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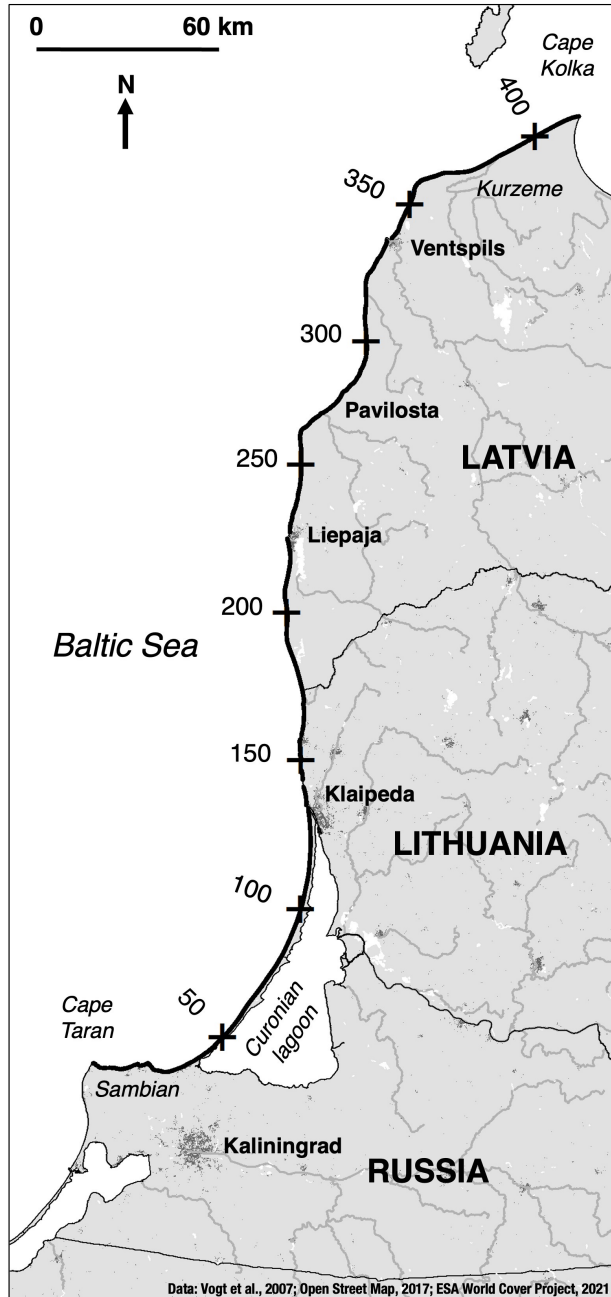


## **The Evolution of the South-Eastern Baltic Sea Coastline Between 1988 and 2018 by Remote Sensing**

**Prof. Dr. Sébastien Gadal, Thomas Gloaguen**  
Aix-Marseille University, CNRS, UMR 7300 ESPACE  
Kaunas University of Technology



## Research context



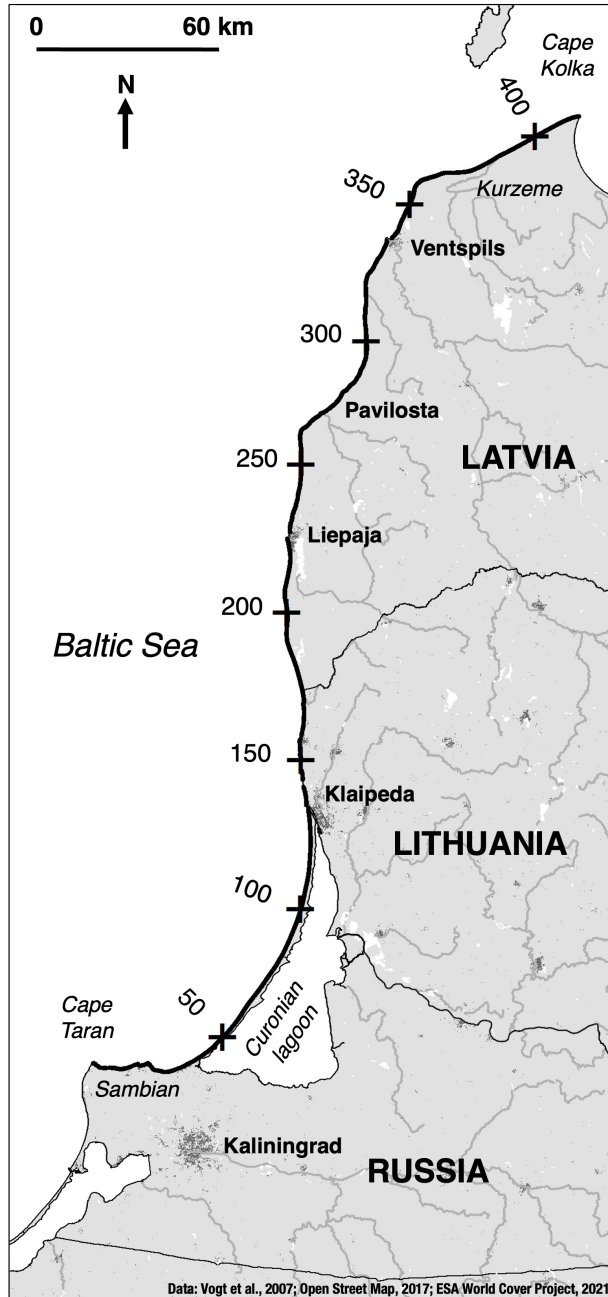
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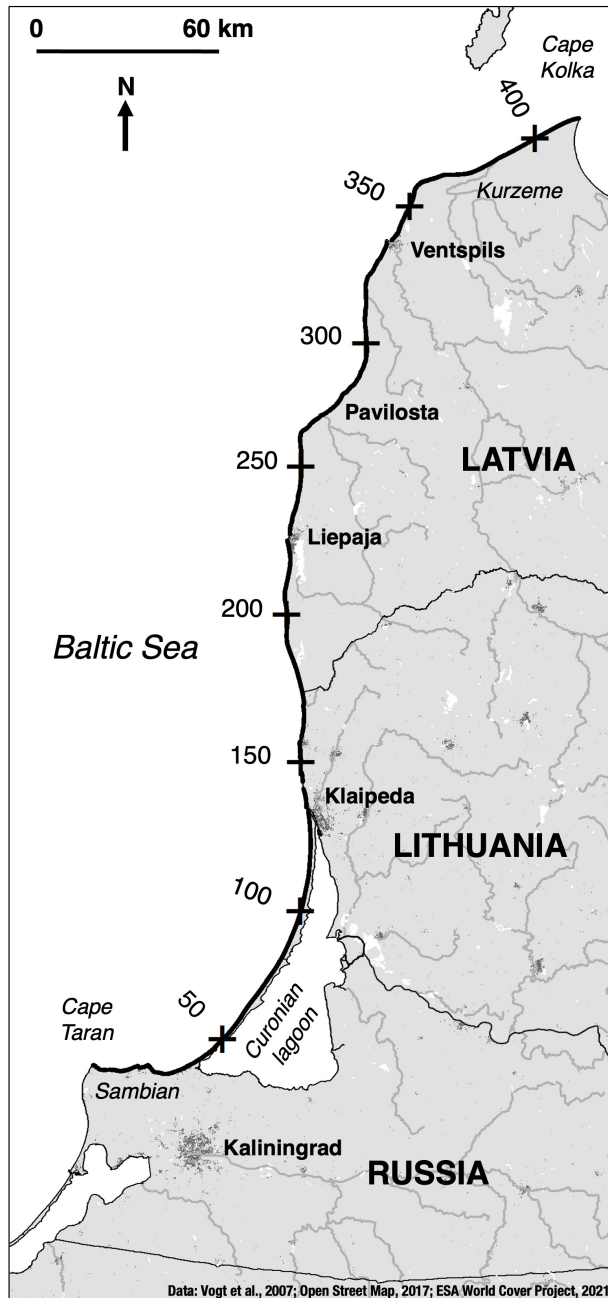


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Example of former military infrastructure on the Latvian coast

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- The effects of climate variability will modify the current morphological processes.



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## Data acquisition

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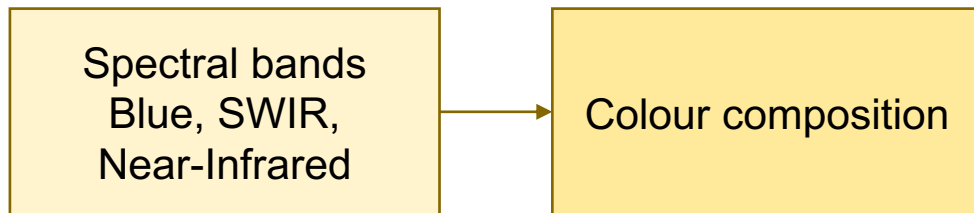
Spectral bands  
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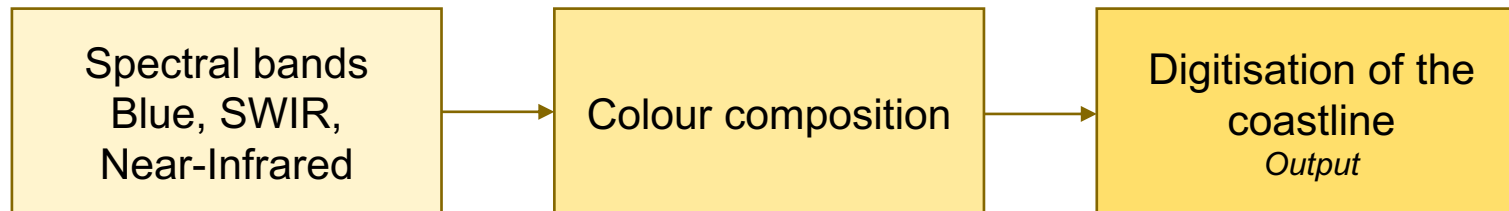


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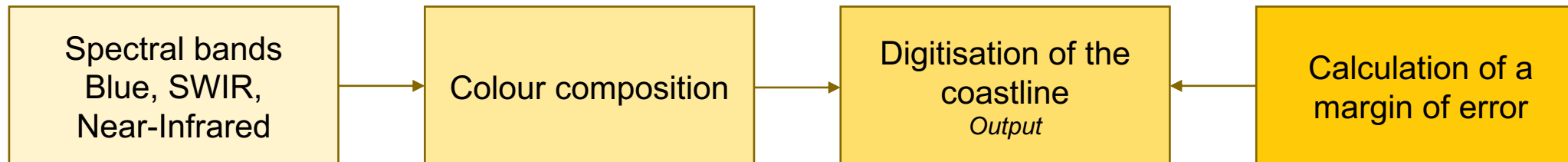


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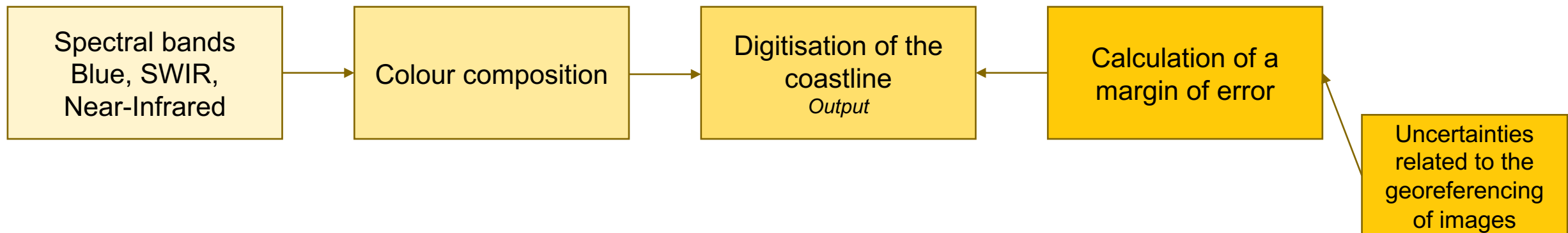


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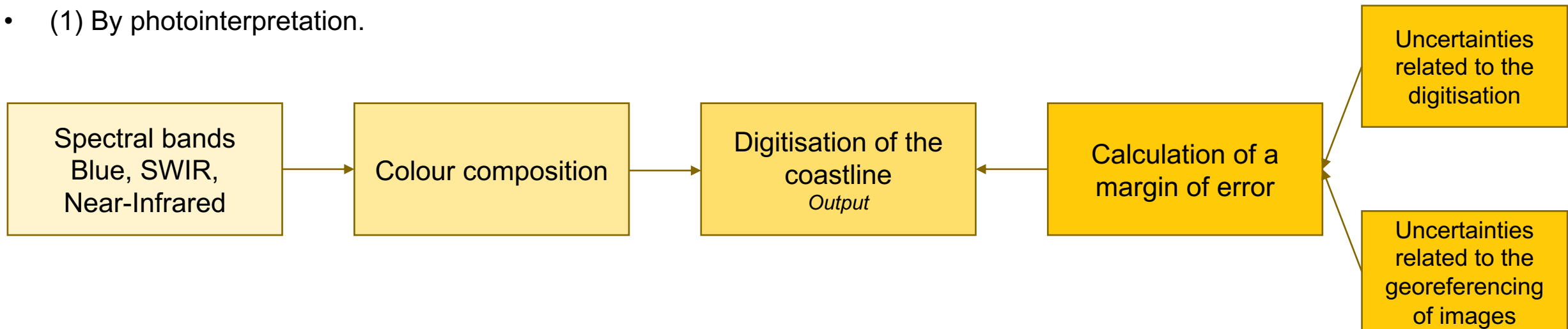


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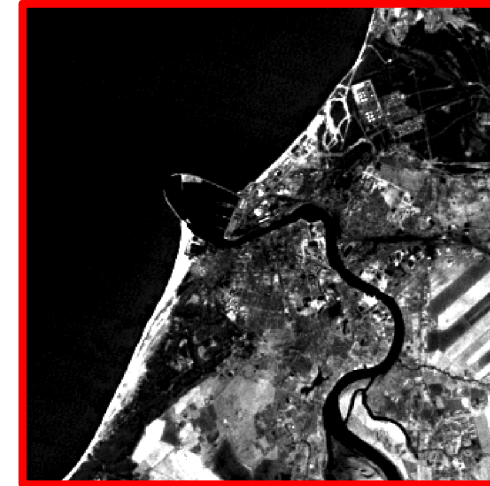
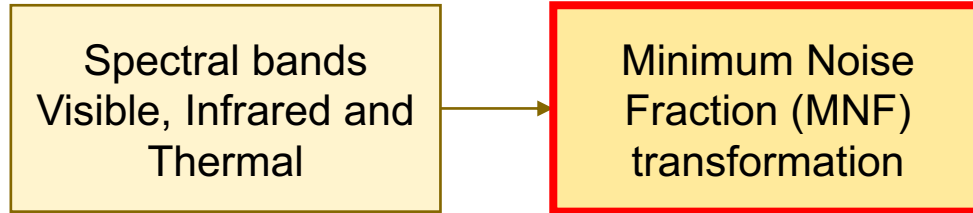
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Spectral bands  
Visible, Infrared and  
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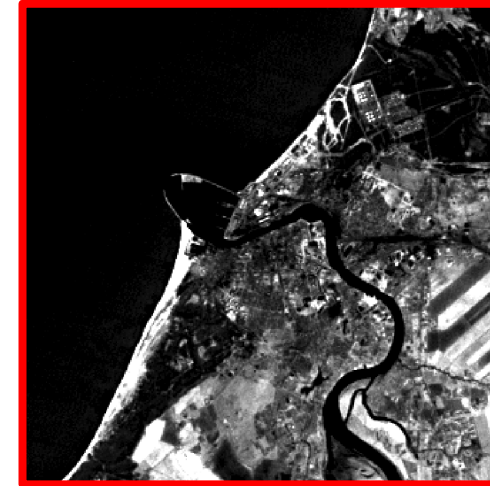
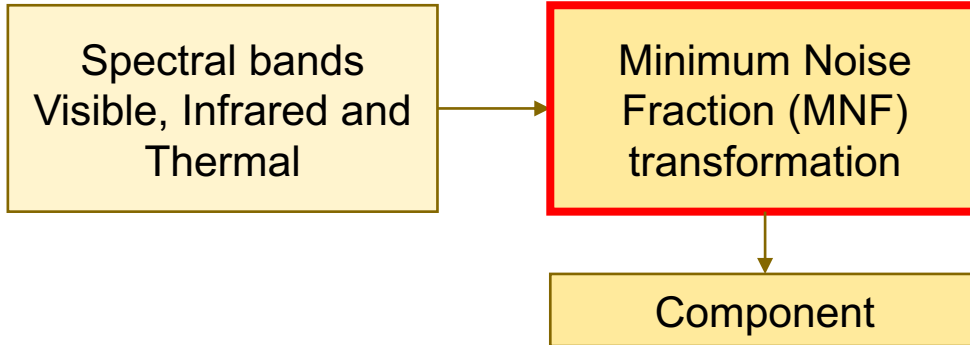
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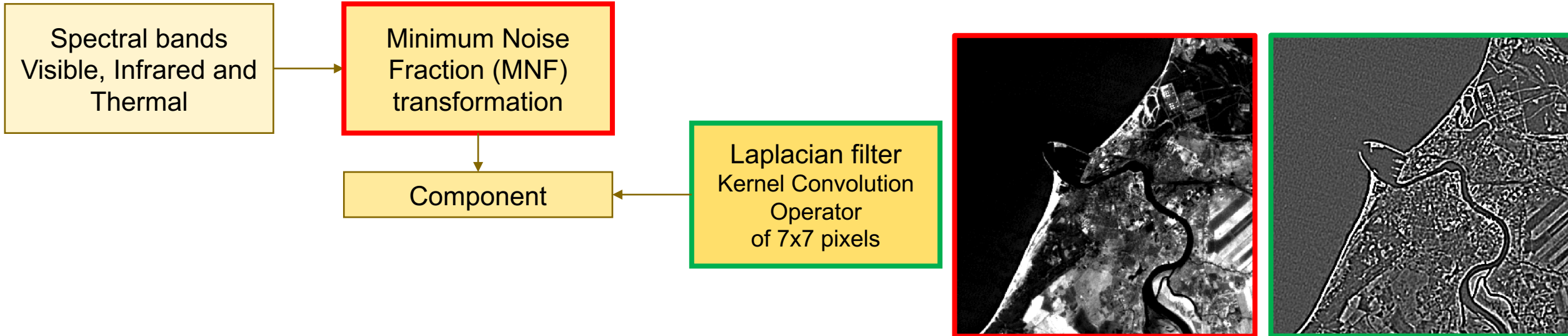
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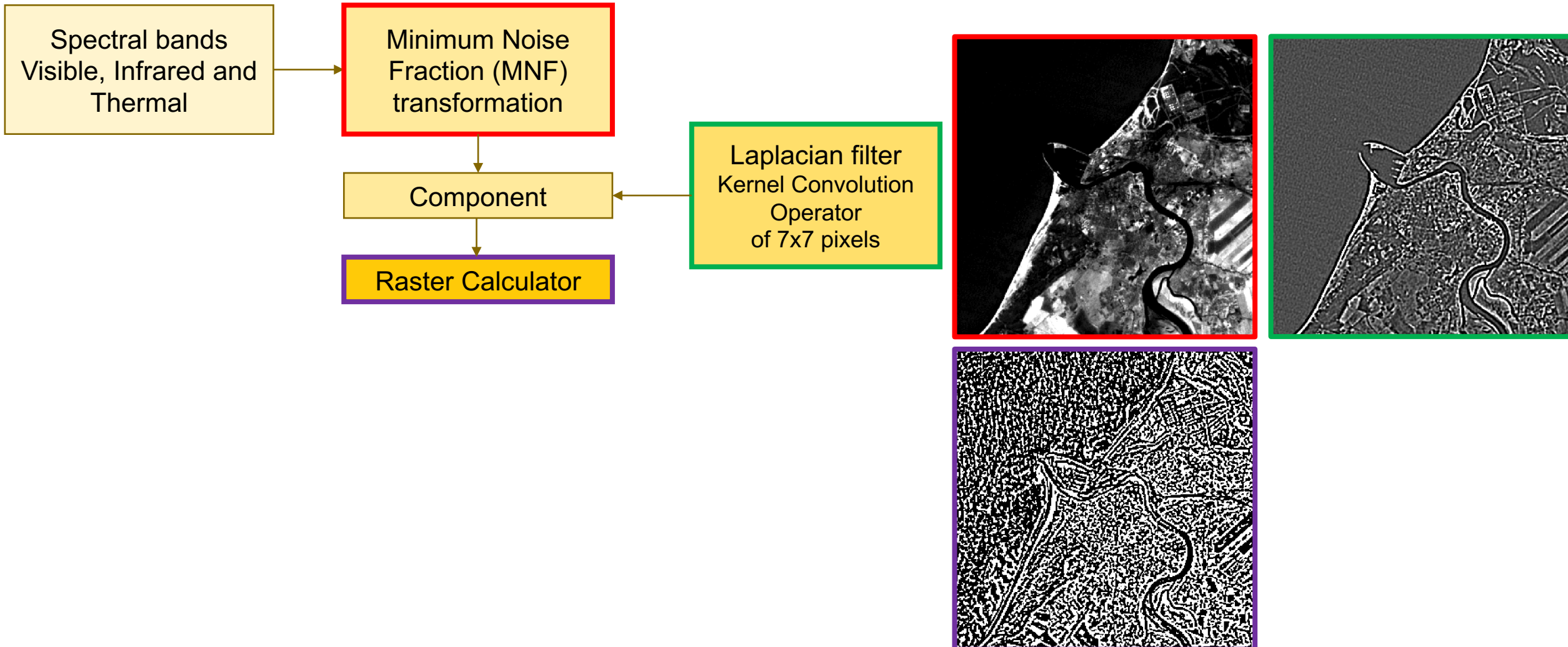
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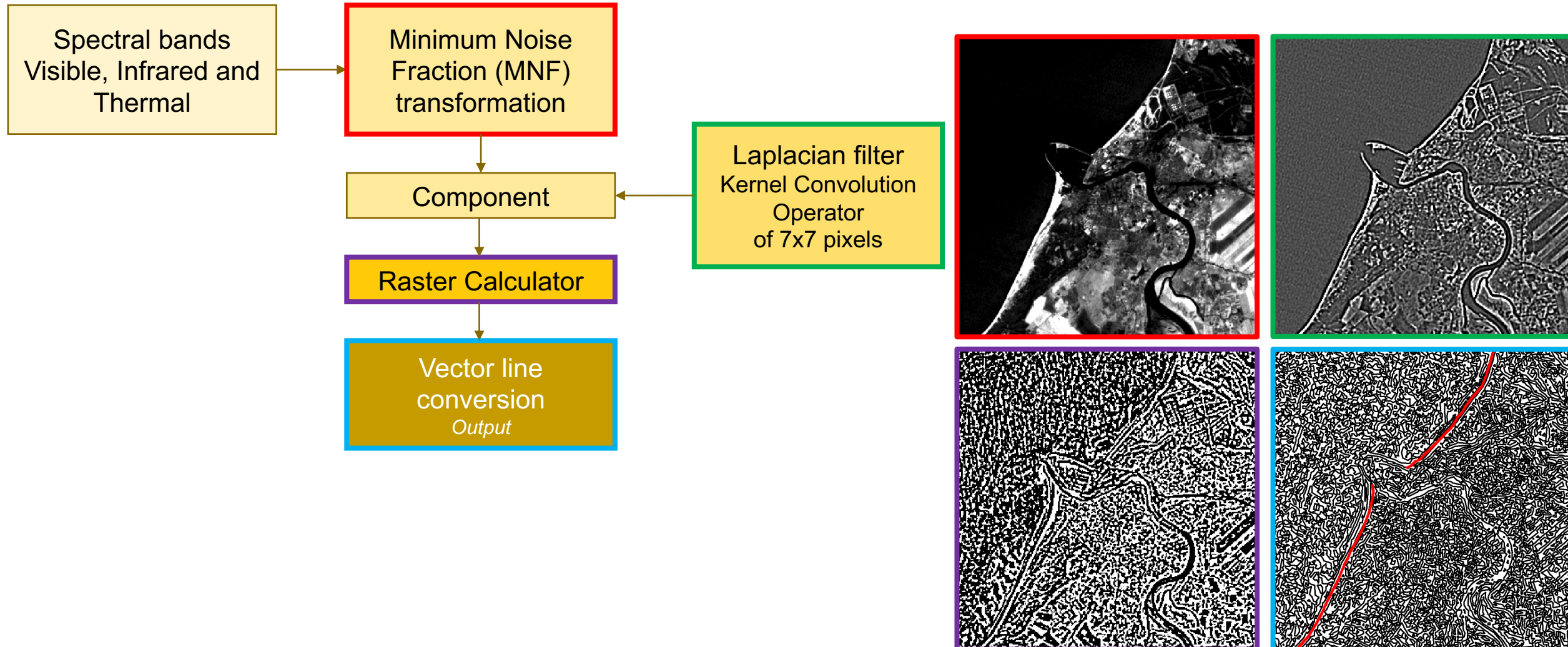
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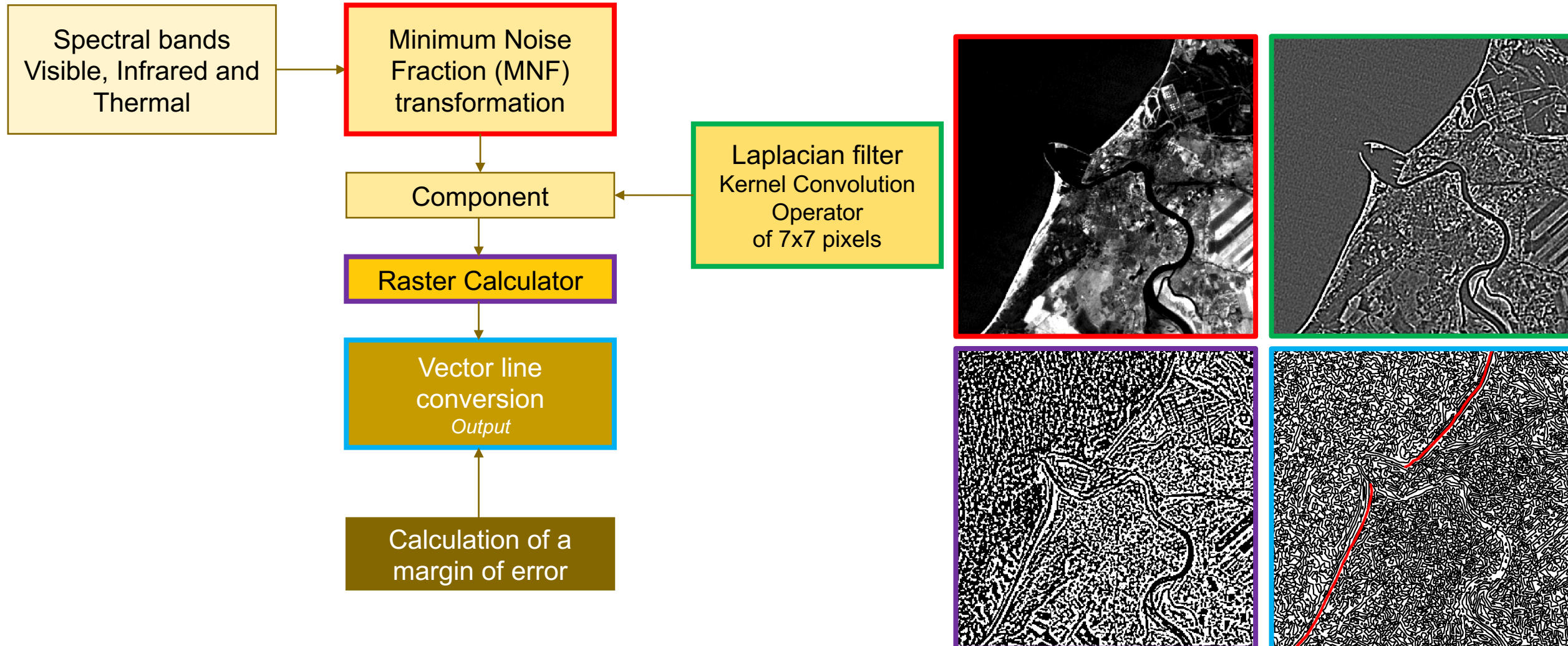
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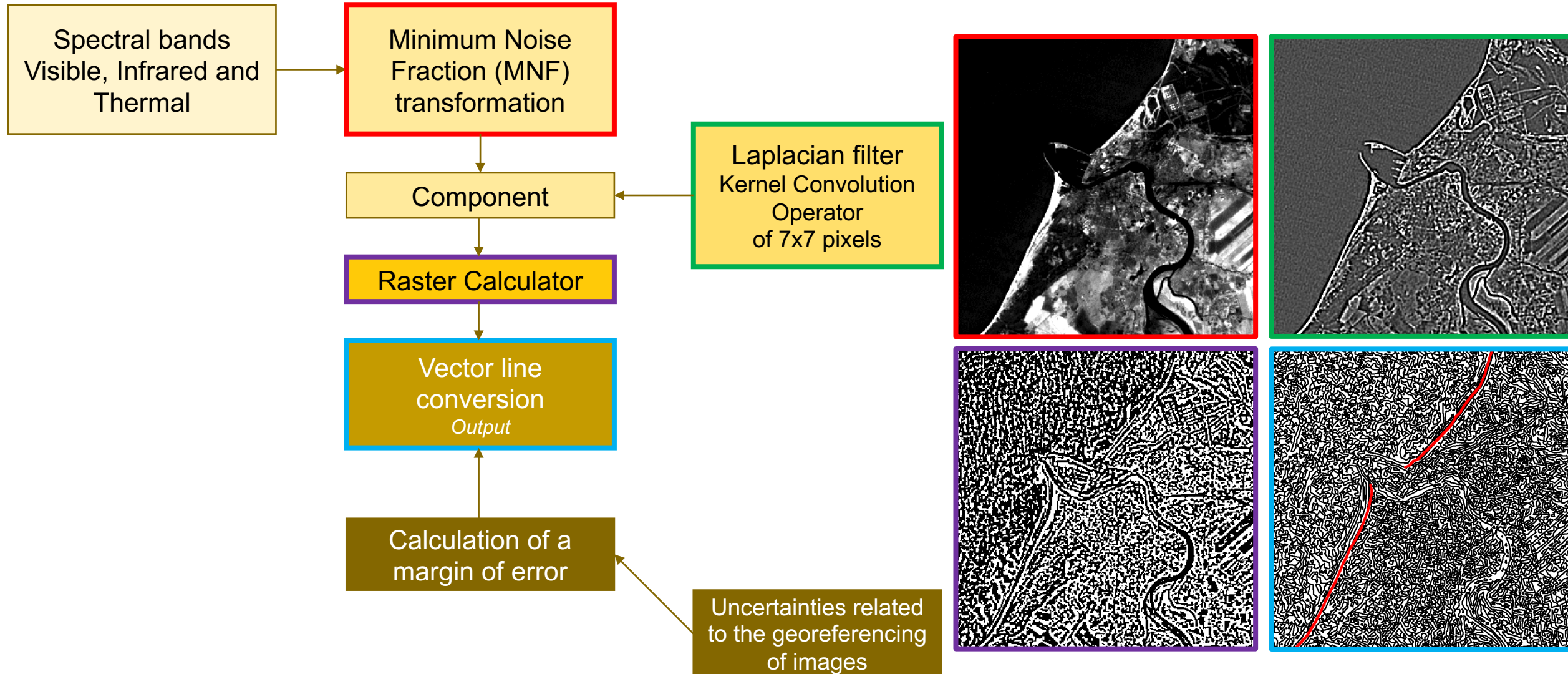
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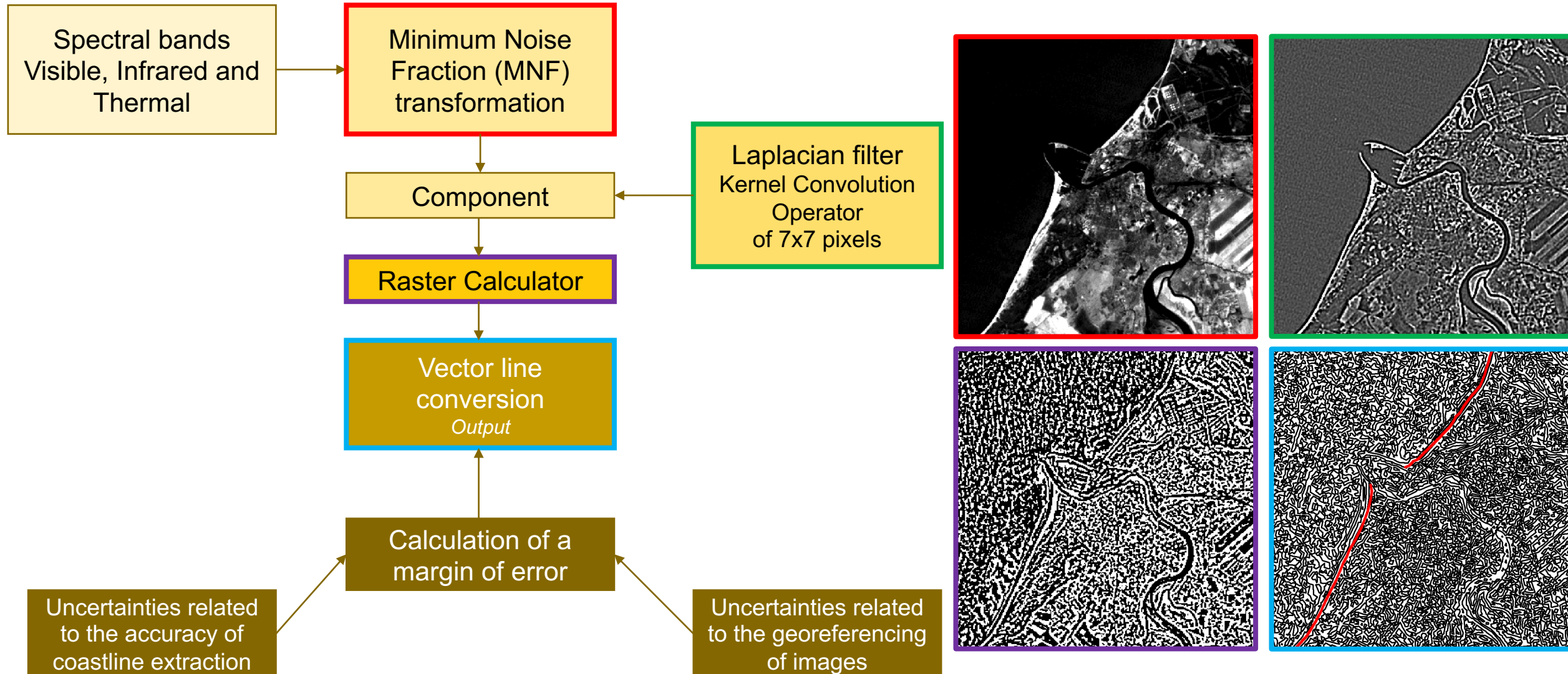
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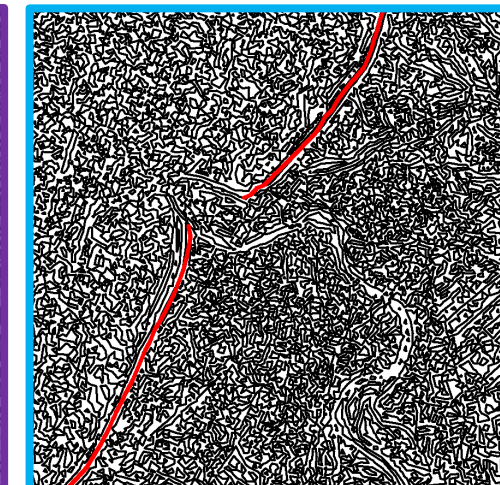
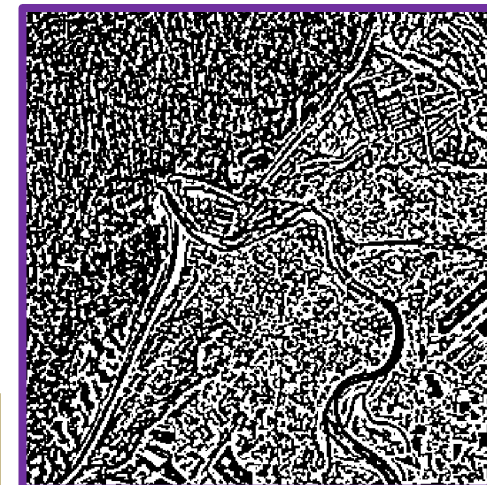
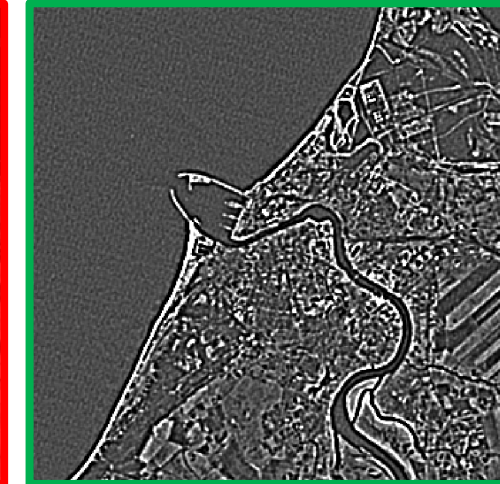
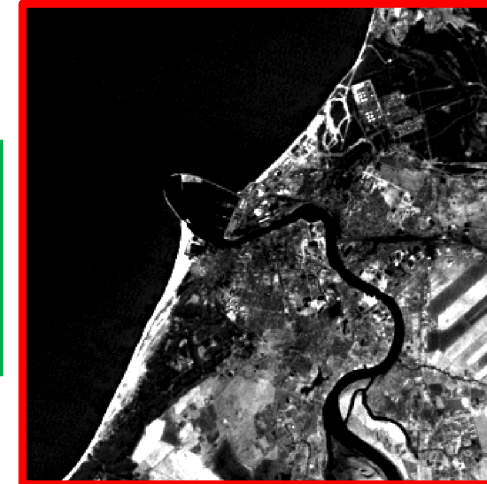
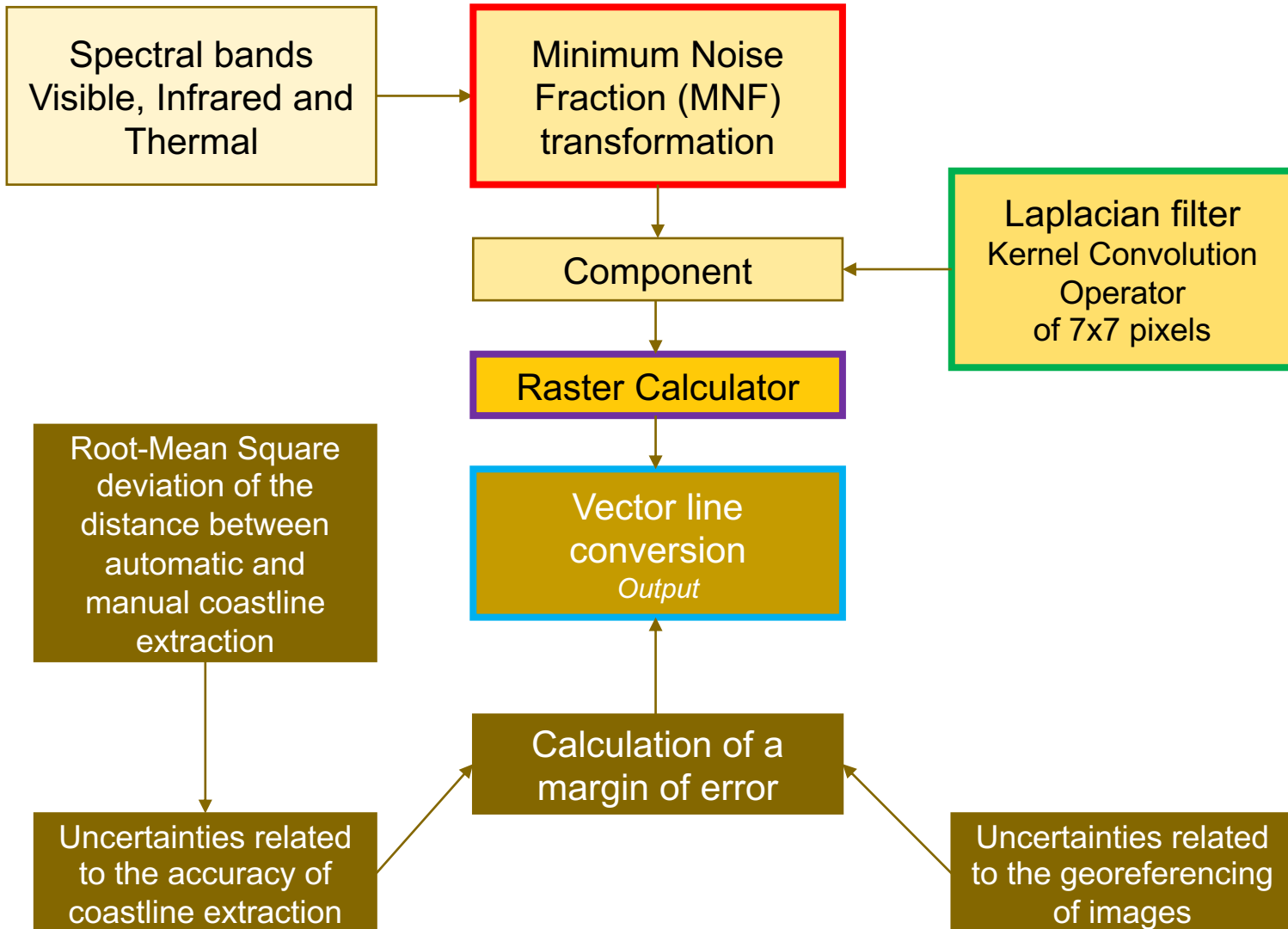
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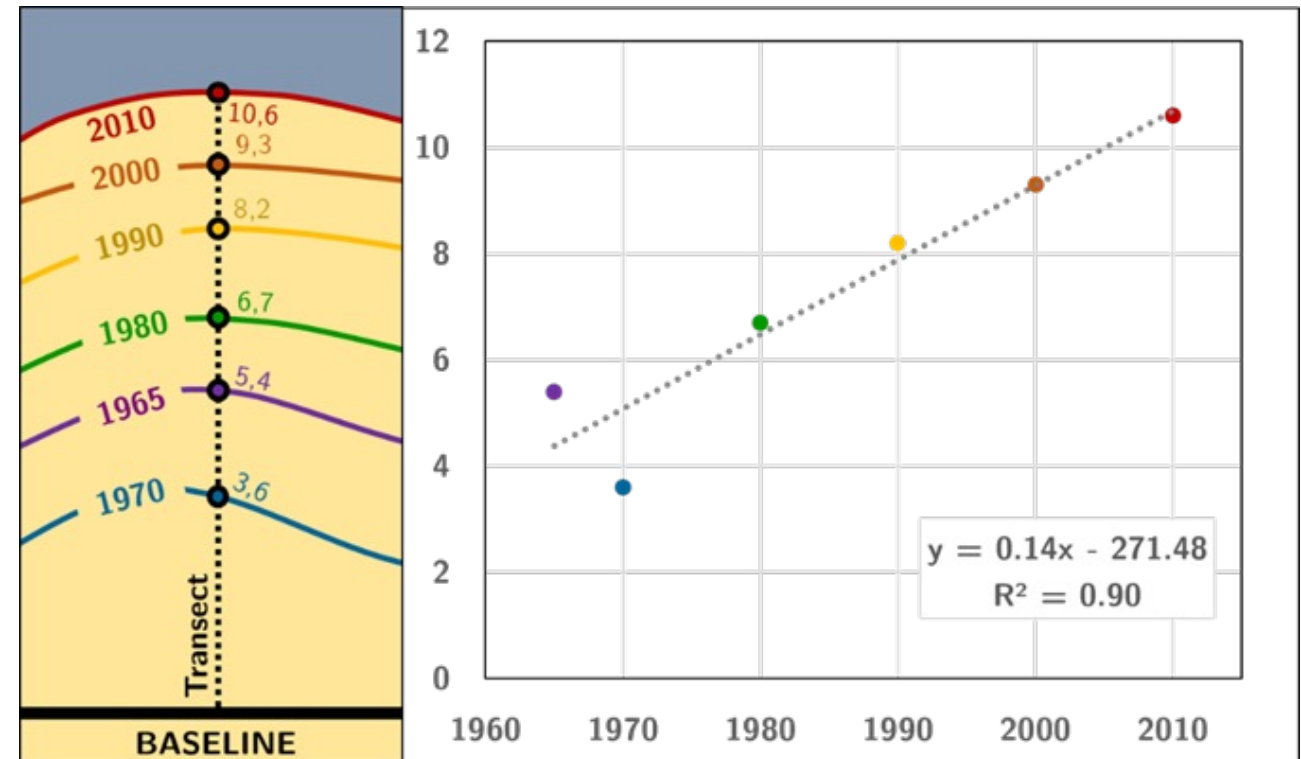
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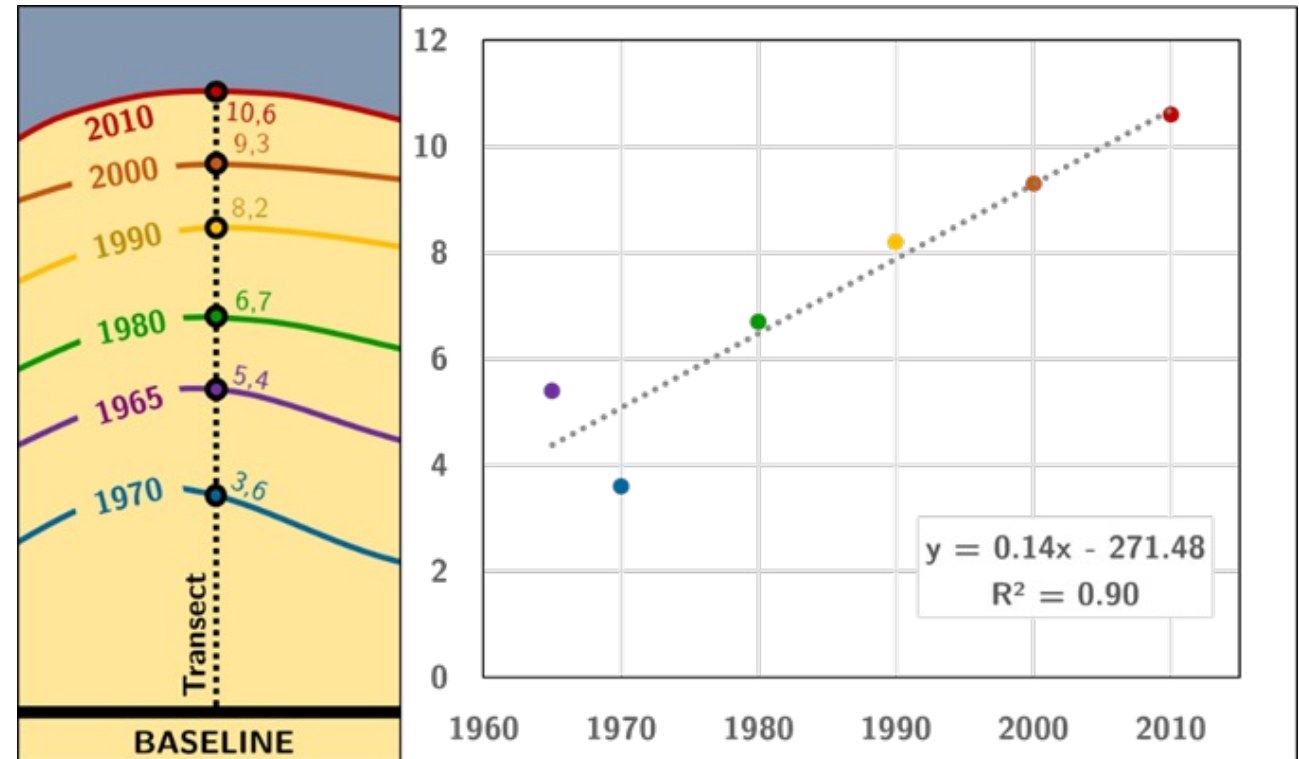


Thieler et al., 2018



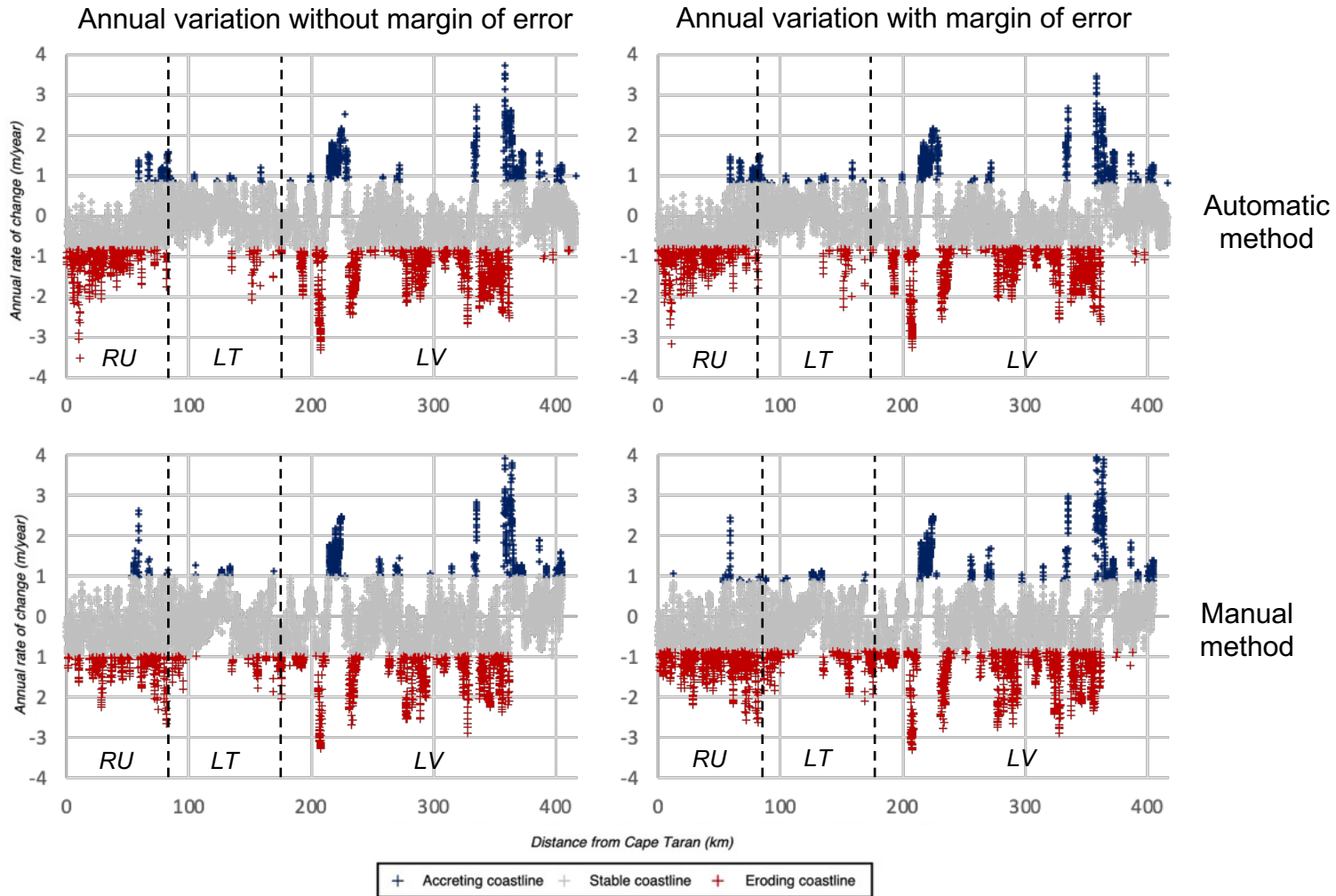
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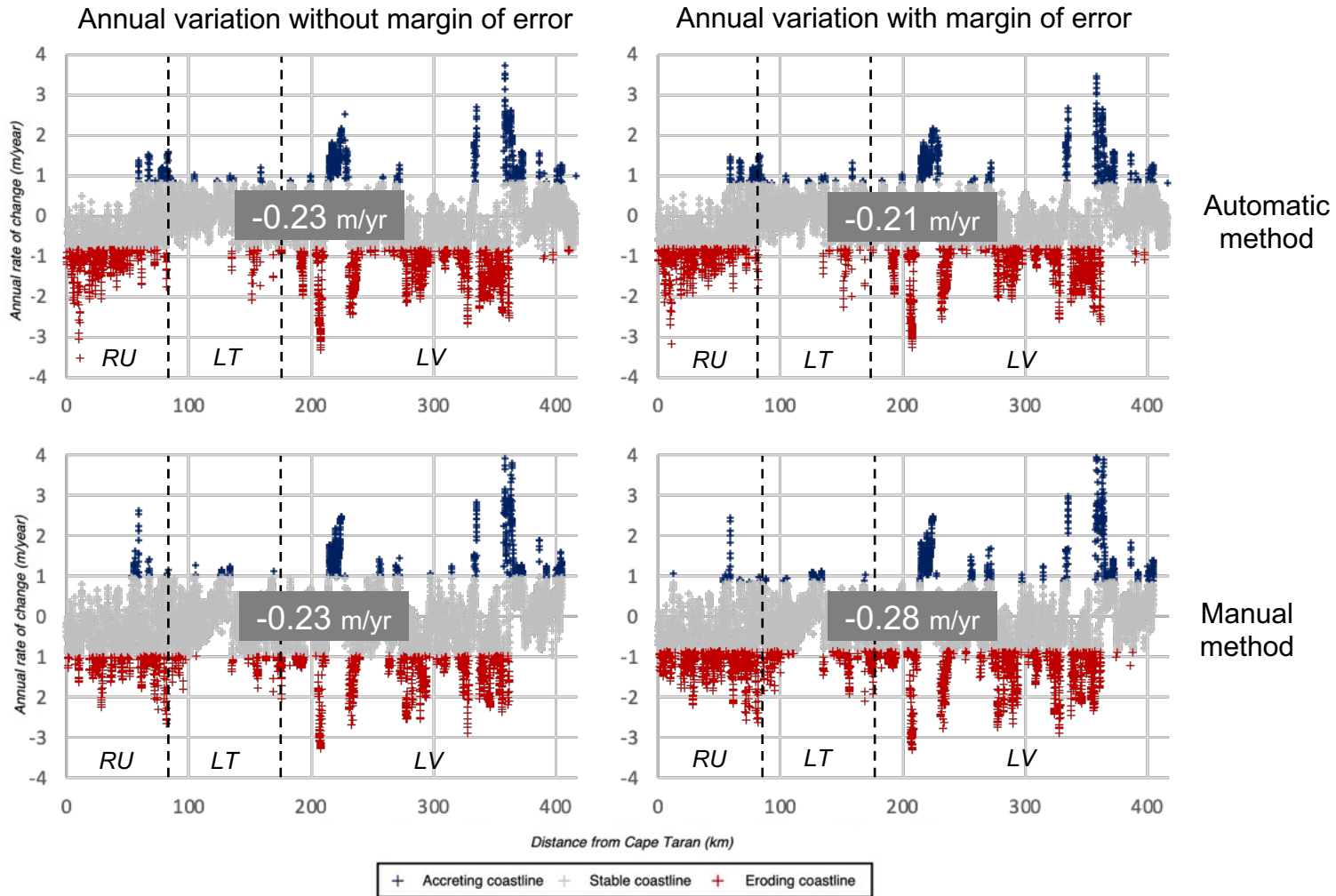
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## An intra-period evolution characterised by a great stability of the coastline

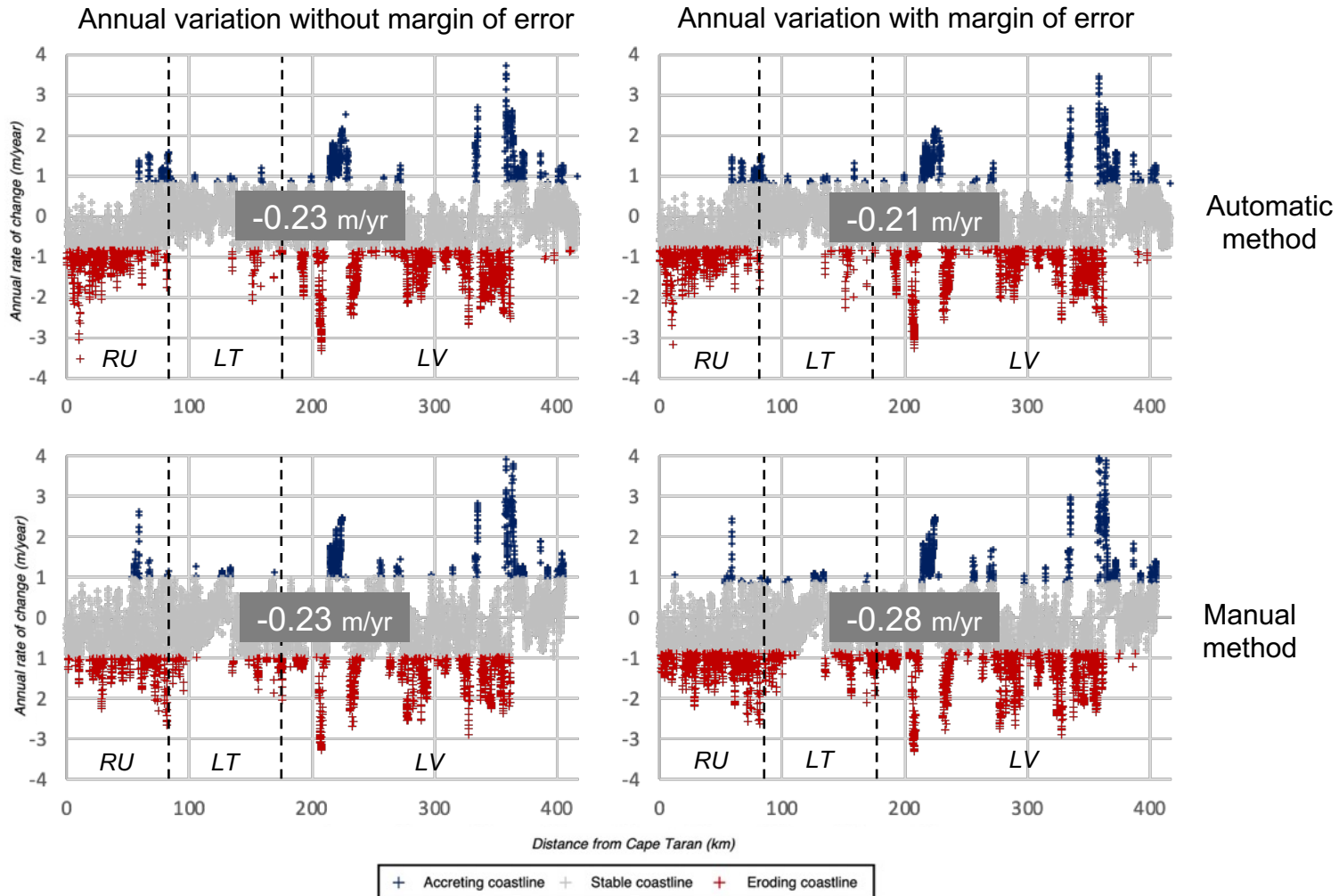


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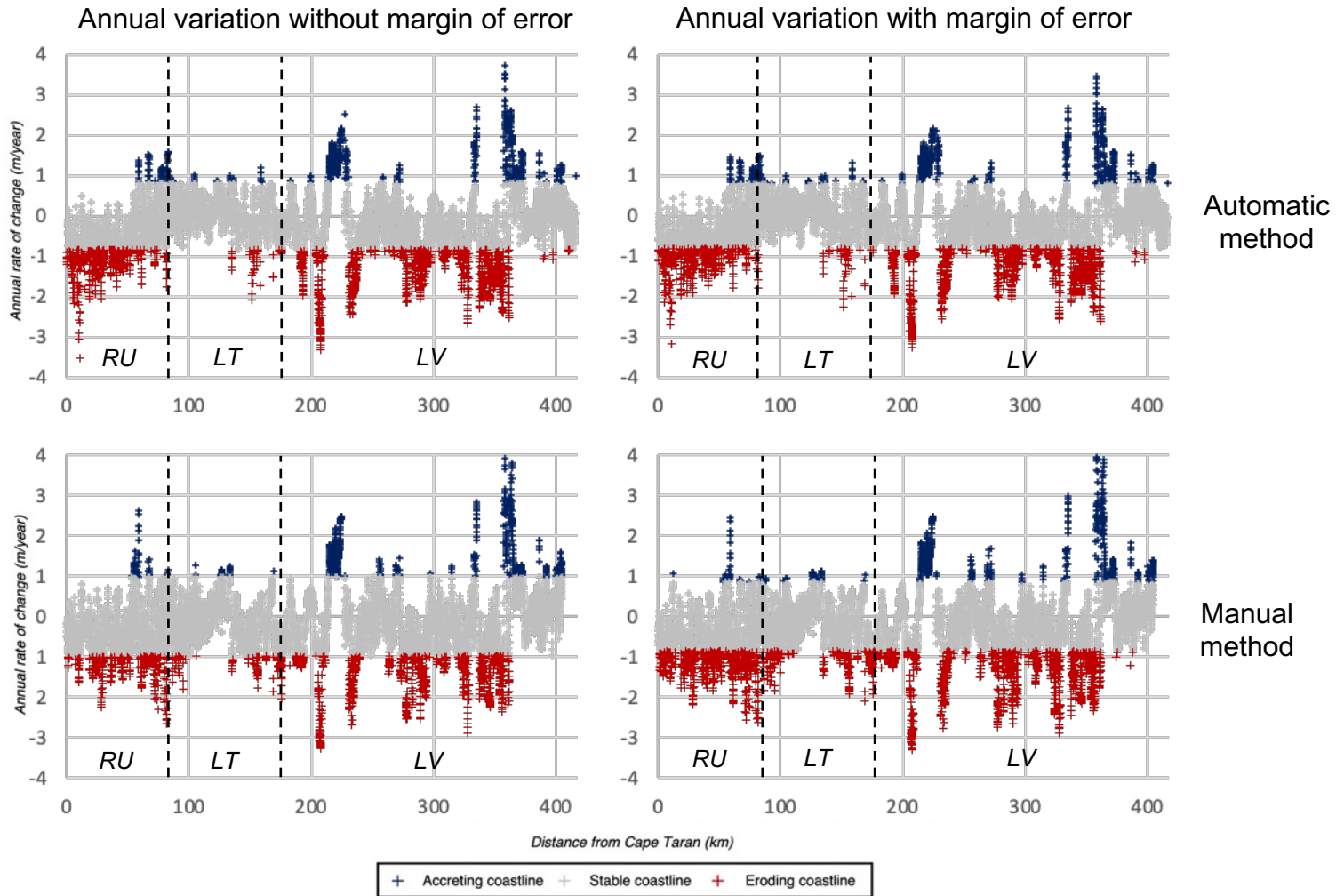


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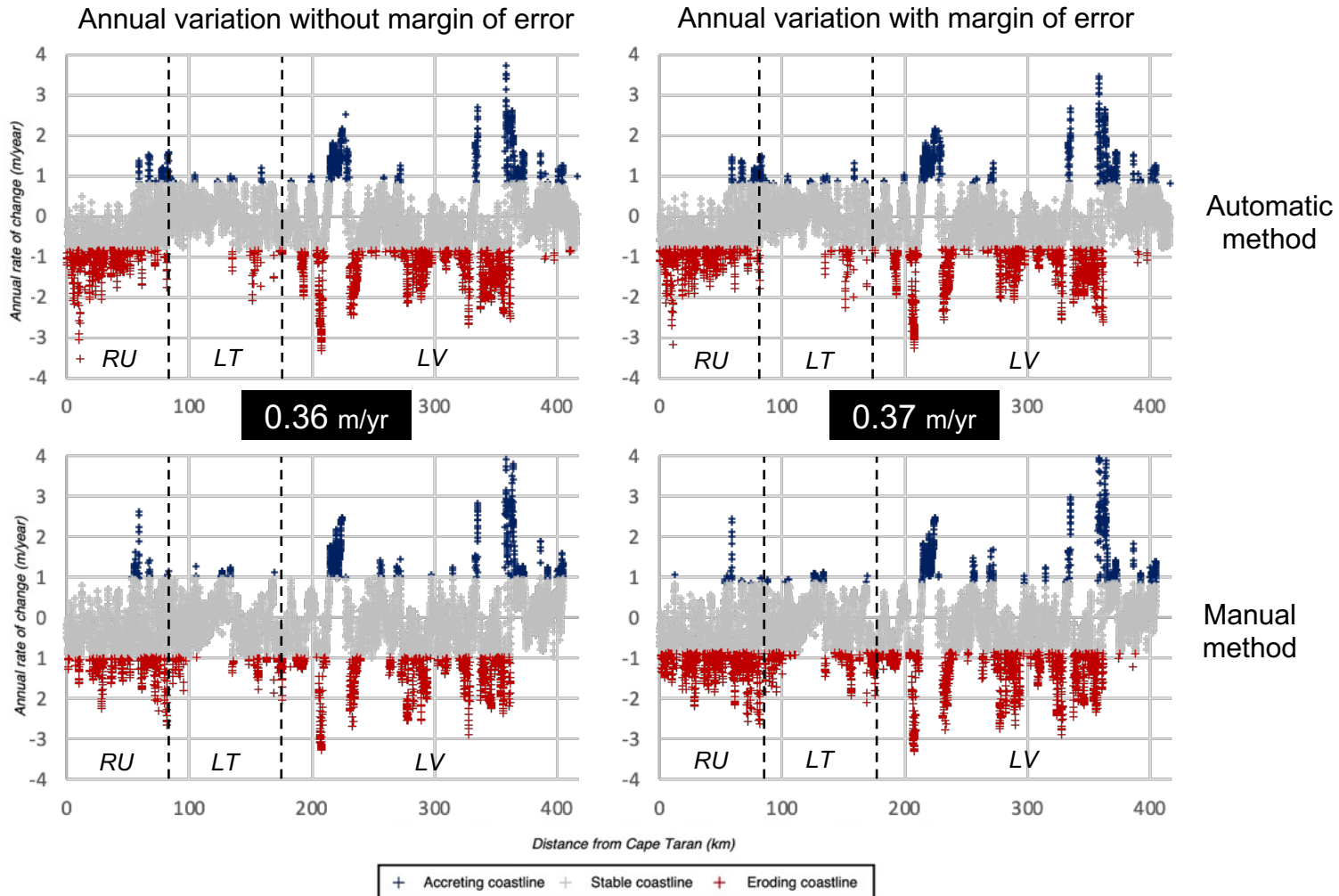
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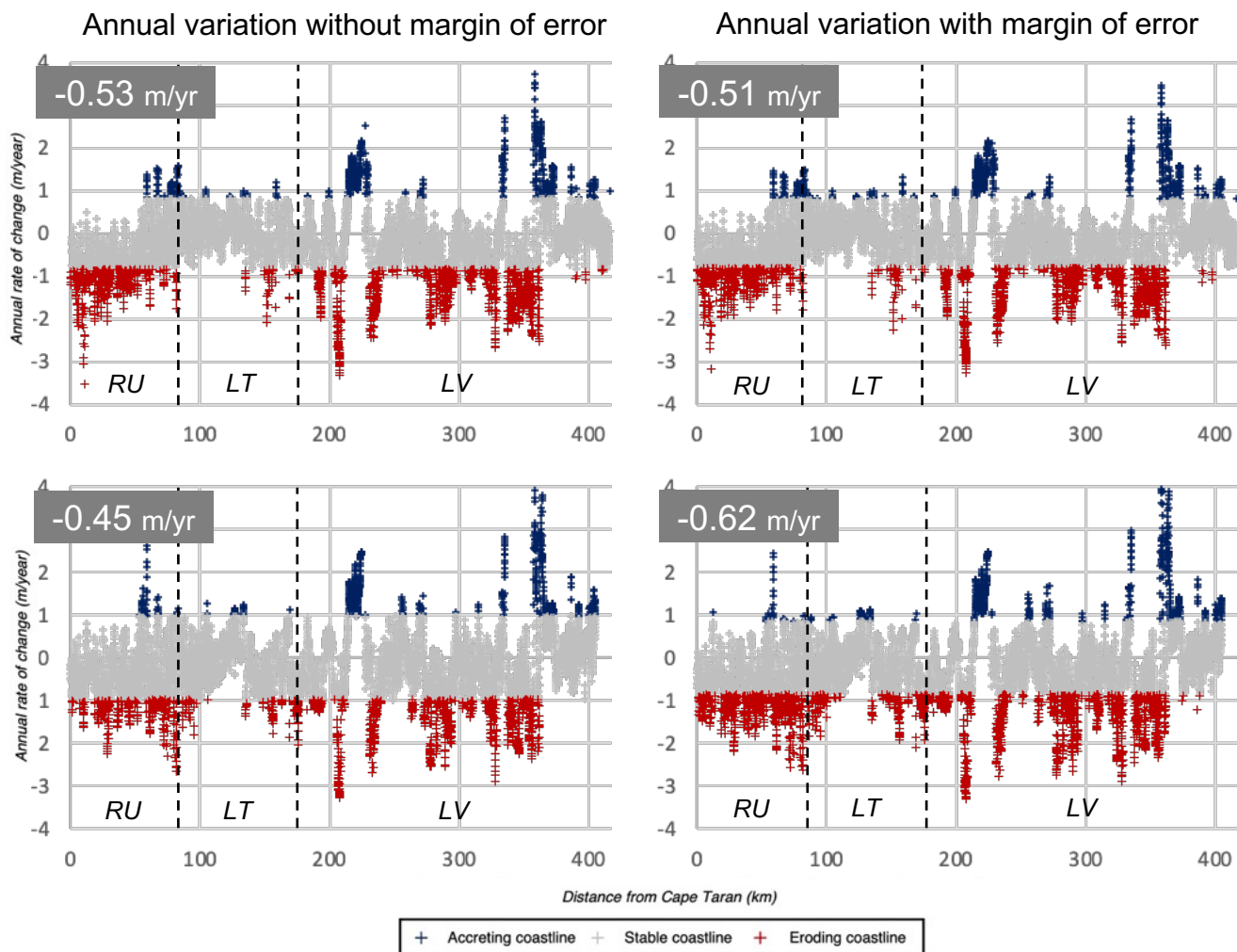
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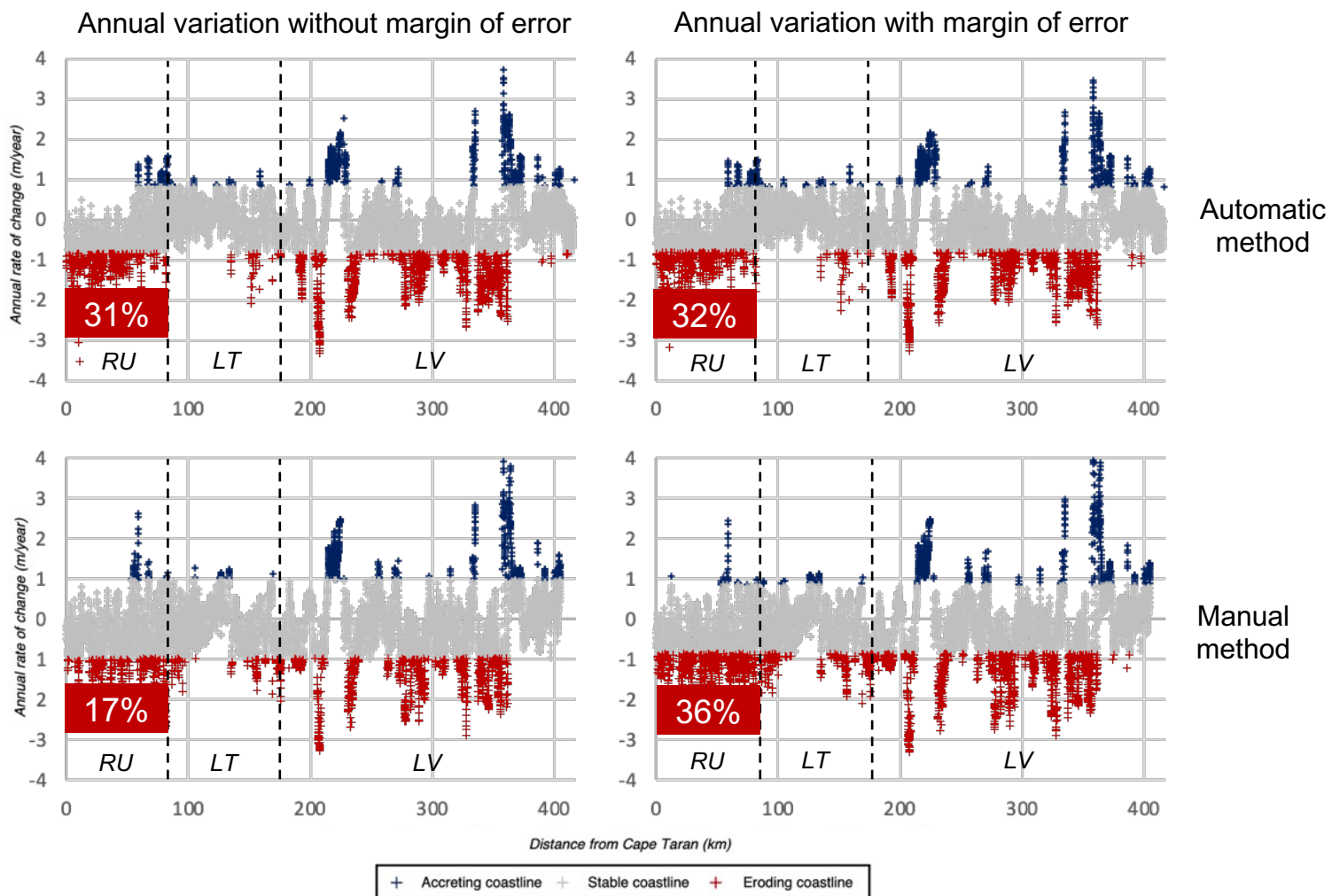


Automatic method

Manual method

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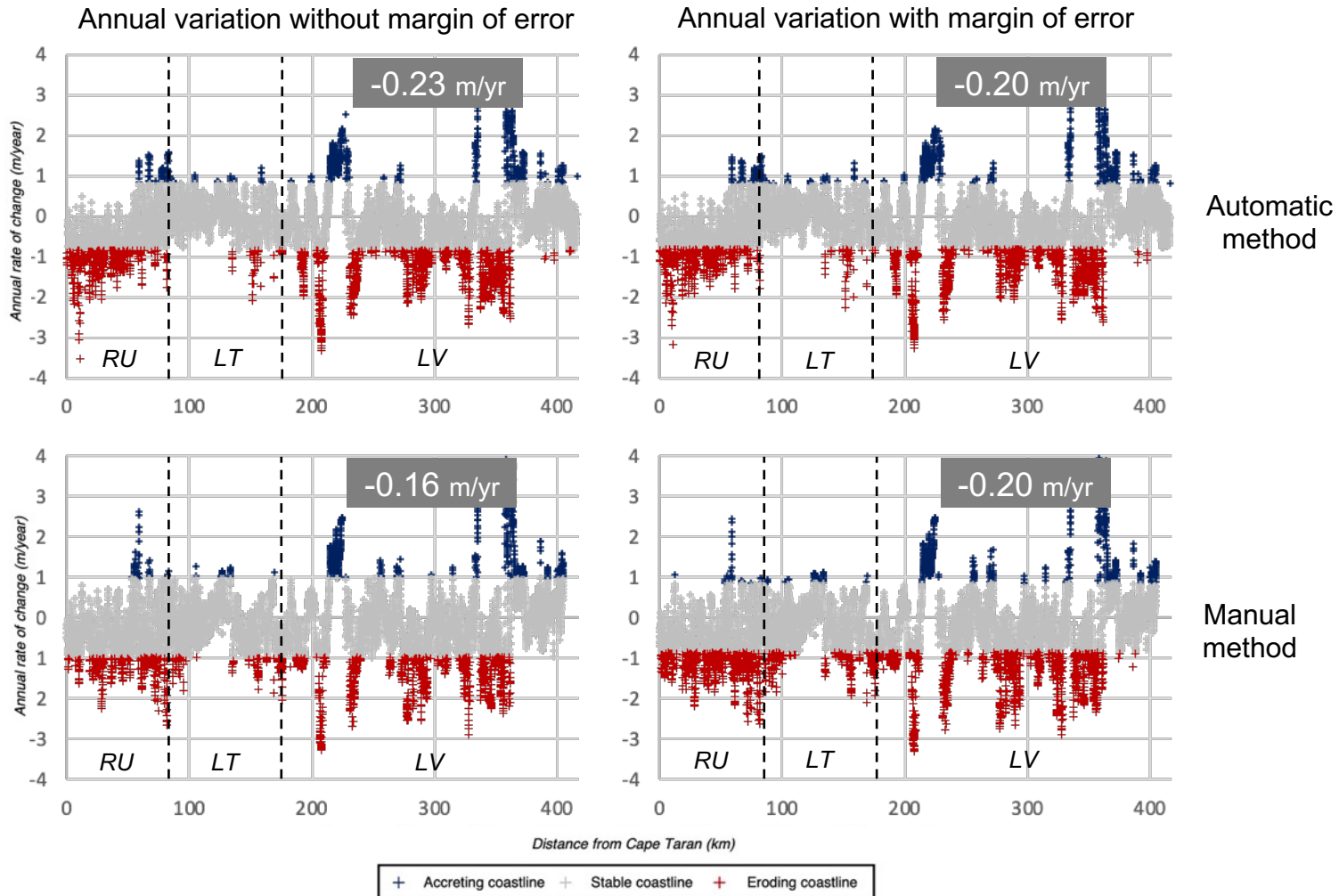
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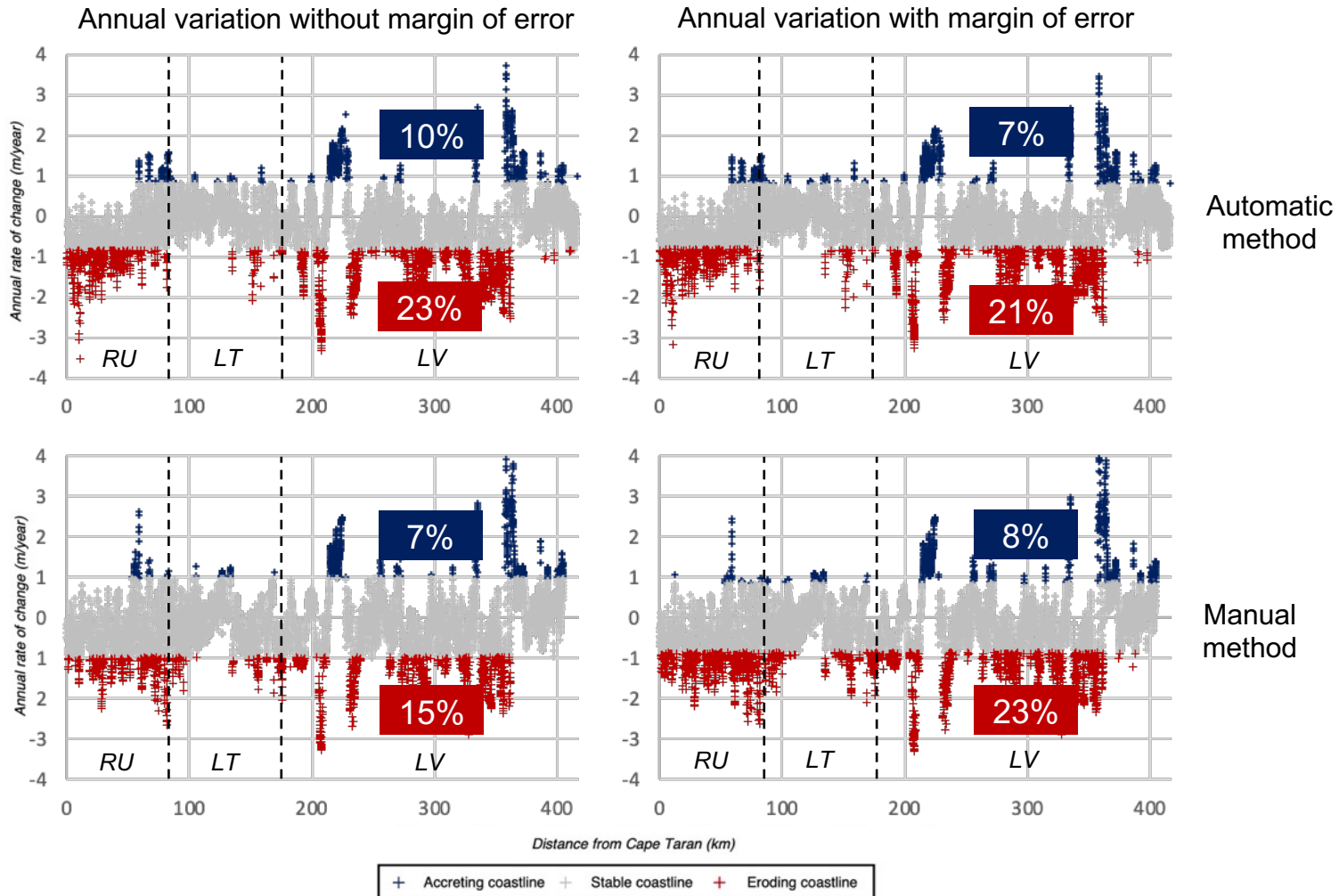


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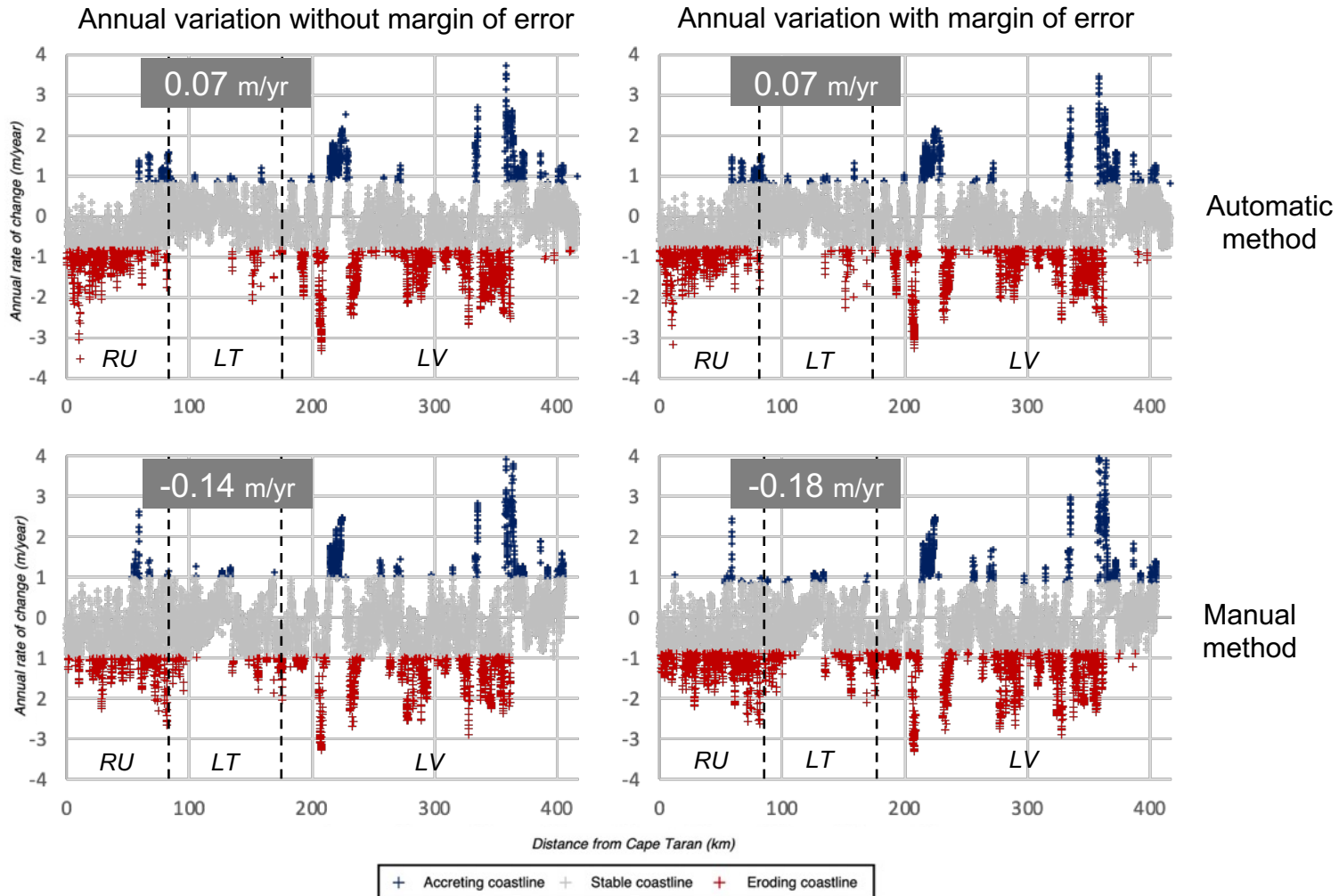
- Between 1988 and 2018, the south-eastern Baltic coast is characterised by overall stability.
- A manual method more sensitive to margins of error.
- 30% of the coastline presents a significantly regular evolution trend in time and space, whatever the extraction method.
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- 1/3 of Russian's coastline is in significant retreat.
- More dispersed coastal variation values in Latvia.

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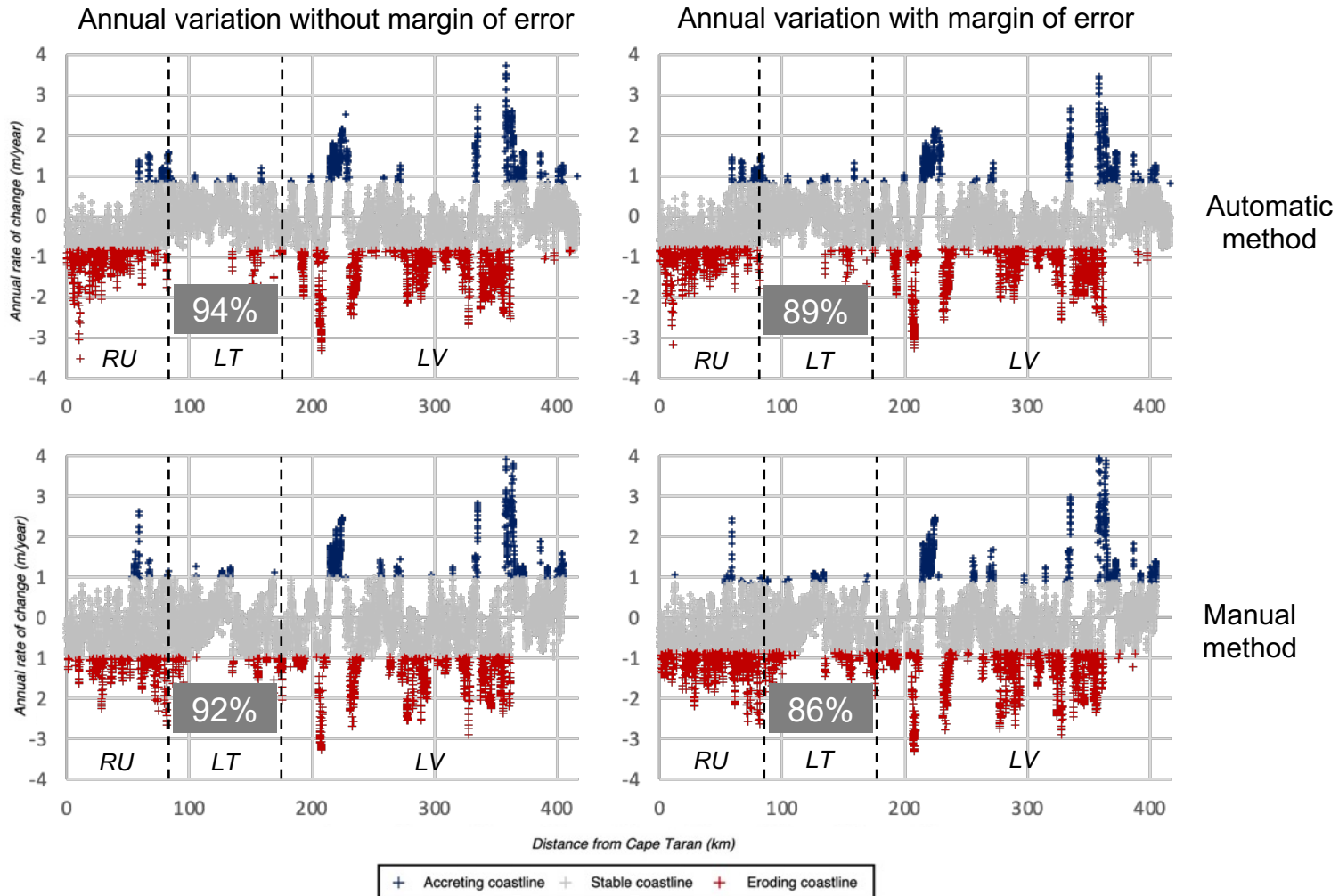
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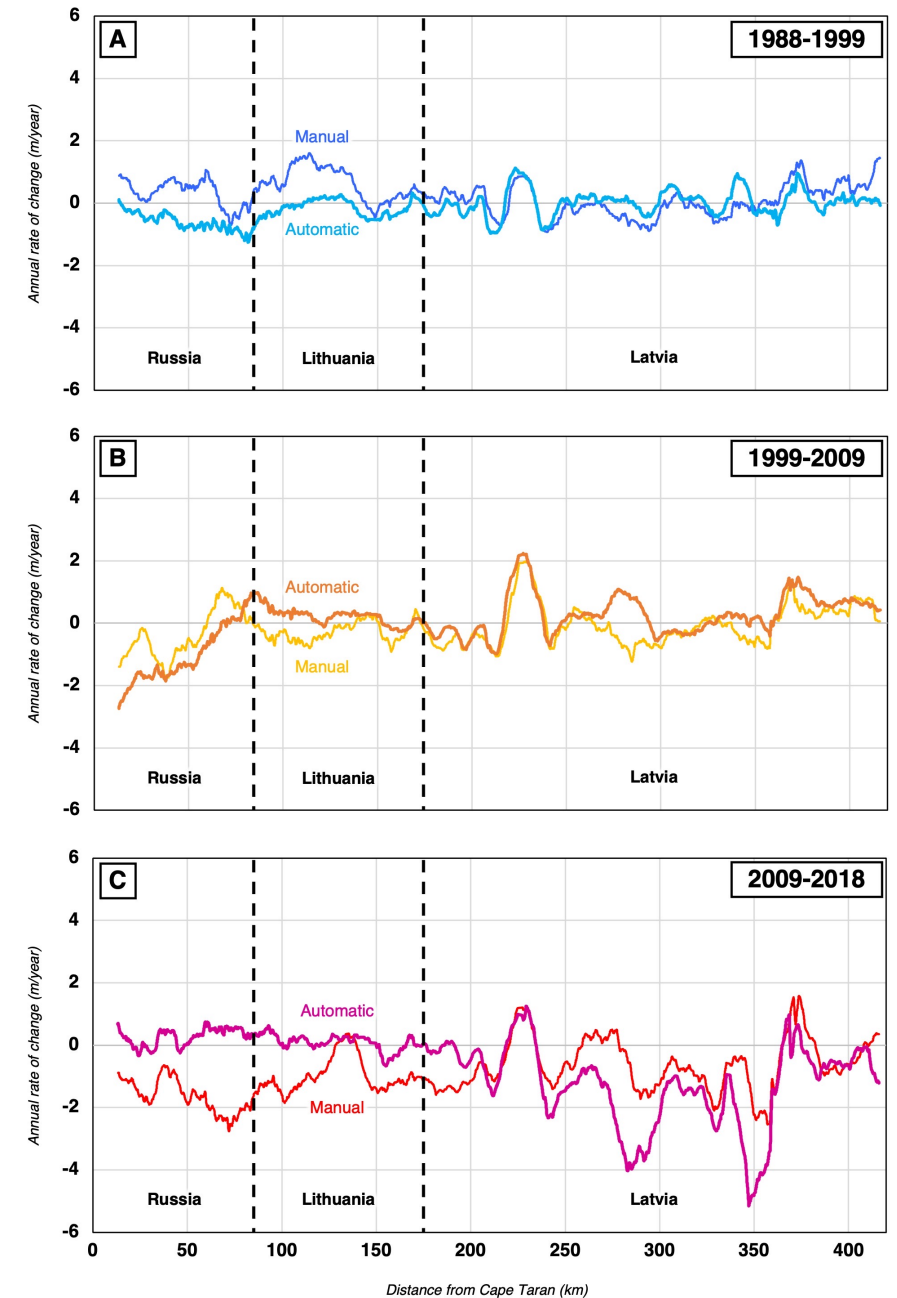
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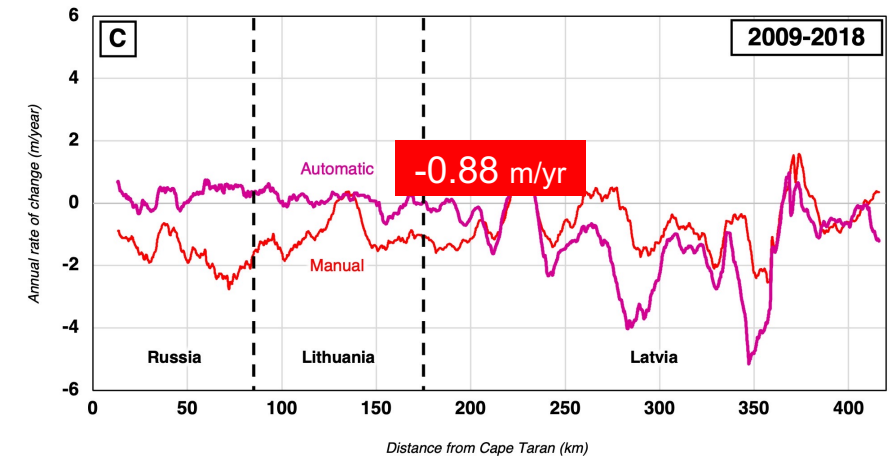
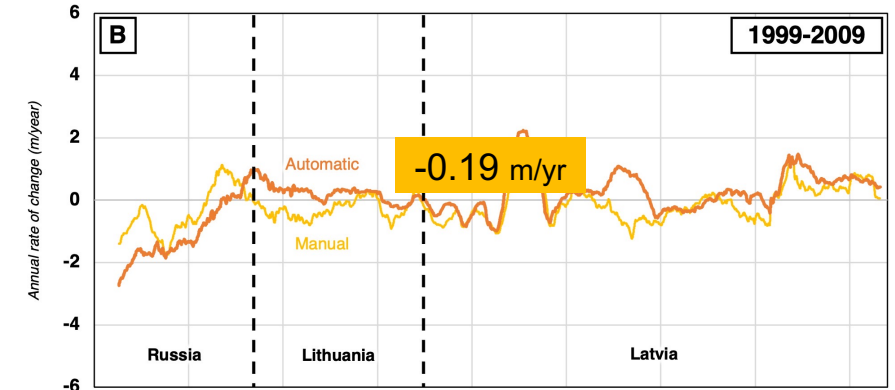
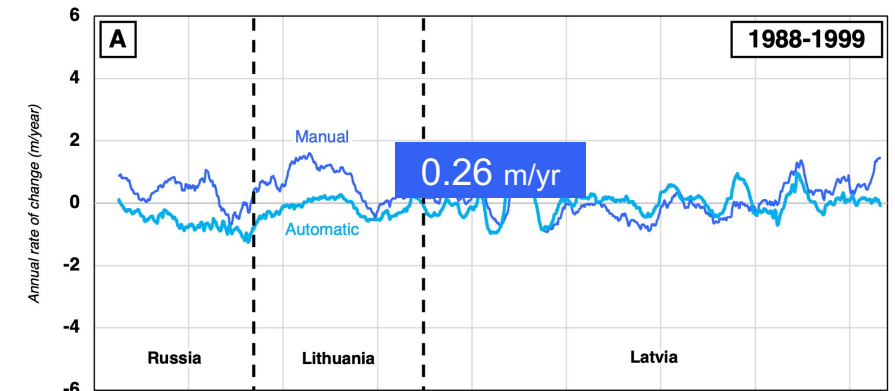
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# An inter-period evolution with a regular alternation between accretion and erosion zones disturbed over time



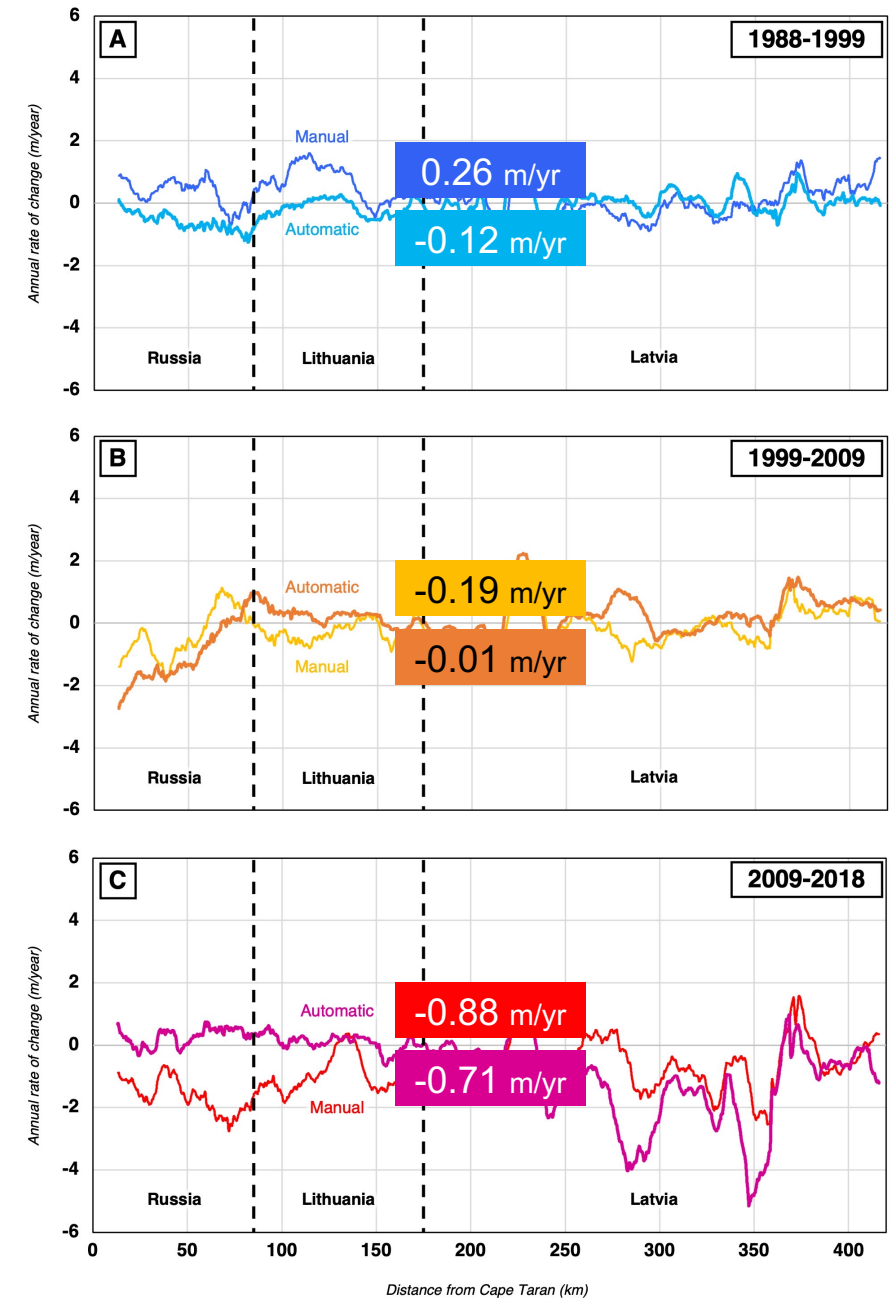
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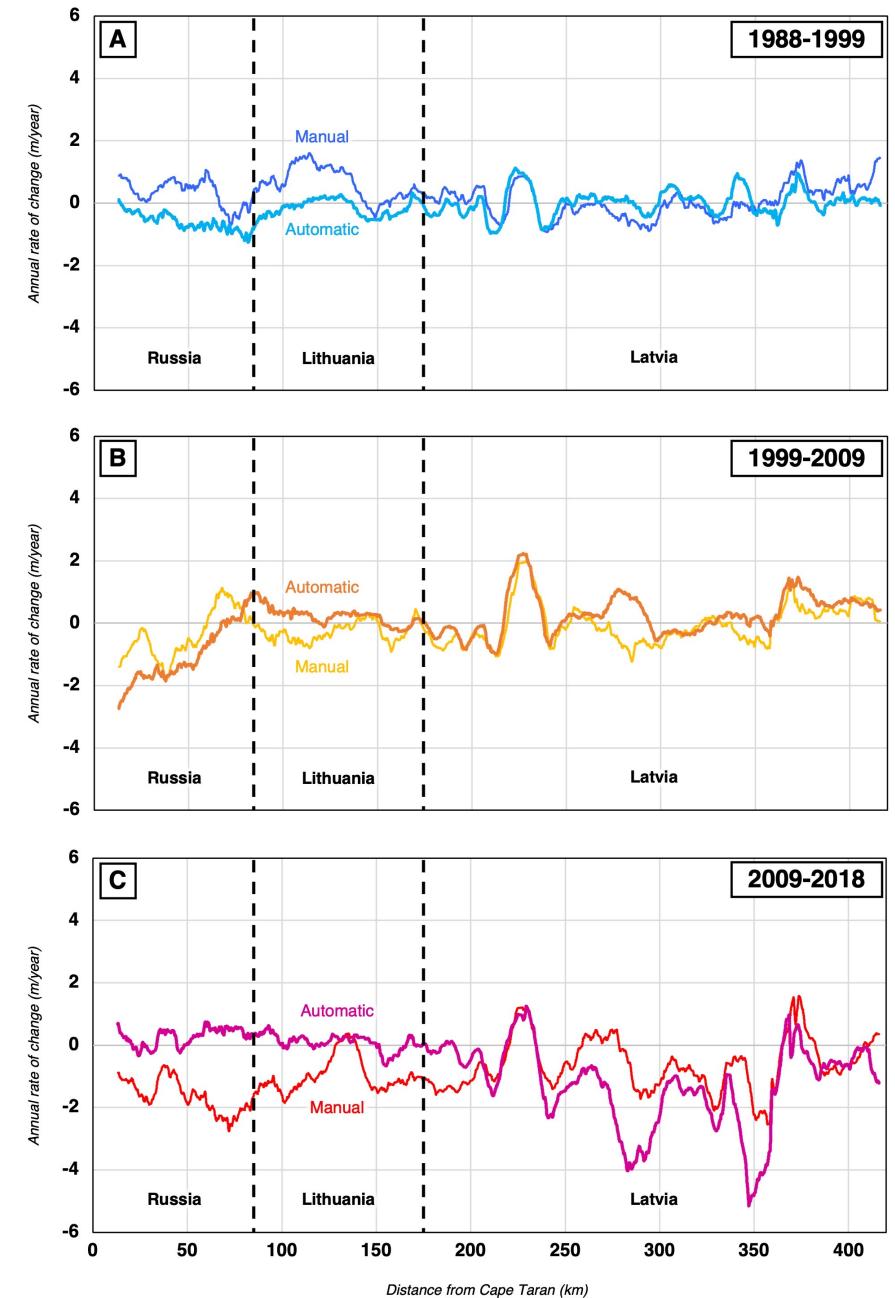
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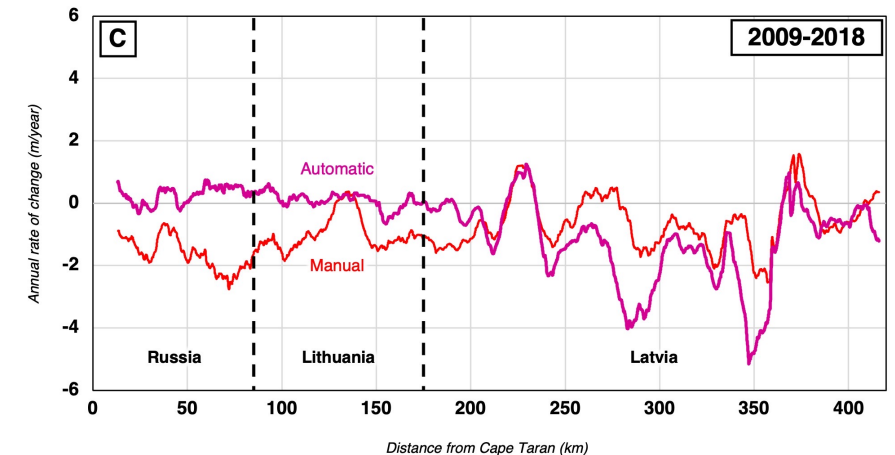
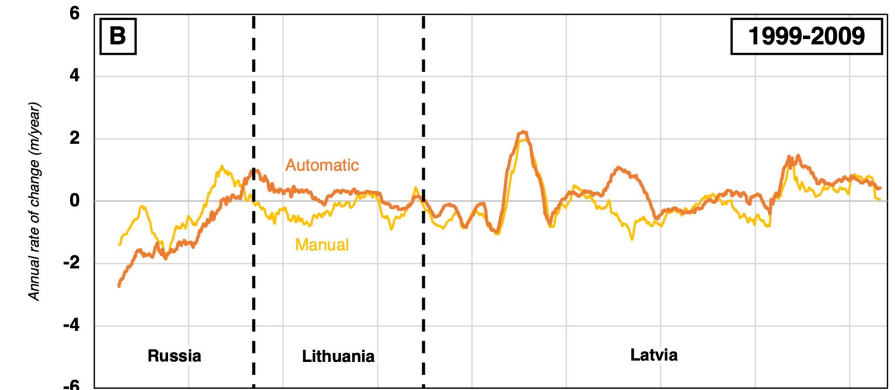
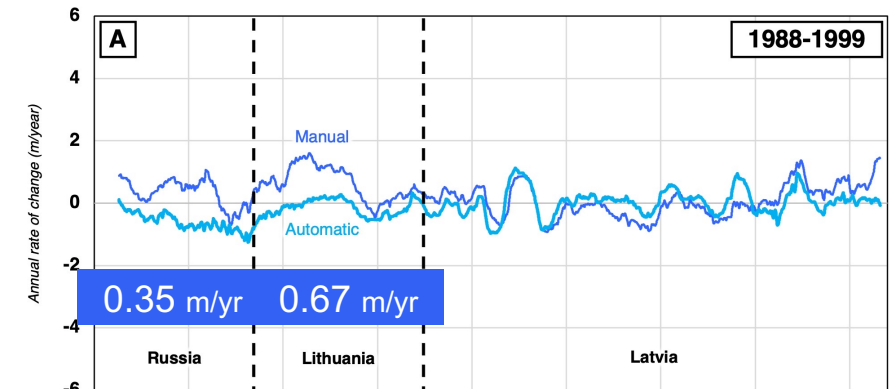
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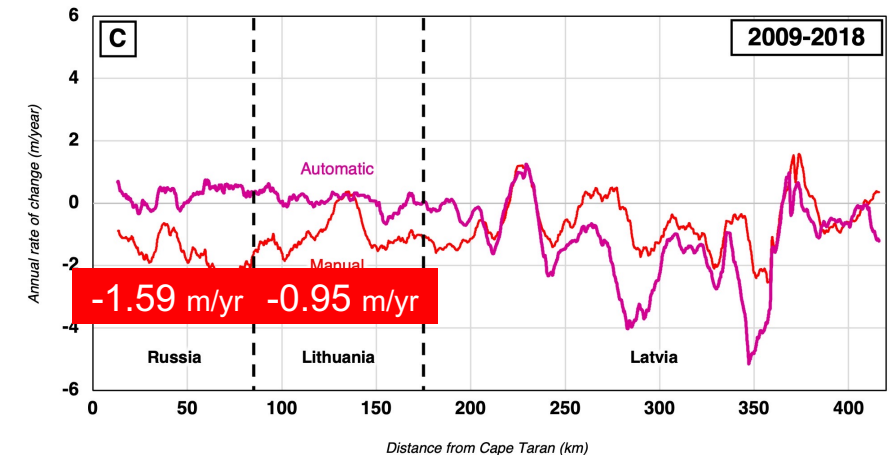
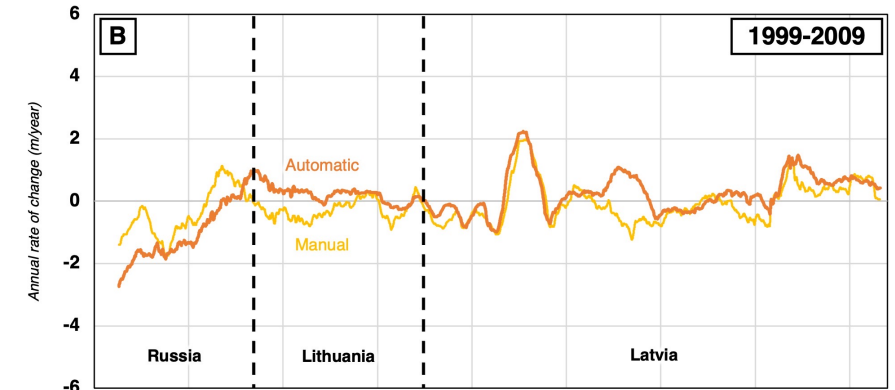
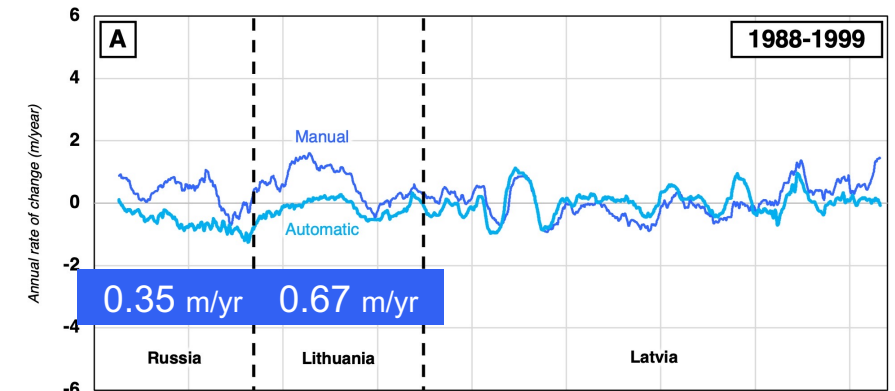
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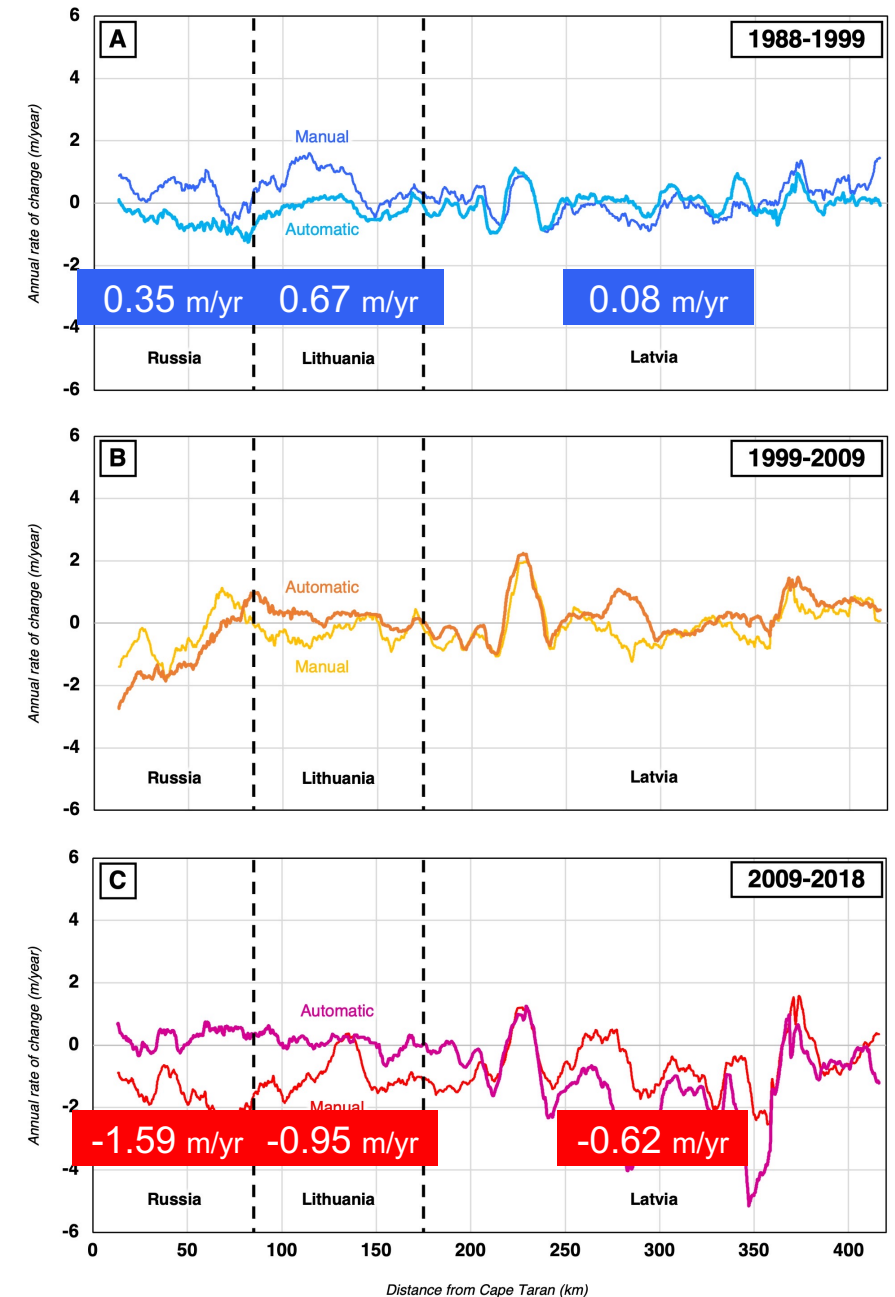
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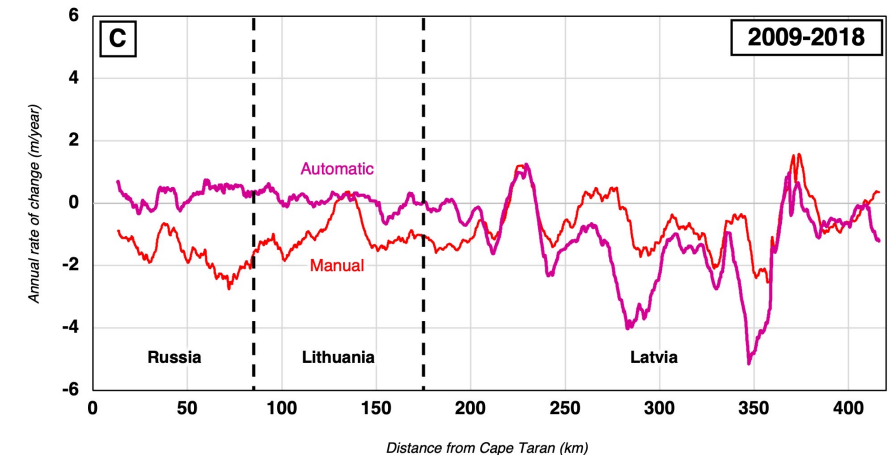
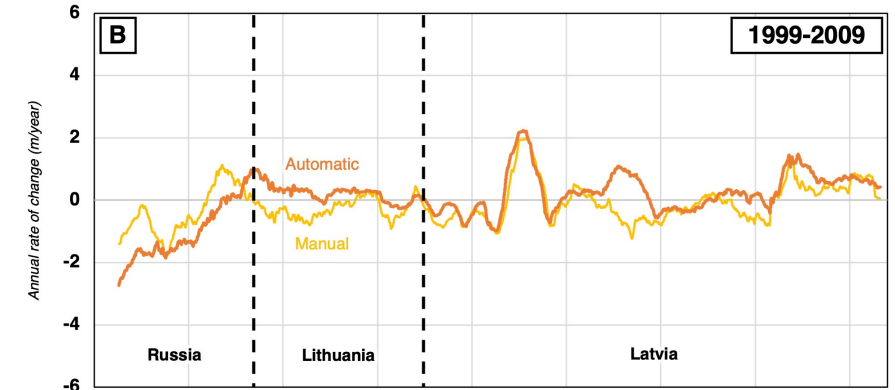
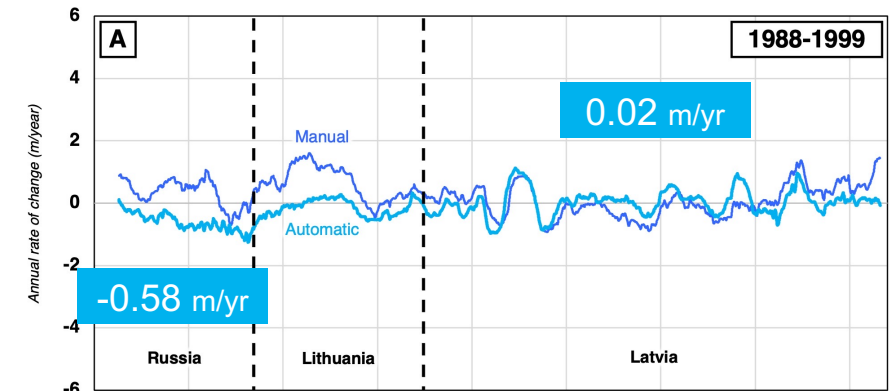
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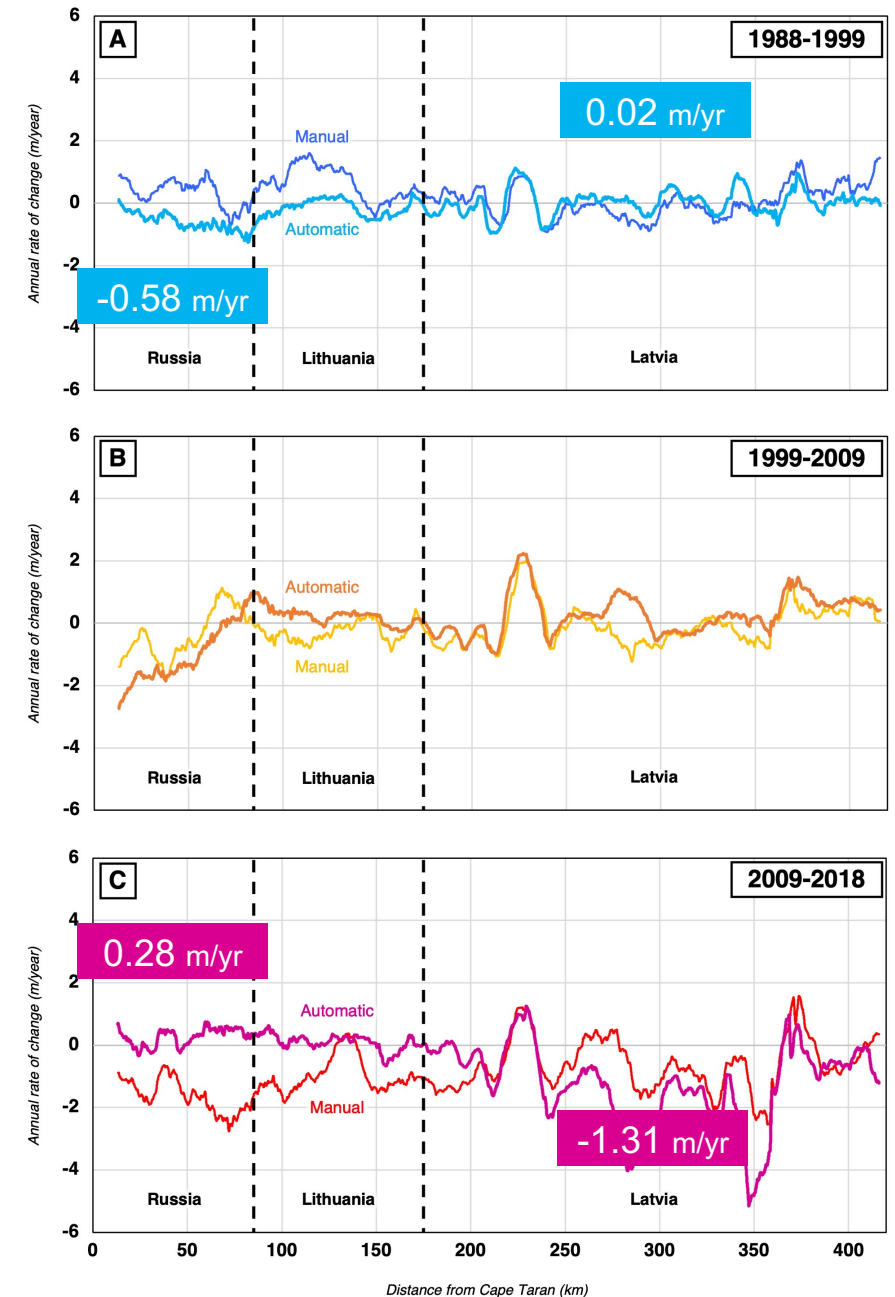
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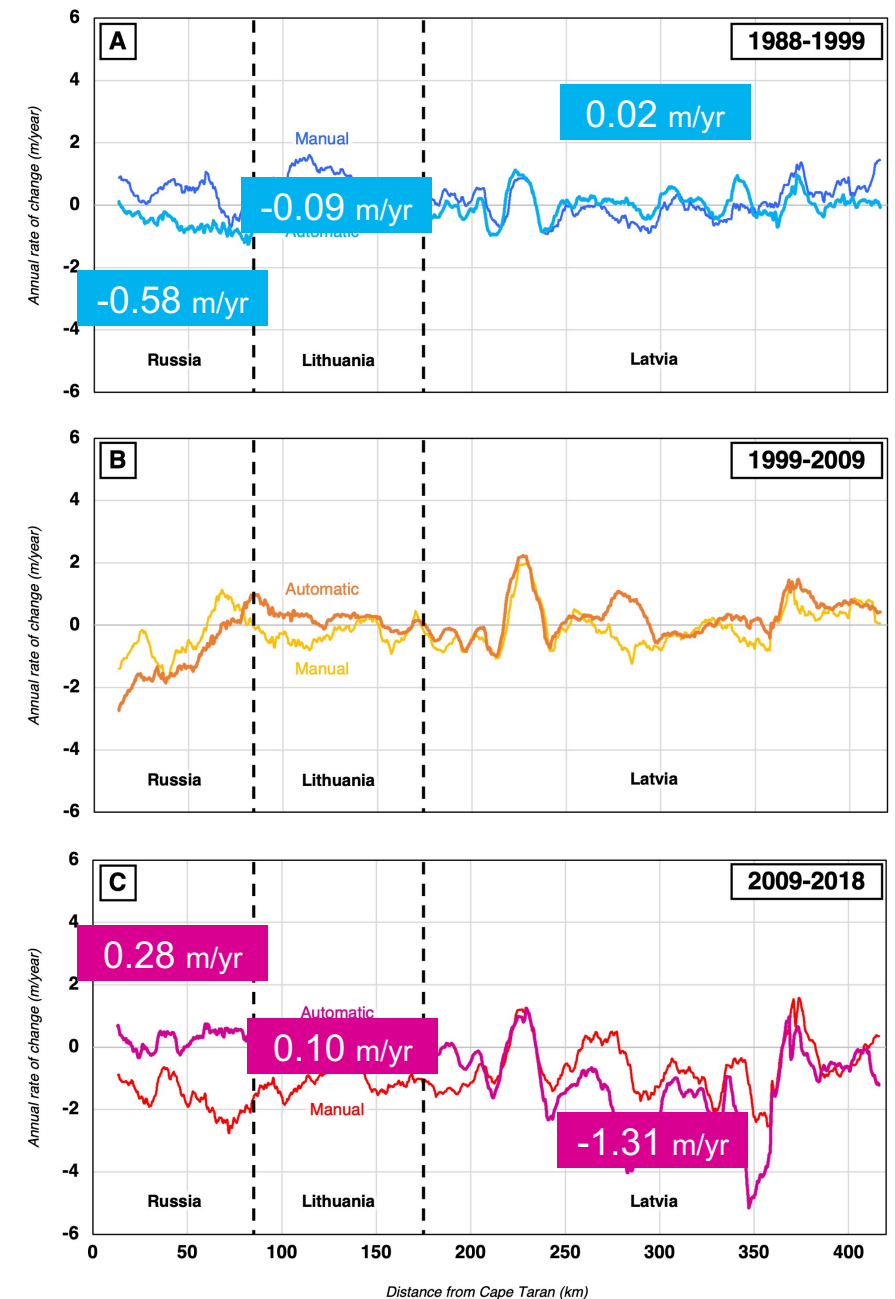
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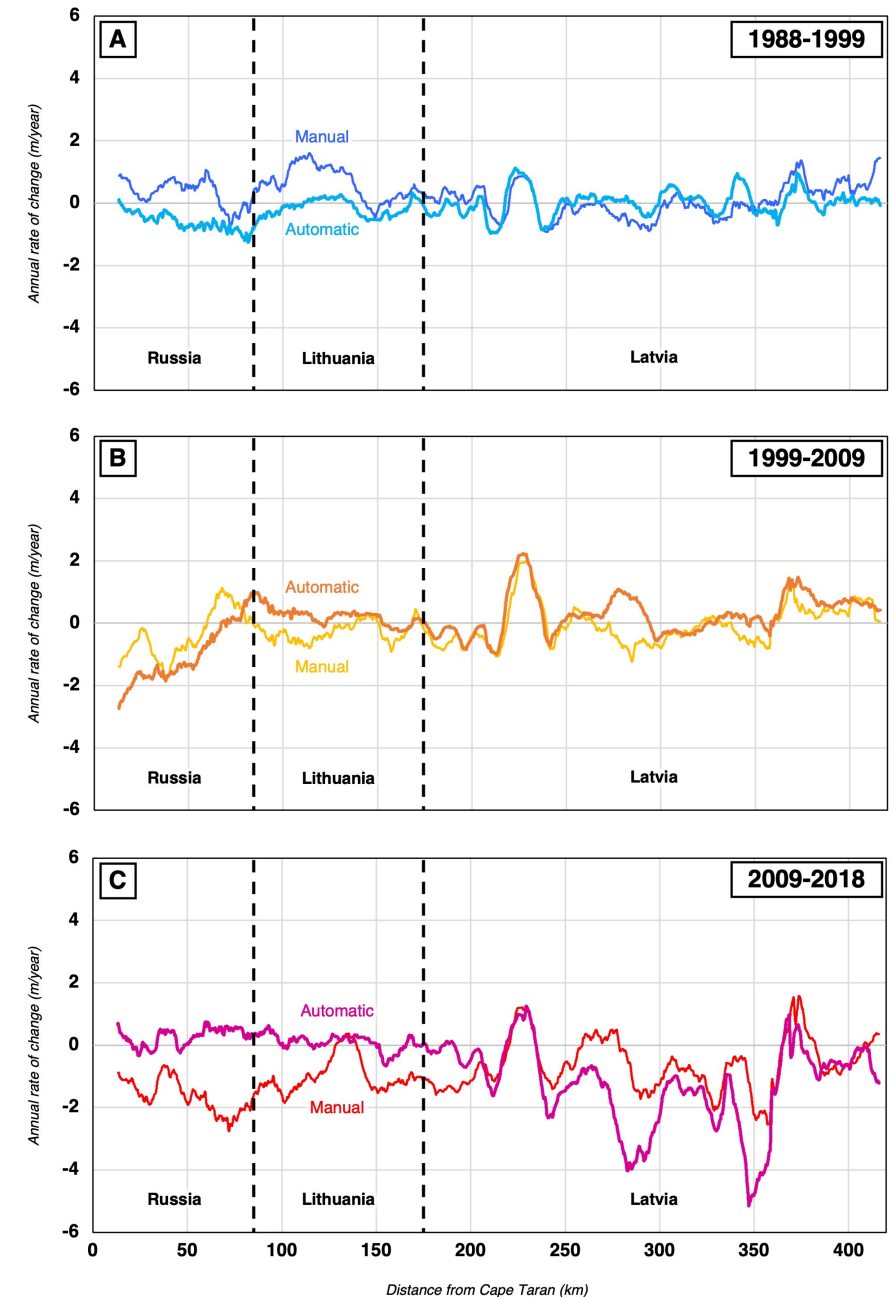
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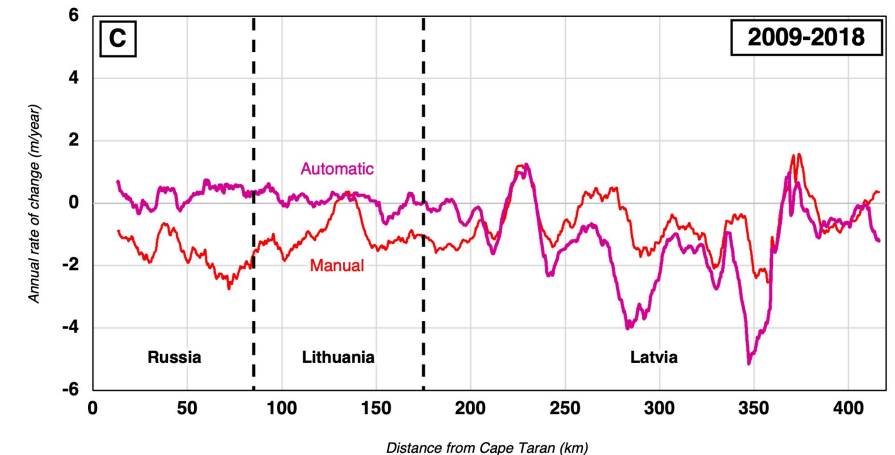
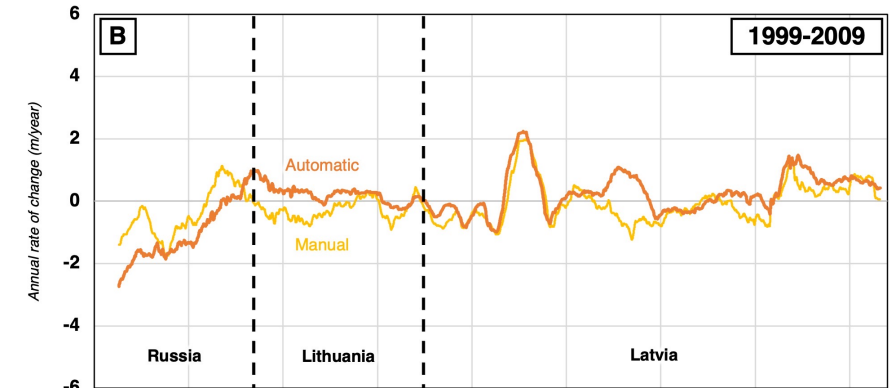
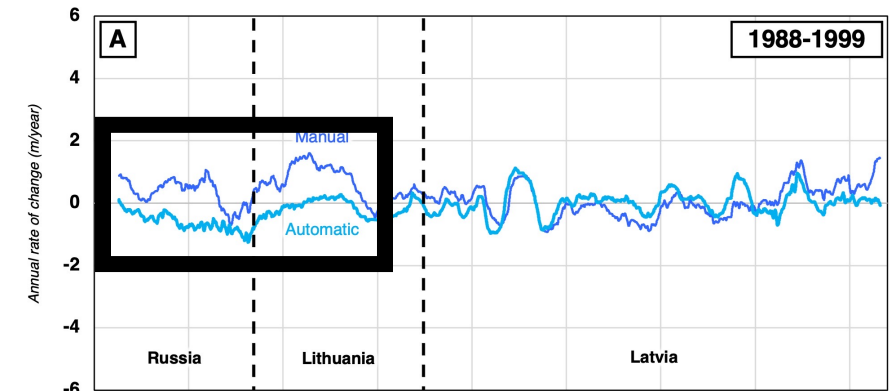


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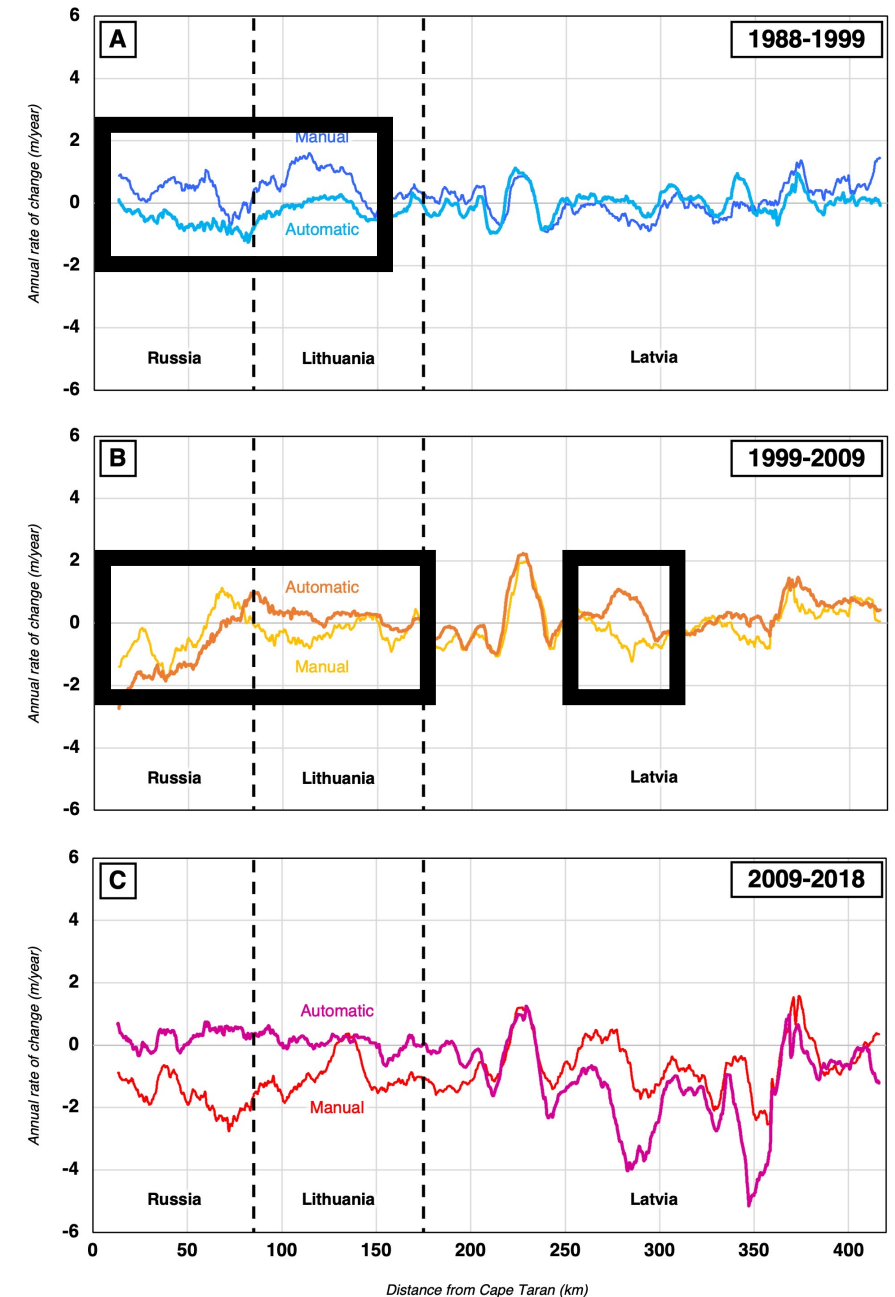


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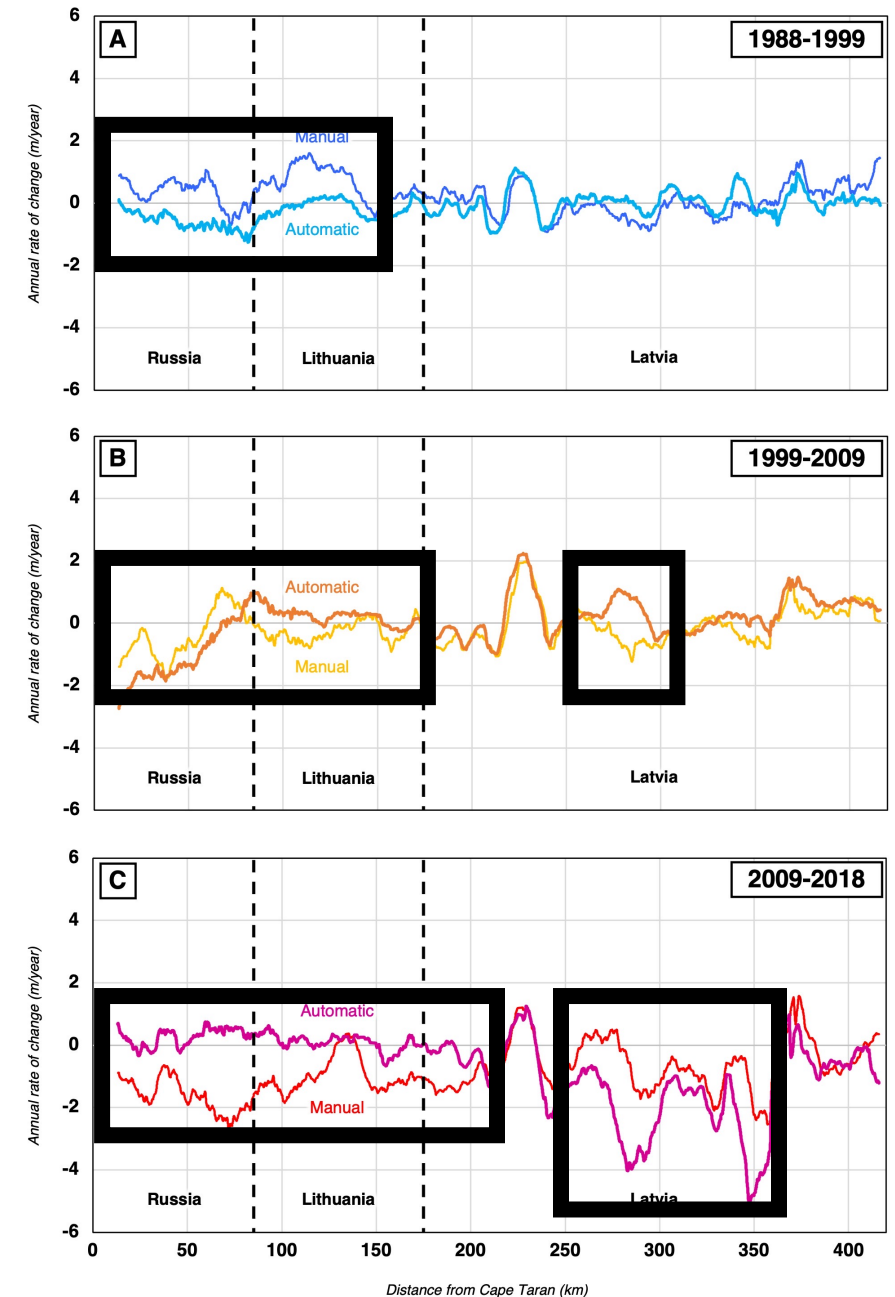


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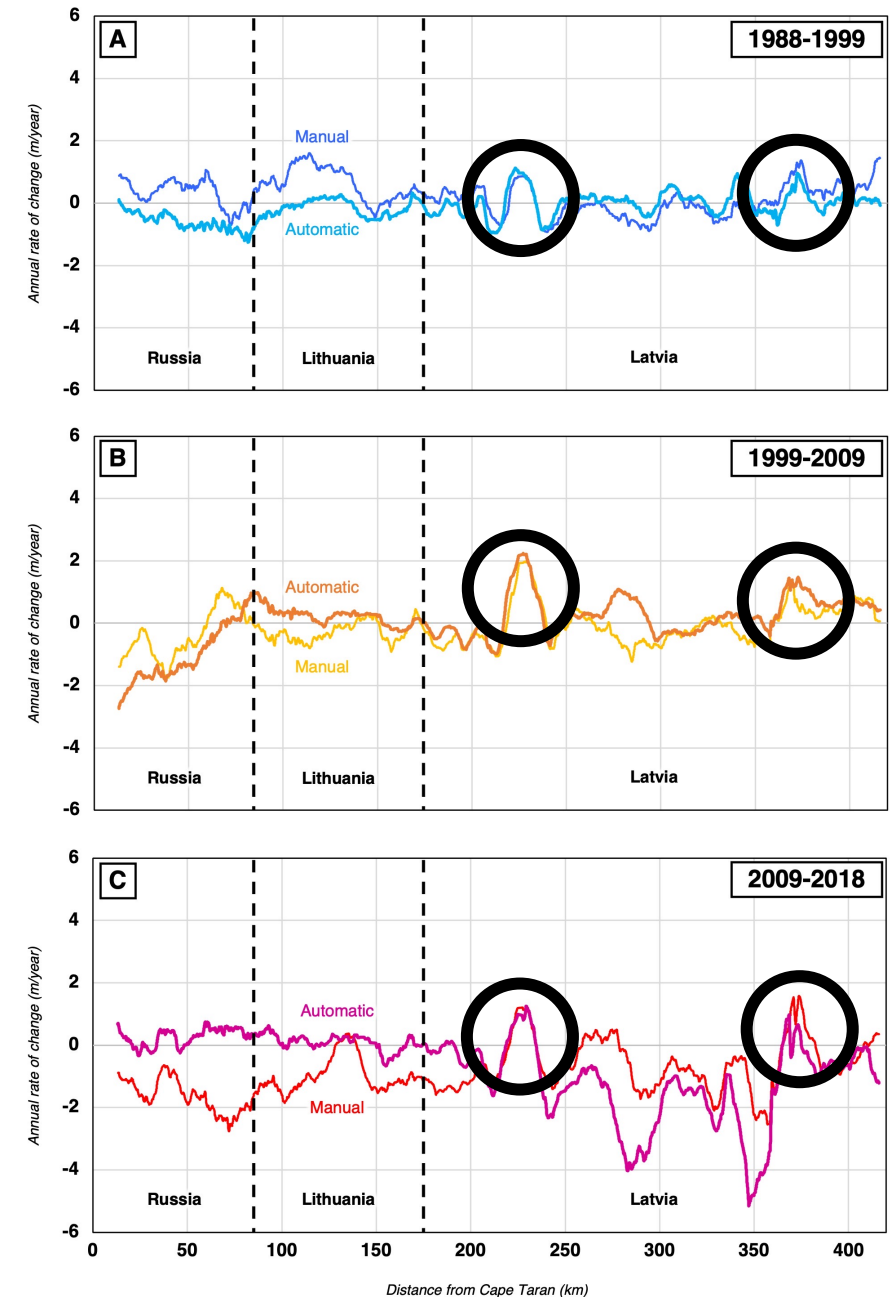


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## **Natural and anthropogenic factors explaining the evolution of the coastline**

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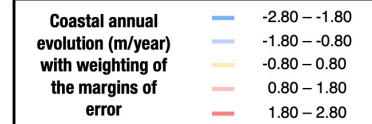
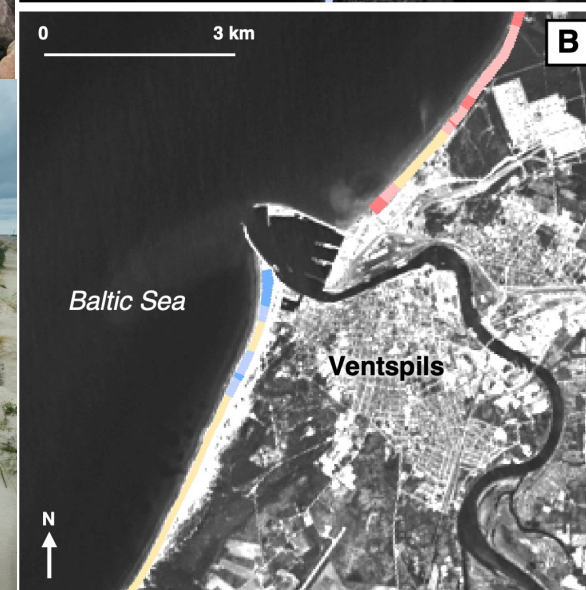
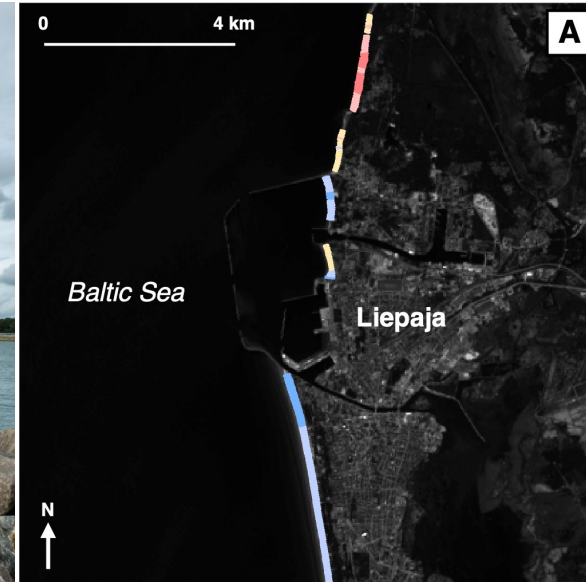
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- Disturbance of sedimentary stocks and inputs: weakening of dunes, extraction activities, etc.
- The case of ports: a disturbance of the littoral drift which causes local erosion of beaches downstream of port structures.

Hard structures in Klaipeda port  
(Gloaguen, 2020)



## Critical analysis of the methodology

Automatic method

Manual method

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Automatic method

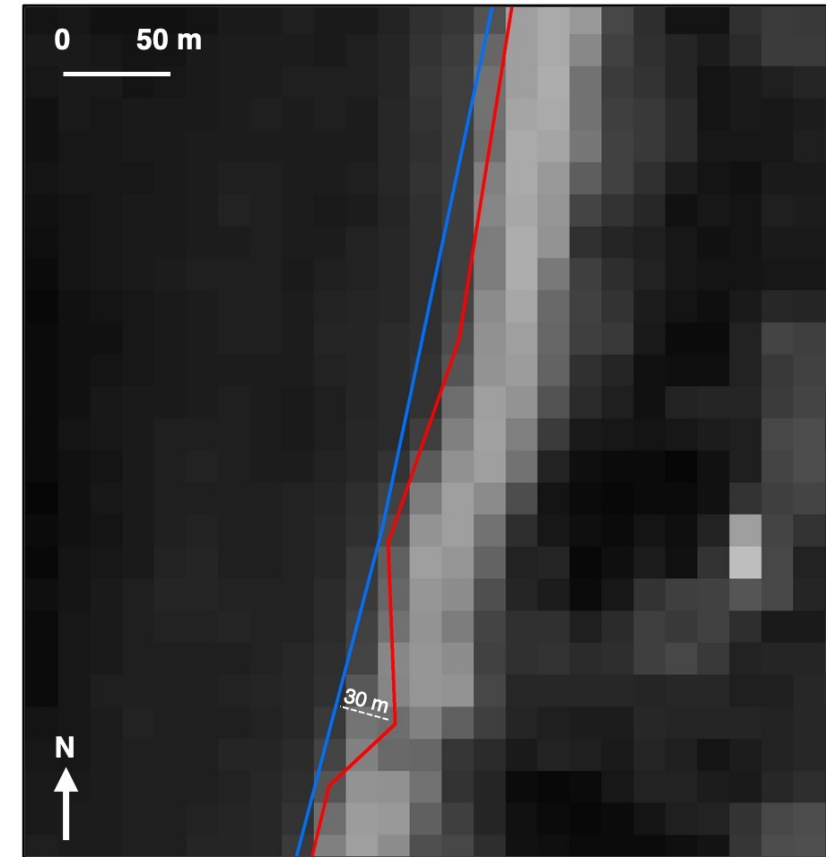
Manual method

Time-processing



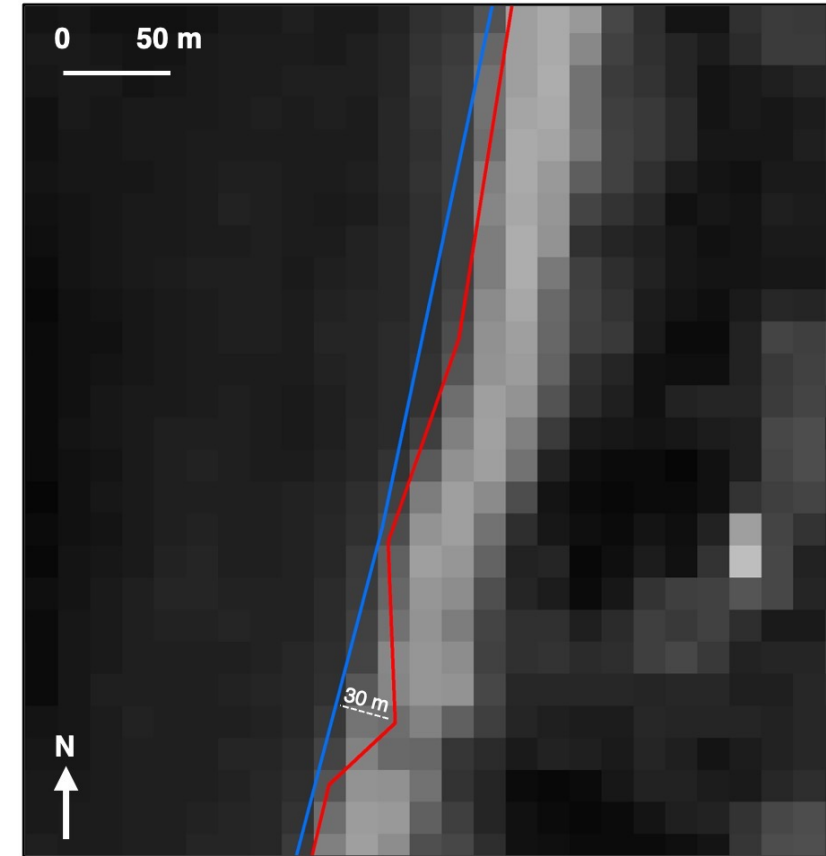
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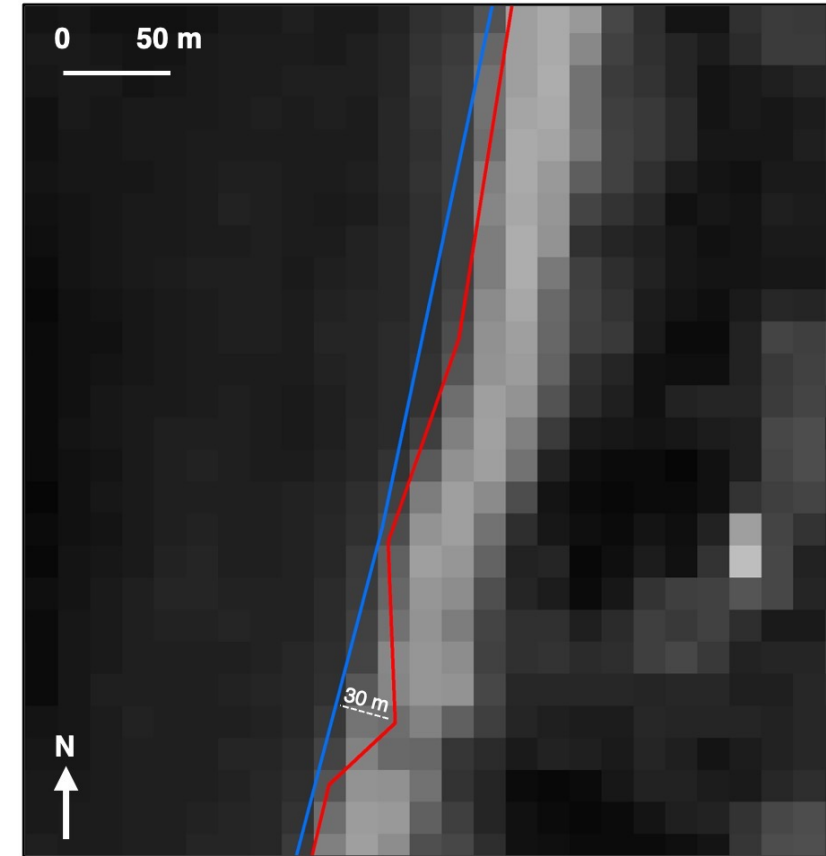
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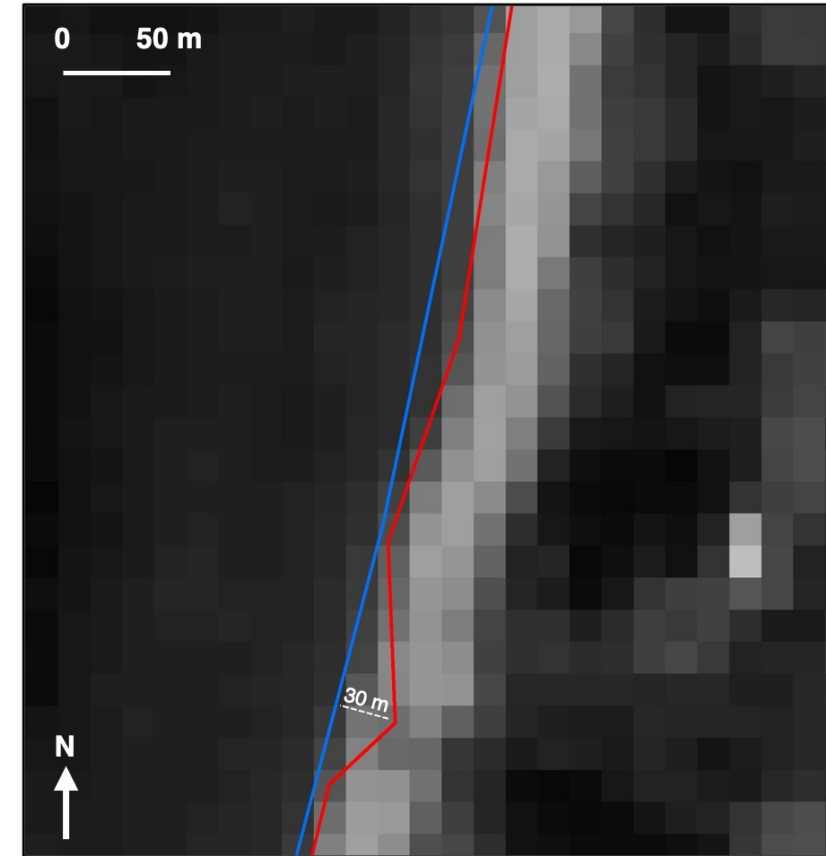




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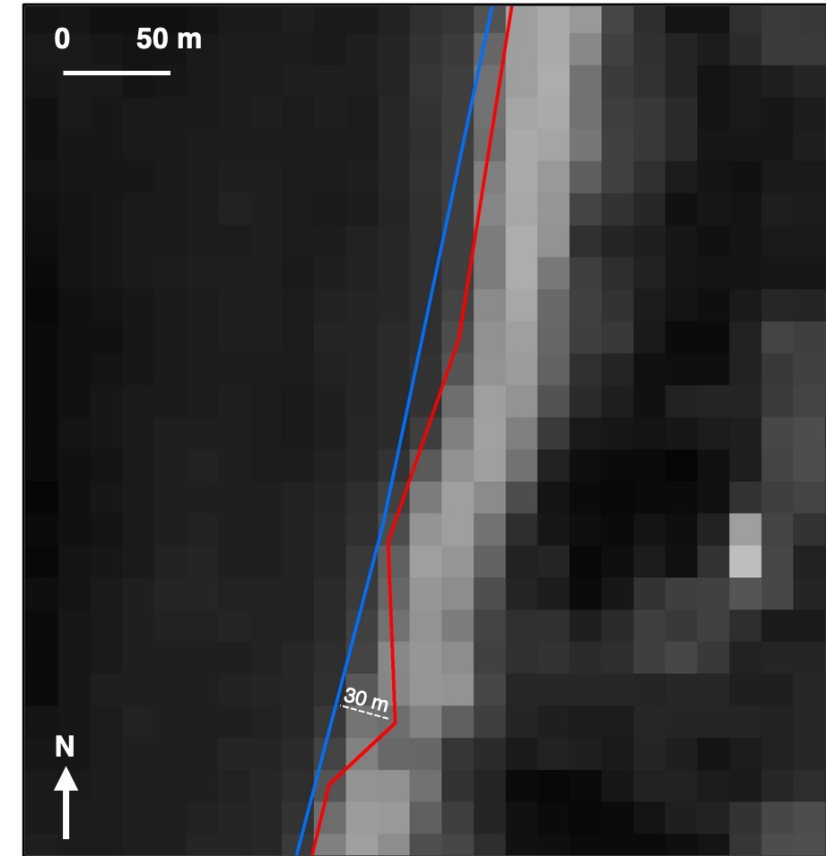
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- Integration of other data sources in the analysis (topographic maps, field measurements, etc.)
- Use of satellite images with better spatial resolution (at the expense of spectral resolution?)



## Conclusions



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- The automatic extraction method (MNF transformation and Laplacian filter) showed its advantages in terms of processing time and robustness of the results even if the differences observed between the two methods remain insignificant.





**Thank you for your attention!**