Xiaohan Ma

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EDUCATION BACKGROUND

BOSTON UNIVERSITY 09.2020–present
Center for Space Physics, the Department of Astronomy

- Graduate Ph.D. Program Major in Astronomy
- Research field Heliophysics
- Core Courses: Introduction Space Physics, Introduction Astrophysics, Radiative Processes and Spectroscopy, Space physics

PEKING UNIVERSITY Beijing, China 09.2017–07.2020
Institute of Space Physics and Applied Technology, School of Earth and Space Science

- Master's Degree Major in space physics
- Programming skills: Python, IDL, Matlab, R

PEKING UNIVERSITY Beijing, China 09.2013–07.2017
School of Earth and Space Science

- Bachelor's Degree Major in space physics
- Core Courses: Advanced Mathematics, Linear Algebra, Magnetospheric Physics, Physics of Solar Atmosphere and Heliosphere, Ionospheric Physics and Radio Wave Propagation

PUBLICATIONS

- Ma, X. H., Zong, Q. G., & Liu, Y. The Intense Substorm Incidence in Response to Interplanetary Shock Impacts and Influence on Energetic Electron Fluxes at Geosynchronous Orbit. (2019). Journal of Geophysical Research, 124(5), 3210-3221.doi:10.1029/2018JA026115
- Ma, X.-H., Zong, Q.-G., Yue, C., Hao, Y.-X., & Liu, Y. Energetic electron enhancement and dropout echoes induced by solar wind dynamic pressure decrease: The effect of phase space density profile. (2021). Journal of Geophysical Research: Space Physics, 126, e2020JA028863. doi:10.1029/2020JA028863

RESEARCH EXPERIENCE

Research on the impact of kinetic neutrals in a multi-fluid treatment on the heliosphere and heliotail
Individual project, Supervised by Prof. Opher (Boston University) present

- Read related papers about physical process in heliosphere and the models of the heliosphere structure.
- Learned Fortran and became familiar with the Solar-wind with Hydrogen Ion Exchange and Large-scale Dynamics (SHIELD) model.

Research on the impact of sudden drop of solar wind dynamic pressure on energetic electrons in the inner-magnetosphere
Individual project, Supervised by Prof. Qiugang Zong (Peking University) 09.2018-03.2020

- Analyzed satellite data, discerned events with solar wind dynamic pressure drop from 2012 to 2017, to do case study and statistical study.
- Found that there were both dropout and enhancement drift echoes of electrons in some events, while other events only show electron dropout drift echoes.
- Analyzed the electron phase space density (PSD) and found that the radial profile of electron PSD were different for the two types of events, suggesting that the electron PSD plays an important role in the variations of energy electron fluxes induced by the dynamics pressure decrease.

Research on warm plasma cloak particle dynamis in the inner magnetosphere
Individual project, Supervised by Prof. Jacob·Bortnik (University of California, Los Angeles) 07.2019–09.2019

- Cleaned the data sets by filtering the data according to location and geomagnetic activities
- Created a 2D model of the spatial distributions of the warm plasma cloak particles with one energy
- Visualized the model's results in the form of movie to show the evolution

Research on the intense substorm incidence in response to interplanetary shock impacts and influence on energetic electron fluxes at geosynchronous orbit

Individual project, Supervised by Prof. Qiugang Zong (Peking University) 12.2016–03.2018

- Analyzed ground station data, discerned substorm events, using IDL.
- Analyzed data of geomagnetic index and electron flux using superposed epoch method in IDL.
- Analyzed data of IMF pre-conditions during substorms using statistical method in R and Python.
- Validated the effect of interplanetary shocks on the Auroral Electrojet index and electron dynamics.

Undergraduate research on the response of the Earth's magnetosphere to interplanetary shock and the interaction between energy particles and ultra low frequency waves generated by shock

Cooperation project, with undergraduate Wenyao Gu

Supervised by Prof. Qiugang Zong (Peking University) 08.2015–06.2016

- Analyzed data of geomagnetic index (SMR index) using superposed epoch method in IDL.
- Validated the effect of interplanetary shocks on the ring current index (SMR index).

SELECTED COURSE PROJECTS

Method to increase the quantity of music broadcast 09.2018–12.2018

Applied Regression Analysis, Supervised by Associate Prof. Mingyao Ai (Peking University)

- Explained the influence of different parameters using logarithmic regression model.
- Trained the sample set to gain prediction model using logistic regression model.

Development of Breast Cancer malignancy prediction algorithm 09.2018–12.2018

Data Analysis and Statistical Models, Supervised by Associate Prof. Yiming Wang (Peking University)

- Visualized data in violin plot and box plot, selected feature with correlation.
- Trained the sample set to gain prediction models using different algorithms, including logistic regression, decision tree algorithm, random forest algorithm and SVM algorithm.

Parameter exploration of professional tennis player ranking algorithm 12.2017–01.2018

CluBear Talent Program (statistics training camp by Hansheng Wang, Peking University)

- Classified the parameters using principal component analysis (PCA) and factor analysis methods.
- Analyzed the influence of factors by building decision tree model.

PRESENTATION EXPERIENCE

Oral Presentation

- 'The intense substorm incidence and influence on Energetic electron in response to interplanetary shock impacts', Ma, X. H., Zong, Q. G., *Fundamental Physical Processes in Solar-Terrestrial Research and Their Relevance to Planetary Physics* Hawaii, USA 01.2018

Poster Presentation

- 'Electron Drift Echoes Induced by Negative Solar Wind Dynamic Pressure Impulse', Ma, X. H., Zong, Q. G., Hao, Y. X., *American Geophysical Union (AGU) Fall Meeting 2019* San Francisco, CA, USA. 12.2019
- 'The Intense Substorm Incidence in Response to Interplanetary Shock: A Statistical Study', Ma, X. H., Zong, Q. G., *Chinese Geoscience Union (CGU) 4th Annual Meeting* Beijing, China 10.2017
- 'The SuperMAG Indices and Inner Magnetosphere Plasma Characteristics in Response to IP Shock and Solar-wind Dynamic Pressure', Ma, X. H., Zong, Q. G., *Asia Oceania Geosciences Society (AOGS) 13th Annual Meeting* Beijing, China 08.2016

HONORS & AWARDS

- The award of "Outstanding scientific research" of Peking University 12.2018
- "LongRuan GIS" Scholarship of School of Earth and Space Science, Peking University (PKU) 11.2017
- Second-grade award of "Academic wishing star" of School of Earth and Space Science, PKU 05.2015
- First-grade award of " Academic wishing star" of School of Earth and Space Science, PKU 05.2014
- The award of "Merit Student" of Peking University 04.2014

EXTRACURRICULAR ACTIVITIES

- Vice minister of the Art Department in College Student Union, PKU 09.2018–07.2019
- Core member of Kendo Association, PKU 03.2016–07.2020
- Core member of College Volleyball Team, PKU 09.2013–07.2020
- Core member of College Debate Team, PKU 09.2013–07.2017
- Volunteer of the 9th Peking University 5+2 Half Marathon Relay 05.2015
- Volunteer of "Caring for the Elderly" activity of Youth Volunteer Association of Peking University 05.2015