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EDUCATION

2007/09 – 2015/06	Ph.D.	Department of Physics, University of California, San Diego, USA
2004/09 – 2006/08	M.S.	Institute of Astronomy, National Tsing Hua University, Taiwan
1999/09 – 2004/06	B.A.	Department of Physics, National Tsing Hua University, Taiwan

EMPLOYMENT

2015/08 - present	Postdoctoral Researcher	RCEC, Academia Sinica, Taiwan
2009/06 - 2015/06	Research Assistant	University of California, San Diego, USA
2007/09 - 2009/06	Teaching Assistant	University of California, San Diego, USA
2006/08 - 2007/08	Research Assistant	Theoretical Institute for Advanced Research in Astrophysics, Academia Sinica, Taiwan
2004/09 - 2005/06	Teaching Assistant	National Tsing Hua University, Taiwan

RESEARCH INTEREST

I study climate change and atmospheric dynamics, with an emphasis on the correlation between weather systems and large-scale atmospheric thermal structures and circulations. My current work focuses on finding the changes in synoptic eddies under anthropogenic global warming and understanding the fundamental dynamics through diagnosis of observational data and state of art climate model simulations. My major research interests are listed below.

Major research interests
Trends and variability of synoptic systems
Dynamics of baroclinic eddies and storm tracks
Wave/mean flow interactions
Changes in weather extremes under greenhouse-gas forcing

RESEARCH HIGHLIGHTS

1. **Coherent changes in large-scale thermal structure and baroclinic life cycle of synoptic eddies in the Northern Hemisphere**

The tropospheric warming during the past decades is inhomogeneous and varies with season. In the winter Northern Hemisphere, the tropospheric warming has been larger at latitudes around 30°N than at the midlatitude (30-60°N). This inhomogeneous warming resulted in an increase in meridional temperature gradient in the lower midlatitudes. We observed a correlated enhancement of the entire baroclinic life cycle of synoptic eddies — including eddy fluxes of heat and momentum, and zonal mean flow — associated with the steepened poleward temperature gradient. By contrast, in the summer Northern Hemisphere, the overall tropospheric warming over the mid- to high-latitude land areas has been accompanied by weakly reduced synoptic eddy activities and circulation.

2. Increasing trends in covarying synoptic eddy activity and temperature gradient in the upper troposphere and lower stratosphere under global warming

The radiative effect of increasing greenhouse gases warms the troposphere and cools the stratosphere, thus increasing the equator-to-pole temperature gradient in the upper troposphere and lower stratosphere (UTLS). We observed increasing trends in the synoptic eddy activity associated with a steepening poleward temperature gradient in mid-latitude UTLS regions during winter/summer in the Southern Hemisphere and during winter in the Northern Hemisphere over the past six decades. Similar tendencies will continue enhancing in the 21st century under warming scenario. Our findings suggest that if greenhouse gas–induced warming and cooling continue to change the equator-to-pole temperature gradient as projected in a warming climate, extratropical synoptic disturbances with larger momentum, heat, and moisture fluxes may change accordingly.

REPRESENTATIVE PUBLICATIONS (*: corresponding author)

1. Li, Jui-Lin Frank, W.-L. Lee, K.-M. Xu, J. Jiang, E. Fetzer, C.-A. Chen, Y.-H. Wang, J.-Y. Yu, P.-C. Hsu, and H.-H. Hsu. "The role of falling ice radiative effects on climate projections over Arctic under global warming." *Terr. Atmos. Ocean. Sci.* Accepted

2. Hsu, Pei-Chun*, P. H. Diamond, and S. M. Tobias. "Nonperturbative mean-field theory for minimum enstrophy relaxation." *Physical Review E* 91.5 (2015): 053024.

3. Hsu, Pei-Chun*, and P. H. Diamond. "On calculating the potential vorticity flux." *Physics of Plasmas* 22.3 (2015): 032314.

4. Hsu, Pei-Chun*, and P. H. Diamond. "Zonal flow formation in the presence of ambient mean shear." *Physics of Plasmas* 22.2 (2015): 022306.

5. Diamond, Patrick H., Y. Kosuga, Z.B. Guo, O.D. Gurcan, G. Dif-Pradalier and P.-C. Hsu. "A new theory of mixing scale selection: What determines the avalanche scale?" 25th IAEA Fusion Energy Conference, Russian Federation, Paper IAEA-CN-TH/P7-7 (2014)

6. Diamond, Patrick H., Y. Kosuga, O.D. Gurcan, T.S. Hahm, C.J. McDevitt, N. Fedorczak, W. Wang, H. Jhang, J.M. Kwon, S. Ku, G. Dif-Pradalier, J. Abiteboul, Y. Sarazin, L. Wang, J. Rice, W.H. Ko, Y.J. Shi, K. Ida, W. Solomon, R. Singh, S.H. Ko, S. Yi, T. Rhee, P.-C. Hsu and C.S. Chang. "On the physics of intrinsic torque and momentum transport bifurcations in toroidal plasmas." 24th IAEA Fusion Energy Conference, USA, Paper IAEA-CN-197/OV/P-03 (2012)

7. Hsu, Pei-Chun*, Kouichi Hirotani, and Hsiang Kuang Chang. "Particle acceleration in pulsar magnetospheres." *Journal of Taipei Astronomical Museum* (2007).

8. Hsu, Pei-Chun*, Kouichi Hirotani and Hsiang-Kuang Chang. "Electrodynamics of particle acceleration in pulsar magnetosphere." Proceedings of the 363rd Heraeus-Seminar on Neutron Stars and Pulsars, 40 years after the discovery, Germany, May. 14-19, 2006, eds. W. Becker, H.H.Huang, MPE Report 291, pp. 146-14

Others (Invited Talks，Keynote speech et al.)

Oral Presentations

AOGS Annual Meeting, 2020 June, Hongcheon, “Observed correlated trends in large-scale thermal structure and baroclinic life cycle of synoptic eddies in the Northern Hemisphere.” (The abstract was accepted for an invited talk, but the meeting is cancelled due to COVID-19.)

EGU General Assembly, 2020 May, Vienna, “Coherent changes in large-scale thermal structure and baroclinic life cycle of synoptic eddies in the Northern Hemisphere under global warming.” (The abstract was accepted for an oral presentation, but the meeting is cancelled due to COVID-19.)

IUGG General Assembly 2019 July, Montréal, “Increasing Trends in Covarying Synoptic Eddy Activity and Temperature Gradient under Global Warming.”

EGU General Assembly, 2018 Apr, Vienna, “Increasing Trends in Weather-Timescale Disturbances due to Tropospheric Warming and Stratospheric Cooling.”

RCAST Climate Variability and Change Workshop, 2017 Nov, Tokyo, “A New Perspective on Increased Intensities of Atmospheric disturbances: Trends in Weather-timescale Fluctuations.”

Joint IAPSO-IAMAS-IAGA Assembly, 2017 Aug, Cape Town, “A New Perspective on Increased Intensities of Atmospheric Disturbances: Trends in Weather-timescale Fluctuations.”