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研究方向

摄影测量与遥感、地质灾害监测、SAR & InSAR、多传感器数据融合、时间序列分析、地表运动估计、数据可视化、目标检测

个人简介

从事遥感科学在地学领域的研究，研究兴趣包含雷达遥感与合成孔径雷达干涉测量(InSAR)、深度学习、遥感影像目标检测和时空大数据挖掘等。博士就读于武汉大学测绘遥感信息工程国家重点实验室，国家公派至亥姆霍兹学会德国地学中心(GFZ)访学 18 个月。发表 SCI 和 EI 论文 11 篇，专著 1 本，授权专利 1 项。指导武汉大学国际地理信息研究院国际硕士生。担任 International Journal of Applied Earth Observation and Geoinformation(一区 Top)、GIScience & Remote Sensing(一区 Top)、Remote Sensing(二区 TOP)等期刊审稿人。参与中国科技部与欧洲航天局龙计划第五期合作项目并担任青年科学家、参与意大利国家研究委员会、意大利宇航局、德国航天局国际合作项目。参与国家自然科学基金、省自然资源科技项目计划书撰写并承担部分科研工作。

高等教育经历

2019.09-2024.06	博士-武汉大学-测绘遥感信息工程国家重点实验室 国家公派-德国地学中心交流(18 个月)	摄影测量与遥感-雷达遥感
2017.09-2019.06	硕士-辽宁工程技术大学-测绘与地理科学学院	摄影测量与遥感-雷达遥感
2013.09-2017.06	本科-辽宁科技学院-资源与土木工程学院	测绘工程

项目经历

2023.01-2024.12	Multi-decade urban subsidence monitoring with multi-temporary PS technique	国家自然科学基金委-国际优秀青年科学家研究基金
<ul style="list-style-type: none">项目主要研究内容针对解决城市地区几十年的长期沉降监测给出多传感器 InSAR 数据融合的解决方法。主要负责多传感器数据融合研究及建立长期沉降非线性形变的多模型、多参数的处理方案。		
2019.01-2020.12	SARchaeology: exploiting satellite SAR for archaeological prospection and heritage site	中国科技部与欧洲航天局在对地观测领域的重大国际科技合

protection		作计划：龙计划第五期子项目
<ul style="list-style-type: none"> 项目的主要目的是用 SAR 遥感进行考古勘探和遗产保护。对于中国的干旱地区以及意大利罗马省的郊区及农村地区，有大量被埋藏的考古遗迹。采用多种平台的 SAR 数据测试不同波段和空间分辨率的信号穿透能力，从而识别出文化遗址。此外，同时采用 InSAR 技术对检测到的文化遗产稳定性进行判断 主要负责基于多源 SAR 数据融合方法和软土固结预测模型的研究。文物保护中的古建筑和大型遗址的稳定性测试需要对主体和周围环境进行长时间序列的动态监测，其中地面沉降和主体变形是非常重要的元素。此外，罗马地区的一些历史遗址建在软土地基上。因此，本人的研究也将为合作者后续在武汉和罗马城区文化遗产保护方面的研究提供方法论和技术支持。 		
2022.01-2022.12	基于深度学习的三峡库区滑坡预测关键技术研究	湖北省自然资源科技项目
<ul style="list-style-type: none"> 项目的主要研究目标是为了对三峡库区漫长地质演化过程中广泛发育的大量的堆积层滑坡进行有效的检测，并避免和减少滑坡灾害引起的破坏和损失，通过将 InSAR，深度学习与地质学相结合，进行滑坡的有效预测预报及评价。 本人在此项目中主要工作为对于多平台 SAR 数据进行多源数据融合，获取三峡库区最长时间序列的形变曲线。提出了一种新型的多源数据融合方法，解决了传统融合方法的不准确，且无法对数据无重叠区域进行融合的问题，为该项目提供了长时间序列点基数据，用于深度学习研究。 		
2020.01-2021.12	COSMO-SkyMed 数据在武汉的联合应用研究	意大利 CNR & ASI WUHAN-CKS
<ul style="list-style-type: none"> 负责对武汉地区迄今为止发布的 COSMO-SkyMed 最长时间序列数据进行了处理和分析，并对非线性 PSInSAR 技术进行测试。揭示了武汉地区地面沉降的特征，阐明了其与城市的关系。 		
2017.01-2018.12	资源三号与高分三号遥感影像融合处理及信息提取	自然资源部国土卫星遥感应用中心基础研究项目
<ul style="list-style-type: none"> 负责 SAR 影像与光学影像融合前的正射校正相关研究。 		
2019.01-2021.12	基于多极化特征的辽东湾全极化 SAR 海冰分类	辽宁省教育厅科学技术研究一般项目
<ul style="list-style-type: none"> 负责基于 Gamma 混合模型和层次化聚类对可变聚类数的 SAR 影像分割研究。 		

发表论文

Jiang, Haonan, Timo Balz, Francesca Cigna, Deodato Tapete, Jianan Li, and Yakun Han. 2023. "Multi-Sensor InSAR Time Series Fusion for Long-Term Land Subsidence Monitoring." *Geo-Spatial Information Science*, May, 1–17. (中科院一区)

Jiang, Haonan, Timo Balz, Francesca Cigna, and Deodato Tapete. 2021. "Land Subsidence in Wuhan Revealed Using a Non-Linear PSInSAR Approach with Long Time Series of COSMO-SkyMed SAR Data." *Remote Sensing* 13 (7): 1256. (中科院二区)

Jiang, Haonan, Timo Balz and Jianan Li. 2023. "Preliminary Investigation of Sudden Ground Subsidence and Building Tilt in Balitai Town, Tianjin City, on May 31, 2023." *Remote Sensing* 15 (19): 4891. (中科院二区)

Jiang, Haonan, Timo Balz and Jianan Li. 2023. “Land Subsidence in Wuhan Revealed Using a Multi-Sensor InSAR Time Series Fusion Approach” *The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences* XLVIII-1/W2-2023, 1399-1404. (EI)

Jiang, Haonan, Timo Balz, Francesca Cigna, Deodato Tapete, and Jianan Li. 2023. “Land Subsidence in Wuhan Revealed Using a Multi-Sensor InSAR Time Series Fusion Approach.” *EGU General Assembly 2023*, Vienna, Austria, 24–28 Apr 2023, EGU23-9638. (EI)

Jiang, Haonan, Timo Balz, Mahdi Motagh, and Jianan Li. 2023. “Decomposition of Surface Subsidence at Different Scales in Wuhan Based on Band-Pass Filtering and Principal Component Analysis.” *IEEE Geoscience and Remote Sensing Letters* (Under review)

Cigna, Francesca, Timo Balz, Deodato Tapete, Gino Caspari, Bihong Fu, Michele Abballe, and **Haonan Jiang**. 2023. “Exploiting Satellite SAR for Archaeological Prospection and Heritage Site Protection.” *Geo-Spatial Information Science*, July, 1–26. (中科院一区)

Jianan Li, Yu Li, **Haonan Jiang**, and Quanhua Zhao. 2022. “Hierarchical Transmission Tower Detection from High-Resolution SAR Image.” *Remote Sensing* 14 (January): 625. (中科院二区)

Deodato Tapete, Francesca Cigna, Timo Balz, Hashir Tanveer, Jinghui Wang, and **Haonan Jiang**. 2021. “Multi-Temporal Insar and Target Detection with COSMO-SkyMed SAR Big Data to Monitor Urban Dynamics in Wuhan (China).” *IEEE International Geoscience and Remote Sensing Symposium IGARSS*, Brussels, Belgium, 2021, pp. 3793-3796 (EI)

Yong Hong, Deren Li, Mi Wang, **Haonan Jiang**, Lengkun Luo, Yanping Wu, Chen Liu, Tianjin Xie, Qing Zhang, and Zahid Jahangir. 2022. “Cotton Cultivated Area Extraction Based on Multi-Feature Combination and CSSDI under Spatial Constraint.” *Remote Sensing* 14 (6): 1392. (中科院二区)

Yize Li, Jianzhong Lu, Hong Shu, Xiaomeng Geng, and **Haonan Jiang**. 2022. “Spatiotemporal Estimation of Model Error to Improve Soil Moisture Analysis in Ensemble Kalman Filter Data Assimilation.” *Journal of Applied Remote Sensing* 16 (3): 034531–034531. (中科院四区)

李玉, 姜昊男, 王华斌, 赵泉华. 基于间接校正的高分三号正射影像生成[J]. 重庆邮电大学学报(自然科学版), 2020, 32(03): 441-451. (中文核心)

李佳楠, 李玉, 赵泉华, 姜昊男, 洪勇. 基于通讯信号塔 RCS 建模的 SAR 影像绝对辐射定标[J]. 武汉大学学报(信息科学版), 2021, 46(11): 1746-1755. (EI)

卜丽静, 李秀伟, 张正鹏, 姜昊男. 条件生成对抗网络在遥感图像复原中的可行性[J]. 国土资源遥感, 2020, 32(01): 27-34. (中文核心)

发表专著

Timo Balz, 姜昊男, 姚树一. 合成孔径雷达地表形变测量[M], 北京: 高等教育出版社, 2023

专利

李玉, 李佳楠, 王华斌, 姜昊男, 等. 一种基于通讯信号塔的辐射定标方法[P]. 中国, 发明专利, 专利号: CN109541560B, 授权日: 2023.05.23.

会议经历

2023.10	TerraSAR-X/TanDEM-X Science Team Meeting 2023	口头报告	德国 慕尼黑
2023.09	2023 Dragon 5 Symposium	口头报告	中国 呼和浩特
2023.09	The ISPRS 2023 Geospatial Week	口头报告	埃及 开罗
2023.04	The EGU23 General Assembly	口头报告	奥地利 维也纳
2021.10	全国博士生学术论坛(测绘科学与技术)	口头报告	中国 北京
2021.06	2021 Dragon Symposium - Dragon 4 Final Results and Dragon 5 First year Report	口头报告	线上
2020.11	全国博士生学术论坛(测绘科学与技术)	口头报告	中国 西安
2019.09	全国博士生学术论坛(测绘科学与技术)	海报	中国 南京

合作导师

李德仁院士, 武汉大学测绘遥感信息工程国家重点实验室

Prof. Timo Balz, 武汉大学测绘遥感信息工程国家重点实验室

李玉教授, 辽宁工程技术大学, 测绘与地理科学学院, 遥感科学与应用研究所

Prof. Mahdi Motagh, 亥姆霍兹波茨坦中心 - 德国地学中心(GFZ) & 莱布尼茨汉诺威大学(LUH)

Francesca Cigna, 高级研究员, 意大利国家研究委员会(CNR) - 大气科学与气候研究所(ISAC)

Deodato Tapete, 高级研究员, 意大利宇航局

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MAIN RESEARCH AREA

Photogrammetry and Remote Sensing, Geohazard Monitoring, SAR & InSAR, Multi-Sensor Data Fusion, Time Series Analysis, Surface Motion Estimation, Data Visualization, Target Detection

HIGHER EDUCATION

Wuhan University, China, PhD in Remote Sensing, 2019-2023

Helmholtz Centre Potsdam - GFZ German Research Centre for Geosciences (GFZ), Visiting scholar, 2022-2024

Liaoning Technical University, M. Sc. in Remote Sensing, 2017-2019

Liaoning Institute of Science and Technology, B. Sc. in Surveying Engineering 2013-2017

PROJECT

2023.01-2024.12	Multi-decade urban subsidence monitoring with multi-temporary PS technique	National Natural Science Foundation of China(NSFC)
<ul style="list-style-type: none">The main research focus of the project is to provide a solution for long-term subsidence monitoring in urban areas spanning several decades through the fusion of multi-sensor InSAR data.I am primarily responsible for the research on multi-sensor data fusion and the development of a comprehensive approach for handling long-term subsidence non-linear deformation, involving multiple models and parameters.		
2019.01-2020.12	SARchaeology: exploiting satellite SAR for archaeological prospection and heritage site protection	NSFC-ESA Dragon project
<ul style="list-style-type: none">The main objective of the project is archaeological exploration and heritage preservation using SAR remote sensing. There are numerous buried archaeological sites in arid regions of China and in the outskirts and rural areas of the Rome Province in Italy. Various SAR data from different platforms with different wavelengths and spatial resolutions are employed to test the signal penetration capability for identifying cultural heritage sites. Additionally, InSAR technology is utilized to assess the stability of the detected cultural heritage.Responsible for research involving the fusion of multi-source SAR data and predictive models for soil consolidation. Long-term dynamic monitoring of ancient buildings and large archaeological sites in cultural		

heritage preservation requires an assessment of both the main structures and their surrounding environments, with ground subsidence and structural deformation being crucial elements. Furthermore, some historical sites in the Rome area are built on soft soil foundations. Therefore, my research will also provide methodological and technical support for future research on cultural heritage preservation in both Wuhan and Rome urban areas for our collaborators.

2022.01-2022.12	Research on Key Technologies for Landslide Prediction in the Three Gorges Reservoir Area Based on Deep Learning	Department of Natural Resources of Hubei Province (China)
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- The main research objective of this project is to effectively detect the extensive accumulation-induced landslides that have developed during the long geological evolution of the Three Gorges Reservoir area. The goal is to prevent and minimize the damage and losses caused by landslide disasters. This will be achieved by combining InSAR, deep learning, and geological knowledge to predict, forecast, and assess landslides effectively.
- Responsible for the fusion of multi-platform SAR data to obtain the longest time series of deformation curves in the Three Gorges Reservoir area. I have proposed a novel method for multi-source data fusion, addressing the inaccuracies associated with traditional fusion methods and the challenge of fusing data with non-overlapping regions. This approach provides the project with a valuable long-time series of point-based data for deep learning research.

2020.01-2021.12	Joint Application Research of COSMO-SkyMed Data in Wuhan	CNR & ASI (Italy) WUHAN-CKS
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- Responsible for processing and analyzing the longest time series data of COSMO-SkyMed released in Wuhan to test non-linear PSInSAR technology. Revealed the characteristics of ground subsidence in the Wuhan area and elucidated its relationship with the city.

PUBLICATIONS

Jiang, Haonan, Timo Balz, Francesca Cigna, Deodato Tapete, Jianan Li, and Yakun Han. 2023. "Multi-Sensor InSAR Time Series Fusion for Long-Term Land Subsidence Monitoring." *Geo-Spatial Information Science*, May, 1–17.

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Cigna, Francesca, Timo Balz, Deodato Tapete, Gino Caspari, Bihong Fu, Michele Abballe, and **Haonan Jiang**. 2023. “Exploiting Satellite SAR for Archaeological Prospection and Heritage Site Protection.” *Geo-Spatial Information Science*, July, 1–26.

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Yong Hong, Deren Li, Mi Wang, **Haonan Jiang**, Lengkun Luo, Yanping Wu, Chen Liu, Tianjin Xie, Qing Zhang, and Zahid Jahangir. 2022. “Cotton Cultivated Area Extraction Based on Multi-Feature Combination and CSSDI under Spatial Constraint.” *Remote Sensing* 14 (6): 1392.

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Yu Li, **Haonan Jiang**, Huabin Wang and Quanhua Zhao. 2020. “Generating GF-3 orthophoto image based on indirect rectification” *Journal of Chongqing University of Posts and Telecommunications*. 2020,32(03):441-451.

BOOK

Timo Balz, **Haonan Jiang**, Shuyi Yao. Synthetic aperture radar surface deformation measurements [M], Beijing: Higher Education Press, 2023

PATENT

Yu Li, Jianan Li, Huabin Wang and Haonan Jiang. A radiation calibration method based on communication signal towers [P]. China, Patents for inventions, Patent number: CN109541560B, 2023

CONFERENCE

2023.10	TerraSAR-X/TanDEM-X Science Team Meeting 2023	Oral Presentation	Munich, Germany
2023.09	2023 Dragon 5 Symposium	Oral Presentation	Hohhot, China
2023.09	The ISPRS 2023 Geospatial Week	Oral	Cairo, Egypt

					Presentation	
2023.04	The EGU23 General Assembly				Oral Presentation	Vienna, Austria
2021.10	National Doctoral Student Academic Forum (Surveying Science and Technology)				Oral Presentation	Beijing, China
2021.06	2021 Dragon Symposium - Dragon 4 Final Results and Dragon 5 First year Report				Oral Presentation	Online
2020.11	National Doctoral Student Academic Forum (Surveying Science and Technology)				Oral Presentation	Xi'an, China
2019.09	National Doctoral Student Academic Forum (Surveying Science and Technology)				Poster	Nanjing, China

REFERENCE

Prof. Deren Li, Wuhan University. Dual membership of both the Chinese Academy of Sciences and the Chinese Academy of Engineering.

Prof. Timo Balz, Wuhan University.

Prof. Mahdi Motagh, Helmholtz Centre Potsdam - GFZ German Research Centre for Geosciences (GFZ) & Leibniz University Hannover (LUH)

Prof. Francesca Cigna, National Research Council CNR - ISAC

Prof. Deodato Tapete, Agenzia Spaziale Italiana - Italian Space Agency (ASI)