



Universitat de Lleida

DEGREE CURRICULUM

REMOTE SENSING OF FOREST FIRES

Coordination: MARTINEZ CASASNOVAS, JOSE
ANTONIO

Academic year 2023-24

REMOTE SENSING OF FOREST FIRES 2023-24

Subject's general information

Subject name	REMOTE SENSING OF FOREST FIRES			
Code	11444			
Semester	1st Q(SEMESTER) CONTINUED EVALUATION			
Typology	Degree	Course	Character	Modality
	Erasmus Mundus Master's Programme in Mediterranean Forestry and Natural Resources Management (MEDFOR)	2	OPTIONAL	Attendance-based
Course number of credits (ECTS)	3			
Type of activity, credits, and groups	Activity type	PRALAB	TEORIA	
	Number of credits	2.4	0.6	
	Number of groups	1	1	
Coordination	MARTINEZ CASASNOVAS, JOSE ANTONIO			
Department	AGRICULTURAL AND FOREST SCIENCES AND ENGINEERING			
Important information on data processing	Consult this link for more information.			
Language	English			

Teaching staff	E-mail addresses	Credits taught by teacher	Office and hour of attention
GELABERT VADILLO, PERE JOAN	perejoan.gelabert@udl.cat	2	
MARTINEZ CASASNOVAS, JOSE ANTONIO	joseantonio.martinez@udl.cat	1	

Subject's extra information

Remote sensing is the science that involves the detection, identification, classification and analysis of the ground cover, land use and phenomena occurring at the Earth surface through remote sensors installed in airborne or space platforms. The course teaches advances techniques and methods for the analysis of forest fires by means of remote sensing techniques. The ultimate goal is to acquire knowledge of how to use the technology to be used in forest fire detection, monitoring, burnt area mapping, analysis of changes in vegetation produced by fires and estimation of CO₂ emissions, among other. GIS and image processing software is used to analyse the remote sensing images.

The basic descriptors of the course are: Remote Sensing, forest fires, monitoring, burnt area mapping, temporal series analysis, emissions.

Learning objectives

Knowledge objectives. A student who passes the course must understand and demonstrate knowledge in:

- The role of Remote Sensing in the acquisition, processing and analysis of vegetation and forest fires from multispectral image data.
- The application of remote sensing images in mapping fuels.
- The spectral response of forest fires affected areas and its application to determine the severity of forest fires.
- The active detection of fires using thermal images.
- Change analysis after forest fires.
- Estimation of emission from vegetation fires.

Competences

Significant competences

Capacity objectives & skills. A student who passes the subject must be able to:

- Apply the knowledge about forest fire detection and monitoring from multispectral images.
- Map potential fuel availability from images.
- Analyse thermal satellite images to detect forest fires.
- Determine the severity of a forest fire from multitemporal remote sensing data.
- Prepare and present thematic mapping resulting from the analysis of images in using GIS software.

Subject contents

Lecture Topics

1. Introduction. Main topics in forest fires: Pre-fire, Detection and monitoring, Post-fire assessment.
2. Pre-fire analysis. Fuel types mapping.
3. Active fire detection.
4. Hotspot recovery.
5. Postfire analysis.
6. Estimation of emissions from forest fires.
7. Multitemporal analysis of forest fires with Google Earth Engine.

Practical training

- Exercise 1. Pre-fire: Mapping fuel types by means of supervised classification.
- Exercise 2. Active fire detection with Sentinel-3 images and SNAP.
- Exercise 3. Hotspot recovery and analysis with MODIS and VIIRS-II.
- Exercise 4. Evaluation of burned areas with NDVI and NBR index.
- Exercise 5. Estimating emissions from vegetation fires with Fire Radiative Power/Energy & other RS products.
- Exercise 5. Google Earth Engine.

Methodology

Lectures on theoretical concepts.

Assisted practical exercises with computer GIS & RS Programs.

Individual tutoring.

Development plan.

Development plan

The calendar will be provided at the beginning of the course.

Evaluation

Assessment of the results of the practical exercises (50%) and one final exam (50%).

Since the exercises are carried out under the modality of continuous evaluation, they are not recoverable. In both evaluation items, a grade equal to or greater than 5.0 must be obtained to pass the course. In case of obtaining a grade lower than 5.0 in the exam, a recovery will be made on the date and time agreed with the coordinator of the subject.

Bibliography

- Abel Calle and José Luis Casanova, 2012. Forest Fires and Remote Sensing, Earth Observation. R. Rustamov (Ed.), ISBN: 978-953-307-973-8, InTech, Available from: <http://www.intechopen.com/books/earthobservation/forest-fires-and-remote-sensing>
- Imagery and GIS: best practices for extracting information from imagery. <https://www.pdfdrive.com/imagery-and-gis-best-practices-for-extracting-information-from-imagery-e133333082.html>
- Chuvieco E., 2000. Remote Sensing of Forest Fires. In: Verstraete M.M., Menenti M., Peltoniemi J. (eds), Observing Land from Space: Science, Customers and Technology. Advances in Global Change Research, vol 4. Springer, Dordrecht. https://doi.org/10.1007/0-306-48124-3_6

- Lentile, L.B., Holden, Z.A., Smith, A.M.S., Falkowski, M.J., et al., 2006. Remote sensing techniques to assess active fire characteristics and post-fire effects. *International Journal of Wildland Fire*, 2006, 15, 319–345
- San-Miguel Ayanz, J., Camia, A., Santos de Oliveira, S. (eds), 2011. Advances in Remote Sensing and GIS applications in Forest Fire Management. Proceedings of the 8th International EARSeL FF-SIG Workshop Stresa (Italy), 20 - 21 October 2011, Aristotle University of Thessaloniki (Greece), 289 pp.
- Xiao-rui, T., Mcrae, D.J., Li-fu, S. *et al.*, 2005. Satellite remote-sensing technologies used in forest fire management. *Journal of Forestry Research* **16**, 73–78 , <https://doi.org/10.1007/BF02856861>