胡晓明

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个人简介

胡晓明，中山大学大气科学学院教授、博士生导师，国家自然科学基金优秀青年科学基金项目获得者。主要从事气候动力学与气候变化研究，重点关注气候反馈及其不确定性、极地气候变化及热带-极区相互作用，以及复合极端事件及其对冰冻圈的影响，并从大气质量、能量和水循环角度开展过程诊断、数值试验和气候模式评估。主持国家重点研发计划课题、国家自然科学基金优秀青年科学基金项目和面上项目等。

教育背景

2013.08-2016.06	中山大学大气科学学院气象系，博士（导师：杨崧教授）
2010.09-2013.06	中国海洋大学海洋环境学院气象系，硕士（导师：黄菲教授）
2006.09-2010.06	中国海洋大学海洋环境学院大气科学系，学士

工作与访问经历

2023.07-至今	中山大学大气科学学院，教授、博士生导师
2019.05-2023.07	中山大学大气科学学院，副教授
2016.07-2019.04	中山大学大气科学学院，特聘副研究员
2016.12-2017.06	美国佛罗里达州立大学地球、海洋和大气科学系，访问学者
2014.11-2015.12	美国佛罗里达州立大学地球、海洋和大气科学系，访问学生
2011.06-2013.05	中国气象局国家气候中心，访问学生

研究方向与方法

- 气候反馈及其不确定性：定量评估辐射、动力和水循环过程对全球及区域增暖的贡献，识别气候模式预估差异的物理来源。

- 极地气候变化及热带-极区相互作用：研究海冰、海洋环流、海底地形、向极能量与水汽输送，以及热带海温和对流异常对极地气候的影响。
- 复合极端事件及其对冰冻圈的影响：关注极地暖湿、暖干等复合极端事件的形成机制及其对冰盖、冰架和海冰的影响。

主要方法与平台

- 气候模式评估与多模式集合分析；过程分解和能量收支诊断；辐射核与能量增益核方法；理想化数值试验；再分析资料与卫星观测综合分析。
- pyCFRAM（GitHub: https://github.com/XHU-sysu/pyCFRAM）：面向气候变化过程归因的开源 Python 工具，可将温度变化分解为辐射、云、水汽、反照率、大气动力和地表热通量等物理过程贡献，并支持 RRTMG 与 Fu 辐射方案。
- COAST 耦合模式：用于开展大气-海洋-海冰耦合数值试验，研究多圈层相互作用及其对区域和极地气候变化的影响。

荣誉与学术服务

获得荣誉

2022	中国新发展奖
2021	谢义炳青年气象科技奖
2017	Yuxiang Overseas Returnee Young Scholar（宇翔海归英才奖）

学术服务

2025-至今	Journal of Geophysical Research: Atmospheres, Associate Editor
2023-至今	《气象科学》，编委
2022-至今	Ocean-Land-Atmosphere Research, Editor
2020-至今	Frontiers in Earth Sciences, Guest Editor
2019-2020	卫星海洋环境动力学国家重点实验室，访问“海星学者”

教学与人才培养

讲授课程

- 《动力气象学》- 本科专业核心课程
- 《海洋与冰冻圈科学》- 本科专业必修课程

- 《冰冻圈科学基础》- 本科专业选修课程
- 《海洋学》- 本科专业选修课程
- 《大洋环流》- 本科专业选修课程
- 《热带大气动力学》- 硕士研究生必修课程
- 《本科毕业论文》- 本科生毕业论文指导

在校成员

- 博士后：王佩禧
- 博士研究生：韩宇慧、张义晗、李敬怡、邵文淼
- 硕士研究生：许可、宋佳颖、刘翔宇、伍亦翔、谭思怡、张尧涵

已毕业成员

- 孔蕴淇（硕士；现就职于广东省气象局生态中心）
- 段志方（硕士；现就职于云南省气象局迪庆州气象局）
- 陈昕璐（硕士阶段由胡晓明指导；现为博士研究生，导师：刘骥平教授）
- 张晓曼（2026届硕士；现就职于国有企业）

合作/参与指导博士生

- 李亚娜、范汉杰、吴玉婷、方樱霏、吴树炎、徐敏、杨冉、刘妍池

近年学生荣誉

- 2026：韩宇慧、张义晗获国家公派出国留学资格；张晓曼获中山大学大气科学学院优秀毕业生（硕士生）。
- 2025：方樱霏获中山大学大气科学学院优秀毕业生（博士生）；韩宇慧、王佩禧获2024-2025学年度陈世训奖学金。
- 2024：张义晗获中山大学优秀毕业生；陈昕璐获中山大学优秀助教及2023-2024学年度陈世训奖学金；韩宇慧获研究生一等学业奖助金。
- 2023：张义晗获研究生国家奖学金；张晓曼获中山大学校级优秀本科毕业论文；韩宇慧获研究生一等学业奖助金。

本科生研习与毕业论文指导

- 排放-气候-经济交互模型（学生：王树；获计算机软件著作权1项）。

2026

- 谭思怡：非温度反馈的空间分布特征及其不确定性
- 叶俊裕：南极融水对南极气候影响的季节性差异（已投稿）
- 董祎凡：罗斯海扇区极端下降风年际变率的主导因子探究（已投稿）
- 唐峥嵘：基于海上浮标观测的台风“苏拉”过程分析（已投稿）

- 伍亦翔：地形塑造下的 ENSO 演变特征研究

2025

- 余芊逸：海底地形对半球间不对称气候的塑造作用（已发表）
- 李瑞铭：南极罗斯海扇区极端下降风对海冰的影响
- 刘翔宇：南极罗斯海扇区下降风事件及其与大尺度背景环流的关系

2024

- 许可：青藏高原极端暖湿事件的增加趋势
- 梁心妍：近20年北极表面加速增暖归因分析
- 王倩倩：南极龙尼冰架表面融化时空特征分析
- 何琳：核废水排放对海洋生态环境污染法律责任浅析
- 苏婧仪：全球复合极端冷事件的时空特征分析

2023

- 韩宇慧：德雷克海峡开闭对亚澳季风降水的影响（已发表；成果延伸为其第一篇 Geophysical Research Letters 论文）
- 张思嘉：2020-2023年“三重”拉尼娜事件的爆发与维持机制（已发表）
- 张晓曼：持续型 ENSO 对中国南方降水的影响：对 CMIP6 模拟结果的评估（已发表）
- 夏叶：大气内部变率对西北太平洋反气旋年际变化的影响
- 潘晓榆：全球变暖下黑潮与湾流延伸体区域涡旋的变化差异和机制

2022

- 李雯宜：大气对罗斯冰架四次强融化事件影响的定量分析（已发表）
- 陈昕璐：向极热输送异常及其与热带的联系

主持及参与科研项目

国家级

- “南极底层水形成变异机理及气候效应研究” 课题2. 调控源区底层水产量和变异的海-冰-气耦合过程研究，411.4万，主持，国家重点研发计划“工程科学与综合交叉”专项
- 气候反馈及其不确定性，200万，主持，国家自然科学基金优秀青年项目
- 大气向极能量和水汽输运对南极温度变化的影响，59万，主持，国家自然科学基金面上项目
- 定量分析模式间气候态差异对气候敏感度不确定性的影响，26万，主持，国家自然科学基金青年项目
- 东亚气候敏感度，11万，主持，国家自然科学基金国际交流与合作项目
- BCC-CSM驱动WRF-ROMS中国区域耦合模式次季节预测性能测试与检验，5万，主持，国家气候中心

- ENSO对全球变暖的响应和反馈，326万，第三骨干，国家自然科学基金委重大项目
- 影响北极未来变化趋势的关键过程、情景与效应研究，322万，第五骨干，国家重点研发计划
- 西太平洋与周边海域相互作用对 ENSO
过程的影响，148万，第四骨干，国家重点研发计划

省部级

- 全球变暖背景下两极增暖不对称响应研究，93万，主持，南方海洋科学与工程广东省实验室（珠海）青年人才支持项目
- ENSO衰退速度对华南春季气候变化及预测的影响，10万，主持，广东省自然科学基金
- 厄尔尼诺和拉尼娜对我国华南旱涝灾害的影响多样性的研究，10万，主持，广东省自然科学基金
- 热带气候态海温模拟误差对气候模拟及气候变化预估的影响，15万，主持，校级青年教师培育项目
- 海洋快响应和慢响应对4倍CO2强迫下北极增暖放大的贡献，1.6万，主持，卫星海洋环境动力学国家重点实验室开放课题
- 基于机器学习的华南地区月尺度气候预测模型，10万，参与，横向课题

学术会议组织与交流

会议组织

- 2026.08.01-02：丁明虎、李熙晨、胡晓明联合召集“中国气象科学研究院建院70周年学术研讨会暨2026年全国气象部门科研院所学术年会”分会“极地天气气候变化及其全球效应”。
- 2026.08.02-07：胡晓明联合召集 AOGS 2026 分会“Tropical and Polar Ocean-land-atmosphere Interactions and Their Teleconnections”。

近年学术交流

- 2025.11：在青岛 Workshop on Building Bridge between Mathematical Theories and Predictive Climate
Dynamics、汕头亚洲-太平洋科学大会作口头报告。
- 2025.07：在新加坡 AOGS 2025 作口头报告“Amplification of Surface Energy Perturbations by the Atmosphere and Its Dependence on Topography”。
- 2025：在未来地球科学大会、中国海洋大学、全国研究生“海洋与气候”学术论坛、中山大学研究生大气科学论坛及冰冻圈科学研讨会作邀请或口头报告。

- 2024.06：在韩国平昌 AOGS 2024 作口头报告。
- 2024.01：在美国巴尔的摩 AMS 2024 作口头报告“Synchrony of Extreme Warm Events and Extreme Precipitation in Antarctica”。
- 2023：在 XMAS-VI 作邀请报告，并参加 EGU

2023、国际极地海洋与全球变化研讨会及 IUGG

2023；受邀访问云南大学和中国科学院大气物理研究所。

著作、评估报告与软件成果

著作及评估报告

1. Hu, X., Y. Li, S. Yang, P. Huang, M. Cai, J. Chen, W. Lin, and J. Ying, 2021: Feedback attributions of climate changes over the globe and over Southeast Asia and its adjacent regions. In Climate Change in Southeast Asia and Surrounding Areas, Springer, 200-259.
2. 胡晓明、李亚娜、杨崧、黄平、蔡鸣、陈俊文、林文实、应俊，2019：东南亚地区及全球气候变化归因分析（第五章）。见杨崧等编著《东南亚及周边地区气候变化》，科学出版社，200-259。
3. 《第四次国家气候变化评估报告》第十二章：气候敏感度、气候阈值及减缓视角（参与撰写）。
4. 《第五次国家气候变化评估报告》第七章：海洋和极地（参与撰写）。

软件著作权

- 排放-气候-经济交互模型（指导本科生王树完成，获计算机软件著作权1项）。
- 海气耦合模式数据后处理及可视化系统

V1.0（学生：张晓曼；获计算机软件著作权1项）。

第一作者及通讯作者期刊论文

* 表示通讯作者；#

表示共同第一作者。仅列已发表或正式接收成果，按年份倒序排列。

1. Chen, X., **X. Hu***, W. Wei, Q. Yang, K. Deng, Y. Fang, and J. Liu*, 2026: Sub-seasonal variability of West Antarctic surface air temperature in austral summer. *Journal of Climate*, 39(14), 4307-4328. https://doi.org/10.1175/JCLI-D-25-0298.1
2. Wang, P., Z. Li, Q. Yu, S. Yang, and **X. Hu***, 2026: Role of ocean topography in shaping Earth's climate: Insights from aquaplanet simulation with realistic bathymetry. *Ocean-Land-Atmosphere Research*, accepted.
3. Han, Y., M. Cai*, Z. Li, S. Yang, and **X. Hu***, 2026: Hemispheric asymmetry of land-ocean distribution causes asynchronous global atmospheric energy response to solar forcing. *Advances in Atmospheric Sciences*, 43(6), 1173-1181.

https://doi.org/10.1007/s00376-025-5239-2

4. Xu, L., S. Yang, A. Wang, S. He, D. Wang, **X. Hu***, T. Zhang, Y. Chen, and K. Deng, 2026: Unveiling remote and local drivers for the interdecadal increase in summer extreme high temperature days over southern China. *Advances in Climate Change Research*, 17(3), 517-527. https://doi.org/10.1016/j.accre.2026.01.009

5. Zhang, X., W. Zhong, Q. Li, **X. Hu***, M. Li*, and Y. Kong, 2025: Assessment of CMIP6 in simulating multiyear El Niño and the associated spring precipitation over Southern China. *Ocean-Land-Atmosphere Research*, 4, 0126. https://doi.org/10.34133/olar.0126

6. Wang, P., Y. Han, S. Yang*, Z. Li, X. Li, J. Ying, and **X. Hu***, 2025: Impacts of strengthened Antarctic Circumpolar Current on the seasonality of Arctic climate. *Geophysical Research Letters*, 52, e2025GL115211. https://doi.org/10.1029/2025GL115211

7. Zhang, Y., S. Yang*, P. Wang, and **X. Hu***, 2025: Projected Antarctic land warming and uncertainty driven by atmospheric heat transport. *Geophysical Research Letters*, 52, e2025GL114630. https://doi.org/10.1029/2025GL114630

8. Han, Y., S. Yang*, P. Wang, Z. Li, and **X. Hu***, 2025: Response of Australian summer monsoon precipitation to a strengthening Antarctic Circumpolar Current. *Geophysical Research Letters*, 52, e2024GL113080. https://doi.org/10.1029/2024GL113080

9. **Hu, X.**, M. Cai*, J. Sun, F. Ding, and J. Feng, 2025: Energy gain kernel for climate feedbacks. Part II: Spatial pattern of surface amplification factor and its dependency on climate mean state. *Journal of the Atmospheric Sciences*, 82(3), 675-688. https://doi.org/10.1175/JAS-D-24-0079.1

10. Cai, M.*#, **X. Hu#**, J. Sun, G. Liu, and Z. Wu, 2025: Principles-based adept predictions of global warming from climate mean states. *National Science Review*, nwae442. https://doi.org/10.1093/nsr/nwae442

11. Fang, Y., J. Screen, **X. Hu***, S. Lin, N. Williams, and S. Yang*, 2024: CMIP6 models underestimate ENSO teleconnections in the Southern Hemisphere. *Geophysical Research Letters*, 51, e2024GL110738. https://doi.org/10.1029/2024GL110738

12. Chen, X., L. Xu, R. Yang, M. Cai, Y. Deng, D. Chen, S. Yang, J. Liu, Q. Yang, and **X. Hu***, 2024: Deciphering the prevalence of warm-wet extremes in ice-covered zones. *Geophysical Research Letters*, 51, e2024GL109777. https://doi.org/10.1029/2024GL109777

13. Wang, P., S. Yang, Z. Li, Z. Song, X. Li, and **X. Hu***, 2024: Role of the Antarctic Circumpolar Current in asymmetric Arctic and Antarctic warming. *Geophysical Research Letters*, 51, e2024GL110265. https://doi.org/10.1029/2024GL110265

14. Fang, Y., S. Yang, **X. Hu***, S. Lin, J. Screen, and S. Chen, 2024: Remote forcing for a circulation pattern favorable to surface melt over the Ross Ice Shelf. *Journal of*

Climate, 37(18), 4689-4702. https://doi.org/10.1175/JCLI-D-23-0120.1

15. Wu, S., W. Lin, L. Dong*, F. Song, S. Yang, Z. Lu, and **X. Hu***, 2024: Role of SST in seasonal Western North Pacific anomalous anticyclone: Insights from AMIP simulations in CMIP6. *Geophysical Research Letters*, 51, e2023GL107080. https://doi.org/10.1029/2023GL107080

16. Yang, R., **X. Hu***, M. Cai, Y. Deng, K. Clem, S. Yang, L. Xu, and Q. Yang*, 2024: A paradigm shift of compound extremes over polar ice sheets. *Ocean-Land-Atmosphere Research*, 3, 6-9. https://doi.org/10.34133/olar.0040

17. Sun, J., M. Secor, M. Cai, and **X. Hu***, 2024: A quasi-linear relation between planetary outgoing longwave radiation and surface temperature in a radiative-convective-transportive climate model of gray atmosphere. *Advances in Atmospheric Sciences*, 41(1), 8-18. https://doi.org/10.1007/s00376-023-2386-1

18. 段志方、张义晗、孔蕴淇、**胡晓明**、杨崧，2024：青藏高原对温室气体增加的响应及其不确定性：基于 CMIP6 的研究。**大气科学学报**，47(2)，330-345。https://doi.org/10.13878/j.cnki.dqkxxb.20240218021

19. Zhang, Y., Y. Kong, S. Yang, M. Cai, and **X. Hu***, 2023: Asymmetric Arctic and Antarctic warmings and their inter-model spread. *Journal of Climate*, 36(23), 8299-8310. https://doi.org/10.1175/JCLI-D-23-0118.1

20. Liu, Y., Y. Kong, Q. Yang, and **X. Hu***, 2023: Influence of surface types on the seasonality and inter-model spread of Arctic amplification in CMIP6. *Advances in Atmospheric Sciences*, 40, 2288-2301. https://doi.org/10.1007/s00376-023-2338-9

21. Li, W., Y. Wu, and **X. Hu***, 2023: Processes-based attribution of four major surface melting events over the Ross Ice Shelf. *Advances in Atmospheric Sciences*, 40, 1662-1670. https://doi.org/10.1007/s00376-023-2287-3

22. **Hu, X.***, Y. Kong, Y. Liu, and Q. Yang, 2022: A quantitative analysis of the source of inter-model spread in Arctic surface warming response to increased CO_2 concentration. *Geophysical Research Letters*, 49, e2022GL100034. https://doi.org/10.1029/2022GL100034

23. Wu, Y., **X. Hu***, Z. Li, M. Cai, M. Lu, and S. Yang*, 2022: Remote effect of model systematic bias in tropical SST on the cold bias over the Tibetan Plateau. *Climate Dynamics*, 60, 2219-2234. https://doi.org/10.1007/s00382-022-06421-y

24. Kong, Y., Y. Wu, **X. Hu***, Y. Li, and S. Yang*, 2022: Uncertainty in projections of the South Asian summer monsoon under global warming by CMIP6 models: Role of tropospheric meridional thermal contrast. *Atmospheric and Oceanic Science Letters*, 15(1), 100145. https://doi.org/10.1016/j.aosl.2021.100145

25. **Hu, X.***, J. Ma, J. Ying, M. Cai, and Y. Kong, 2021: Inferring future warming in the Arctic from the observed global warming trend and CMIP6 simulations. *Advances in Climate Change Research*, 12, 499-507. https://doi.org/10.1016/j.accre.2021.04.002

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