



The Diploma Supplement

to the Massive Open Online Course (MOOC) 'Echoes in Space: Introduction to Radar Remote Sensing'

This Diploma Supplement follows the model developed by the European Commission, Council of Europe and UNESCO/CEPES. The purpose of the supplement is to provide sufficient independent data to improve the international 'transparency' and fair academic and professional recognition of qualifications (diplomas, degrees, certificates etc.). It is designed to provide a description of the nature, level, context, content and status of the studies that were pursued and successfully completed by the individual named on the original qualification to which this supplement is appended. It should be free from any value judgments, equivalence statements or suggestions about recognition. Information in all eight sections should be provided. Where information is not provided, an explanation should give the reason why.



1 Information Identifying The Qualification

1.1 Name of qualification and (if applicable) title conferred (in original language):

Not applicable

1.2 Main field(s) of study for the qualification:

Radar Remote Sensing

1.3 Name and status of awarding institution (in original language):

The certificate of completion is awarded by the EO College, a project by the Friedrich-Schiller-University of Jena.

1.4 Name and status of institution (if different from 1.3) administering studies:

See 1.3

1.5 Language(s) of instruction:

English



2 Information On The Level Of The Qualification

2.1 Level of qualification:

Level 2 of the European Qualifications Framework

2.2 Official length of programme:

The average study time for the entire online course is estimated with 30 hours.

2.3 Access requirements(s):

None



3 Information On The Contents And Results Gained

3.1 Mode of study:

Massive Open Online Course (self-paced and automatically evaluated online learning)

3.2 Programme requirements:

None

3.3 Programme details: (e.g. modules or units studied), and the individual grades/marks/credits obtained:

Massive Open Online Course (MOOC) on Radar Remote Sensing ‘Echoes in Space’ comprises essential details of the basics of Spaceborne Radar Remote Sensing and its manifold applications. The course provides also detailed insight into the history of Radar technology, the basics that are required to understand how electromagnetic waves work and how the radar images are acquired. Furthermore, the MOOC provides hands-on experience to work with Radar data in diverse application scenarios through tutorials.

The course is open for everybody who wants to start working with Radar images, or have an interest in understanding how this unique technology can be utilized to monitor the Earth.

The course consists of five consecutive weeks, each lesson builds on the knowledge acquired in the previous lessons. It covers the following topics:

- History of radar technology and the discovery of electromagnetic waves
- Image acquisition geometry of airborne and spaceborne radar systems
- Land applications of radar remote sensing
- Applications of radar remote sensing over water
- Application of radar remote sensing for hazard management

The content of ECHOES IN SPACE:

Lesson 1: History	
Topic 1: Introduction <ul style="list-style-type: none">• Basics of radar• Radar History	Topic 4: Sensors & Missions <ul style="list-style-type: none">• The radar bands• Existing missions
Topic 2: Introduction to ElectroMagnetic (EM) wave <ul style="list-style-type: none">• Properties of EM waves• The EM spectrum	Topic 5: Getting used to radar images <ul style="list-style-type: none">• SAR image features• Comparison to optical images
Topic 3: Active radar systems <ul style="list-style-type: none">• Basics of active systems• The SAR principle	

Lesson 2: Geometry	
Topic 1: The imaging geometry <ul style="list-style-type: none">• Radar imaging geometry• Effects of imaging geometry	Topic 3: How to obtain and use radar data <ul style="list-style-type: none">• Sentinel-1 data access• Introduction to SNAP• Other data sources
Topic 2: Interaction with the Earth surface <ul style="list-style-type: none">• The scattering mechanisms• Important parameters	

Lesson 3: Land

Topic 1: Theory

- Introduction to Interferometry
- Introduction to Polarimetry
- Introduction to Time-Series

Topic 3: Settlements

- Urban applications
- Urban tutorial

Topic 2: Forest

- Forest applications
- Forest tutorial

Topic 4: Agriculture

- Agriculture applications
- Agriculture tutorial

Lesson 4: Water

Topic 1: Theory

- Scattering mechanisms over water

Topic 3: Oceanography

- Maritime applications
- Sea ice, sea wind, sea waves
- Sea surface current
- Oil spill mapping

Topic 2: Water Bodies

- Water body applications
- Water body tutorial

Lesson 5: Hazard

Topic 1: Theory

- Subsidence Monitoring
- Hazard monitoring

Topic 3: Seismic events

- Seismic introduction
- Volcano tutorial

Topic 2: Flood monitoring

- Flood applications
- Flood tutorial

Topic 4: Wrap up

- Processing tools
- Final test

In total, Echoes in Space includes 78 Videos, 14 Tutorials, 9 Animations and 25 Explorable Explanations.

	Videos	Tutorials	Animations	Explorable Explanations
History	39	0	2	17
Geometry	7	2	5	3
Land	11	3	2	2
Water	9	7	0	2
Hazard	12	2	0	1
	78	14	9	25

3.4 Grading scheme and, if available, grade distribution guidance:

Performance is graded in the form of quizzes. The following quiz types are incorporated:

- Single choice
- Multiple choice
- Free choice
- Sorting choice
- Matrix sorting choice
- Fill in the blank

The following parameters are set for each of the quizzes:

- Passing Score: 50%
- Number of quiz retakes: Unlimited
- Time Limit: None

Total number of quizzes: **12**

Total number of questions: **58**

3.5 Overall classification of the qualification (in original language):

Certificate is granted based on passed/not passed grading.

4 Information On The Function Of The Qualification

4.1 Access to further study:

Not applicable

4.2 Professional status (if applicable):

Not applicable



5 Additional Information

5.1 Additional information:

For further information please refer to the EO-College website:
<https://eo-college.org/courses/echoes-in-space>