

YUANZHENG WEN

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EDUCATION

Chengdu University of Technology, Chengdu

Sep 2018 - Jun 2022 (Expected)

Department of Geophysics and Space Sciences, School of Geophysics

B.S. in Space Sciences and Technology (Sciences Concentration)

Overall GPA: 86.5/100

Standardized Test: TOEFL (R28+L30+S25+W22=105) GRE: In progress

Core Courses:

Linear Algebra(99), Probability and Statics(92), College Physics(90), Mathematical Methods for Physics(91), Theoretical Mechanics(92), Fundamentals of Geophysics(95), Thermodynamics and Statistical Physics(89), Calculus(88/87), Space Exploration(92), Electrodynamics(85), General Astronomy(90), Introduction to Space Physics(85)

RESEARCH EXPERIENCE

Institute of Geology and Geophysics, Chinese Academy of Sciences

Jul 2021 - Present

Undergraduate Researcher

Supervisor: Prof. Zhaojing Rong

- **Project: Statistical Investigations of the Flow-Aligned Component of IMF Impact on Magnetic Field Structure in Martian Magnetotail: MAVEN Observations**
- Selected steady IMF magnetospheric crossings of MAVEN based on steady criteria ($\cos(\mathbf{B}_1 \cdot \mathbf{B}_2) < 30^\circ$, $\frac{2\|\mathbf{B}_1\| - \|\mathbf{B}_2\|}{\|\mathbf{B}_1\| + \|\mathbf{B}_2\|} < 0.2$), \mathbf{B}_1 , \mathbf{B}_2 represent the average magnetic field 30min before/after bow shock crossings respectively.
- Selected Current Sheet crossing cases based on magnetic field data from MAG and ion, electron energy spectrum of SWIA and SWEA.
- Applied Minimum Variance Analysis (MVA) method (Sonnerup and M.Scheible., 1998) for magnetic field to define the normal of the Current Sheet and calculated the shift distance of Current Sheet of selected cases.
- Analyzed statistical correlations between the cone angle and shift distance based on selected Current Sheet crossing cases.
- Set up the Mars-Solar-Electric field (MSE) reference frame based on selected steady IMF proxies and transformed the magnetic field data into MSE coordinates.
- Statics of the Current Sheet structure configurations in MSE coordinates under different IMF cone angle conditions. (with crustal fields, solar EUV effects considered)
- There is a systematic asymmetry in the location of the Martian magnetotail current sheet in modified MSE coordinates controlled by the flow-aligned component of IMF.
- **First-author paper is in preparation.**

Swedish Institute of Space Physics (IRF), Kiruna

Apr 2021 - Present

Undergraduate Researcher (Remote) **Supervisor: Prof. Hans Nilsson, Prof. Mats Holmstrom**

- **Project: Solar Wind and Planetary Ions Mixing Investigations in the Vicinity of Martian Tail Region with MEX and MAVEN**
- Made average spatial distribution of ions in Martian space environment and compared with previous publications to check validation of MEX newly produced ion moments derived from ASPERA-3 IMA.
- Compared mixing ratio of solar wind ions and planetary ions at different selected regions (Bow shock, magnetosheath, tail boundary, near Mars).
- Calculated ion moments using MAVEN STATIC C6 products based on Fraenz et al.,(2006), removed cross-talk problems of the instrument and compared results with previous publications.

- Quantified the mixing degree of solar wind and planetary ions in Martian space environment with MEX and MAVEN moments.
- Identified good mixing cases based on certain criteria and derived case characters with ion energy spectrum and moments
- Compared good mixing cases with less mixing cases to look for the signatures of planetary ions acceleration and instabilities.
- **This work is currently in progress.**

National Space Science Center, Chinese Academy of Sciences

Jul 2020 - Sep 2020

Undergraduate Researcher

Supervisor: Dr. Yiteng Zhang

- **Project: MHD Simulation of Mars Space Environment**
- Visualized the MHD simulation data (provided by Dr. Yingjuan Ma) with Tecplot software
- Investigated the global magnetic field structure and crustal fields influences on magnetic field topology.
- Studied the global current system of Mars with MHD simulation (bow shock, magnetosheath, ionosphere, tail region) under the influence of crustal fields.
- Constructed 3D MHD models of different regions for detailed comparison of the current system in the Martian space environment and crustal fields effects on the current system.
- Compared simulation results with MAVEN MAG data and Martian global current system paper (Ramstad et al., 2020).
- **This work was presented on Annual Meeting of Chinese Geoscience Union (Poster).**

Chengdu University of Technology

Sep 2019 - Dec 2020

Undergraduate Research Assistant

Supervisor: Dr. Dan Tao

- **Project: Investigations of Seismic-Ionospheric Disturbances with GPS and CSES**
- Analyzed Kp, F10.7, Dst data from OMNI and earthquake data from USGS to select appropriate strong earthquake events.
- Analyzed ionospheric total electron content (TEC) data from GPS prior to earthquake event via moving median method to quantify the unusual variations of the Global Ionospheric Map (GIM) before selected earthquakes.
- Further analysis using plasma parameters data from China Seismo-Electromagnetic Satellite (CSES). Electron density, temperature data from Langmuir Probe (LAP) and ion density, temperature data from Plasma Analyzer Package (PAP).
- Detected unusual perturbations in ionospheric TEC and plasma parameters prior to 14 July 2019 M_w 7.2 Indonesia Laiwu earthquake
- **First-author manuscript submitted to COSPAR journal Advances in Space Research**

ACADEMIC ACTIVITY

International Summer School in Planetary Sciences, USTC	Jul-Aug 2021
Space Physics Summer School, ISPAT, Peking University	Jul 2021
MACH Workshop (Virtual)	Jun 2021
35th ASPERA-3 and 27th ASPERA-4 Team Meeting, IRF-Kiruna	Feb 2021
2020 Annual Meeting of Chinese Geoscience Union (Poster), Chongqing	Oct 2020
International Summer School in Planetary Sciences, USTC	Jul-Aug 2020
CSES Mission International Workshop, Changsha, China	Oct 2019

SELECTED HONORS AND AWARDS

Undergraduate Research Fellowship, Chinese Academy of Sciences	Sep 2020/2021
Honorary Student of CAS-USTC International Summer School in Planetary Sciences	Aug 2020/2021
Honorary Student of Space Physics Summer School, ISPAT, Peking University	Jul 2021
National Scholarship, Ministry of Education of China	Sep 2020
Second Prize (Ranked Top 5% among 3000) in Mathematical Competitions (College Students), Chinese Mathematical Society	Nov 2019

PUBLICATION

1. Ionospheric TEC and plasma anomalies associated with the 14 July 2019 MW7.2 Laiwui earthquake detected by the GPS and CSES

YZ Wen, D Tao, GX Wang et al.

Submitted to AISR, doi: 10.21203/rs.3.rs-223597/v1

2. Statistical investigations of the flow-aligned component of IMF impact on magnetic field structure in Martian magnetotail: MAVEN observations (In Preparation)

YZ Wen, ZJ Rong, H Nilsson et al.

TEACHING EXPERIENCE

Teaching Assistant of Mathematical Methods for Physics	Mar 2020-Jun 2020
Teaching Assistant of College Physics	Sep 2020-Jan 2021
Private Tutoring in Math, Physics and MATLAB Programming	

COMPUTER SKILLS

Programming Languages	MATLAB, CERN ROOT, IDL (SPEDAS), Python (irfpy)
Software & Tools	Mathematica, Tecplot, ArcGIS, ENVI
Scientific Writing	Word, LaTeX
Operation System	Windows, Linux (Ubuntu)

REFERENCES

Prof. Dan Tao <i>Undergraduate Research Supervisor and Lecturer</i>	Assistant Professor, Chengdu University of Technology dan.tao@cdut.edu.cn
Prof. Hans Nilsson <i>Undergraduate Research Supervisor</i>	Associate Professor, Swedish Institute of Space Physics, Kiruna hans.nilsson@irf.se
Principal Investigator of ESA Rosetta RPC-ICA	
Prof. Zhaojin Rong <i>Undergraduate Research Supervisor</i>	Professor, Institute of Geology and Geophysics, CAS rongzhaojin@mail.iggcas.ac.cn
Co-Investigator of Tianwen-1 Mars Mission	
Prof. Mats Holmstrom <i>Undergraduate Research Supervisor</i>	Associate Professor, Swedish Institute of Space Physics, Kiruna matsh@irf.se
Principal Investigator of ESA Mars Express ASPERA-3	
Prof. Yiteng Zhang <i>Undergraduate Research Supervisor</i>	Associate Professor, National Space Science Center, CAS ytzhang@nssc.ac.cn