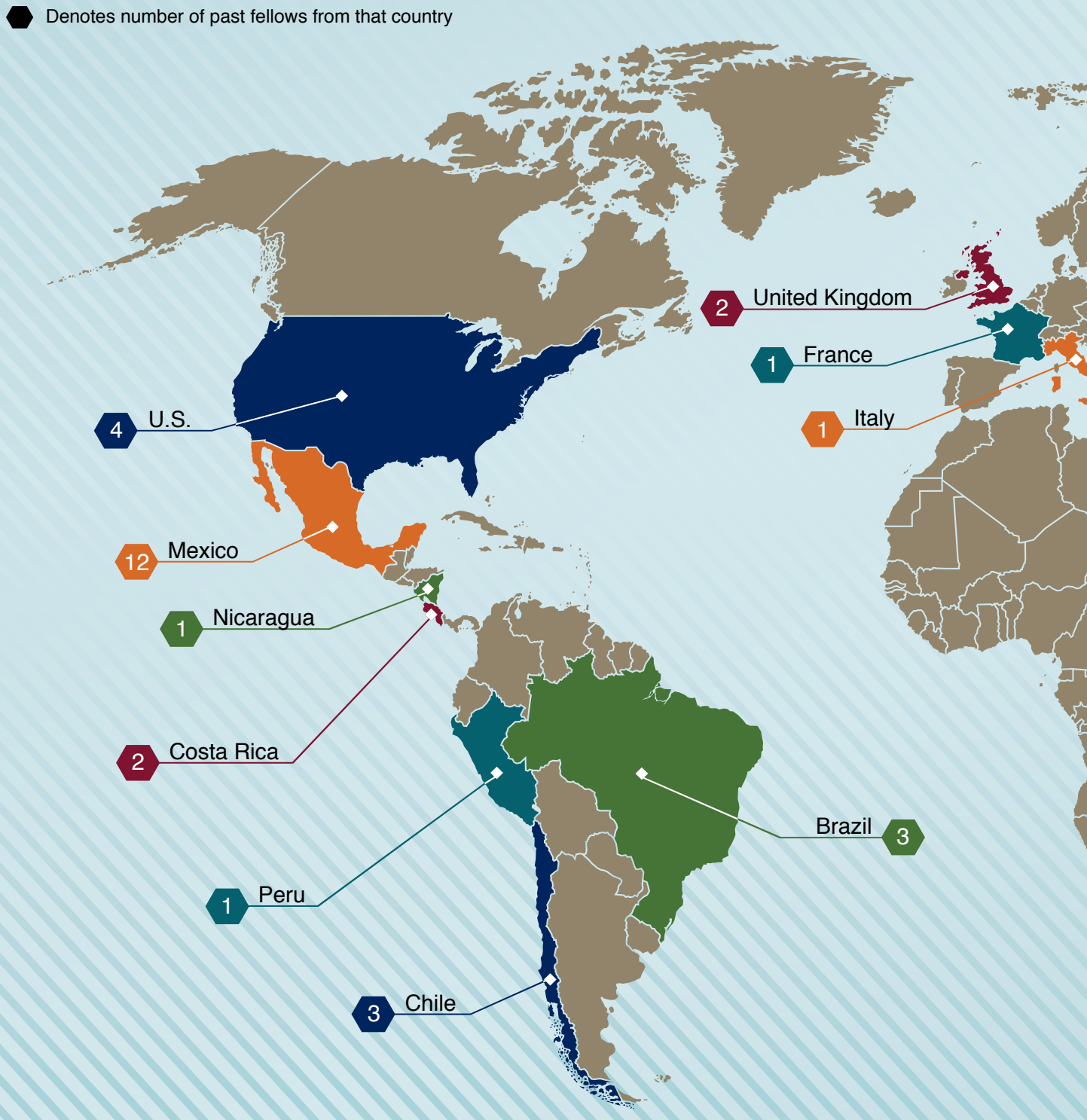
ACKNOWLEDGEMENTS

Irwin and Joan Jacobs

Joan and Irwin Jacobs' philanthropic support has had a significant impact on numerous cultural, medical, educational and civic organizations in San Diego. Since 2006, they have supported the vision of GPS Acting Dean Gordon Hanson and faculty to make the creation and continued success of CGT possible. Their support enables our campus and the Greater San Diego region to become a center for reflection and action by leaders from the Pacific region, as well as a catalyst for innovative research.

PACIFIC LEADERSHIP FELLOWS

CGT's Pacific Leadership Fellows program brings leaders to UC San Diego from around the globe to engage in dialogue, research and instruction with students, alumni, faculty and the San Diego community. Fellows comprise remarkable scholars and policymakers who shape strategy in their own countries through government, the private sector and academia, plus through providing valuable insight into how economic and political systems are evolving. Having completed its 11th year, CGT now has hosted 85 fellows from 21 different countries.



FELLOWS ACTIVITIES

While in residence, each fellow fulfills a number of responsibilities. Though their events and interactions vary based on interests and length of stay, each fellow will:

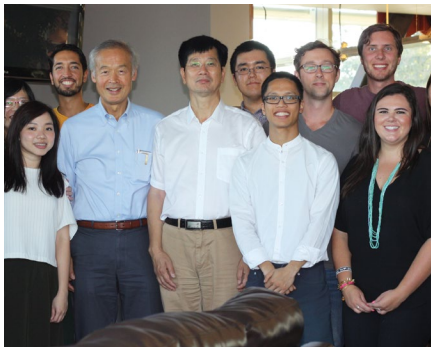
- COLLABORATE with a faculty partner on a project or initiative
- MENTOR students informally and in a classroom setting
- SPEAK at a public program or guest lecture at community events
- ENGAGE with other UC San Diego departments
- CONNECT with the broader San Diego regional community, and business, government or nonprofit leaders
- INTERACT with supporters and the local community

SIR TADATAKA YAMADA

OCT. 3-7, 2016

Faculty Host: Ulrike Schaede

BESTOWING LESSONS FROM GLOBAL HEALTH



Sir Tadataka Yamada is the life sciences team venture partner and growth buyout team senior advisor at Frazier Healthcare Partners. Before his current role, Sir Yamada was the chairman of research and development at GlaxoSmithKline PLC, director of global health at the Bill & Melinda Gates Foundation, as well as chief scientific officer at Takeda Pharmaceuticals Co. in Tokyo. As an extension of his work in entrepreneurship and medical development, Sir Yamada emphasizes the power of partnerships in health care between large pharmaceutical companies and philanthropic foundations.

During his residency, Sir Yamada held several meetings within the UC San Diego community, including GPS faculty and student groups, JFIT, Department of Bioengineering, School of Medicine and Skaggs School of Pharmacy. In addition to presenting a public talk on "Biomedical Research: Lessons from Global Health," Sir Yamada had several high-level meetings with major private companies and institutes such as Qualcomm Inc., J. Craig Venter Institute, Sanford Burnham Prebys Medical Discovery Institute, aTyr Pharma Inc. and PvP Biologics.

KEPING YU

OCT. 3-14, 2016

Faculty Host: Susan Shirk

REVIEWING GOVERNANCE REFORM IN CHINA

Keping Yu is dean of the School of Government at Peking University. Previously, he served as deputy president of the Central Compilation and Translation Bureau and was a professor at Peking University. A stable voice in Chinese academia and an advocate for democratization and rule of law from within the establishment, Yu's book "Democracy is a Good Thing (2009)" relaunched an intellectual debate on the future of China's political system and democratization.

As a fellow, he gave GPS's 21st Century China Center's Sokwanlok Distinguished Lecture on "China's Governance in Transition," during which he traced the principal lines of governance reform in China since the 18th Party Congress and assessed challenges going forward. Yu also had extensive interactions with faculty and students and took part in an academic conference titled the "The Evolution of Communist Political Systems," guest lectured in GPS Associate Professor Victor Shih's Chinese politics course and attended a China Research Workshop on modern Chinese history.

YORIKO KAWAGUCHI

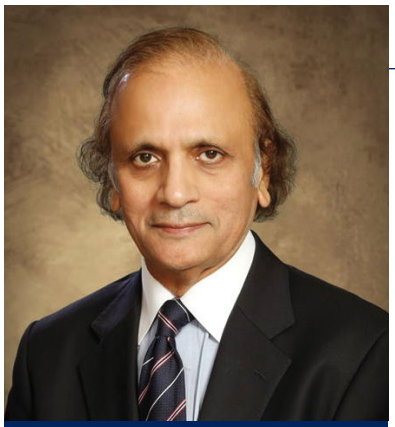
FEB. 9-20, 2017

Faculty Host: Ulrike Schaede

FORECASTING THE FUTURE OF JAPAN-U.S. RELATIONS

Yoriko Kawaguchi is a professor at the Meiji Institute for Global Affairs at Meiji University, as well as Japan's former minister for foreign affairs (2002-04) and minister of the environment (2000-02). She also served as a member of the House of Councilors for Japan's Liberal Democratic Party, as co-chair of the International Commission on Nuclear Non-proliferation and Disarmament and as a special adviser to Prime Minister Junichiro Koizumi. In addition, Kawaguchi has worked as an economist for the World Bank and as managing director of Suntory Holdings Ltd.

During her residency, Kawaguchi provided a public talk as part of the San Diego Global Forum, discussing Japanese-U.S. diplomatic relations regarding the economy, the environment and geopolitics. She also led discussions with students and faculty on the challenges women face when participating in foreign affairs and policymaking in mostly male environments. While in San Diego, she visited Qualcomm Inc., UC San Diego's Energy Innovation Park, Kyocera Corp. and — to fuel her interests in sustainability and the environment — Ecoparque in Tijuana, Mexico.



JUSTICE TASSADUQ JILLANI

FEB. 27 – MARCH 10, 2017

Faculty Host: Gordon Hanson

MAINTAINING AN INDEPENDENT JUDICIARY

Justice Tassaduq Jillani is the 21st Chief Justice of the Supreme Court of Pakistan (2013-14). He began practicing law at the district court level in 1974 and has since established a reputation as an independent and balanced judge, being a proponent of the separation of powers in government and an advocate for the rule of law in democratization. He was appointed judge of the Lahore High Court in 1994 and remained so until 2004, when he joined the Supreme Court of Pakistan. Justice Jillani also served as advocate general of Punjab, a member of the Punjab Bar Council and general secretary of the District Bar Association Multan. In addition, he was formerly co-chair of the Working Party on Mediation in family international law by the Hague Conference.

As a fellow, Justice Jillani shared with UC San Diego students and faculty his stance on how the judicial system in Pakistan has established its independence from other branches of government. He was joined by the Honorable M. Margaret McKeown of the U.S. Court of Appeals for the Ninth Circuit. While in San Diego, Justice Jillani connected with law students in an event at the University of San Diego, visited the U.S.-Mexico border and met with judges from the San Diego Superior Court and the U.S. Court of Appeals.

ENRICO LETTA
APRIL 10-14, 2017

Faculty Host: Gordon Hanson

AN E.U. VIEW ON BREXIT AND THE MIGRATION CRISIS

Enrico Letta is dean of the Paris School of International Affairs at Sciences Po and the founder of Scuola di Politiche in Italy. He has served as prime minister of Italy (2013-14), as well as minister for E.U. affairs (1998-99), minister for industry, commerce and crafts (2000), minister for industry, commerce and crafts and foreign trade (2000-01) and as undersecretary of state to the prime minister of the centre-left government led by Romano Prodi (2006-08). He is the author of several books on international and economic affairs, with particular reference to E.U. enlargement.

As part of the San Diego Global Forum, Letta shared with UC San Diego students, faculty and community members his views on the changing priorities of the E.U. with regard to the migration crisis and its shift toward foreign policy. During his visit, he also met with students interested in European public policy matters, visited Qualcomm Inc., as well as toured the U.S.-Mexico border region. In addition, Letta attended his first NBA game, during which his favorite team the Los Angeles Lakers beat the New Orleans Pelicans.

MAURICIO TOLMASQUIM
MAY 22 – JUNE 2, 2017

Faculty Host: David Victor

UNEARTHING BRAZIL'S ENERGY POTENTIAL

Mauricio Tolmasquim is a professor at the Federal University of Rio de Janeiro and former president and CEO of Empresa de Pesquisa Energética, an affiliate of Brazil's Ministry of Mines and Energy (MME). Previously, he served as an executive secretary at the MME, where he led a team that designed a new model for Brazil's electricity sector. Tolmasquim also is the former president of the Brazilian Society for Energy Planning. He has authored 20 books and has had dozens of articles published in national and international newspapers.

During his residency, Tolmasquim gave a public talk with GPS Professor David Victor on "Brazil's Future as an Energy Superpower." They discussed the country's energy future and what role Brazil will play globally in tackling energy challenges such as limiting emissions causing global warming. Tolmasquim also connected with GPS students and faculty and attended the Institute of the Americas-sponsored La Jolla Energy Conference, during which he partook in a roundtable discussion about Latin America's renewable energy. As well, Tolmasquim visited Qualcomm Inc. and met with other leaders in the local energy sector.

UPCOMING PACIFIC LEADERSHIP FELLOWS

The following are the confirmed 2017–18 Pacific Leadership Fellows. Visit cgt.ucsd.edu for an updated list.

FELLOW	RESIDENCY DATE
JORGE DOMINGUEZ Professor for the Study of Mexico, Harvard University	Winter 2018
GREGORY LEE President, Nokia Technologies	Fall 2017
EDUARDO PORTER Economic Scene Columnist, New York Times	Winter 2018
SOMKIAT TANGKITVANICH President, Thailand Development Research Institute	Fall 2017
ALBERTO TREJOS Dean, INCAE Business School in Costa Rica	Winter 2018

2016 SUMMER FELLOWSHIPS

CGT's summer fellowship program was established to assist GPS students in conducting high-caliber summer internships related to research on economic growth, equality and market change in the Pacific region.

Kristen Hamel, MIA '17, interned in the trade intelligence unit at the Brazilian Confederation of Agriculture and Livestock in Brasilia, Brazil. Amid immersing in the Brazilian culture, Hamel's position also allowed for the opportunity to apply the economic analysis tools she learned from her first year at GPS. This included honing her understanding of trade analysis, with a focus on examining barriers to trade such as tariffs and regulations that are hindering Brazilian agriculture exports.

Seung Wan Kim, MIA '17, via an internship with the Malawi Project, helped refine public health programs and education in Lilongwe, Malawi. Kim's responsibilities included supporting data management through cleaning baseline survey data, conducting data quality checks, updating census data and making data-entry programs. He also set up a new monitoring team for maternal and pediatric health.

CGT Summer Fellow Kristen Hamel, MIA '17, interns with the trade intelligence unit of the CNA in Brasilia, Brazil.

CGT Summer Fellow Seung Wan Kim, MIA '17, interns with the Malawi Project in Lilongwe, Malawi.

ACADEMIC EVENTS

CGT engages with other research centers, universities, corporations and government agencies to provide a focus for dialogue.

Biomedical Research: Lessons from Global Health

Oct. 5, 2016

Sir Tadataka Yamada, life sciences team venture partner and growth buyout team senior advisor at Frazier Healthcare Partners, discussed key global health issues and current trends in biomedical research and their impact. This event was co-sponsored by JFIT at GPS.

Sokwanlok Distinguished Lecture: China's Governance in Transition

Oct. 10, 2016

Delivering the second Sokwanlok Distinguished Lecture on China, Keping Yu, dean of the School of Government at Peking University, traced the principal lines of governance reform in China since the 18th Party Congress and assessed the main challenges going forward. This event was co-sponsored by the 21st Century China Center at GPS and Fudan-UC Center on Contemporary China.

3D Robotics Workshop

Oct. 13, 2016

Chris Anderson, CEO of 3D Robotics and former editor of Wired, led this workshop for 20 UC San Diego faculty members. Beyond presenting current research, participants discussed applications of unmanned aircraft systems and the potential for UC San Diego to collaborate with 3D Robotics on research projects.

New Insights from the Brain Mapping Project in Japan

Nov. 16, 2016

Hideyuki Okano, dean of Keio University School of Medicine, and David Brenner, vice chancellor for health sciences and dean of the UC San Diego School of Medicine, held a talk on their project, "New Insights from the Brain Mapping Project in Japan: Modeling Human Diseases with iPS cells and Transgenic Non-Human Primates." This event was co-sponsored by JFIT at GPS and the UC San Diego School of Medicine.

Hideyuki Okano, dean of Keio University School of Medicine, visits campus to discuss a project in collaboration with UC San Diego's School of Medicine, titled 'New Insights from the Brain Mapping Project in Japan: Modeling Human Diseases with iPS cells and Transgenic Non-Human Primates.'


At a San Diego Global Forum, Yoriko Kawaguchi, Japan's former minister of foreign affairs and minister of the environment, discusses Japan-U.S. relations.

San Diego Global Forum: Japan-U.S. Relations Going Forward

Feb. 15, 2017

Yoriko Kawaguchi, Japan's former minister of foreign affairs and minister of the environment, provided her take on Japanese-U.S. diplomatic relations with regard to the economy, the environment and geopolitics. CGT Executive Director and GPS Professor Ulrike Schaede then led a conversation on how these matters affect global trade and San Diego. Co-sponsored by JFIT at GPS, this event was a part of the San Diego Global Forum, with support from Bank of America and World Trade Center San Diego.

Remote Sensing Analysis at Scale with Google Earth Engine

Feb. 28, 2017

Nick Clinton, lead developer advocate at Google Earth Engine, returned to campus to discuss how research communities can use Google Earth Engine as a tool for planetary-scale, cloud-based analysis. This event was co-sponsored by UC San Diego's Big Pixel Initiative.

Maintaining an Independent Judiciary in Face of Political Challenges

March 8, 2017

Justice Tassaduq Jillani, 21st Chief Justice of the Supreme Court of Pakistan, opined on how the judicial system in Pakistan has established its independence from other branches of government. The Honorable M. Margaret McKeown of the U.S. Court of Appeals for the Ninth Circuit then provided a comparative perspective and discussed the current challenges facing U.S. courts.

San Diego Global Forum: Europe Between Brexit and the Migration Crisis

April 12, 2017

Former Prime Minister of Italy Enrico Letta, current dean of the Paris School of International Affairs at Sciences Po, expanded on the changing priorities of the E.U. with regard to the migration crisis and its shift toward foreign policy. This event was a part of the San Diego Global Forum, with support from Bank of America and World Trade Center San Diego.


At a San Diego Global Forum, Enrico Letta, former prime minister of Italy, delivers a talk titled 'Europe Between Brexit and the Migration Crisis.'

Failure to Adjust: How Americans Got Left Behind in the Global Economy

May 11, 2017

Edward Alden, the Bernard L. Schwartz Senior Fellow at the Council on Foreign Relations, opened up about his new book, "Failure to Adjust," and why the political consensus in support of trade liberalization has collapsed, plus how to correct the course.

Brazil's Future as an Energy Superpower

May 31, 2017

Mauricio Tolmasquim, professor at the Federal University of Rio de Janeiro, and GPS Professor David Victor forecasted Brazil's energy future, including what role the country will play globally in tackling energy challenges such as limiting emissions causing global warming. The event concluded with a concert by Sonic Impact, a global ensemble comprising musicians from China, Korea, Japan and the U.S.

RESEARCH GRANTS

CGT fosters academic inquiry at GPS and departments across UC San Diego by offering grants for innovative research, as well as supporting six grants for faculty and doctoral students through PDEL. CGT grants also funded the following major projects.

Developing a database for CVC investments in Japan

Ulrike Schaede, professor, GPS; Masato Sasaki, professor, Hitotsubashi University

In examining global corporate venture capital (CVC) activities by large Japanese companies, Ulrike Schaede and Masato Sasaki are going beyond the known numbers that — in contrast to approximately 20 percent in the U.S. — CVC accounts for 60 percent of investments in Japan. As such, they have built a database comprising CVC investments by Japanese companies outside Japan accessing the database CB Insights and, for those same companies within Japan, accessing the database Entrepedia. The data include approximately 5,000 deals in 3,000 startup companies globally with Japanese investments, covering more than 70 percent of total Japanese CVC activity in dollar terms. In merging these startup data with accounting data for the large investor companies, Schaede and Sasaki intend to assess the relevance of CVC investments on their business.

Proving the effectiveness of mapping with machine learning

Ran Goldblatt, postdoctoral researcher, GPS; Gordon Hanson, acting dean, GPS

With efficiency and affordability top of mind, Ran Goldblatt and Gordon Hanson are developing a novel machine-learning approach to map urban areas at large scales. Their methodology combines data from nighttime lights and Landsat 8 imagery for pixel-based image classification of built-up areas, using a transfer-learning approach that overcomes the lack of extensive ground-truth data. Tangibly, Goldblatt and Hanson have developed high-quality 30m resolution maps that characterize urban built-up land cover areas in India, Mexico and the U.S. This project is in collaboration with Columbia University, Arizona State University and Google Earth Engine.

Viewing land cover and land use in Vietnam

Ran Goldblatt, postdoctoral researcher, GPS; Gordon Hanson, acting dean, GPS

The majority of studies that analyze urbanization have been limited in part by the availability of extensive high-resolution satellite data, lack of ground-truth data and computational constraints — until now. Honing in on Vietnam by use of Google Earth Engine, Ran Goldblatt and Gordon Hanson have produced high-resolution, high-quality maps of built-up land cover and land use for the country. In doing so, they have demonstrated the applicability of their approach both to map annual changes in the extent of the built-up areas and to differentiate between residential and nonresidential land use. The methodology and the results of this study, Goldblatt and Hanson presume, will help governments and decision-makers answer questions related to policy, planning and distribution of resources. This project is supported in part by the World Bank.

Comparing city structures and functionalities

Ran Goldblatt, postdoctoral researcher, GPS; Sam Roy, Ph.D. candidate, Indiana University; Nick Clinton, lead developer advocate, Google Earth Engine

Urban areas house more than 53 percent of the human population, and the morphology of cities or their spatial structure (i.e., the street network or building structure) is intimately related to functionality. But to what extent? Ran Goldblatt, Sam Roy and Nick Clinton are turning to high-resolution satellite imagery to find out. Utilizing new nano satellites, such as SandBox, the researchers capture and generate data at high-spatial resolution and at high-temporal frequency. All the while, a high-resolution "spectral unmixing" image classification approach allows them to examine the morphology of cities locally and contextually. By applying these image classification methods, one can detect and map urban areas without relying on supervised machine-learning approaches that require expensive ground-truth data sets.

A crowdsourced understanding of the human footprint

Ran Goldblatt, postdoctoral researcher, GPS; Gordon Hanson, acting dean, GPS

Ran Goldblatt and Gordon Hanson are calling on "the crowd" for assistance with this project. Via crowdsourcing, they intend to collect more than 300,000 images tagged as "built-up" or as "not built-up," based on human inspection. Using this first-of-its-kind data set to train a machine-learning algorithm to create a global map of urban activity at the finest level of spatial detail ever achieved, Goldblatt and Hanson will update these maps annually and make them available to the public free of charge, via Google Earth Engine. Their aim in measuring urbanization with a high degree of geographic precision and in close to real time is to transform how public policy is designed, identify strategies achieving sustainable urban growth, and help to create a high-resolution database of all built-up areas on Earth. Ultimately, Goldblatt and Hanson are revolutionizing the understanding of the human footprint. This project is in collaboration with Columbia University, Arizona State University and Google Earth Engine.

Exploring economic activity at small geographies

Ran Goldblatt, postdoctoral researcher, GPS; Gordon Hanson, acting dean, GPS; Kilian Heilmann, Ph.D. candidate, UC San Diego Department of Economics; Yonatan Vaizman, Ph.D. candidate, UC San Diego Department of Electrical and Computer Engineering; Amit Khandelwal, professor, Columbia Business School

Earth-observation data offers a new and potentially groundbreaking way to track the spatial distribution of economic activity and how it changes over time. A traditional proxy for economic activity is the intensity of the emitted radiation during the night, referred to as nighttime lights (NTL). While NTL are adequate proxies for aggregate economic activity, they have limitations for analysis of urbanization. The limitations of NTL for measuring economic activity have led geographers, economists, computer scientists and, now, Ran Goldblatt, Gordon Hanson, Kilian Heilmann, Yonatan Vaizman and Amit Khandelwal to capture physical characteristics of land by incorporating daytime high-resolution satellite images in their development of remote-sensing image classification methodologies. In this study, the researchers are exploring the potential and the limitations of remotely-sensed data as a proxy for economic activity at small geographic units using a commune-level data set from Vietnam. They compare the performance of commonly used NTL data and higher-resolution Landsat imagery. This project is supported in part by the World Bank.

CGT supports research relying on satellite data such as of India to improve understandings of how infrastructure affects urbanization.

Eyeing how infrastructure affects urbanization in India

Ran Goldblatt, postdoctoral researcher, GPS; Gordon Hanson, acting dean, GPS

Developing countries are devoting massive resources on infrastructure, particularly intracity transport. However, standard approaches to trace impacts typically rely only on administrative data, which often are not available to the public, collected at infrequent intervals and/or have measurement challenges. High-resolution satellite data promises to improve understandings of how infrastructure, such as intracity transport investments, affect urbanization. And Ran Goldblatt and Gordon Hanson are using just this — publicly available satellite data — to map India's land cover at a 30m resolution. Performing the analysis in Google Earth Engine, they aim to address how different types of transportation corridors affect the spatial distribution of activity within Indian cities; how city boundaries spread in response to infrastructure investments; how intercity size distributions change in response to intercity transport investments; and how spatial distribution of consumption and production change with infrastructure. This project is supported in part by the World Bank.

GPS Postdoctoral Researcher Ran Goldblatt shows GPS students a project conducted through the Big Pixel Initiative. Photo by Erik Jepsen/UC San Diego Publications

CGT GOES BIG WITH THE BIG PIXEL INITIATIVE

When it comes to education and research at UC San Diego, divisions of study are anything but divided. Which is why since its launch in 2015, UC San Diego's Big Pixel Initiative — co-directed by CGT Director and GPS Acting Dean Gordon Hanson — has worked hand in hand with our center to ensure breakthroughs abound.

The initiative harnesses satellite imagery and big data analytics to make even the biggest things — places, data sets and the world's problems — seem very small. Motivated by access to imaging data with the analytic ability of Google Earth Engine, Hanson and Albert Yu-Min Lin of the Qualcomm Institute founded the Big Pixel Initiative two years ago, creating a living, learning laboratory with the capacity to address the world's greatest challenges at scale. These tools have already made a difference for a variety of researchers on campus who strive to see the bigger picture, literally. Here are three examples.

Ran Goldblatt, postdoctoral research at GPS, uses Big Pixel Initiative satellite imagery to map urban areas around the globe, potentially revolutionizing large-scale analysis of urbanization. Starting with India, his team plans to scale from there to create a continuous global map of urbanization that yields insights over time and area. The need for this kind of analysis has become increasingly clear, as urbanization shapes almost all dimensions of the modern world: from land cover and use around cities to environmental and economic policymaking.

David Kline of Scripps Institution of Oceanography has teamed up with the Big Pixel Initiative to explore the extents of coral bleaching — the loss of photosynthetic algae that produces colorful and healthy reefs. Higher water temperatures, albeit due to climate change, a record-breaking El Niño or other factors can cause corals to lose algae and die, leaving large swathes of white remains. Kline's goal is to determine if bleaching episodes can be quantified by remote sensing, creating a "bleaching detection tool" to estimate the phenomenon's extent and severity.

Jennifer Burney, assistant professor at GPS, has her hands in three research projects incorporating high-resolution satellite imagery. The first examines the structure of cities to understand the actual economies emerging as regions grow. She's also assessing semi-arid ecosystems to develop density maps linked to farm management data. Launching the third project in sub-Saharan Africa, she uses satellites in lieu of on-the-ground data to identify sites with a higher likelihood for successful water wells.

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Information and updates can be found on Facebook, Twitter, Instagram and Vimeo.

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