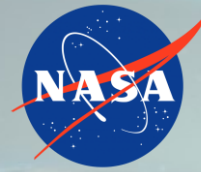


TAT-11: Earth Observation and Machine Learning for Disaster Mapping  
Mediterranean Agronomic Institute of Chania (CIHEAM Chania)  
14–17 July 2024, Chania



# EO data access from NASA, ESA, and other sources

**Dimitris Stavrakoudis — Assistant Professor**

Laboratory of Forest Management & Remote Sensing

School of Forestry & Natural Environment

Aristotle University of Thessaloniki

[jstavrak@for.auth.gr](mailto:jstavrak@for.auth.gr)

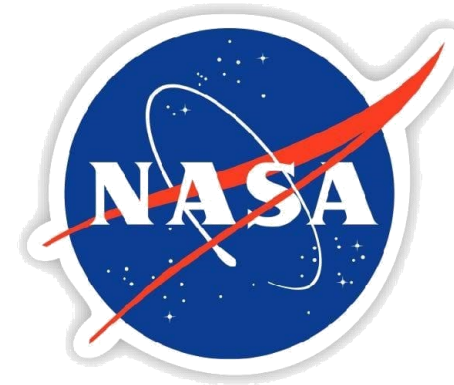
<https://fmrs.web.auth.gr>

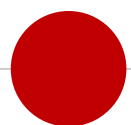
<https://epadap.web.auth.gr>



## EO data access

- Wide range of open EO data sources (most available on registration)
- Free open-source platforms provided by—among others—ESA, NASA.



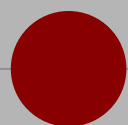


## EO data

# Where to access EO data?





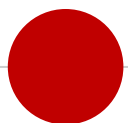


## Where to access EO data?

### ESA's free open-source platforms

- Copernicus Data Space Ecosystem
- Copernicus Land Monitoring Service





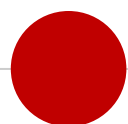
# Copernicus Data Space Ecosystem

Link: <https://dataspace.copernicus.eu/>

Data collection: Sentinel data (1, 2, 3, 5P)

EXPLORE THE COPERNICUS BROWSER REGISTER

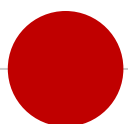




# Copernicus Services







# Copernicus Land Monitoring Service

Link: <https://land.copernicus.eu/en>



European Space Agency



## Copernicus Land Monitoring Service (CLMS)

We provide geographical information on land cover and its changes, land use, ground motion, vegetation state, water cycle and earth surface energy variables for both Europe and the entire globe.

All products are free of charge and can be used for any purpose.

Credits



### Land Cover and Land Use Mapping

Land cover classifications complemented by detailed layers on vegetated and non-vegetated land cover characteristics



### Priority Area Monitoring

Tailored land cover and land use information with a higher level of detail for specific areas of interest prone to environmental changes



### Bio-geophysical Parameters

Qualified bio-geophysical products on the status and evolution of the land surface complemented by the long term time series



### Ground Motion Monitoring

Information on the natural and anthropogenic ground motion throughout Europe with millimeter accuracy



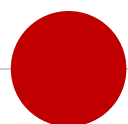
### Satellite Data

Satellite image mosaics from Copernicus and commercial satellite missions monitoring land surface conditions

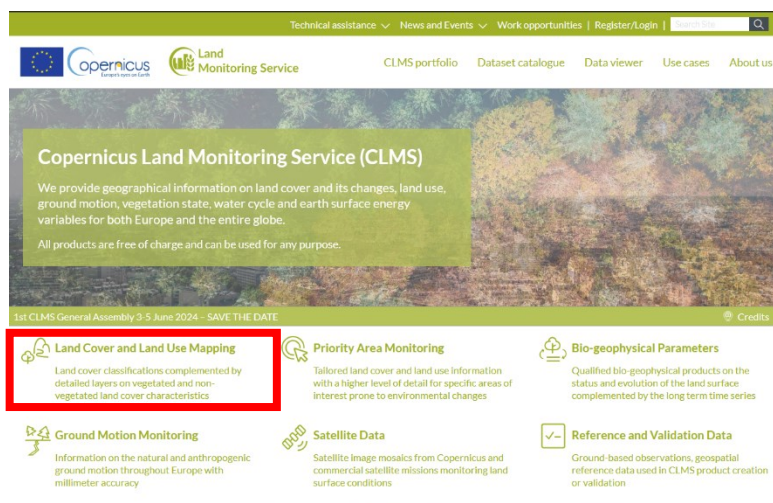


### Reference and Validation Data

Ground-based observations, geospatial reference data used in CLMS product creation or validation



# Copernicus Land Monitoring Service



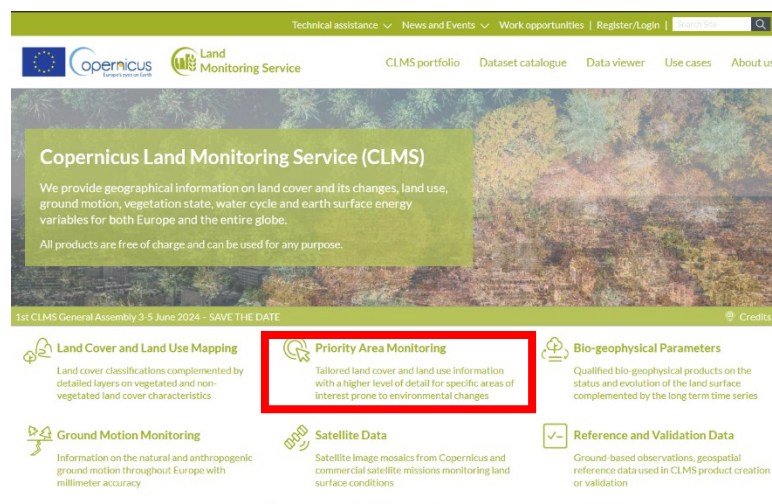
## Land Cover and Land Use Mapping

Land cover classifications complemented by detailed layers on vegetated and non-vegetated land cover characteristics

- Information about land cover/use, changes & land cover characteristics
- Various levels of detail
- Pan-European & global context
- Characteristics:
  - ✓ allowing status, changes, developments, trends monitoring
  - ✓ high spatial resolution (e.g., 10 m)
  - ✓ regular update cycle of 3-6 years
  - ✓ coordinated by the European Environment Agency (EEA)



# Copernicus Land Monitoring Service

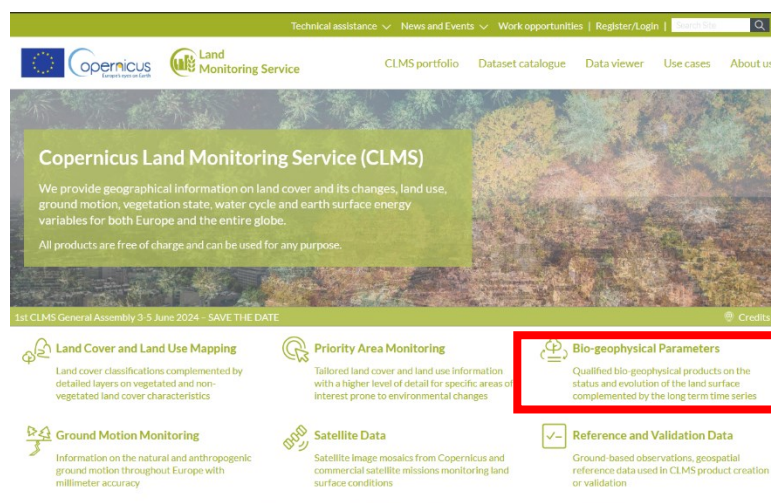



## Priority Area Monitoring

Tailored land cover and land use information with a higher level of detail for specific areas of interest prone to environmental changes

- Focus on different hotspots, i.e., areas prone to specific environmental challenges & problems related to human activity and biodiversity
- Various levels of detail & update frequency
- Regional & national context
- Characteristics:
  - ✓ spatial resolution (10 m - 1 ha)
  - ✓ regular update cycle of 6 years (for most products)
  - ✓ coordinated by the European Environment Agency (EEA)

# Copernicus Land Monitoring Service



Technical assistance | News and Events | Work opportunities | Register/Login

opernicus Land Monitoring Service CLMS portfolio Dataset catalogue Data viewer Use cases About us

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1st CLMS General Assembly 3-5 June 2024 - SAVE THE DATE

- Land Cover and Land Use Mapping**  
Land cover classifications complemented by detailed layers on vegetated and non-vegetated land cover characteristics
- Priority Area Monitoring**  
Tailored land cover and land use information with a higher level of detail for specific areas of interest prone to environmental changes
- Bio-geophysical Parameters**  
Qualified bio-geophysical products on the status and evolution of the land surface complemented by the long term time series
- Ground Motion Monitoring**  
Information on the natural and anthropogenic ground motion throughout Europe with millimeter accuracy
- Satellite Data**  
Satellite image mosaics from Copernicus and commercial satellite missions monitoring land surface conditions
- Reference and Validation Data**  
Ground-based observations, geospatial reference data used in CLMS product creation or validation

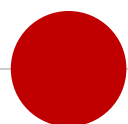


## Bio-geophysical Parameters

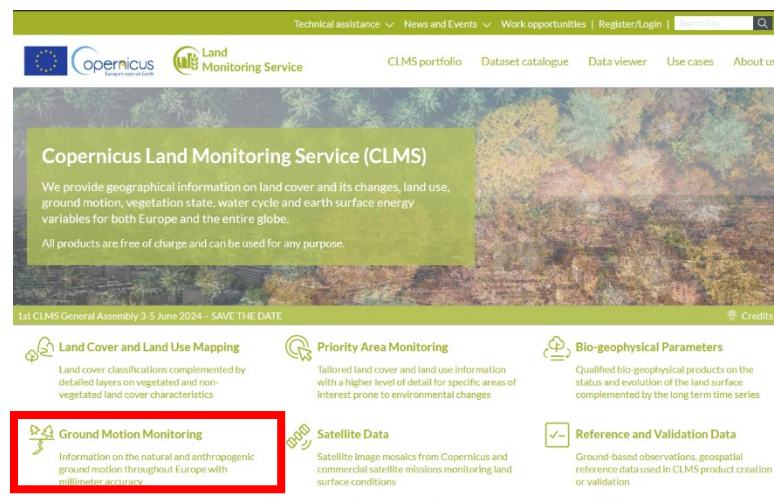
Qualified bio-geophysical products on the status and evolution of the land surface complemented by the long term time series

- A series of qualified bio-geophysical products on the state and evolution of the land surface
- Grouped into five thematic blocks (i.e., Soil Moisture, Snow, Vegetation, Temperature & Reflectance and Water Bodies)
- Regional & national context
- Characteristics:
  - ✓ allowing vegetation, crops, water cycle, energy budget and terrestrial cryosphere variables monitoring
  - ✓ spatial resolution ranges from 10 m to 12.5 km
  - ✓ the update frequency ranges from hourly to yearly







# Copernicus Land Monitoring Service



Technical assistance | News and Events | Work opportunities | Register/Login | Search









 CLMS portfolio | Dataset catalogue | Data viewer | Use cases | About us

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1st CLMS General Assembly 3-5 June 2024 - SAVE THE DATE | Credits

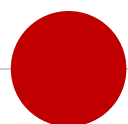
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- 
**Priority Area Monitoring**  
 Tailored land cover and land use information with a higher level of detail for specific areas of interest prone to environmental changes
- 
**Bio-geophysical Parameters**  
 Qualified bio-geophysical products on the status and evolution of the land surface complemented by the long term time series
- 
**Ground Motion Monitoring**  
 Information on the natural and anthropogenic ground motion throughout Europe with millimeter accuracy
- 
**Satellite Data**  
 Satellite image mosaics from Copernicus and commercial satellite missions monitoring land surface conditions
- 
**Reference and Validation Data**  
 Ground-based observations, geospatial reference data used in CLMS product creation or validation

- Information regarding natural and anthropogenic ground motion over the Copernicus participating states and across national borders, with millimeter accuracy
- Characteristics:
  - ✓ Spatial resolution ranges from 5 m x 20 m to 100 m x 100 m
  - ✓ The update frequency is either yearly or 2-yearly

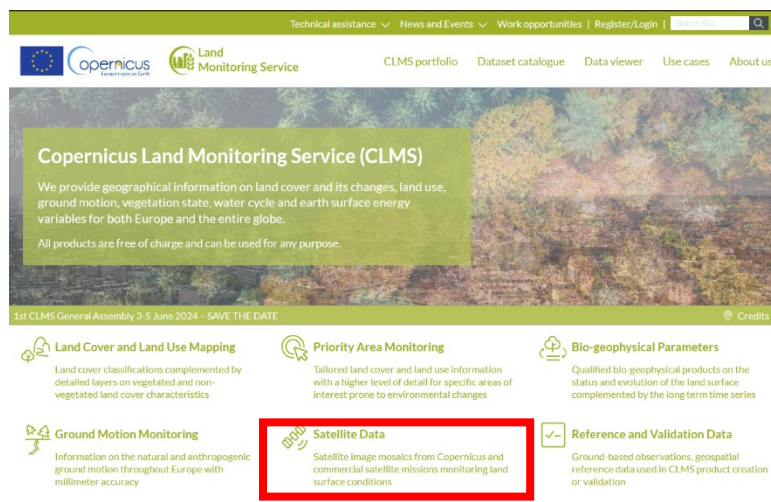


## Ground Motion Monitoring

Information on the natural and anthropogenic ground motion throughout Europe with millimeter accuracy



# Copernicus Land Monitoring Service



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Copernicus Land Monitoring Service

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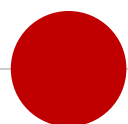


## Satellite Data

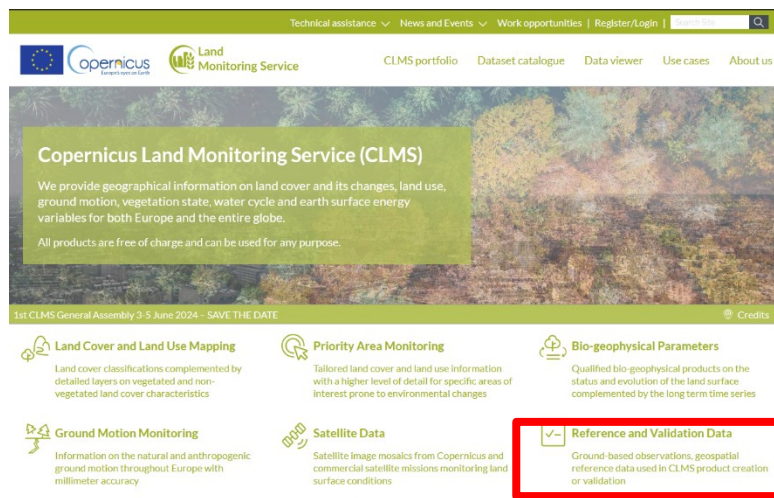
Satellite image mosaics from Copernicus and commercial satellite missions monitoring land surface conditions

- Image mosaics from contributing missions covering the territory of Europe as well as Sentinel-2 image mosaic production at global level
- Characteristics:
  - ✓ Spatial resolution for “European Image Mosaic: Very High Resolution” is 2.5 m and the update frequency depends on input data quality and availability
  - ✓ Spatial resolution for “European Image Mosaic: High Resolution” is either 5 m, 10 m or 20 m and the update frequency is 3 years
  - ✓ Spatial resolution for “Global Image Mosaic” is either 10 m, 20 m or 60 m and the update frequency is continuous







# Copernicus Land Monitoring Service



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 Ground-based observations, geospatial reference data used in CLMS product creation or validation



## Reference and Validation Data

Ground-based observations, geospatial reference data used in CLMS product creation or validation

- Satellite images and in-situ data used by the Copernicus Land services to produce reliable products and services.
- Pan-European & global context
- Included datasets:
  - ✓ EU-Hydro
  - ✓ Reference measurements
  - ✓ Validation products



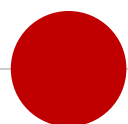
## Where to access EO data?

### NASA's free open-source platforms

- USGS Earth Explorer
- EarthData Search
- Application for Extracting and Exploring Analysis Ready Samples (AppEARS)
- Land Processes (LP) Distributed Active Archive Center (DAAC)

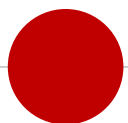






# Common resources for accessing NASA data

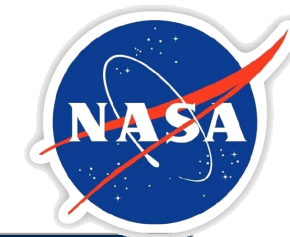
- NASA's Earthdata Search (<https://search.earthdata.nasa.gov/search>)
  - GUI for spatio-temporal querying of ECOSTRESS (and all other NASA Earthdata) observations
- NASA's Common Metadata Repository (CMR) (<https://cmr.earthdata.nasa.gov/search>)
  - API for querying ECOSTRESS (and all other NASA Earthdata) observations
  - I would recommend users looking for direct access use the earthaccess python package:  
<https://earthaccess.readthedocs.io/en/latest/>
- The Application for Extracting and Exploring Analysis Ready Samples (AppEEARS) (<https://appeears.earthdatacloud.nasa.gov/>)
  - Easy to use web application (and API!) interface for accessing, processing, and visualizing NASA Earthdata
  - Allows spatio-temporal and band/layer subsetting
  - Reformatting options
  - Time Series visualizations
  - Quality decoding
  - Analysis ready outputs
- USGS EarthExplorer (<https://earthexplorer.usgs.gov/>)
  - ECOSTRESS will no longer be available in the USGS EarthExplorer Application as of August 30, 2024
  - It would be good to let users know that this option is going away and it is not recommended
    - <https://lpdaac.usgs.gov/news/lp-products-to-be-removed-from-earthexplorer-and-m2m-on-aug-30-2024/>



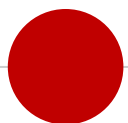
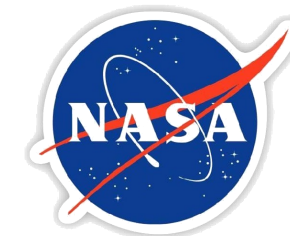
# USGS Earth Explorer

Link: <https://earthexplorer.usgs.gov/>

Data: Satellite images & aerial photos provided by the U.S. Geological survey







# NASA's Earthdata Search

Link: <https://search.earthdata.nasa.gov/search>



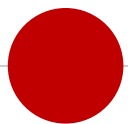
Data: A wide remote sensing data collection derived from different types of platforms (aerial, terrestrial, satellite, water-based)

## Data Pathfinders

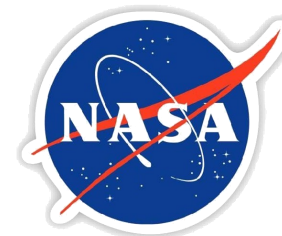
New to using NASA Earth science data? Our Data Pathfinders will help you chart a path through the process of selecting data products and







# AppEEARS



• Link: <https://appears.earthdatacloud.nasa.gov/>

• Web application interface for accessing, processing, visualizing geospatial data products

Slide kindly provided by [Dr. Glynn Hulley](#), NASA Jet Propulsion Laboratory










# AppEEARS


























- ✓ Spatial, temporal & band subsetting
- ✓ Reprojection & reformatting
- ✓ Interactive visualization
- ✓ Quality measures apparent & usable
- ✓ Interoperability & traceability
- ✓ Reduced at-archive data volumes

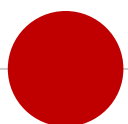
## Download Area Sample BETA

Request: Input Variables for Crop Yield in Iowa by County >

Supporting Files			
	Input-Variables-for-Crop-Yield-in-Iowa-by-County-MOD13A2-006-metadata.xml	ISO 19115 Metadata	99 KB
	Input-Variables-for-Crop-Yield-in-Iowa-by-County-MYD11A2-006-metadata.xml	ISO 19115 Metadata	99.01 KB
	Input-Variables-for-Crop-Yield-in-Iowa-by-County-granule-list.txt	Data pool URLs for all source granules used in the extraction	17.97 KB
	README.txt	Instructions and details about the request	10.81 KB
	Input-Variables-for-Crop-Yield-in-Iowa-by-County-request.json	JSON file which can be used to create a new request	519.7 KB
	MOD13A2-006-1-km-16-days-VI-Quality-lookup.csv	Lookup values for the quality bits	42.5 KB
	MYD11A2-006-QC-Day-lookup.csv	Lookup values for the quality bits	1.36 KB

Select: All | None 7920 Selected (18.76 MB) Q Save ▾

Name	Size
✓  MOD13A2.006__1_km_16_days_NDVI_doy2017001_aid0001.tif	5.09 KB
✓  MOD13A2.006__1_km_16_days_NDVI_doy2017001_aid0002.tif	4.13 KB
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## LP DAAC

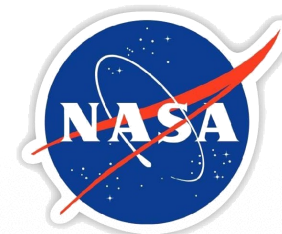
NASA's Land Discipline Archive (one of several DAACS)

Sponsored by the NASA Earth Observing System Data and Information System (EOSDIS)

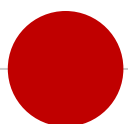
Located and Managed at USGS EROS, Sioux Falls, SD

All data and resources available at no cost

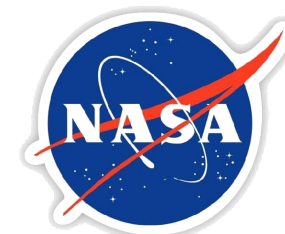
<https://lpdaac.usgs.gov>



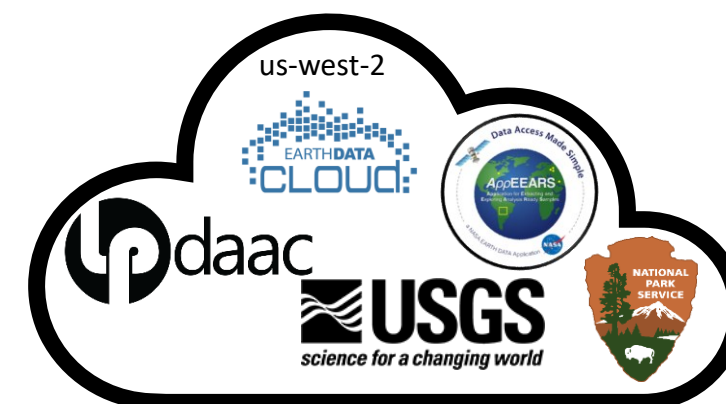


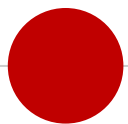


## LP DAAC



- New Product Releases (September 2022 – Present)
  - MODIS Version 6.1 Products
  - Harmonized Landsat Sentinel-2 Products
  - ECOSTRESS V2 L1-L2 Radiance, LSTE, Cloud Swath and Tiled Products
  - SEDAC Gridded Population of the World, V4 Basic Demographic Characteristics
  - MEaSURES Geostationary Earth Orbit LST Hourly North/South America V2
  - Daymet V4R1 2022 data update in collaboration with ORNL DAAC
  - USGS Landsat C2 U.S. ARD Surface Reflectance Products
  - NPS Daily & Monthly Historical Water Balance Model V1.5 Products
  - EMIT L1B and L2A Products
  - VIIRS Version 2 Products
- New Features:
  - Input feature preview: See spatial details of point/area requests immediately after submission
  - Layer Selector—Ability to “Select All” or “Remove All” layers button
  - Changelog: <https://appears.earthdatacloud.nasa.gov/changelog>
- Decommissioned MODIS Version 6.0 from AppEEARS





# Copernicus Data Space Ecosystem

Link: <https://dataspace.copernicus.eu/>

Data collection: Sentinel data (1, 2, 3, 5P)

EXPLORE THE COPERNICUS BROWSER

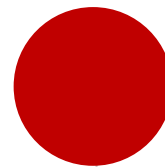
REGISTER



TAT-11: Earth Observation and Machine Learning for Disaster Mapping  
Mediterranean Agronomic Institute of Chania (CIHEAM Chania)  
14–17 July 2024, Chania



*Thank you for your  
attention!*



### Communication

Laboratory of Forest Management & Remote Sensing

School of Forestry and Natural Environment

Aristotle University of Thessaloniki

[jstavrak@for.auth.gr](mailto:jstavrak@for.auth.gr)

<https://fmrs.web.auth.gr>

<https://epadap.web.auth.gr>

