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Remote sensing for mapping Natura 2000 habitats in the Brière marshes (France, Loire-Atlantique) : setting up a long-term monitoring strategy to understand changes

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Slide 1 :

Presentation of the project

I come from France, I'm going to present you some results of my thesis.

Slide 2 :

- location : west Atlantic coast in France
- thesis work on the Regional natural park of Briere
- more precisely on the Natura 2000 sector over 17 000 hectares
- main aim of the thesis is to study the changing dynamics of plant formations on the entire sector, in order to enable prospective modelling

Slide 3 :

- three different maps were available at the beginning of the study
- field sampling efforts are very costly and time-consuming, and are hampered by difficult access to the extensive marsh areas
- not spatially exhaustive, present a simplification of habitat mosaics, making modelling impossible.

Slide 4 :

- The first step involves an hyperspectral and LiDAR aerial survey across the whole sector.
- It is completed by the acquisition of a World View 3 scene, in order to assess the contributions of the different types of data → because hyspec aerial survey very costly and hard to realize. And to set-up the observatory
- At the same time, floristic field surveys were carried out to characterize the textural and spectral variability of the images → transformed into ROI
- Automatic classification methods were then applied.
- differences between the variables used : only 19 for WV3 included the DHM from the LiDAR survey
- results : 13 habitats and a Out Of Bag

Slide 5 :

- in Briere, two invasive alien species are very endangering the habitats
- the trees are also invasive

Slide 6 :

- a complete mapping over the 17000 hectares of marshland has been carried out,
- according to the Eunis declination
- WV3 is not spatially exhaustive but it's a test, with no big differences

Slide 7 :

- we can follow *Crassula helmsii* and *Ludwigia* , 0.00% of confusion with other species in the matrix of confusion
 - for 1950, 1977, 1999 photointerpretation → very time consuming and boring
- So in 2023 we can have the distribution and the species

Slide 8 :

- as a result : Complete mapping, according to the Eunis declination
- 2024 : National LiDAR survey planned by the National Geographic Institute
- 2025 : a new WV03 image + DHM from de NGI LiDAR

Questions

Why didn't you use a hyperspectral satellite ?

Satellite such as ENDMAP is 30 meters resolution, it is not enough

How did you obtain the ROI :

- 1-identify the texture and spectral variability of the image by applying a vegetation indice
- 2-go on the localisation
- 3-describe the dominant species

What is the cost ?

50 \$ of the kilometer square, for the hyspec hard to say because there is the hyspec +lidar but it is much more

The update of the acquisition of the image ?

To study the alien species, maybe 2 images in summer in July in the end of august

For classic communities, updated each year

Link between the research and the Park ?

The CIFRE programme is a partnership between a French company, a laboratory and a PhD student

According to climate change how will the swamp evolve ?

Is the main goal of the thesis, we will do a prospective modelisation of the changing dynamics of plant formations

Less precipitations and a longer warm period, high temperature

We will include the management practices in the model

Explication of the alien specie distribution ?

North factor : species competition + lower topographical level too much water during a longer period

South factor : salt concentration in the soil

Future of sea level rise ?

We know that in the estuary sea level will rise from 60 to 1meter until 2100 so plant communities will be very impacted, maybe the swamp will be a gulf with salt water