

# Tsz-Kin (Eric) Lai

Ph.D. Candidate

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## Research Interests

Tropical Cyclones, Mesoscale Convective Systems, Tropical Meteorology, Severe Weather, Cloud Dynamics

## Education

**Ph.D. Candidate in Atmospheric and Oceanic Sciences** 2015–Present  
McGill University Montreal, Canada

- Impacts of Asymmetric Dynamics on Tropical Cyclone Eyewall Replacement Cycles
- Supervisor: Prof. M. K. (Peter) Yau

**M.Sc. in Atmosphere, Ocean and Climate** 2013  
University of Reading Reading, UK

- Dissertation: *Emergence of Tropical Cyclones in Baroclinic Waves*
- Supervisors: Prof. John Methven and Prof. Rosalind J. Cornforth
- Graduated with Distinction

**B.Sc. in Physics with minor in Earth System Science** 2012  
The Chinese University of Hong Kong Hong Kong

- Bachelor Final Year Project: *Advanced Bias Removal Approach Using a Kalman Filter for Probabilistic Wind Speed Forecasts During the Periods of Tropical Cyclone Influence*
- Supervisors: Mr. Ping Cheung (Hong Kong Observatory) and Dr. Kam-Moon Pang

## Research and Work Experience

Research.....

**Visiting Graduate Student** Jul 2019–Oct 2019  
Research Applications Laboratory (RAL), National Center for Atmospheric Research (NCAR) Boulder, USA

- Tropical Cyclone Inner Eyewall Decay in Numerical Experiments
- Host: Dr. Eric A. Hendricks

**Graduate Research Assistant** Sep 2015–Present  
Department of Atmospheric and Oceanic Sciences, McGill University Montreal, Canada

**Meteorology Researcher** Dec 2013–Jul 2015  
Fugro GEOS Ltd. (now Fugro GB Marine Ltd.) South Oxfordshire, UK

- Participated in a meteorological research project “IFADS: Improving Forecasts of African Dust Storms” in collaboration with University of Leeds
- Participated in a research project on “Holistic Vessel Performance and Routing System” in collaborations with University of Southampton etc.
- Performed internal projects such as Nigeria lightning statistics and validation of wind speed forecasts produced by WRF and GFS

**Voluntary Research Assistant** Aug 2013–Aug 2015  
Department of Meteorology, University of Reading Reading, UK

- Performed a research project about tropical cyclogenesis based on my master’s dissertation

**Summer Intern Student** Summer 2011  
 Hong Kong Observatory Hong Kong

- Worked on “Improving the very short range convective weather forecast for the Hong Kong Flight Information Region (HKFIR)”
- Developed an improved forecasting approach based on ECMWF model data

**Student Research Assistant** Summer 2010  
 Institute of Space and Earth Information Science, The Chinese University of Hong Kong Hong Kong

- Studied the influence of ENSO on the weather in Hong Kong

## Teaching and Technical.....

**Teaching Assistant** Sep 2016–Apr 2020  
 Department of Atmospheric and Oceanic Sciences, McGill University Montreal, Canada

- ATOC214 Introduction: Physics of the Atmosphere (Fall 2016, Fall 2018)
- ATOC184 Science of Storms (Winter 2017, Winter 2018, Winter 2019, Winter 2020)
- ATOC181 Introduction to Atmospheric Science (Fall 2017)

**Technical Helper for Community Weather Information Network (Co-WIN)** Summer 2009  
 Department of Applied Physics, The Hong Kong Polytechnic University Hong Kong

- Monitored, maintained and upgraded the automatic weather stations of Co-WIN
- Performed data testing and apparatus calibration

## Selected Honours and Awards

**2019: Graduate Mobility Award, McGill University, Canada**  
**2017–2019: Graduate Research Enhancement and Travel (GREAT) Award, McGill University, Canada**  
**2015–2018: Graduate Excellence Fellowship, McGill University, Canada**  
**2015–2016: Atmospheric and Oceanic Sciences Graduate Award, McGill University, Canada**  
**2012: International Masters Bursary, University of Reading, UK**  
**2011: Hong Kong Observatory Scholarship, Hong Kong Observatory, Hong Kong**  
**2011: Second Runner-up in Undergraduate Individual Entry, Professor Sir Charles K. Kao Student Creativity Awards 2011, The Chinese University of Hong Kong, Hong Kong**

## Publications

### Published.....

- **Lai, T.-K.**, E. A. Hendricks, M. K. Yau, and K. Menelaou, 2021: Roles of barotropic instability across the moat in inner eyewall decay and outer eyewall intensification: Essential dynamics. *J. Atmos. Sci.*, **78**, 1411–1428, doi:10.1175/JAS-D-20-0169.1.
- **Lai, T.-K.**, E. A. Hendricks, K. Menelaou, and M. K. Yau, 2021: Roles of barotropic instability across the moat in inner eyewall decay and outer eyewall intensification: Three-dimensional numerical experiments. *J. Atmos. Sci.*, **78**, 473–496, doi:10.1175/JAS-D-20-0168.1.
- **Lai, T.-K.**, K. Menelaou, and M. K. Yau, 2019: Barotropic instability across the moat and inner eyewall dissipation: A numerical study of Hurricane Wilma (2005). *J. Atmos. Sci.*, **76**, 989–1013, doi:10.1175/JAS-D-18-0191.1.
- Menelaou, K., M. K. Yau, and **T.-K. Lai**, 2018: A possible three-dimensional mechanism for oscillating wobbles in tropical cyclone-like vortices with concentric eyewalls. *J. Atmos. Sci.*, **75**, 2157–2174, doi:10.1175/JAS-D-18-0005.1.

## Submitted.....

- **Lai, T.-K.**, E. A. Hendricks, and M. K. Yau, 2021: Long-term effect of barotropic instability across the moat in double-eyewall tropical cyclone-like vortices in forced and unforced shallow-water models. Submitted to *J. Atmos. Sci.*

## Presentations

- **Lai, T.-K.**, E. A. Hendricks, K. Menelaou, and M. K. Yau, 2019: Barotropic Instability across the Moat and Inner Eyewall Decay: Numerical Experiments. *AGU Fall Meeting 2019*, San Francisco, CA, USA. (Oral)
- **Lai, T.-K.**, E. A. Hendricks, K. Menelaou, and M. K. Yau, 2019: Barotropic Instability across the Moat and Inner Eyewall Dissipation: A Real Case Simulation and Numerical Experiments. *NCAR MMM Dynamics Happy Hour Seminar Series*, Boulder, CO, USA. (Invited talk)
- **Lai, T.-K.**, K. Menelaou, and M. K. Yau, 2019: Barotropic Instability across the Moat and Inner Eyewall Dissipation: A Real Case Simulation and an Idealised Experiment. *9th Northeast Tropical Meteorology Workshop*, Dedham, MA, USA. (Oral)
- **Lai, T.-K.**, K. Menelaou, and M. K. Yau, 2018: Barotropic Instability across the Moat and Inner Eyewall Dissipation: A Numerical Study of Hurricane Wilma (2005). *AGU Fall Meeting 2018*, Washington, DC, USA. (Oral)
- **Lai, T.-K.**, K. Menelaou, and M. K. Yau, 2018: A Dynamical Perspective on Inner Eyewall Dissipation in Hurricane Wilma (2005). *AMS 33rd Conference on Hurricanes and Tropical Meteorology*, Ponte Vedra, FL, USA. (Poster)
- **Lai, T.-K.**, and M. K. Yau, 2017: Emergence of PV Skirts in TC-like Vortices. *8th Northeast Tropical Meteorology Conference*, Rensselaerville, NY, USA. (Poster)

## Professional Affiliations

**American Meteorological Society**, USA

**American Geophysical Union**, USA

## Other Training Received

**2013: University of Reading Forecasting Module held by Met Office**, *University of Reading*, UK

## Other Professional Experience

**Founder and President (2010–2011)**

The Meteorological Society, The Student Union of the Chinese University of Hong Kong

Hong Kong

## Languages

**English:** Professional proficiency

**French:** Elementary proficiency

**Cantonese:** Native

**Mandarin:** Bilingual proficiency

## Computer Skills

**Operating Systems:** Unix, Linux, Windows, macOS

**Programming:** Python, Fortran, Perl (basic), C++ (basic)

**Computing:** MATLAB, Mathematica, R (basic)

**Visualisation:** GrADS, IDL, NCL (basic)

**Scripting:** PHP, JavaScript, PowerShell (basic)

**Typography:** L<sup>A</sup>T<sub>E</sub>X

**Miscellaneous:** MySQL, HTML, CSS