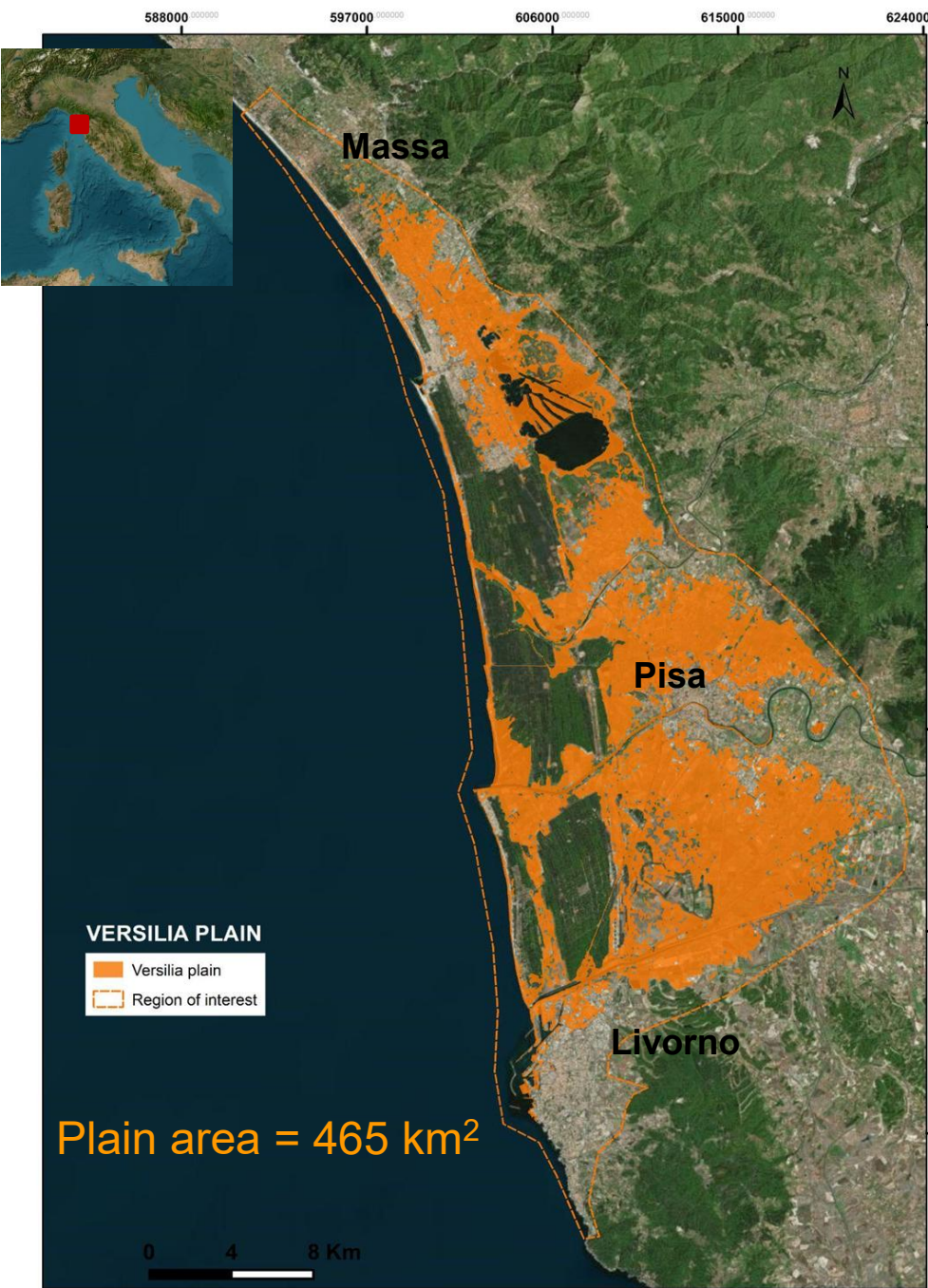


# Sea-Level Rise Scenarios up to 2150 for the Tuscany Coast: The Case of the Northern Sector

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## INTRODUCTION



Coastal zones, long favored for fertile lands, trade, and mild climates, are now highly exposed to climate change impacts, particularly **Sea Level Rise (SLR)** and erosion. By 2060, global low-elevation areas may host over one billion people, facing growing flood risks. Regional sea-level is influenced by climatic drivers, tectonics, isostatic adjustments, and circulation. In particular, in the Mediterranean, land subsidence and global warming intensify hazards, threatening infrastructure and heritage.

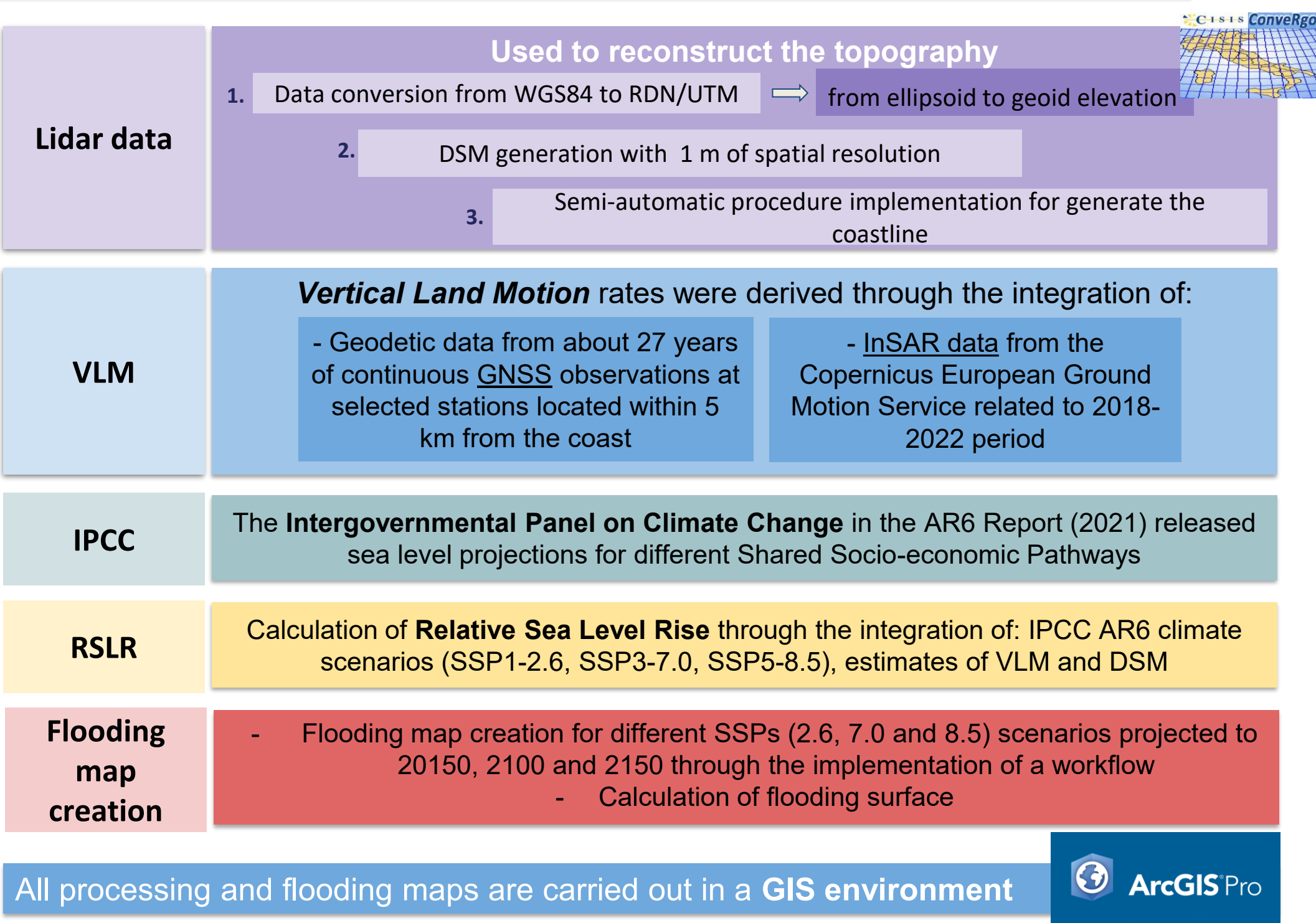
### AIM

Assessment of flooded surface due to the SLR at year 2050, 2100 and 2150 over the **northern Tuscany coast**, between Livorno and Massa-Carrara (Italy)

Area of interest has been identified by isolating areas with elevation a.s.l. lower than 4 m a.s.l. (from Tin Italy DEM)

Figure 1. Geographical setting of the plain of interest

## METHOD



## RESULTS & DISCUSSION

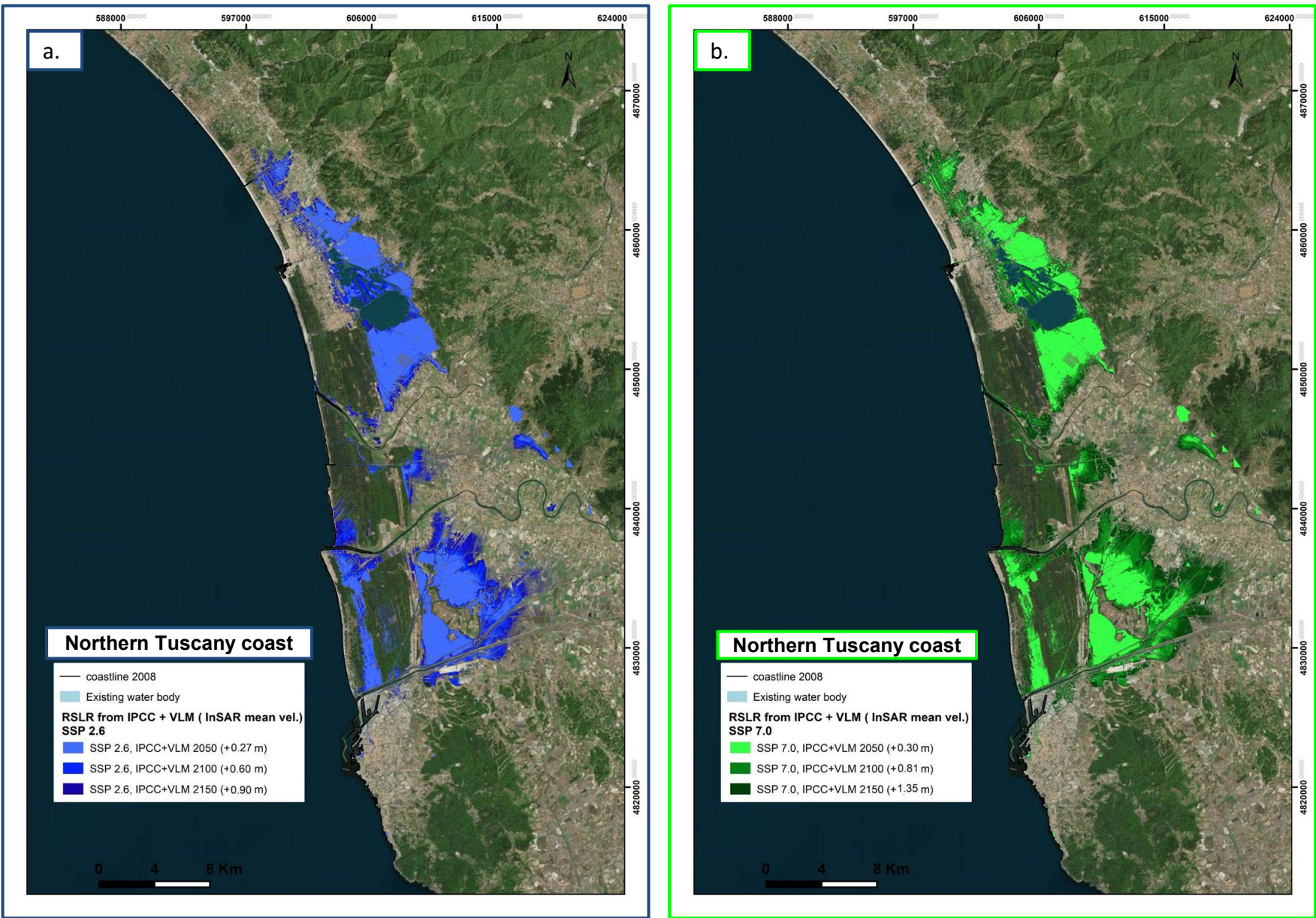


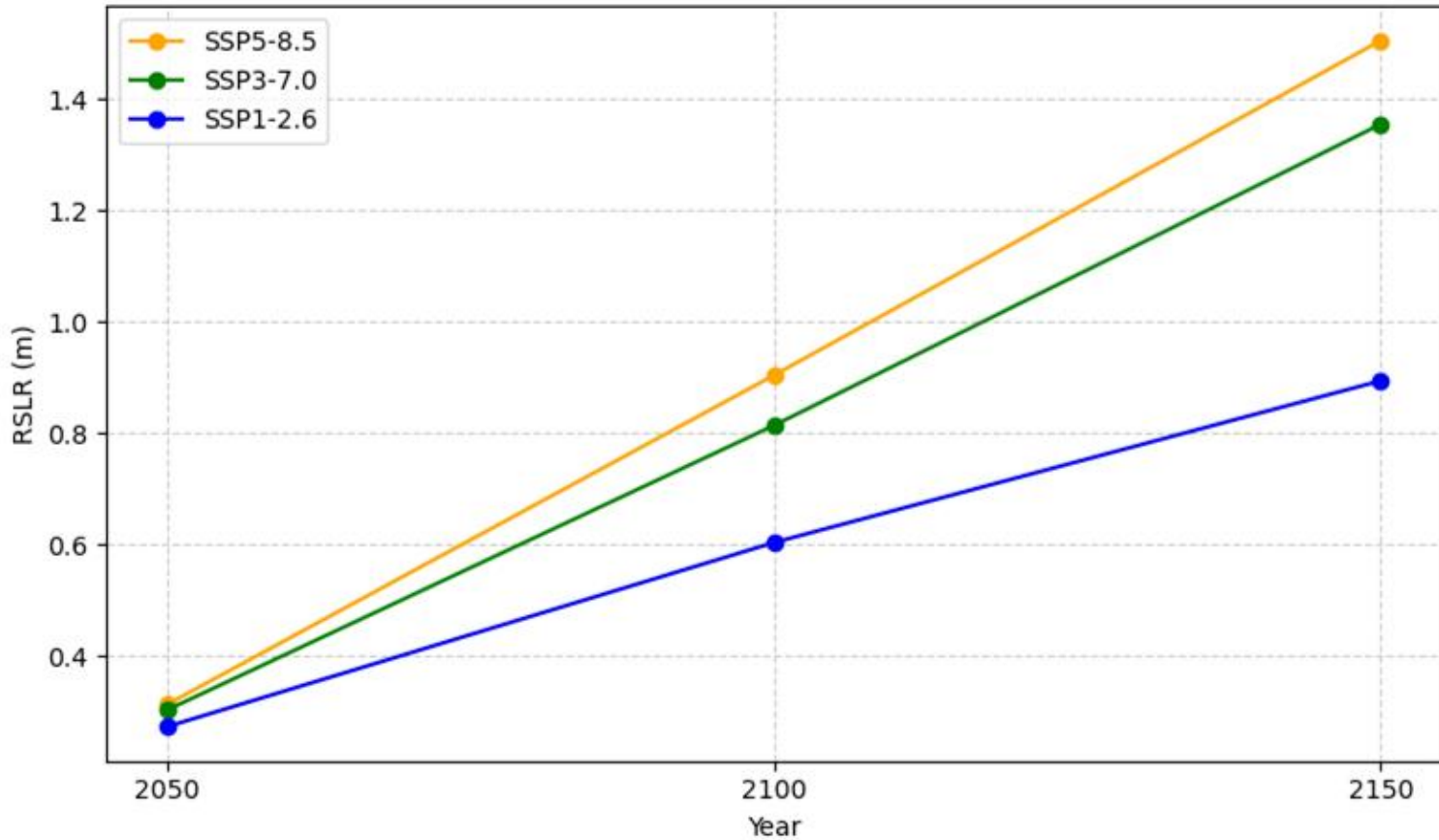
Figure 2. Flooding scenario for the northern Tuscany coast. The colored areas represent the projected relative sea-level rise (RSLR) and the extent of flooding for the years 2050, 2100, and 2150, according to the SSP1-2.6 scenario (a), SSP3-7.0 scenario (b) and SSP5-8.5 scenario (c) from the IPCC AR6 Report

| SSP    | Year | RSLR m | Area km <sup>2</sup> |
|--------|------|--------|----------------------|
| SSP2.6 | 2050 | 0.274  | 65.537               |
| SSP2.6 | 2100 | 0.604  | 89.168               |
| SSP2.6 | 2150 | 0.894  | 113.417              |

| SSP    | Year | RSLR m | Area km <sup>2</sup> |
|--------|------|--------|----------------------|
| SSP7.0 | 2050 | 0.304  | 67.383               |
| SSP7.0 | 2100 | 0.814  | 106.515              |
| SSP7.0 | 2150 | 1.354  | 156.004              |

| SSP    | Year | RSLR m | Area km <sup>2</sup> |
|--------|------|--------|----------------------|
| SSP8.5 | 2050 | 0.314  | 68.006               |
| SSP8.5 | 2100 | 0.904  | 114.230              |
| SSP8.5 | 2150 | 1.504  | 170.748              |

Estimates were obtained using a passive approach, where land below projected water level is considered inundated, regardless of direct hydraulic connection to the sea.



## CONCLUSION

- Results show that current IPCC projections are often not representative of future sea levels, because they neglect the effects of vertical land motion (VLM) due to tectonics and local factors.
- By 2150, under SSP5-8.5 (the worst), sea level along the northern Tuscany coast (465km<sup>2</sup>) could rise up to 1.5m, flooding 170.7km<sup>2</sup>.
- Results highlight the vulnerability of northern Tuscany's infrastructure and settlements. They stress the need for proactive planning, stronger coastal defences, and integration of climate risk into development policies. Interdisciplinary collaboration among scientists, planners, and policymakers is essential for resilient and sustainable coastal management under future SLR.

## REFERENCES

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