Improving the predictions of environmental variables of tidal flats using object-based image analysis and deep-learning features

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CONTEXT
➢ Tidal flats are ecologically rich coastal ecosystems
➢ They provide habitat & ensure food security for migratory birds & fishes
➢ Sediment & Biodiversity monitoring
➢ They are dynamic in space & and time
➢ Remote sensing provides continuous spatial & and temporal coverage

AIM
➢ Make use of deep-learning features
➢ Object-based mapping
➢ Prediction of the environmental variables

DATA
• SIBES by NIOZ @ 500 x 500 m grid
• Variables
  • Median Grain size (µm)
  • Silt Content (%)
  • Benthic biomass (gAFDM/m2)
  • Species richness (no. of species/sample)
• Sentinel–2 (B,G,R,NIR)

WORKFLOW
1) Deep learning features
2) Segmentation process

RESULTS
➢ Predictions using deep-learning features outperformed the spectral bands.
➢ Median grain size predictions were best with object size (12 ha) larger than the other three variables (silt content & species richness~2 ha, biomass~2.6 ha).
➢ A negative correlation between the median grain size and silt content is evident in the predictive maps
➢ The prediction maps show biomass and species richness in low energetic zones in line with the field data.

CONCLUSIONS
➢ Deep learning features showed consistent improvement.
➢ 21% point improvement over pixel-based
➢ Predicted maps to aid in coastal planning & management.
➢ Useful approach for other similar spectrally deficient regions

REFERENCES


The Netherlands