



# Research Field: Planetary Atmospheres

## Focused Field: Hydrodynamics in Gas Giants

### SHORT BIO

Tao Cai received a BSc degree in Information and Computational Science from Central South University, a MSc degree in Astrophysics from Chinese Academy of Sciences, and a PhD degree in Mathematics from Hong Kong University of Science and Technology.

After his PhD, he worked as a visiting fellow at Department of Mathematics in City University of Hong Kong, and a lecturer at School of Mathematics in Sun Yat-sen University. In 2018, he joined the State Key Laboratory of Lunar and Planetary Sciences in Macau University of Science and Technology as an assistant professor.

His research areas include planetary atmospheres, hydrodynamics in stars and planets, and computational fluid dynamics.

Asst. Prof.

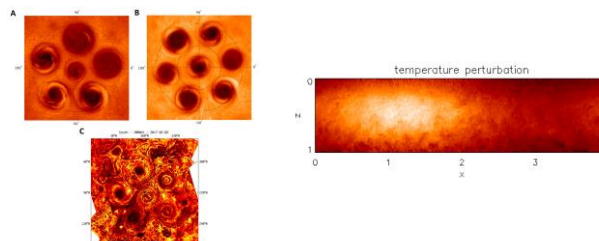
Tao Cai



PhD: Mathematics – The Hong Kong University of Science and Technology

MSc: Astrophysics – Chinese Academy of Sciences

BSc: Information and Computational Science – Central South University



Simulations on Jupiter's polar cyclones (Cai, Chan & Mayr 2021 PSJ) and the Great Red Spot (Cai, Chan & Chow 2021 ApJ)

### KEY PUBLICATIONS (first author)

**Cai T., Chan K.L., Chow K.-C., 2022, Spontaneous Generated Convective Anticyclones in Low Latitude --- A Model for the Great Red Spot, *The Astrophysical Journal*, 925, 94.**

**Cai T., 2021, Large-scale Vortices in Rapidly Rotating Rayleigh-Bénard Convection at Small Prandtl Number, *The Astrophysical Journal*, 923, 138.**

**Cai T., Yu C., Wei X., 2021, Convectively Coupled Equatorial Trapped Waves in Stars and Planets, *The Astrophysical Journal*, 914, 11.**

**Cai T., Yu C., Wei X., 2021, Inertial and Gravity Wave Transmissions near Radiative-Convective Boundaries, *Journal of Fluid Mechanics*, 916, A48.**

**Cai T., Yu C., Wei X., 2021, Enhancement of Wave Transmissions in Multiple Radiative-Convective Boundaries, *Journal of Fluid Mechanics*, 915, A125.**

**Cai T., Chan K.L., Mayr, H.G., 2021, Deep, Closely Packed, Long-lived Cyclones on Jupiter's Poles, *The Planetary Science Journal*, 2, 81.**

**Cai T., 2020, Penetrative Convection for Rotating Boussinesq Flow in tilted F-planes, *The Astrophysical Journal*, 898, 22.**

**Cai T., 2020, Upward Overshooting of Turbulent Compressible Convection. III. Calibrate Parameters for One-dimensional Reynolds Stress Model, *The Astrophysical Journal*, 891, 77.**

**Cai T., 2020, Upward Overshooting of Turbulent Compressible Convection. II. Simulations at Large Relative Stability Parameters, *The Astrophysical Journal*, 891, 49.**

**Cai T., 2020, Upward Overshooting of Turbulent Compressible Convection. I. Effects of the Relative Stability Parameter, the Prandtl Number, and the Péclet Number, *The Astrophysical Journal*, 888, 46.**

### PROFESSIONAL EXPERIENCE

**2018 – present – Macau University of Science and Technology, Macao (China) – Asst. Prof.**

**2013 – 2017 – Sun Yat-sen University, China – Lecturer**

### GRANTS

**NSFC – 2022-2025 – PI : On the study of convection and overshooting in rotating stars**

**FDCT – 2020-2023 – PI : On the study of Jovian oscillation and its excitation mechanism**