International Pacific Research Center

April 2016 – March 2017

School of Ocean and Earth Science and Technology
University of Hawai‘i at Mānoa

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The International Pacific Research Center

Conceived under the "US–Japan Common Agenda for Cooperation in Global Perspective," the International Pacific Research Center (IPRC) was established in 1997 within the School of Ocean and Earth Science and Technology at the University of Hawai'i at Mānoa. The IPRC mission is "To provide an international research environment dedicated to improving mankind's understanding of the nature and predictability of climate variations and change in the Asia-Pacific region, and to developing innovative ways to utilize knowledge gained for the benefit of society." The core support for the IPRC comes from the State of Hawai'i through the University and from the principal supporting agencies: the Japan Agency for Marine-Earth Science and Technology (JAMSTEC), and NOAA. Financial support for our research is also provided by other government agencies in the US and abroad.

Asia and the Pacific region are home to over half the world's people, all of whom are affected by variations in the climate system. IPRC researchers conduct modeling and diagnostic studies to document these variations and understand their causes, whether such causes are purely natural or have a human component. Through advances in basic research, the IPRC contributes to improving environmental forecasting for the Asia-Pacific region. One focus of IPRC investigations is the understanding of key phenomena rooted in the tropics, such as the El Niño-Southern Oscillation of the ocean-atmosphere system, monsoon circulations, interannual variability in the Indian Ocean, intraseasonal oscillations of the tropical atmosphere, and tropical cyclones. Other examples of important issues for IPRC study include the nature of decadal variability in the extratropical North Pacific Ocean, the dynamics of the very strong Kuroshio and Oyashio ocean currents in the western North Pacific and the role of marginal seas in the climate system. Concerns about climate change are addressed through modeling studies of past climate and through assessment of model predictions for future trends in climate.

国際太平洋研究センター

国際太平洋研究センター（IPRC）は、「地球的展望に立った協力のための日米共通課題」のもと、1997 年にハワイ大学マノア校の海洋地球科学技術学部内に設立されました。その使命は、「国際色豊かな研究環境を創り、アジア・太平洋地域の気候変動及び変化について、その性質と予測可能性に対する人類の理解を向上させ、そして得られた知見を社会に役立てるために活用する革新的な手段を生み出すこと」です。IPRC の研究費は主に、ハワイ大学を通してハワイ州から、また主要支援機関である海洋研究開発機構、NOAA から支援されています。さらに米国内外のその他の政府機関からも支援を受けています。

アジア・太平洋地域は世界人口の半分以上が居住する地域で、気候系の変動はこれらの人々すべてに影響を及ぼします。そのような気候変動には純粋な自然現象であるものも人類活動が関係したものもありますが、IPRC では、それらを記述し原因を探るため、モデルによる研究や診断的研究を実施しています。このような基礎研究を進展させることでアジア・太平洋地域の環境予測の改善に大きく貢献しています。現在 IPRC では、エルニーニョ・南方振動、モンスーン循環、インド洋の経年変動、熱帯大気の季節内振動、そして熱帯低気圧といった、熱帯起源の現象に注目して研究を行っています。その他の重要な課題として、北太平洋亜熱帯域における十年規模変動の性質、西部北太平洋の強い海流である黒潮・親潮の力学、気候系での縁辺海の役割に関する研究を行っています。さらに、過去の気候のモデル研究やモデルによる将来予測の評価により、気候変化に関する様々な課題に取り組んでいます。

Foreword

This report summarizes the activities of the International Pacific Research Center for the period April 1, 2016–March 31, 2017. The IPRC performs research to enhance understanding of the nature and mechanisms of climate variability and change, and to improve the tools for modeling and forecasting the climate system.

Brief reports on a number of selected IPRC research highlights during this period are available on the IPRC website (iprc.soest.hawaii.edu). Easy access to the abstracts of papers is also available at the website via the List of Publications.

The IPRC has a scientific staff of over 50, including faculty, researchers, postdoctoral fellows, and long-term scientific visitors. IPRC faculty members also supervise graduate students in the Atmospheric Sciences and Oceanography departments of the University of Hawai‘i at Mānoa.

In addition, through our Asia-Pacific Data-Research Center (APDRC), the IPRC operates a web-based server system that makes data resources readily accessible to IPRC researchers, the international climate community, and the wider public.

The staff of the IPRC are grateful to JAMSTEC as well as to NOAA and other US and foreign science agencies for their continued support of our activities. We also acknowledge the State of Hawai‘i for its sponsorship of the IPRC through the University of Hawai‘i.

Kelvin J. Richards
Director

The Year's Publications

Published

Amores, A., O.V. Melnichenko, and N.A. Maximenko, 2017: Coherent mesoscale eddies in the North Atlantic subtropical gyre: 3D structure and transport with application to the salinity maximum. *J. Geophys. Res.-Oceans*, **122** (1), 23-41, doi:10.1002/2016JC012256. IPRC-1231.

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Chen, G., and B. Wang, 2017: Reexamination of the wave activity envelope convective scheme in theoretical modeling of MJO. *J. Climate*, **30** (3), 1127-1138, doi:10.1175/JCLI-D-16-0325.1. IPRC-1223.

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Chen, L., T. Li, Y. Yu, and S.K. Behera, 2017: A possible explanation for the divergent projection of ENSO amplitude change under global warming. *Clim. Dyn.*, doi:10.1007/s00382-017-3544-x. IPRC-1237.

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Wang, L., and L. Chen, 2016: Interannual variation of convectively-coupled equatorial waves and their association with environmental factors. *Dyn. of Atmos. and Oceans*, **76** (1), 116-126, doi:10.1016/j.dynatmoce.2016.10.004. IPRC-1219.

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Wang, L., and T. Li, 2017: Roles of Convective Heating and Boundary-layer Moisture Asymmetry in Slowing Down the Convectively Coupled Kelvin Waves. *Clim. Dyn.*, **48** (7), 2453-2469, doi:10.1007%2Fs00382-016-3215-3. IPRC-1197.

Wang, L., T. Li, E. Maloney, and B. Wang, 2017: Fundamental Causes of Propagating and Non-propagating MJOs in MJOTF/GASS models. *J. Climate*, **30** (10), 3743-3769, doi:10.1175/JCLI-D-16-0765.1. IPRC-1235.

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Zhang, L., T. Li, and M.M. Lu, 2017: Trends of Surface Wind Energy near Taiwan in Winter since 1871. *Terrestrial, Atmospheric and Oceanic Sciences*, **28**, 295-302, doi:10.3319/TAO.2016.04.29.01(A). IPRC-1192.

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Zhu, Z., and T. Li, 2017: Empirical prediction of the onset dates of South China Sea summer monsoon. *Clim. Dyn.*, **48** (5), 1633-1645, doi:10.1007%2Fs00382-016-3164-x. IPRC-1189.

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Zhu, Z., and T. Li, 2017: The record-breaking hot summer in 2015 over Hawaii and its physical causes. *J. Climate*, **30** (11), 4253-4266, doi:10.1175/JCLI-D-16-0438.1. IPRC-1240.

Zhu, Z., T. Li, L. Bai, and J.Y. Gao, 2016: Extended-range forecast for the temporal distribution of clustering tropical cyclogenesis over the western North Pacific. *Theor. Appl. Climatol.*, doi:10.1007/s00704-016-1925-4. IPRC-1210.

Zuo, H., T. Li, J. Liu, and M. Peng, 2016: What Controls Early or Late Onset of Tropical North Atlantic Hurricane Season? *Journal of Meteorological Research*, **30** (3), 298-311, doi:10.1007/s13351-016-5119-x. IPRC-1186.

The Year's Seminars

2017

March 23 — Paul Spence, Climate Change Research Center DECRA, University of South Wales, Sydney, Australia
*Subsurface warming of West Antarctic coastal waters by remote winds****

March 14 — Gerald Meehl, National Center for Atmospheric Research (NCAR), Boulder Colorado
*Interdecadal Pacific Oscillation (IPO) contributions to Antarctic sea ice expansion from 2000-2014**

February 28 — Emanuele Di Lorenzo, Director of Program in Ocean Science & Engineering, Georgia Institute of Technology
*Evidence for stronger and more prolonged heat waves in the North Pacific: Is the 2014/15 event the new norm?**

February 16 — Nikolai Maximenko, IPRC
*Ocean surface currents and applications: Progress and challenges****

February 15 — Mong-Ming Lu, Research and Development Center, Center Weather Bureau, Taiwan
*The physical-empirical TC ACE seasonal forecast models in Taiwan area and their sources of predictability***

February 9 — Xianyao Chen, Physical Oceanography Lab, Ocean University of China
*EOF Analysis of global sea surface temperature****

February 2 — Niklas Schneider, IPRC/Department of Oceanography
*Dynamics of the atmospheric boundary layer response to ocean mesoscale sea surface temperature****

2016

November 1 — Robert Weller, Woods Hole Oceanographic Institution
*Observing trends in surface forcing and trying to understand the ocean response**

October 26 — Zhiping Tian, Institute of Atmospheric Physics, Chinese Academy of Sciences
*Global monsoon and Pacific Walker circulation during the mid-Holocene: PMIP simulation results***

October 18 — Takashi Doi, Application Laboratory, JAMSTEC
*Improvement of the Indian Ocean Dipole Mode prediction by initializing subsurface ocean observation ~SINTEX-F2 seasonal prediction system~**

October 12 — Bin Wang, IPRC
*How does MJO modulate tropical cyclone genesis?***

October 5 — Tim Li, IPRC/Department of Atmospheric Sciences
*Mechanisms for MJO initiation in western Indian Ocean***

September 9 Fuqing Zhang, Director of ADAPT, Pennsylvania State University
*Intrinsic versus practical limits of multi-scale atmospheric predictability***

August 15 Thomas Stoker, University of Bern, Switzerland
*Mitigation Delay Sensitivity: a new policy-relevant metric**

June 9 Shoshiro Minobe, Physical Oceanography and Climate Laboratory, Hokkaido University, Sapporo, Japan
*Western boundary sea-level: A theory and rule of thumb**

May 11 Glab Panteleev, International Arctic Research Center (IARC), University of Alaska, Fairbanks
*Adjoint-free variational data assimilation into regional wave model**

*IPRC Discussion/Seminar
** Joint IPRC-Atmospheric Sciences Seminar
*** Joint IPRC-Oceanography Seminar

The Year's Workshops and Conferences

2017

March 8 *Earth, Sea, and Sky: A Symposium on research at the University of Hawai'i*
Watanabe Hall, Room 112
University of Hawai'i at Mānoa, Honolulu, Hawai'i

March 1 *IPRC/JIMAR Mini-Workshop on Submesoscale Impacts on the Upper Ocean*
Pacific Ocean Science & Technology Building, Room 414
University of Hawai'i at Mānoa, Honolulu, Hawai'i

Visiting Scholars

2017

Paul Spence	University of New South Wales Sydney, Australia	3/28 – 4/06
David Griffin	Commonwealth Scientific and Industrial Research Organization (CSIRO), Australia	3/02 – 3/02
Emanuele Di Lorenzo	Georgia Institute of Technology	2/27 – 3/03
Patrice Klein	IFREMER, France	2/27 – 3/03
Hideharu Sasaki	JAMSTEC, Japan	2/27 – 3/03
Daiki Ito	Tohoku University, Japan	2/27 – 3/03
Dan Li	Boston University	2/17 – 2/25
Jae Hwan Kim	Pusan National University, South Korea	1/19 – 1/31
Masahisa Kamachi	JAMSTEC, Japan	1/16 – 1/18
Soon-Il An	Yonsei University, Seoul, South Korea	1/04 – 1/14

2016

Suhong Ma	NWPD/NMC Beijing, China	12/29 – 1/31
Luca Centurioni	Scripps Institution of Oceanography, UC San Diego	12/20 – 12/21
Qinyu Liu	Ocean University of China	12/08 – 1/07
Suping Zhang	Ocean University of China	12/08 – 1/07
Shayne McGregor	Monash University, Australia	12/05 – 12/09
Pang-chi Hsu	Nanjing University of Information Science and Technology, China	10/21 – 11/18
Takeshi Doi	JAMSTEC, Japan	10/17 – 11/03
Ching-Teng Lee	Central Weather Bureau, Taiwan	9/04 – 9/14
Yea-Ching Tung	Central Weather Bureau, Taiwan	9/04 – 9/10
Annalisa Cherchi	Centro Euro-Mediterraneo sui Cambiamenti Climatici /Istituto Nazionale di Geofisica e Vulcanologia, Italy	9/01 – 9/10
Ryo Furue	JAMSTEC, Japan	8/30 – 9/07
Jingwu Liu	Ocean University of China	8/26 – 9/10
Andrea Alessandri	ENEA, Italy	8/18 – 9/09
Xiong Chen	PLA University of Science and Technology, China	8/01 – 10/31
Haiming Xu	Nanjing University of Information Science and Technology, China	8/01 – 8/31
Michelle Tigchelaar	University of Washington	7/08 – 7/21
Malte Heinemann	University of Kiel, Germany	7/06 – 7/19
Thomas Stocker	University of Bern, Switzerland	7/05 – 8/19
David Pollard	Pennsylvania State University	7/05 – 7/27
Junyao Heng	Nanjing University of Information Science and Technology, China	7/05 – 7/19

Gregory Holland	NCAR	7/03 – 7/05
Joao Pedro Cardoso	Rio De Janeiro State University, Brazil	6/01 – 8/08
Xiangwen Liu	National Climate Center, Climate Model Division	5/31 – 7/31
Yoshio Kawatani	Japan Agency for Marine-Earth Science and Technology	4/21 – 4/27
Shoshiro Minobe	Hokkaido University, Sapporo, Japan	4/07 – 6/11