

# SAR Remote Sensing

2023 Spring

Instructor: 胡燮 HU, Xie ([hu.xie@pku.edu.cn](mailto:hu.xie@pku.edu.cn))

Office: 464

Office hour: Schedule as needed

Time: 1 ~ 16 weeks, Friday #5 ~ #7: 1~4 pm (3.30 pm)

Classroom: 460

Credits: 3

## Textbook

- NASA-ISRO SAR (NISAR) Mission Science Users' Handbook.  
[https://nisar.jpl.nasa.gov/files/nisar/NISAR\\_Science\\_Users\\_Handbook.pdf](https://nisar.jpl.nasa.gov/files/nisar/NISAR_Science_Users_Handbook.pdf)
- Ferretti, A., et al., InSAR Principles: Guidelines for SAR Interferometry Processing and Interpretation  
[https://www.esa.int/esapub/tm/tm19/TM-19\\_ptA.pdf](https://www.esa.int/esapub/tm/tm19/TM-19_ptA.pdf)
- Additional reading assignments will be given.

## Objectives

- Understand fundamental principles of Synthetic Aperture Radar (SAR)
- Gain hands-on experience on SAR capability configuration, image selection, error identification and correction, etc.
- Apply and develop scripts to obtain surface displacements using spaceborne and airborne SAR imagery.

## Tools

- MATLAB (<http://software.pku.edu.cn/>)
- HyP3 (<https://hyp3-docs.asf.alaska.edu/>)
- GMTSAR (<https://topex.ucsd.edu/gmtsar/>)
- MintPy (<https://github.com/insarlab/MintPy>)

## Prerequisites

Basic programming skills are recommended to be attained before the class.

## Schedule

Week	Date	Format	Theme
1	2/24	Lec 01	Introduction
2	3/3	Lec 02	Radar basics
3	3/10	Lec 03	SAR backscattering
4	3/17	Lec 04	SAR geometry
5	3/24	Lec 05	InSAR
6	3/31	Lab 01	InSAR map interpretation
7	4/7	Lec 06	Error sources

8	4/14	Lab 02	InSAR data processing and interpretation
9	4/21	Lec 07	Time-series analysis
10	4/28	Lab 03	Proposal
<del>11</del>	<del>5/5</del>	<del>Lab 04</del>	<del>UAVSAR data analysis</del>
12	5/12	Lab 04	Time series inversion
13	5/19	Lec 08	Case study - landslides
14	5/26	Lec 09	Case study - aquifers
15	6/2	Lec 10	Case study - urban
16	6/9		Final Presentation 🙌🙌

\* Students are encouraged to bring your own research interests to develop a solid term project by processing and analyzing SAR data and investigating the spatiotemporal correlation between SAR-derived products and hydroclimatic, geological, tectonic, or industrial variables.

#### Evaluation and grade:

In-class quiz and labs	55%
Term project	45%
Presentation	15% × 2
Report	15%
Total	100%

#### ⚠️ATTENTION PLEASE⚠️

- **Be Present.** Attend all lectures. If you cannot attend a lecture, please contact me before the class meeting time. Do not attend class if you are ill but do contact me before the class time and review the recorded lectures when possible.
- **Be Prompt.** Late labs will not be accepted and will result in an F.
- **Dedicate yourself.** Commit to giving it your best each and every class and manage your time.
- **Problems.** If you are having problems please communicate with me as soon as possible
- [PKU Code of Conduct](#)

Thanks for your cooperation 🌹🌹