EXPLORING DESIS FOR INLAND WATER QUALITY IN SPANISH RESERVOIRS

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MAIN OBJECTIVE

- Check DESIS images for water quality studies in lakes and reservoirs in the East of Spain.

- How:
  1) Spectra comparison L2A (DESIS vs. S2-MSI) → vs. in situ (in the near future)
  2) Optical Water Type classification of lakes.
     Check with un-supervised approaches first → dimensionality reduction worth it?
  3) Chlorophyll and TSM estimation with WASI-2D → comparison with C2RCC from MSI/ in situ data, when available.

- Related to:
  - OWT studies with S2-MSI: supervised approaches. How will DESIS improve results?
  - WQ analysis for cianoMOD and other future projects (possible ESAQS extension):
    - [https://ipl.uv.es/esaqs/](https://ipl.uv.es/esaqs/)
§ Man-made reservoirs after dam construction in the Turia and Jucar rivers, respectively.

§ These reservoirs are classified as oligotrophic to meso-trophic:
  - (Chl-a<25 (mg/m3)
  - Zsd>3 (m).
RGB Visualization (Bands Analysis)
SNAP AS PROCESSING SOFTWARE

Benageber

Processing chain

Tous

1st DESIS Users Workshop (28 Sept-1Oct)
Threshold + Land/Water Mask in SNAP

-999.0 <= 'Band 219' <= 0.05

Or use the one by default in DESIS *QUALITY-2.tif
BENAGEBER RESERVOIR: DESIS SPECTRAL SIGNATURE
BENAGEBER SENTINEL-2 SPECTRA
(SEN2COR)
BENAGEBER DIFFERENCE IN WATER TYPES
NON-SUPERVISED CLASSIFICATION

**K-means (1-235)**

<table>
<thead>
<tr>
<th>Label</th>
<th>Colour</th>
<th>Value</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear</td>
<td></td>
<td>0</td>
<td>77.551%</td>
</tr>
<tr>
<td>Moderate</td>
<td></td>
<td>1</td>
<td>13.832%</td>
</tr>
<tr>
<td>Turbid</td>
<td></td>
<td>2</td>
<td>6.576%</td>
</tr>
<tr>
<td>Very Turbid</td>
<td></td>
<td>3</td>
<td>2.041%</td>
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**K-means (414-700nm)**

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<tr>
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<td>6.047%</td>
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<tr>
<td>class_4</td>
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<td>2.268%</td>
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PCAs?
BENAGEBER
K-MEANS
DEISIS VS. MSI
TOUS, DESIS 2020-02-21
TOUS S2-MSI SPECTRAL RESPONSES
TOUS
K-MEANS CLASSIFICATION
(414-700NM)
TOUS CLASSIFICATION MSI VS. DESIS
TOUS C[0]=CHL [MG/L] DESIS
As Conchas (Ourense), 2020-05-27 (Cianomod)

Haze and sunglint + clouds and clouds shadows
AS CONCHAS (OURENSE), 2020-05-27

1st DESIS Users Workshop (28 Sept-1 Oct)
**OBSERVATIONS**

- Dark lakes, oligotrophic, blue wavelengths with very low negative values (bands 402-411.8). Very low negative values from >600 nm too.

- Better separation among OWT classes using only reflectances as inputs with DESIS comparing with MSI

- Cloud shadows identification is good & useful for water/shadow separation

- CHL test with WASI-SD still on going

**FUTURE WORK**

- Add more complex lakes or lagoons like Albufera de València (cianoMOD target) or Mar Menor (Murcia) → bigger sizes too

- Work with higher number of DESIS images and matchups (with S2-MSI and in situ)

- OWT with supervised classification: probably PCAs for dimensionality reduction