



UNIVERSITÀ DEGLI STUDI DI MILANO  
DIPARTIMENTO DI SCIENZE DELLA TERRA “A. DESIO”

# *Geoarchaeological evidence of multiple climatic and anthropic triggers driving the breakdown of the Terramare civilization (Bronze Age, Northern Italy)*



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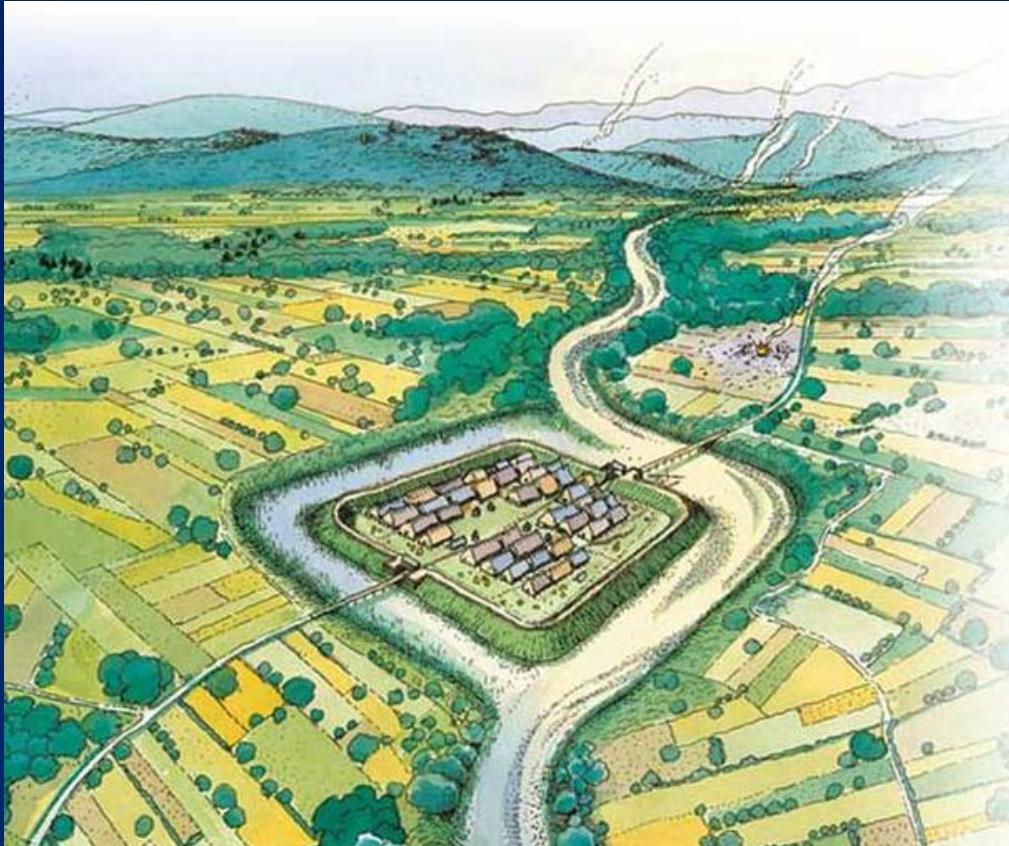
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# The Terramare Culture of the Po Plain (N Italy)



Complex material culture

Subsistence based  
on intensive  
agriculture and  
herding

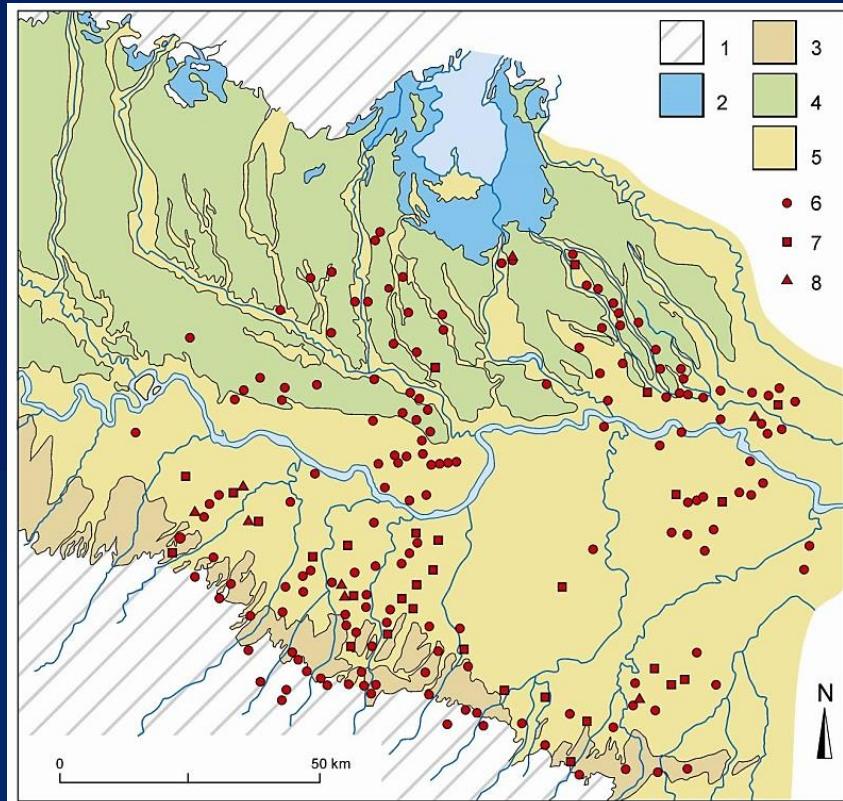


# The Terramare Culture of the Po Plain (N Italy)

The Terramare culture in the Po plain covered the Middle (BM) and Recent (RB) Bronze Age, and disappeared before the transition to the Final Bronze Age (FB)



Cremaschi and Gallinaro, in press



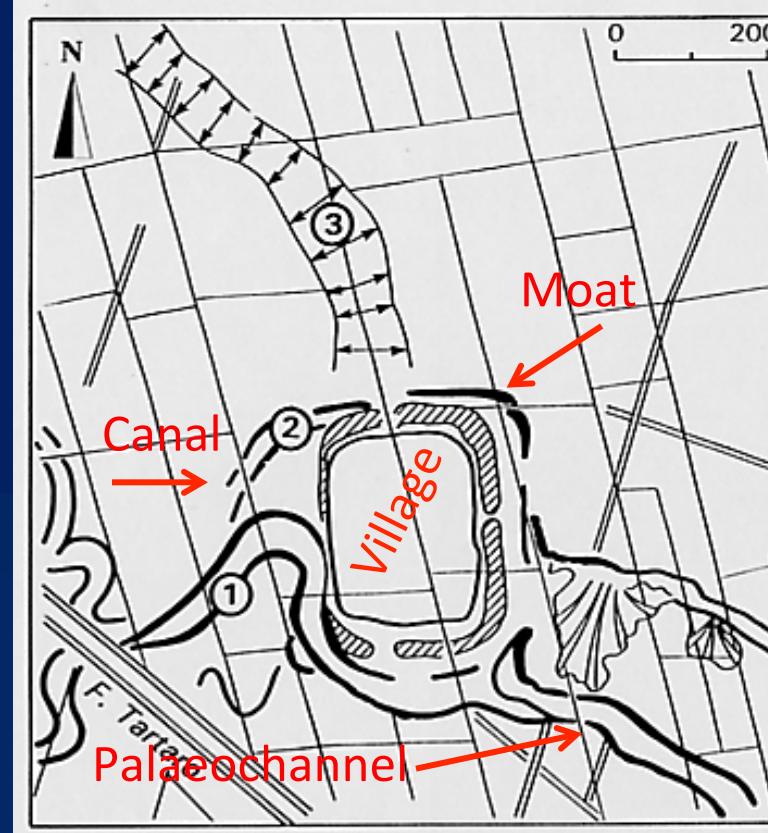
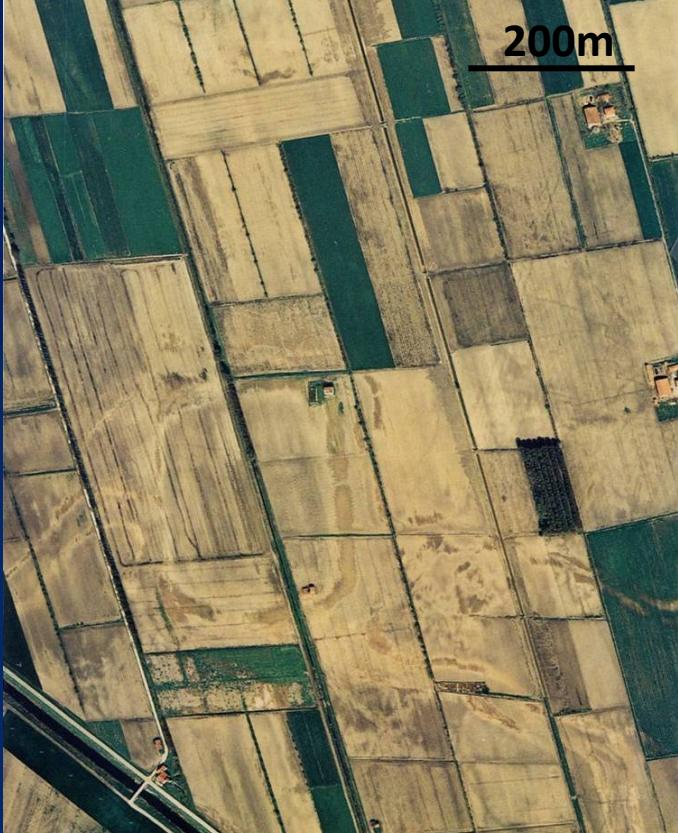
Cremaschi et al, QSR 2016



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# The Terramare Culture of the Po Plain (N Italy)

Settlement type and facilities for water management



# The Terramare Culture collapsed at ~1170 BCE

What are the reason(s) of the collapse of the Terramare society?

- Social transformation?
- Population relocation?
- Climate/environmental changes?



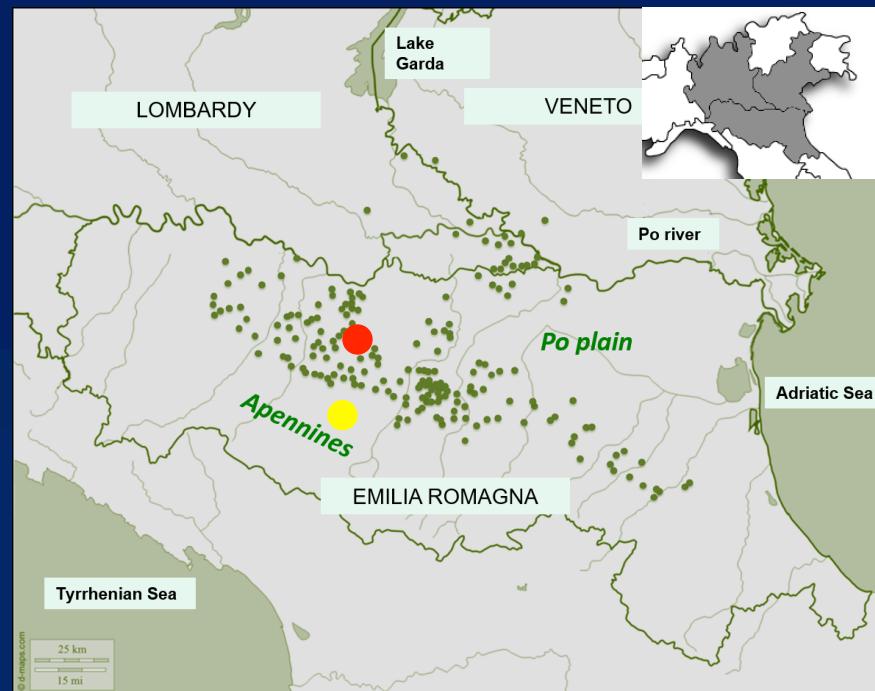
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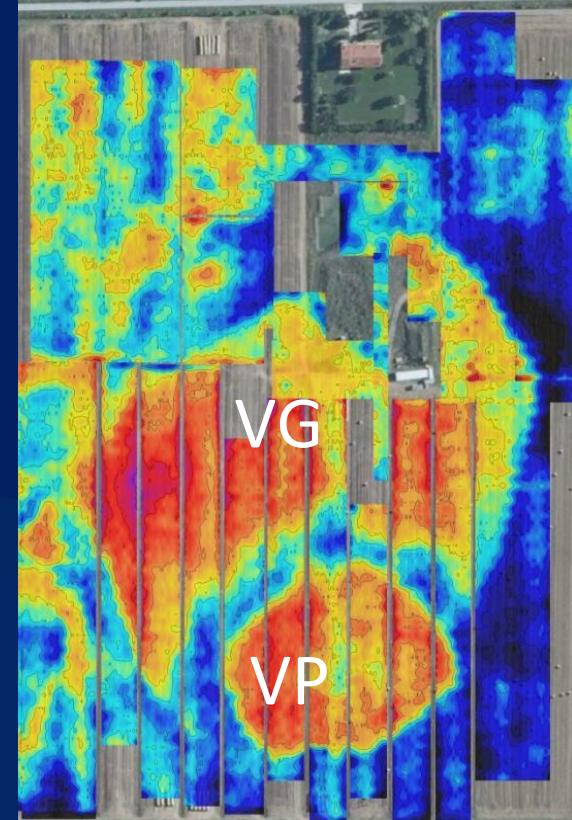
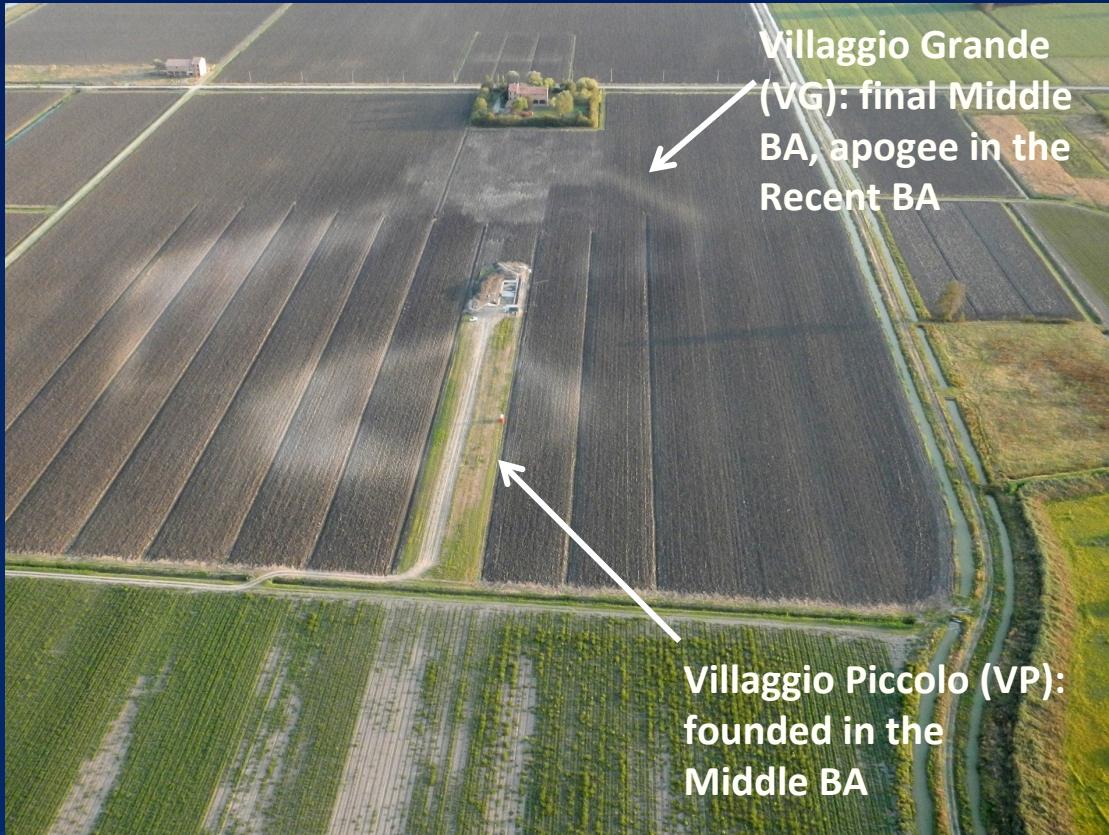
During the Successo-Terra Project, we investigated two archaeological sites:

- The Terramara Santa Rosa di Poviglio in the Po plain ●
- The Bronze Age archaeological site of San Michele di Valestra in the Apennines ●

Same cultural horizon, but different environments and different adaptations



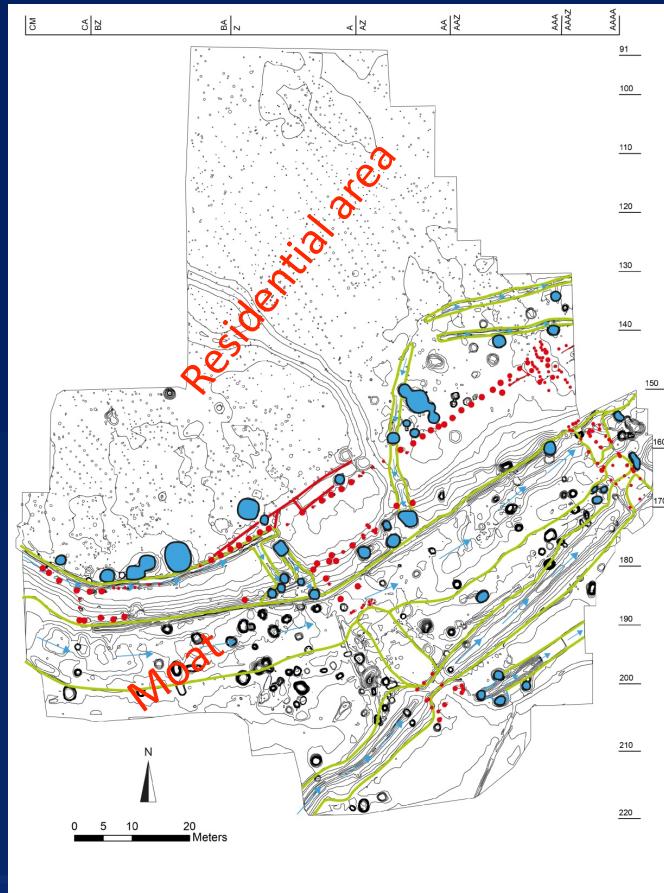
# Terramara Santa Rosa di Poviglio



Mele et al., JAS 2013



# Key geoarchaeological evidence: the hydraulic system



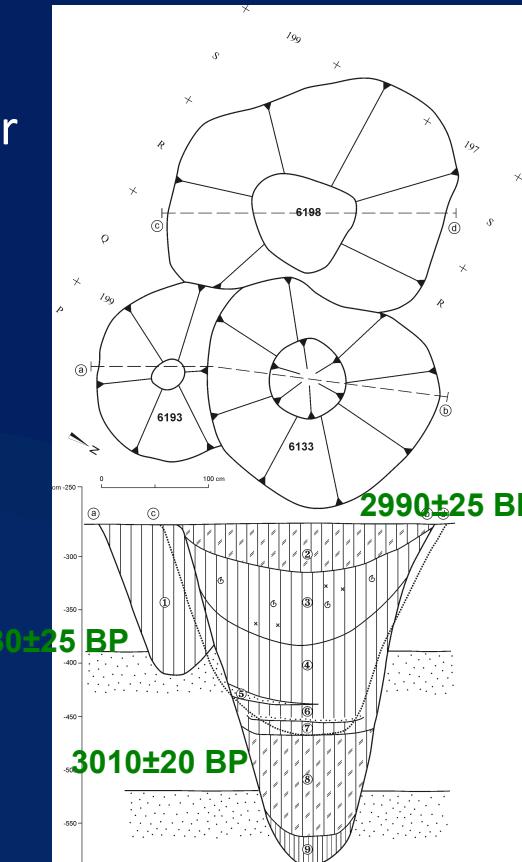
Wells providing water for domestic use and productive activities



# Key geoarchaeological evidence: the hydraulic system

The number and depth of water wells increase towards the Recent BA.

This suggests the progressive lowering of the water table.



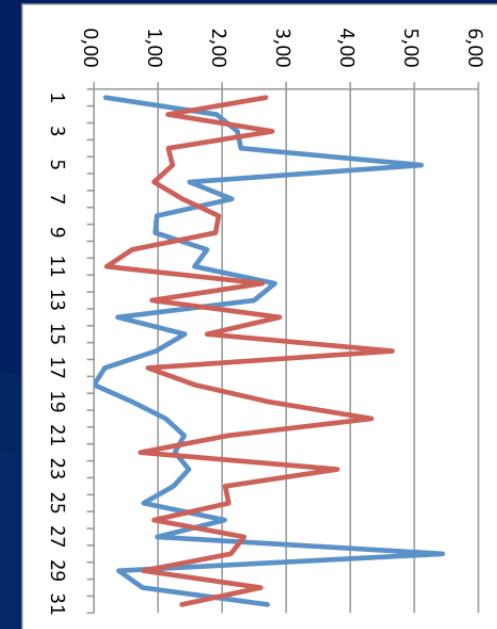
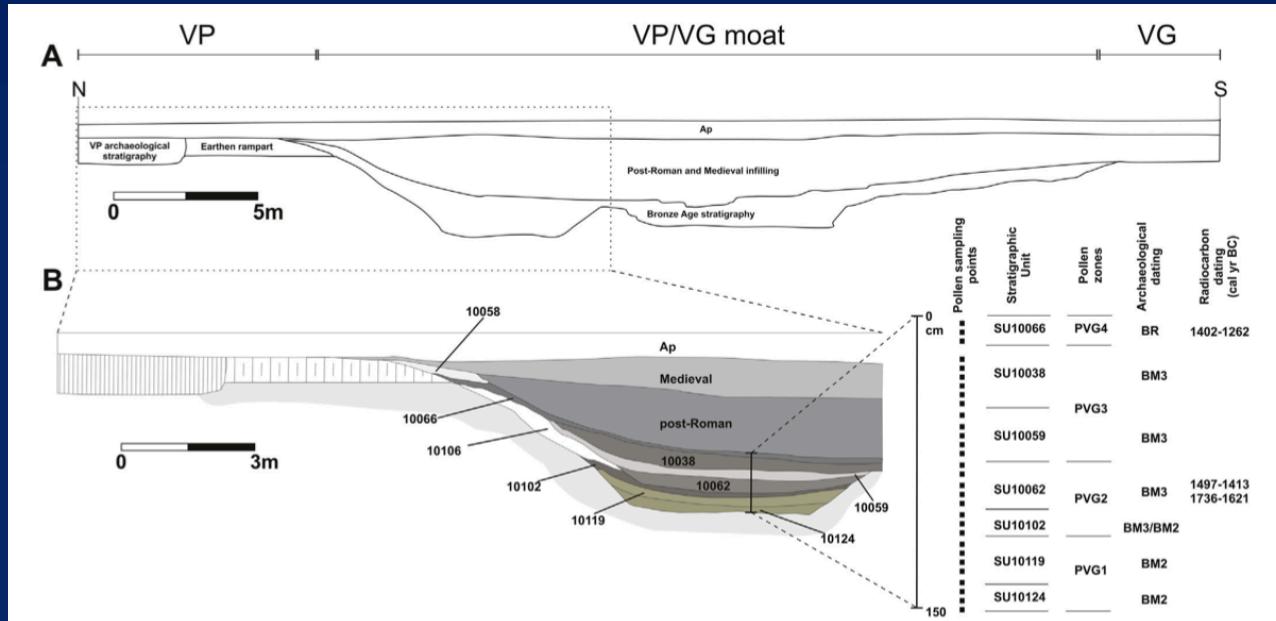
Cremaschi et al., Q1 2003



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# Key geoarchaeological evidence: the hydraulic system

The infilling of the moat formed for a long time and preserves pollen data covering most of the life of the site



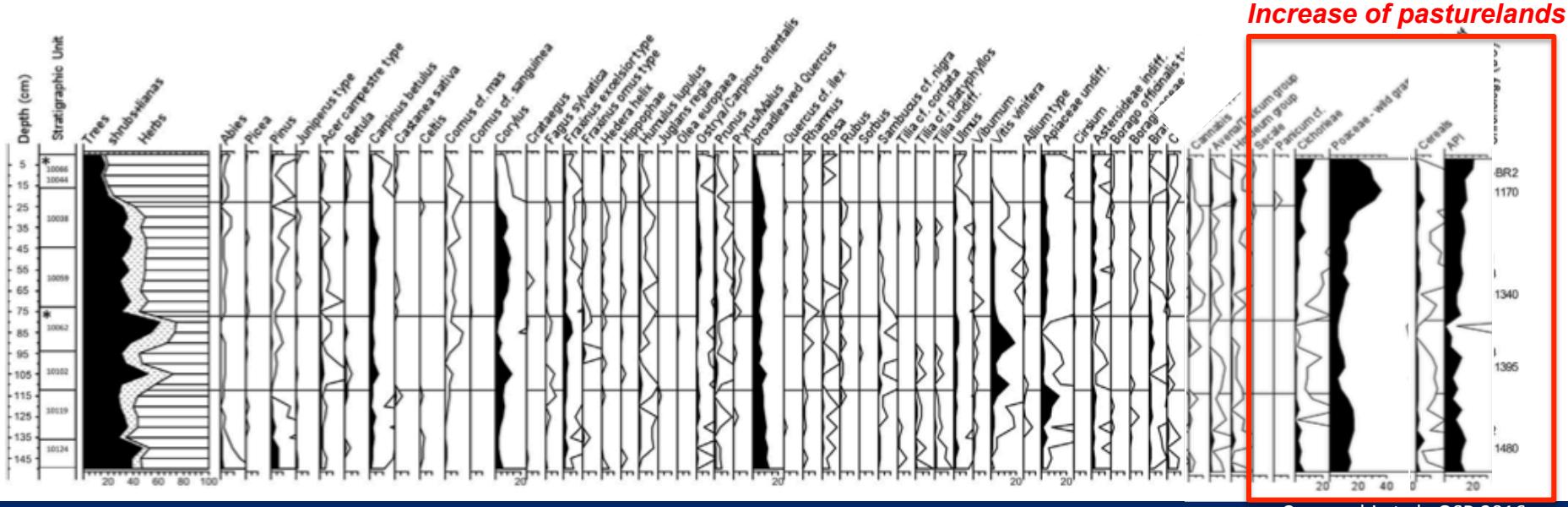
Cremaschi et al., QSR 2016



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DIGITARE NOME CENTRO

# Key geoarchaeological evidence: the hydraulic system

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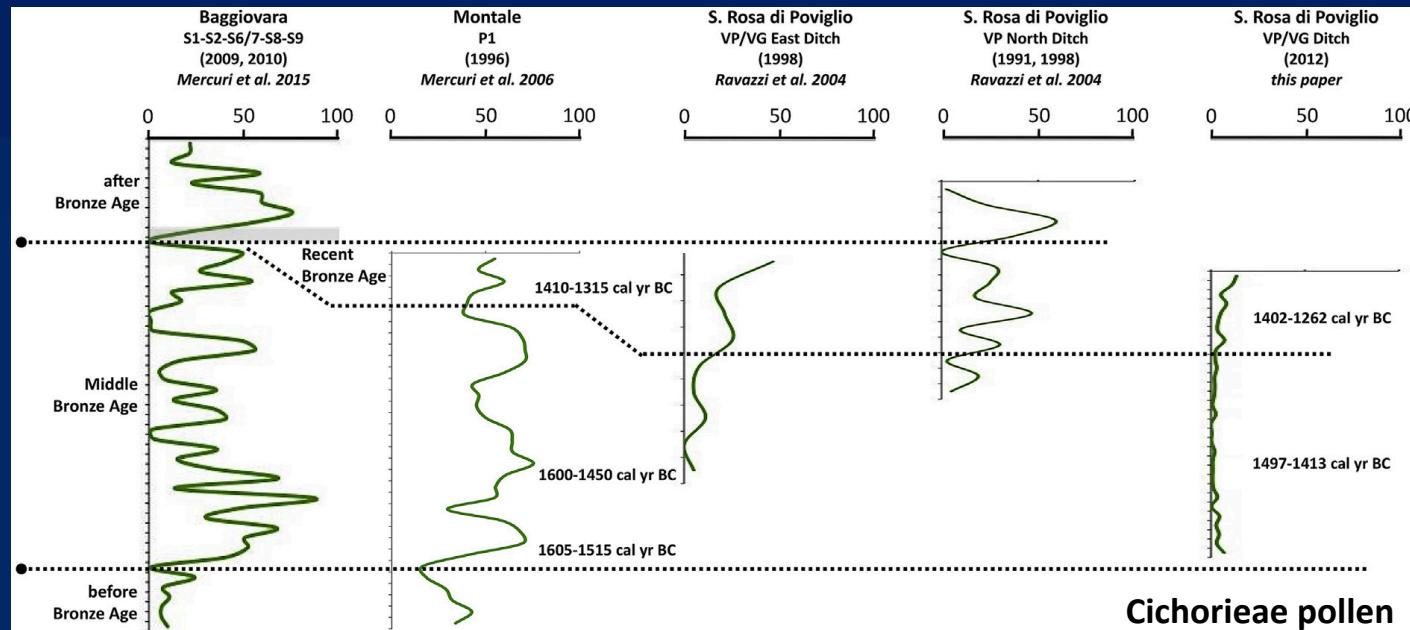


Cremaschi et al, QSR 2016



# Key geoarchaeological evidence: the hydraulic system

Pollen data suggest the spreading of dry pastures that corresponded to (i) a land use change under dry climate conditions and (ii) the abandonment of cultivation



Cremaschi et al., QSR 2016



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# Mountain Bronze Age settlements as comparison

Preliminary evidence from  
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Valestra site



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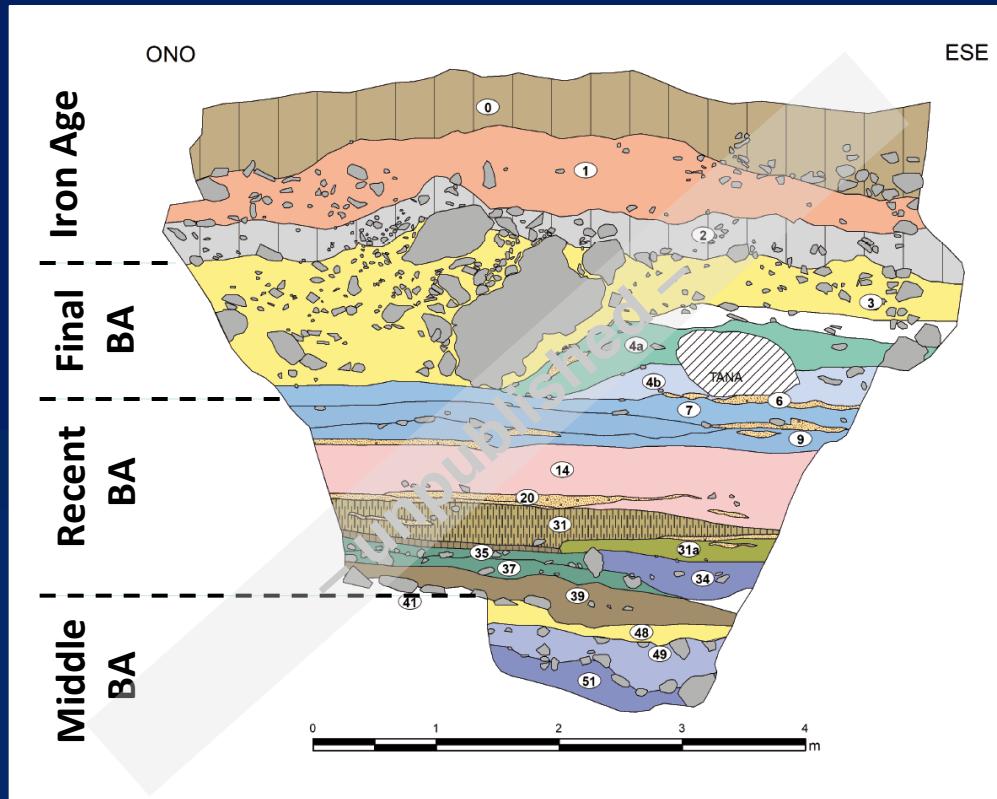
The stratigraphic record is preserved below a rock fall.



# Mountain Bronze Age settlements as comparison

Continuity in the settlement at San Michele di Valestra site from the Bronze Age to the Iron Age

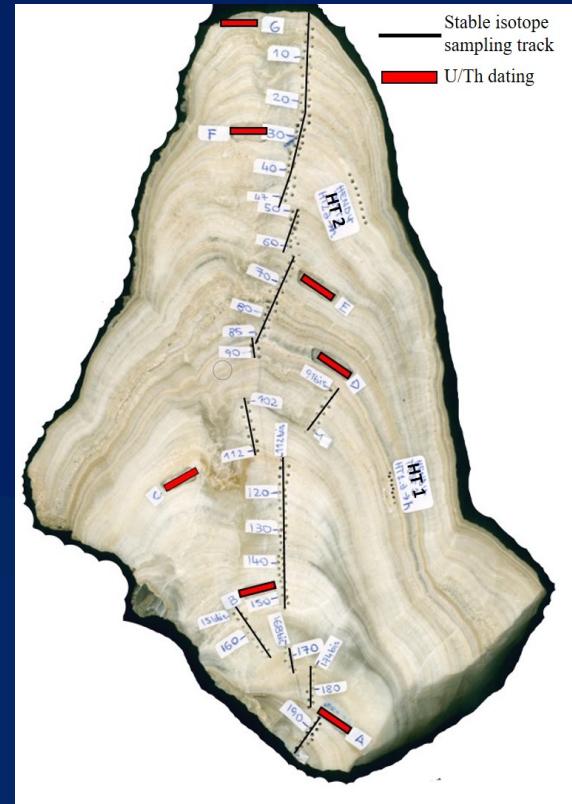
VAL17 US7	$2830 \pm 25$
VAL17 US7	$2870 \pm 20$
VAL17 US9	$2880 \pm 20$
VAL17 US14	$2600 \pm 20$
VAL17 US31	$3060 \pm 20$
VAL17 US35	$3150 \pm 25$
VAL17 US37	$3020 \pm 25$
VAL17 US49	$3070 \pm 20$
VAL17 US51	$3200 \pm 25$
VAL18 US173	$3140 \pm 20$



No environmental crisis in the mountain?



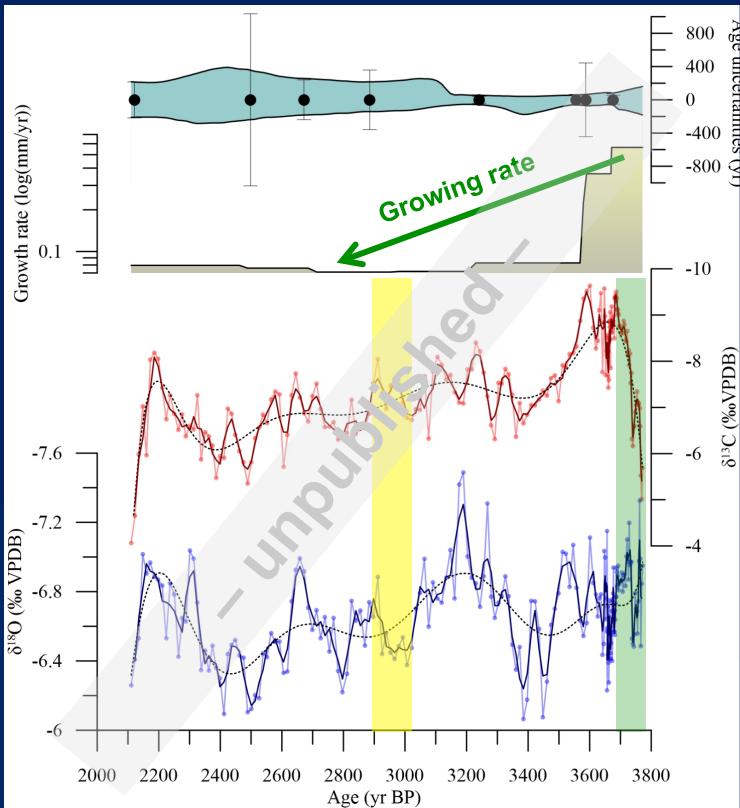
# Looking for independent climatic proxy: the Mussina cave



# Looking for independent climatic proxy: the Mussina cave

A speleothem covering the Terramara cultural trajectory

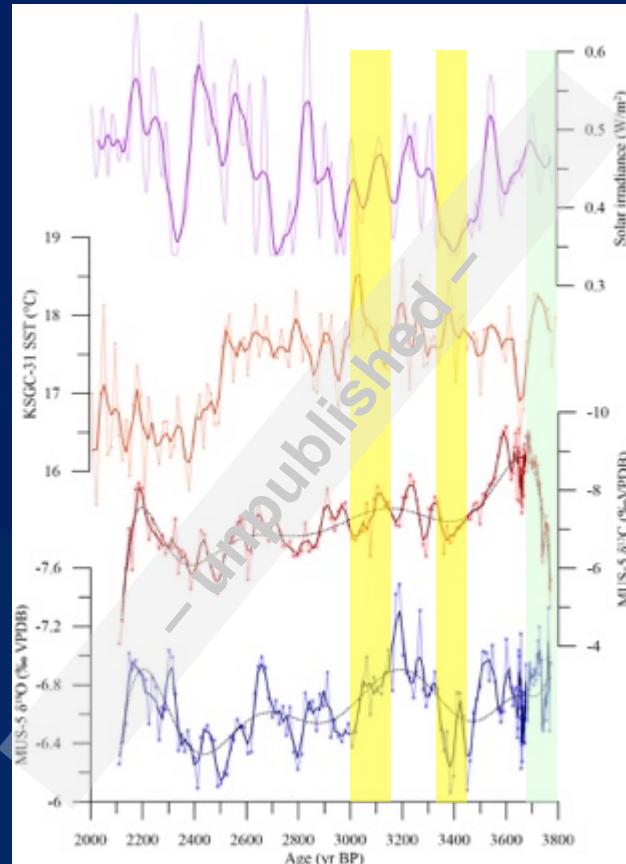
- Huge decrease of the growing rate
- C and O indicate wet environmental conditions during most of the Terramare trajectory (especially the beginning)
- A decrease in rainfall between 3.2 and 3 ka BP (end of the trajectory)



# Looking for independent climatic proxy: the Mussina cave

Data suggest other phases of marked rainfall decrease, but only the second event may have impacted the Terramare culture.

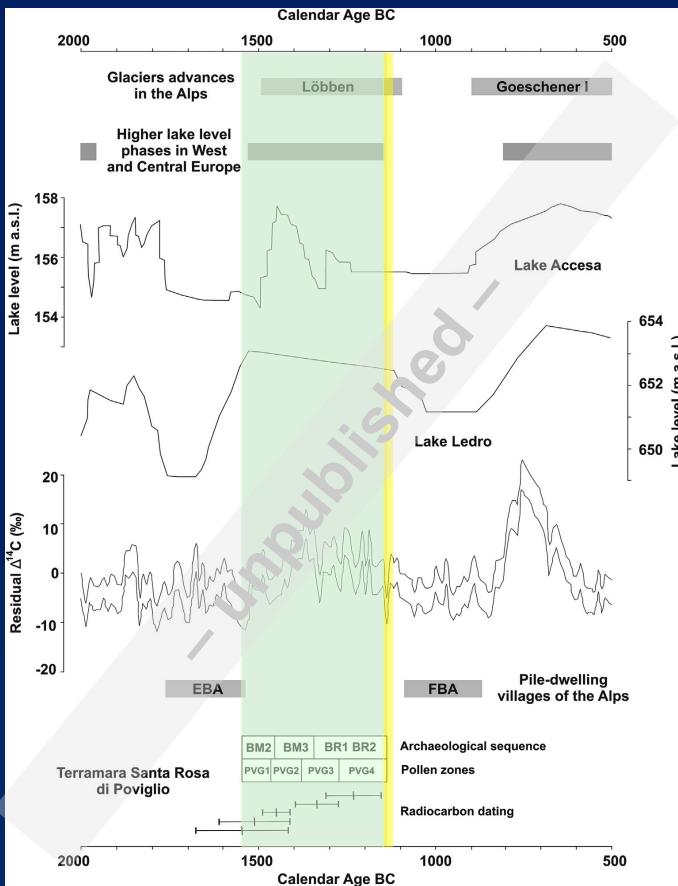
- Less intense climatic changes?
- Does climate change impacted on a society suffering strong demographic (and settlements) increase?



# Po Plain Vs. Apennines: contrasting evidence (and response)

Geoarchaeological, pollen, and climatic proxy data suggest:

- Wet conditions helped the increase of settlements
- Overgrazing + demographic explosion: negative mix
- Unbalanced use of natural resources
- Collapse and/or relocation of populations in the plain.
- Resilience of population in the mountain.
- No climatic determinism!



# Thank you!



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