

Team 02 Presentation 3

Presentation 3: Results of the 2nd week



Erasmus+



UNIVERSITAT POLITÈCNICA
DE CATALUNYA
BARCELONATECH



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Catchment Var - Team 2 Presentation

Summary

1. Introduction
2. Climate change
3. Scenarios considered
4. Hydrological results
5. Hydraulics results
6. Conclusion



01.03.2024

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Team 02_2



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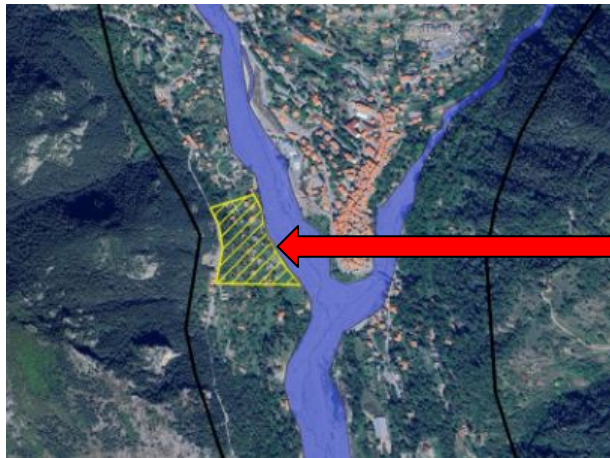




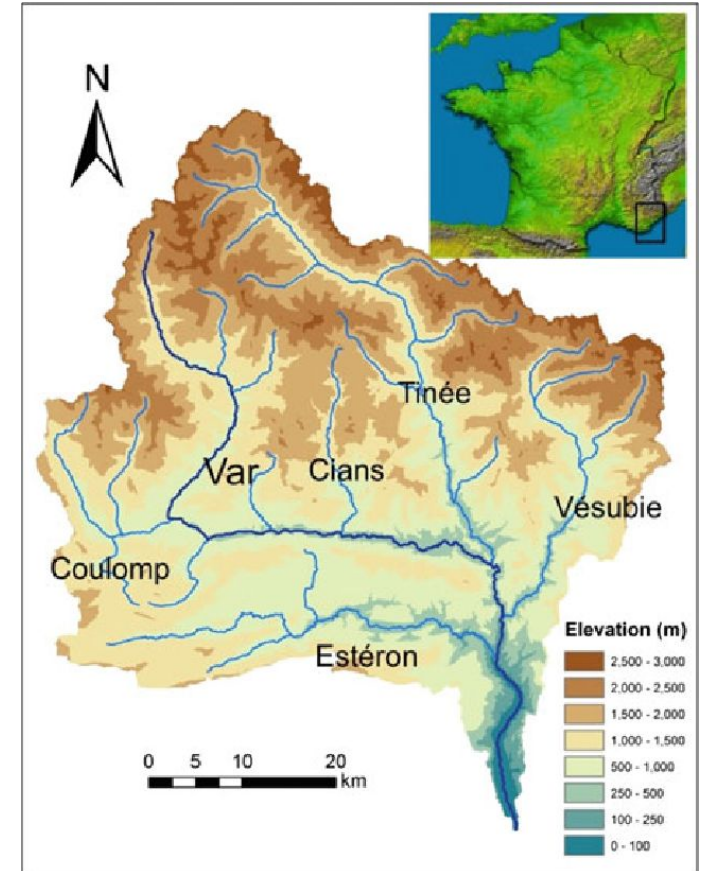
1. Introduction : Objectives

Climate change impacts on Flash Floods

- St Martin de Vésubie
- **Climate change** = pressing and complex challenge facing our society today
- **Where to relocate the WWTP ?**



Will it be the same?



2. Climate change



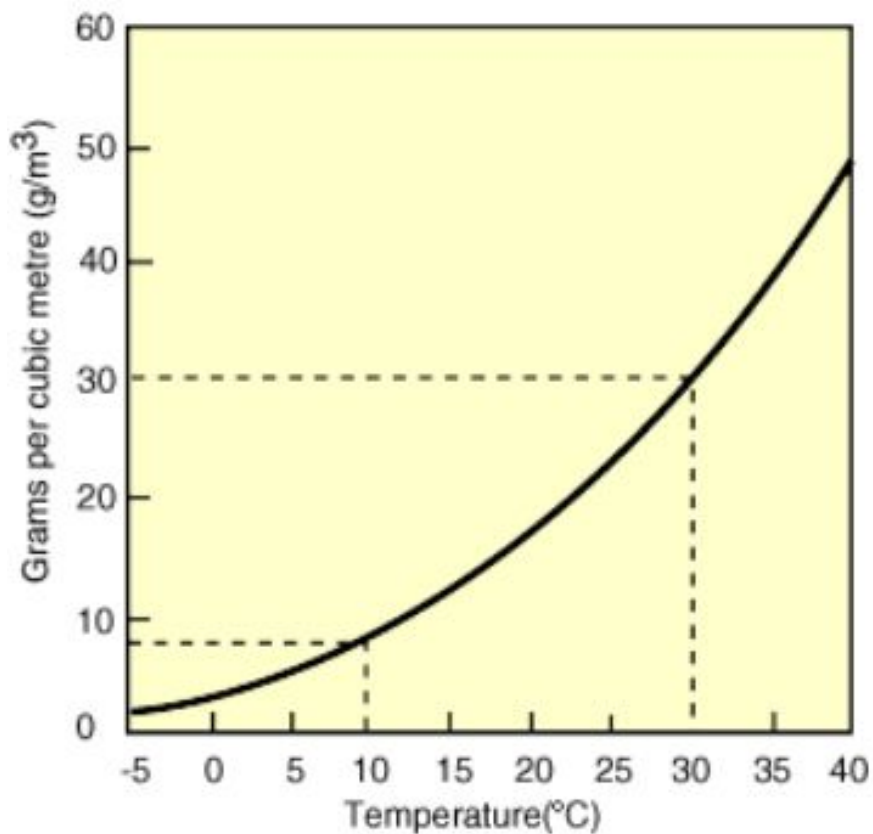
If CO_2 \nearrow

T° \nearrow

Humidity \nearrow

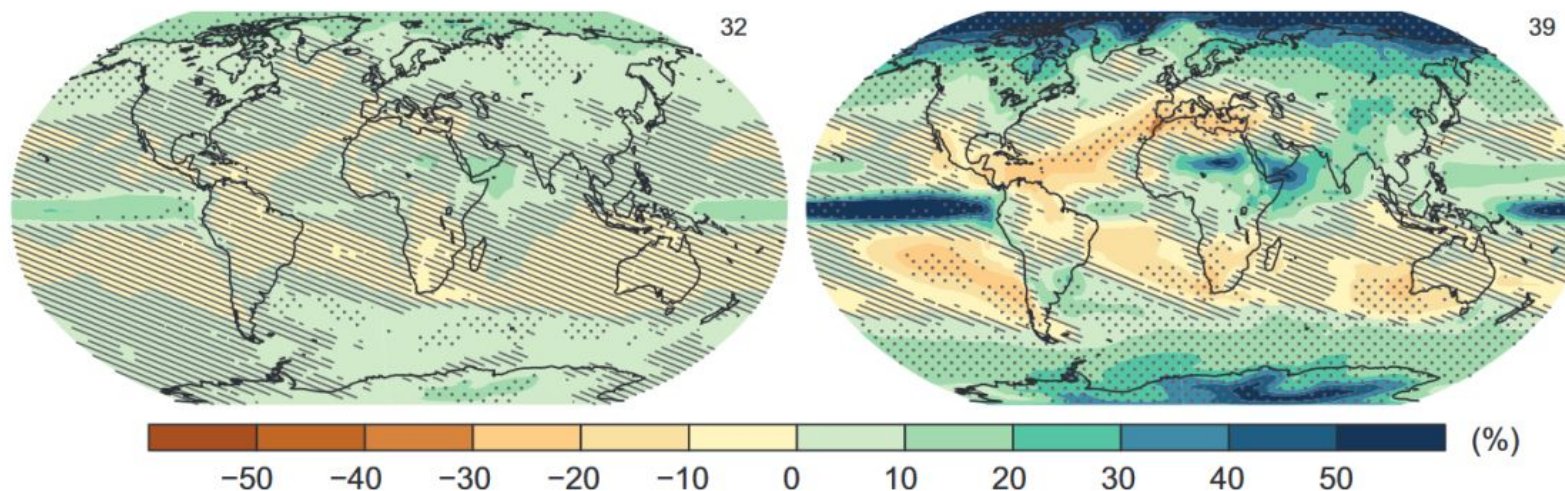
$$RH = \frac{H_2O_{\text{actual}}}{H_2O_{\text{max}}}$$

<https://www.e-education.psu.edu/earth111/node/557>



i)

Change in average precipitation (1986–2005 to 2081–2100)



3. Climate change: scenarios

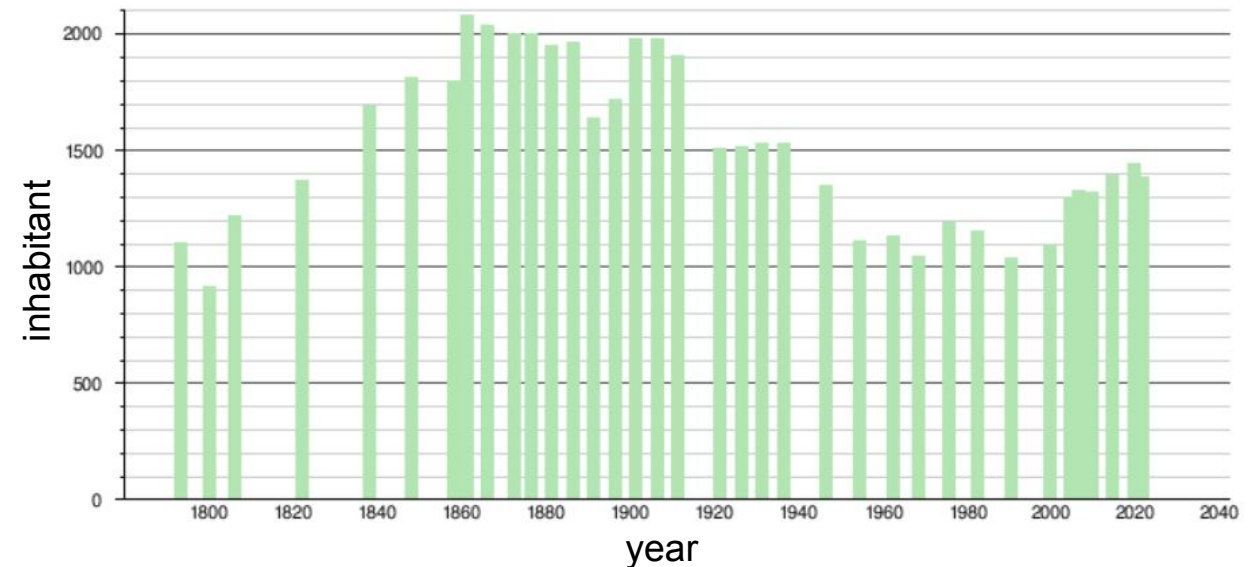
*SSP1-2.6

- “Optimist” pathway
- Global policies to mitigate the climate change
- Low-emission of GHG

SSP5-8.5

- “Pessimist” pathway
- High fossil fuel use
- Fragmented global society
- High emission of GHG

Evolution of population in Saint-Martin-Vésubie since 1793



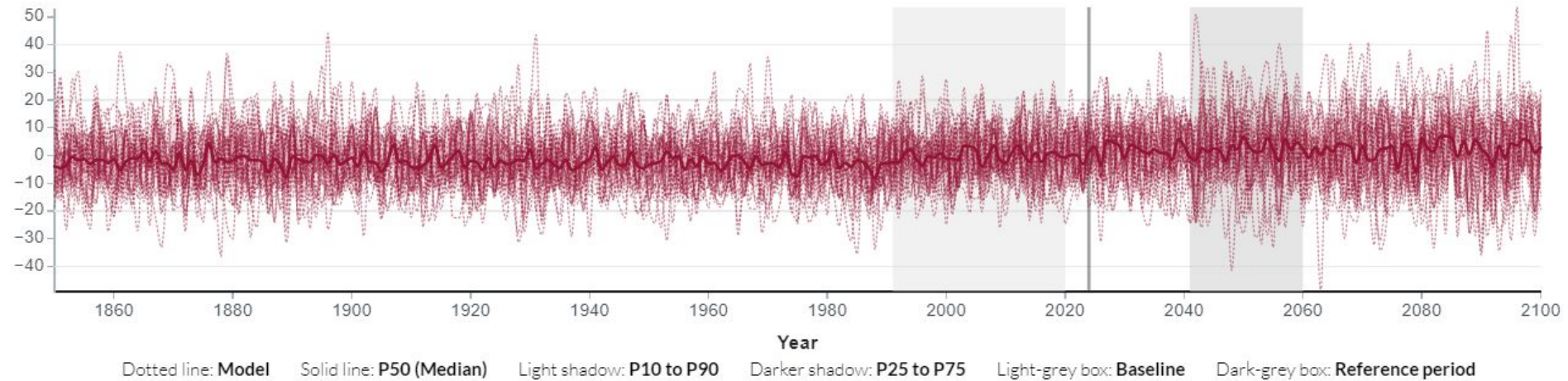
What variable for Saint-Martin-Vésubie?
→ precipitation

*SSP: shared socioeconomic pathway



2. Climate change: atlas

Maximum of 1-day accumulated precipitation (%) - CMIP6 - Relative change - SSP5-8.5 - Medium Term (2041-2060)
- Annual - rel. to 1991-2020



- 24 climate models
- 4 models developed in France
- CNRM-CM6-1-HR
 - High spatial resolution
 - Multi-component model
 - Detailed physical processes
 - Research applications

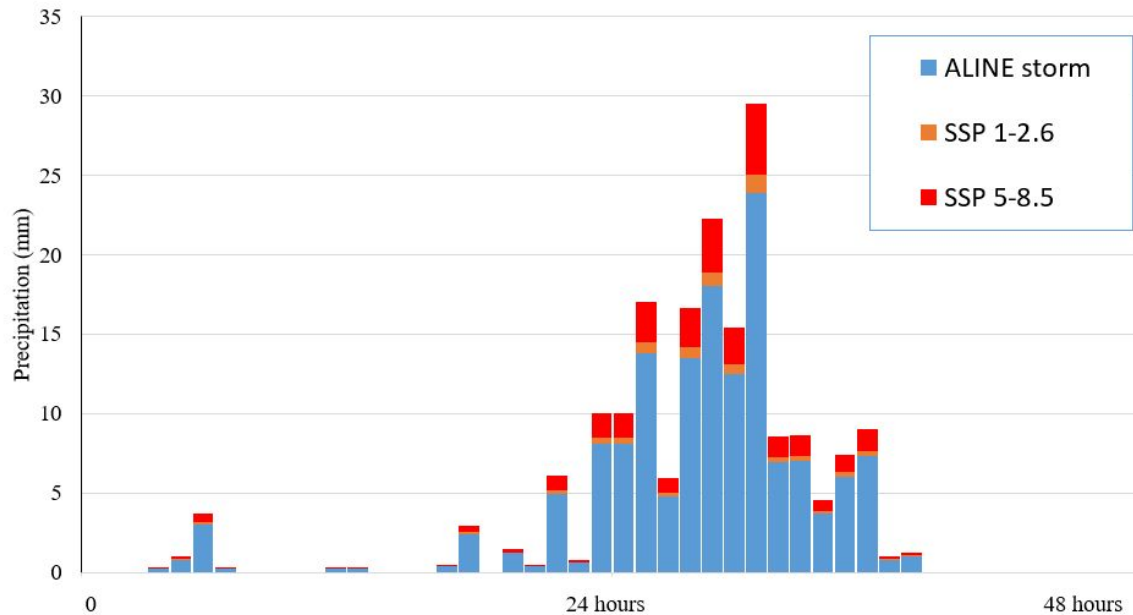
Projected precipitation:

- SSP1-2.6: +5%
- SSP5-8.5: +18%

4. Hydrological model

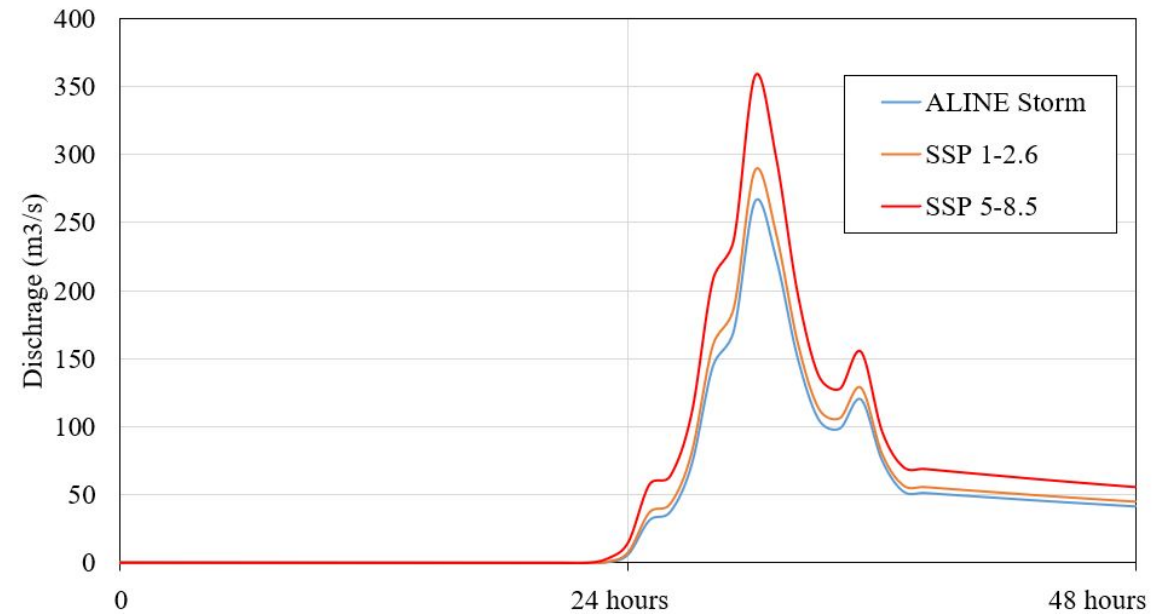
- Projected changes of precipitation are applied to ALINE storm according to scenario SSP1-2.6 and SSP5-8.5.

PROJECTED RAINFALL FOR 2050



- Discharge at Saint Martin de Vesubie is simulated with the projected precipitation for hydraulics modelling.

ALINE Storm associate with 2050 projected precipitation



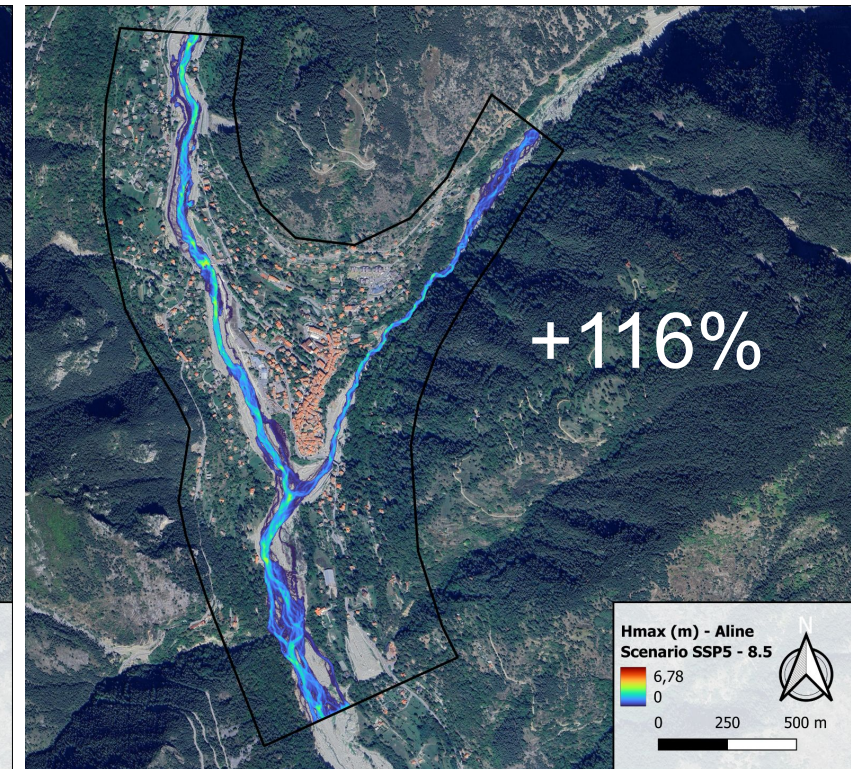
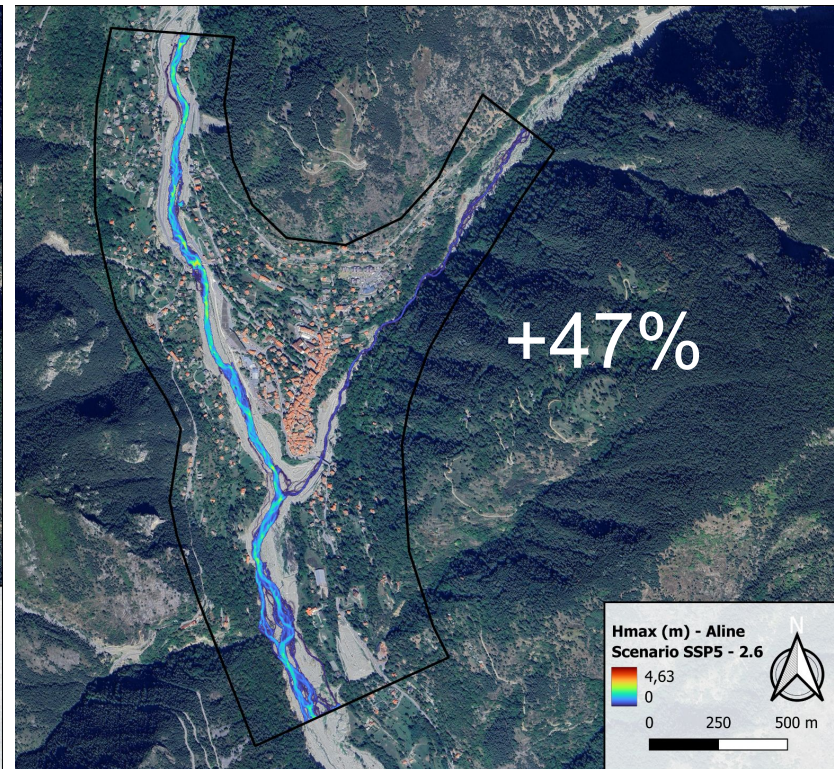
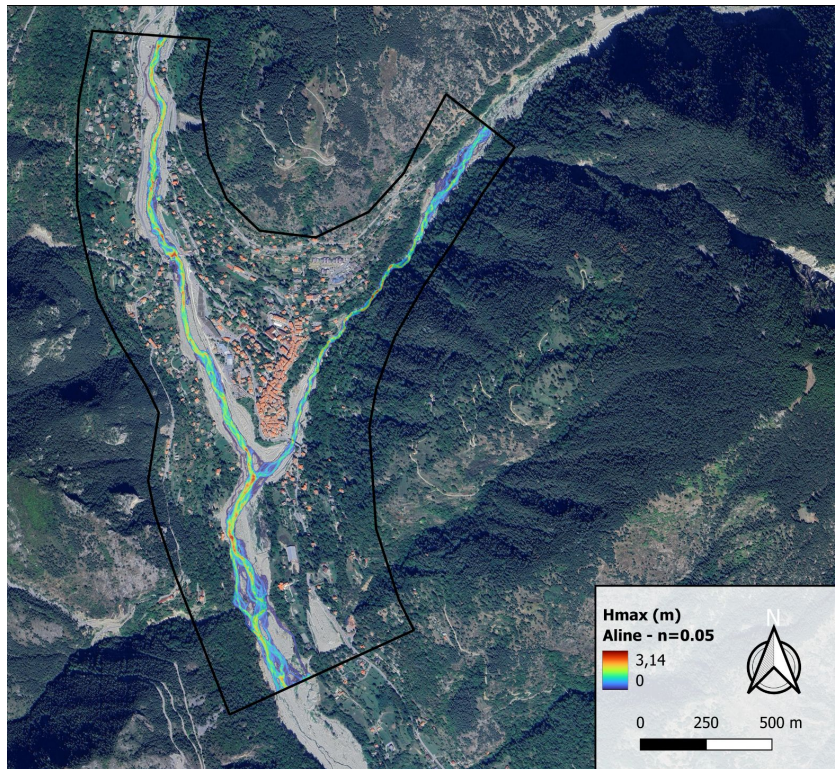


5. Hydraulic model results (max water depth)

Actual state

Optimist scenario (2050)

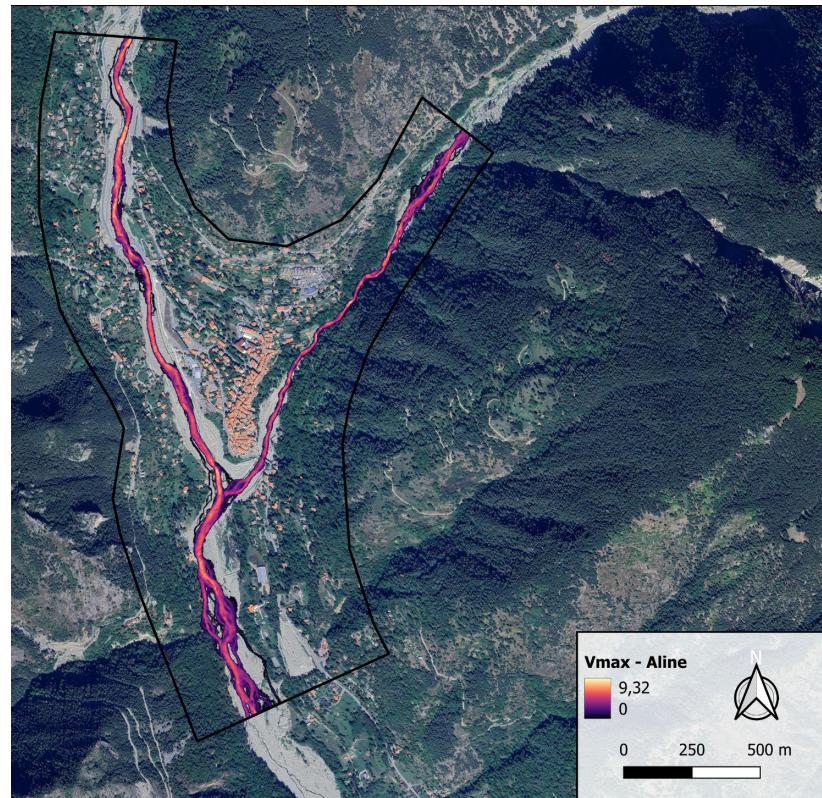
Pessimist scenario (2050)



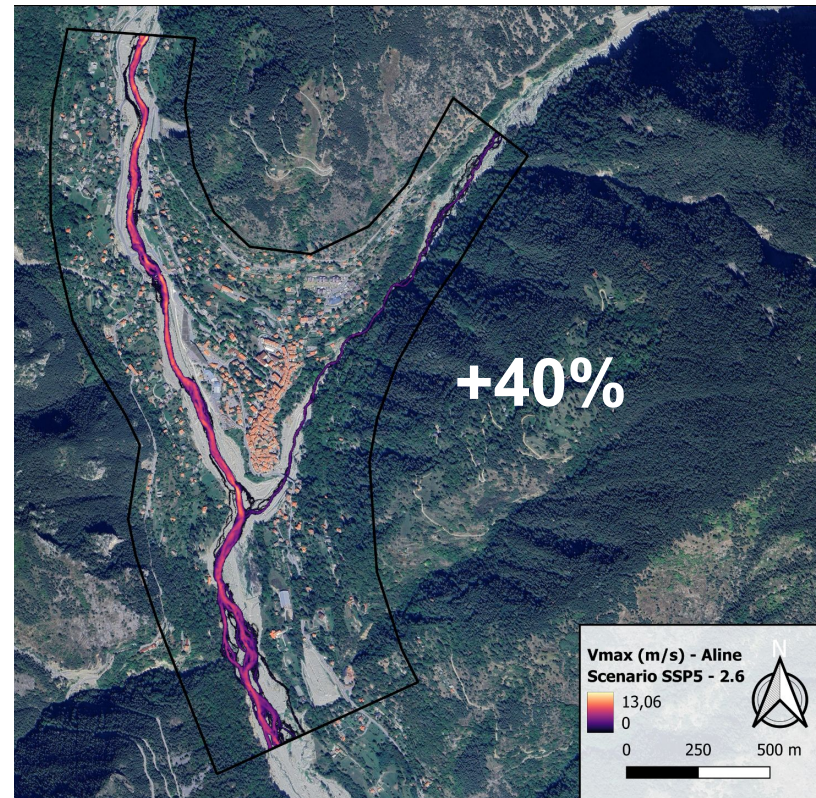


6. Hydraulic model results (max velocity)

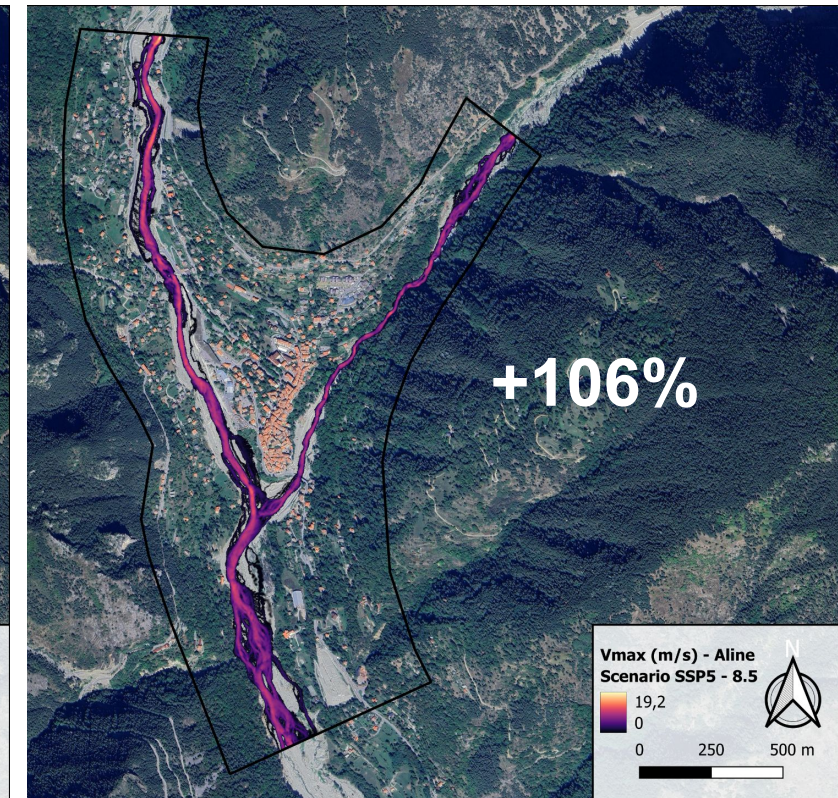
Actual state



Optimist scenario (2050)



Pessimist scenario (2050)



7. Conclusion:

Where to relocate the WWTP?

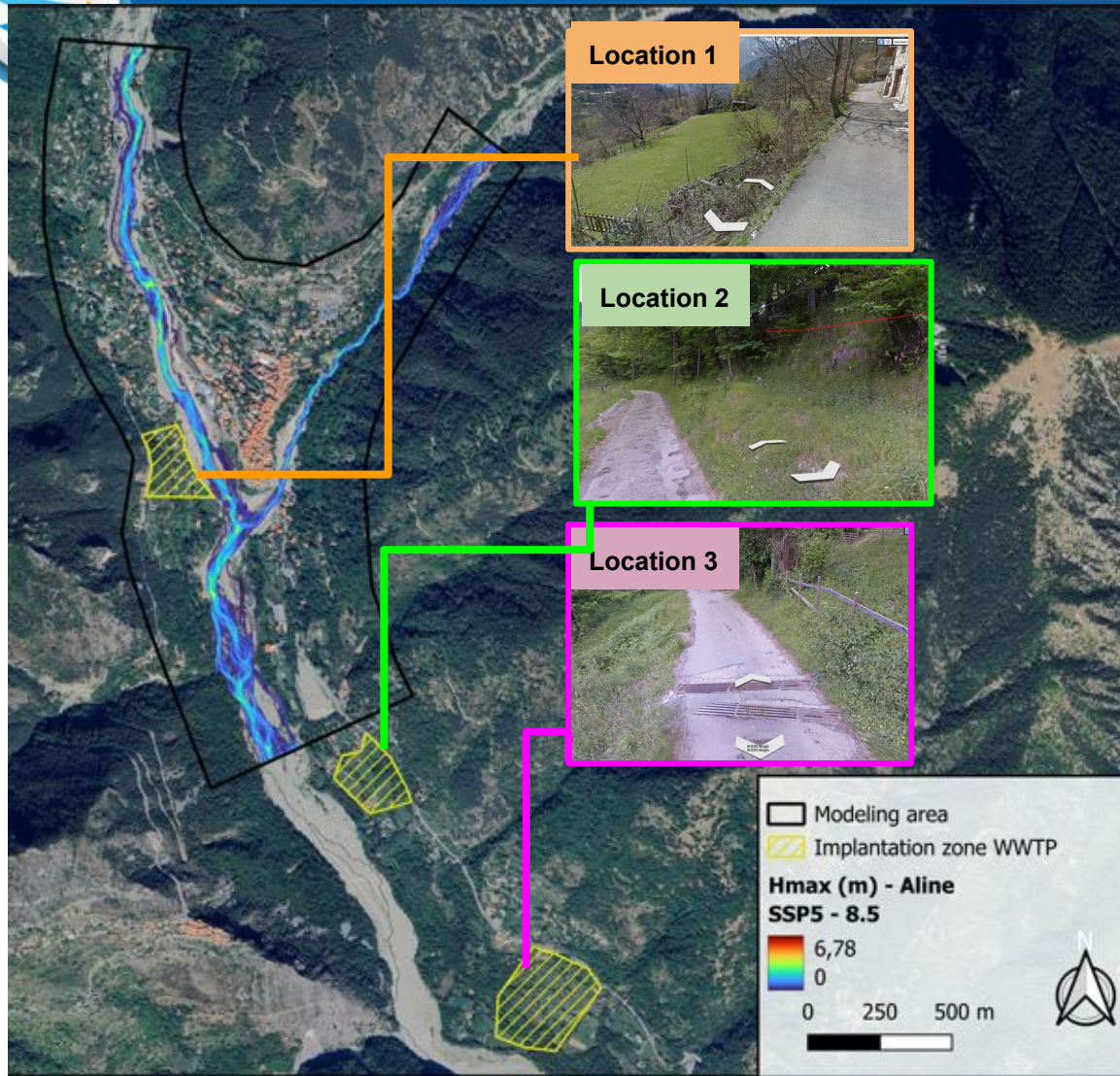
Site Selection Considerations:

- Modelling Results
- Elevation
- Accessibility
- Landuse
- Other Site Conditions

Criteria:	Location 1	Location 2	Location 3
Elevation	946m	890m	835m
Accessibility	ok	ok	ok
Land Uses	Urban development, residential	Urban development, residential	For agricultural needs, Protected area, urban development
Other site conditions	1. Majority are Rendisol type of soil		
	2. Concerned Stakeholders: -Gubernatis Palace -Chapel of the Holy Cross -Notre-Dame-de l'Assomption Church -Chapel of Mercy or Black Penitents		2. Very far from the existing urbanized area (about 2km)

Recommended is Location 2.

7. Conclusion: Proposed Locations



Further steps:

- Perform modelling further downstream
- Complete site reconnaissance
- Conduct specific site investigation/studies.
- Consider potential flooding impact in design

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Team 02 11



Thank you for your attention

Any questions?

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Appendix

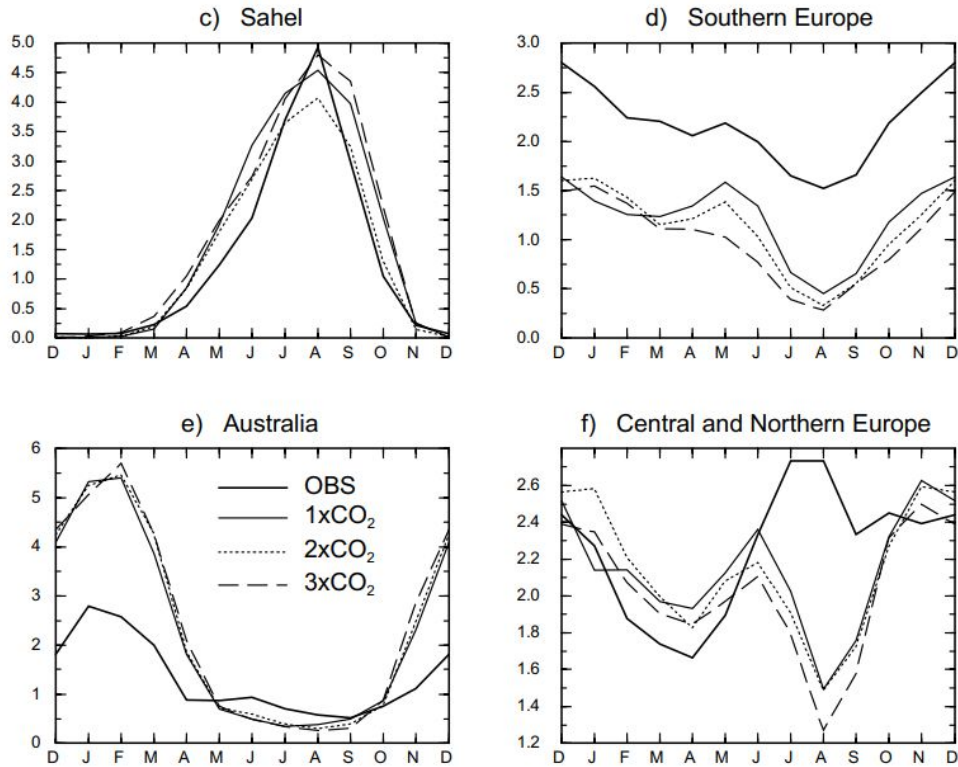


Figure 6. The annual cycle of the precipitation (mm/day) for the observation (bold solid) and the 1xCO₂ (thin solid), 2xCO₂ (dotted) and 3xCO₂ (dashed) integrations for Central North America (a), Southern Asia (b), the Sahel region (c), Southern Europe (d), Australia (e), and Central and Northern Europe (f) (after Cubasch et al., 1995).

Différence du cumul des précipitations (en %) - projection 2071-2100 par rapport à la période 1976-2005
Scénario avec émissions modérées (RCP 4.5)

