MAPPING OF WATER QUALITY DYNAMICS
DERIVED FROM HYPERSPECTRAL EARTH OBSERVATION DATA FOR THE TAM GIANG LAGOON IN CENTRAL VIETNAM

Diploma Thesis

Introduction

The Tam Giang Coastal Lagoon is the largest lagoon in Southeast Asia, covering an area of 216 km². It has an average depth of 2 meters and reaches a maximum depth of 5 to 15 meters in the inlet regions due to water fluxes.

Currently, there are two inlets: the Thuan An inlet in the north and the Tu Hien inlet in the south. The opening and dynamics of these channels are closely related to the rainy and flood seasons, which regulate the evacuation of water in the lagoon. The lagoon system receives water primarily from the Huong River basin, which is the main contributor to its water flux. The population living along the lagoon is approximately 300,000 inhabitants.

Objectives

The primary objective of this master's thesis is to analyze the temporal evolution of water quality in the Tam Giang Lagoon using time-series hyperspectral EO (Earth Observation) data and to develop advanced geovisualization techniques for better visualizing the results.

This thesis addresses two key aspects: the analysis of water quality parameters over time and the visualization and cartographic representation of the derived results. Consequently, the thesis is divided into two research parts:

Research 1: The thematic analytical part, focusing on the temporal analysis of water quality.

Research 2: The geovisualization part, focusing on the visualization and cartographic representation of the results.

The theoretical aim of the thesis is to conduct a comprehensive literature review, concentrating on the topics of water quality indicators, hyperspectral EO data, and methods for cartographic visualization of the obtained results.

Methodology
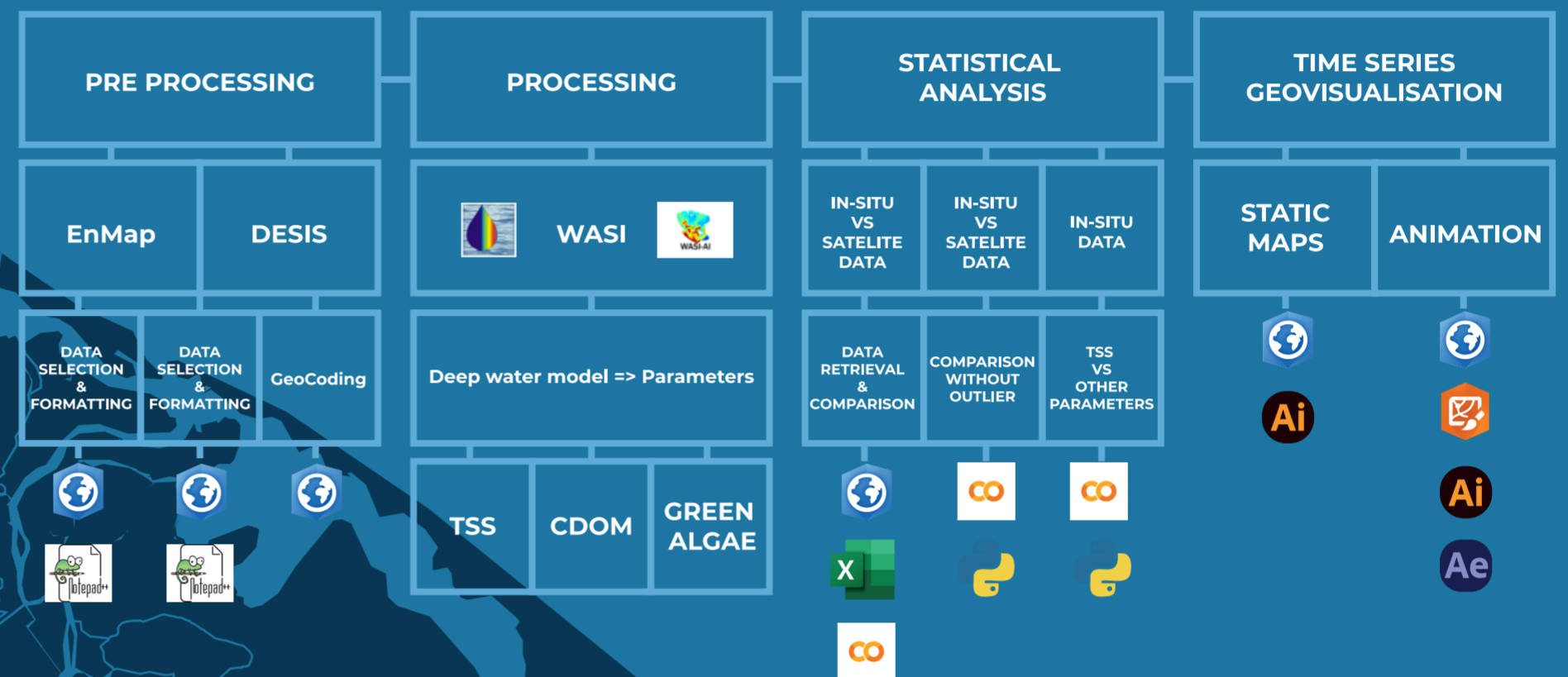
Results

The results of the analytical component include 23 processed hyperspectral images, each evaluated against three parameters: green algae, Total Suspended Solids (TSS), and Colored Dissolved Organic Matter (CDOM). These images collectively provide 15 days of water quality data, which have been utilized for the visualization in the outcomes. More can be found directly with the website QR code.
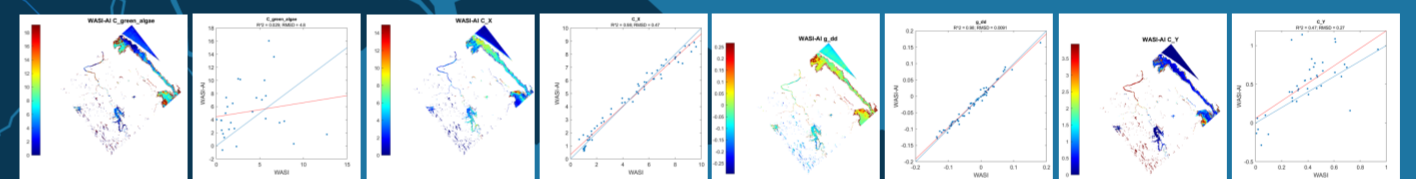
Outcomes

The key outcomes of this research include a 5-minute and 32-second animation that vividly illustrates the temporal evolution of Total Suspended Solids (TSS) within the lagoon. Additionally, the study produced a series of four meticulously crafted map posters, which effectively visualize the results of the analytical component of the research. All of which can be found via the animation & website QR Code.

ANIMATION

WEBSITE
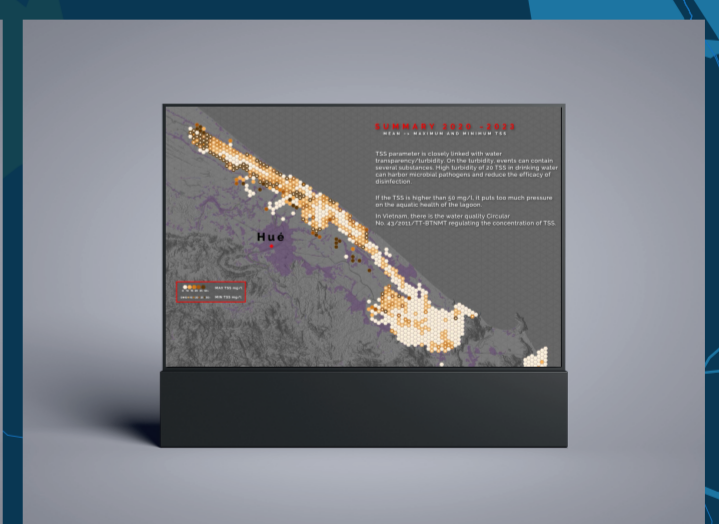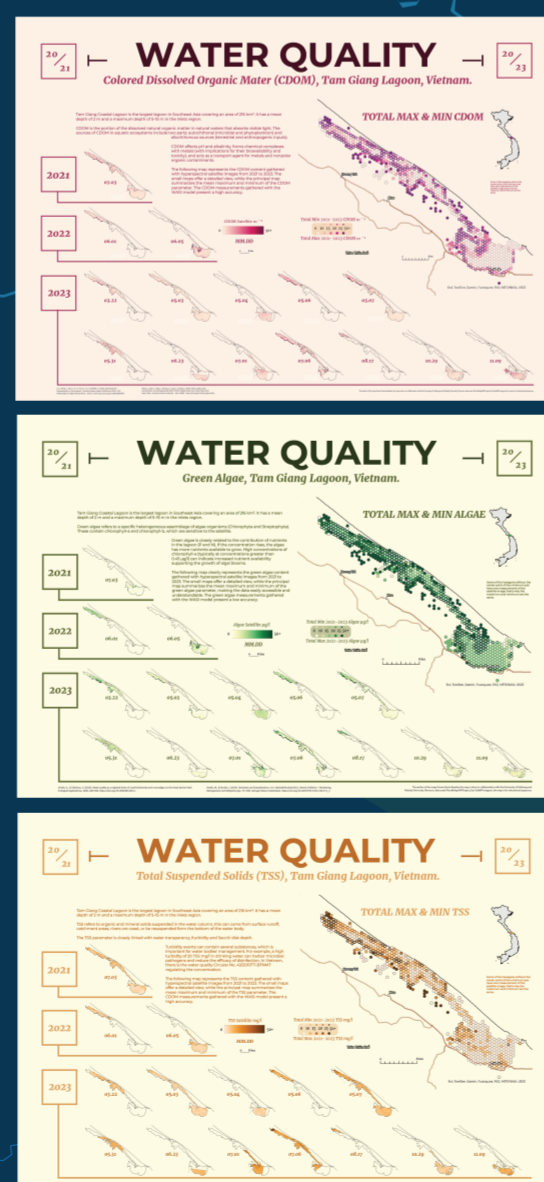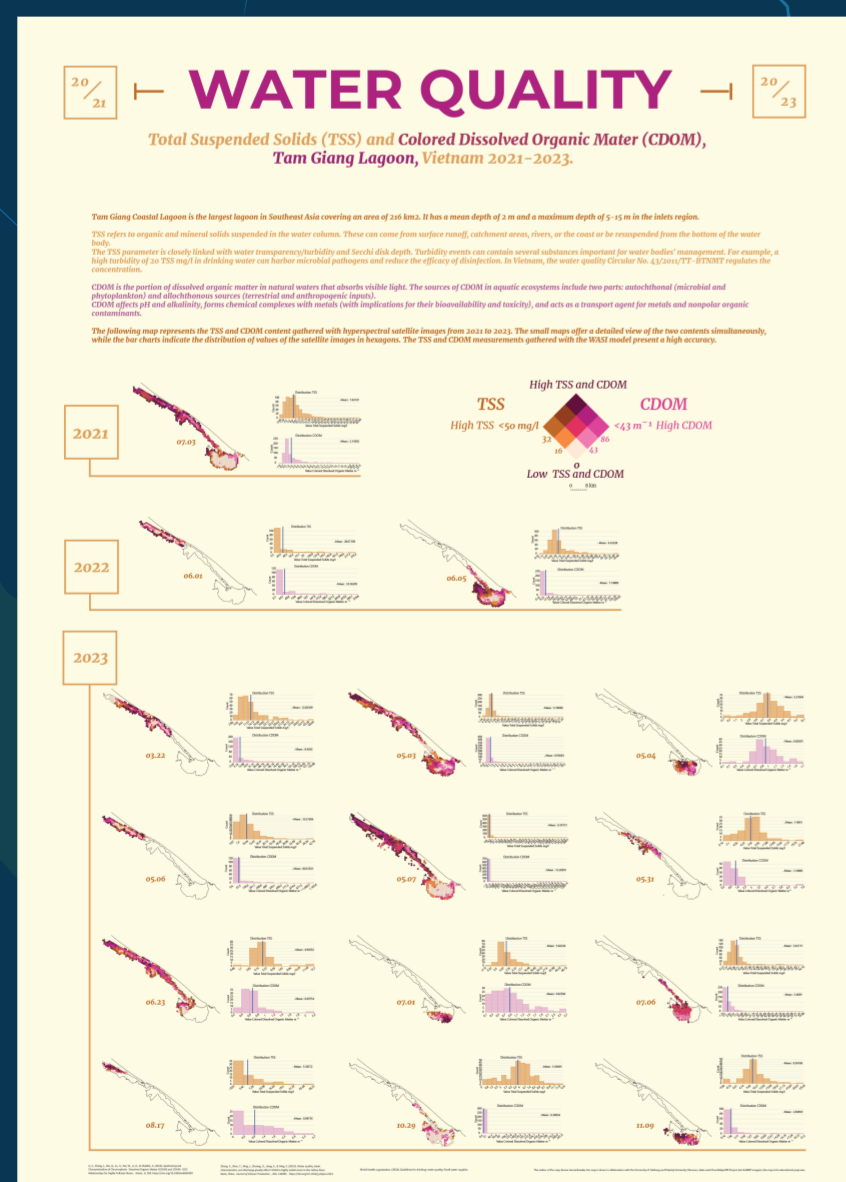
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