GIORNATA DI STUDIO "LE ATTIVITÀ' DELL'UNIVERSITÀ DI PISA SUL TEMA DEGLI EFFETTI DEL CAMBIAMENTO CLIMATICO"

SESSION 5: EFFECTS ON GEOLOGICAL PROCESSES

Dendrochronological studies to reconstruct last millennium climatic variations in the Central Italian Alps

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Dendrochronology:

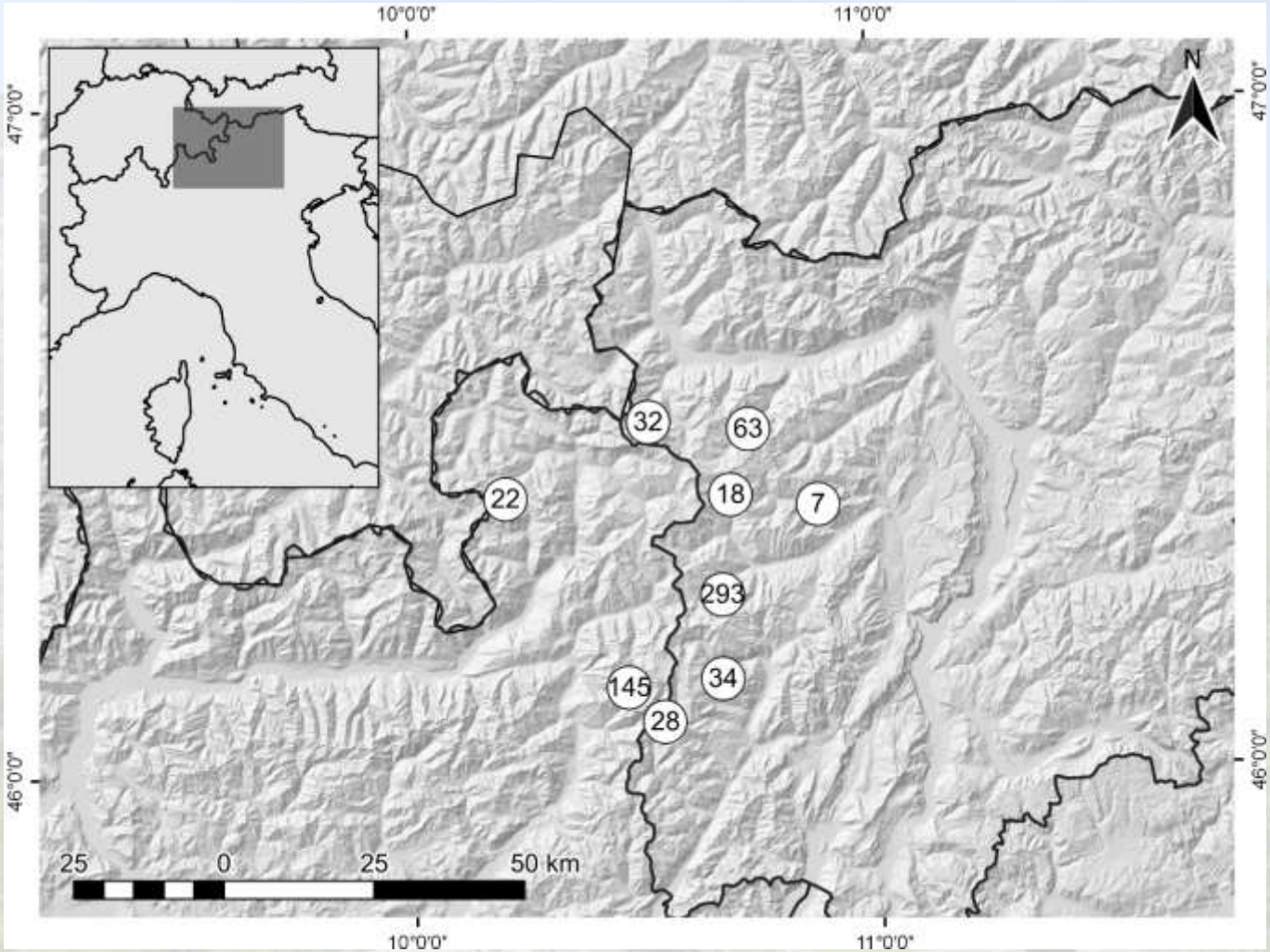
Tree-ring studies where the annual layers have been assigned to or are assumed to be associated with specific calendar years (Fritts, 1976)

Since 1990s the University of Pisa collect tree samples from the Central Italian Alps to reconstruct the climatic variations that affect the tree-line and glacial environments in the last centuries with an annual resolution.

A total of 614 trees has been collected:

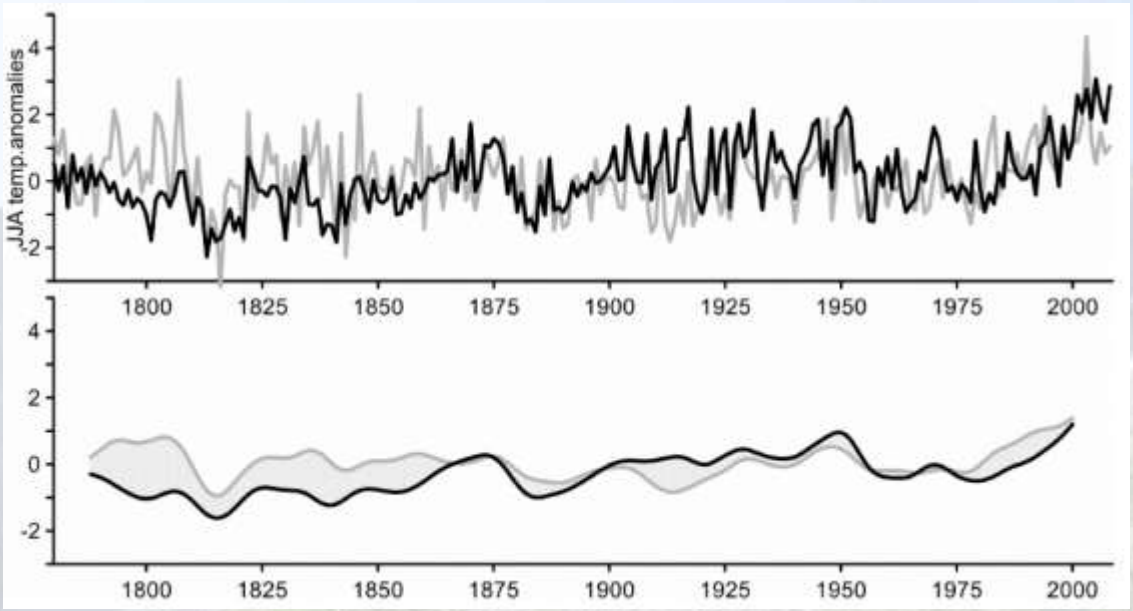
- 409 European Larches (*Larix decidua* Mill.)
- 128 Swiss stone pines (*Pinus cembra* L.)
- 77 Norway Spruces (*Picea abies* (L.) H. Karst.)

For a total of **87'803** dated tree-rings with different methods at the moment.

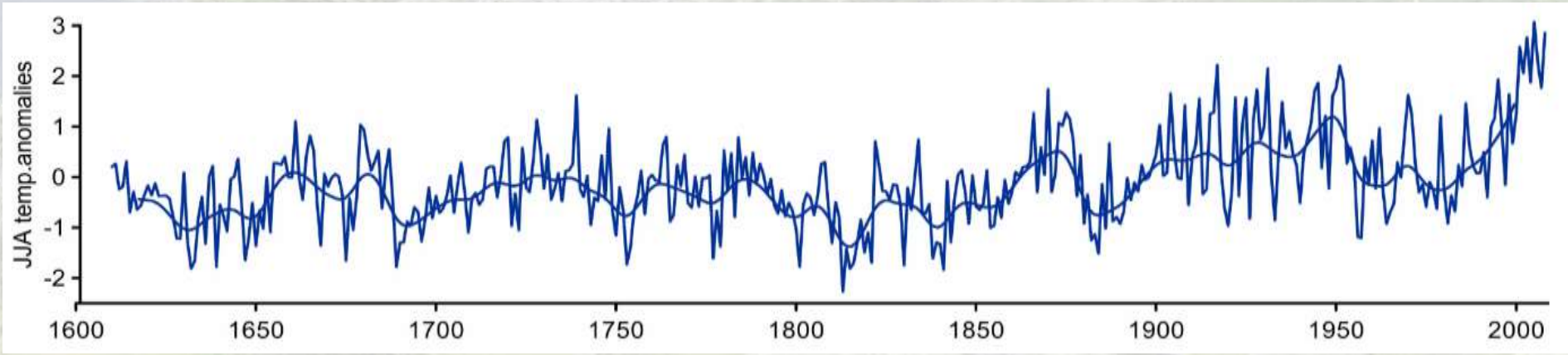


Dendroclimatic reconstructions

Dendrochronological series were calibrated on instrumental data to reconstruct climatic variations back in time with annual resolution. The research group of the University of Pisa applies this method to reconstruct the temperature variation in the Central Italian Alps since 1610, publishing for the first time a dendroclimatic series for this area of the Alps.

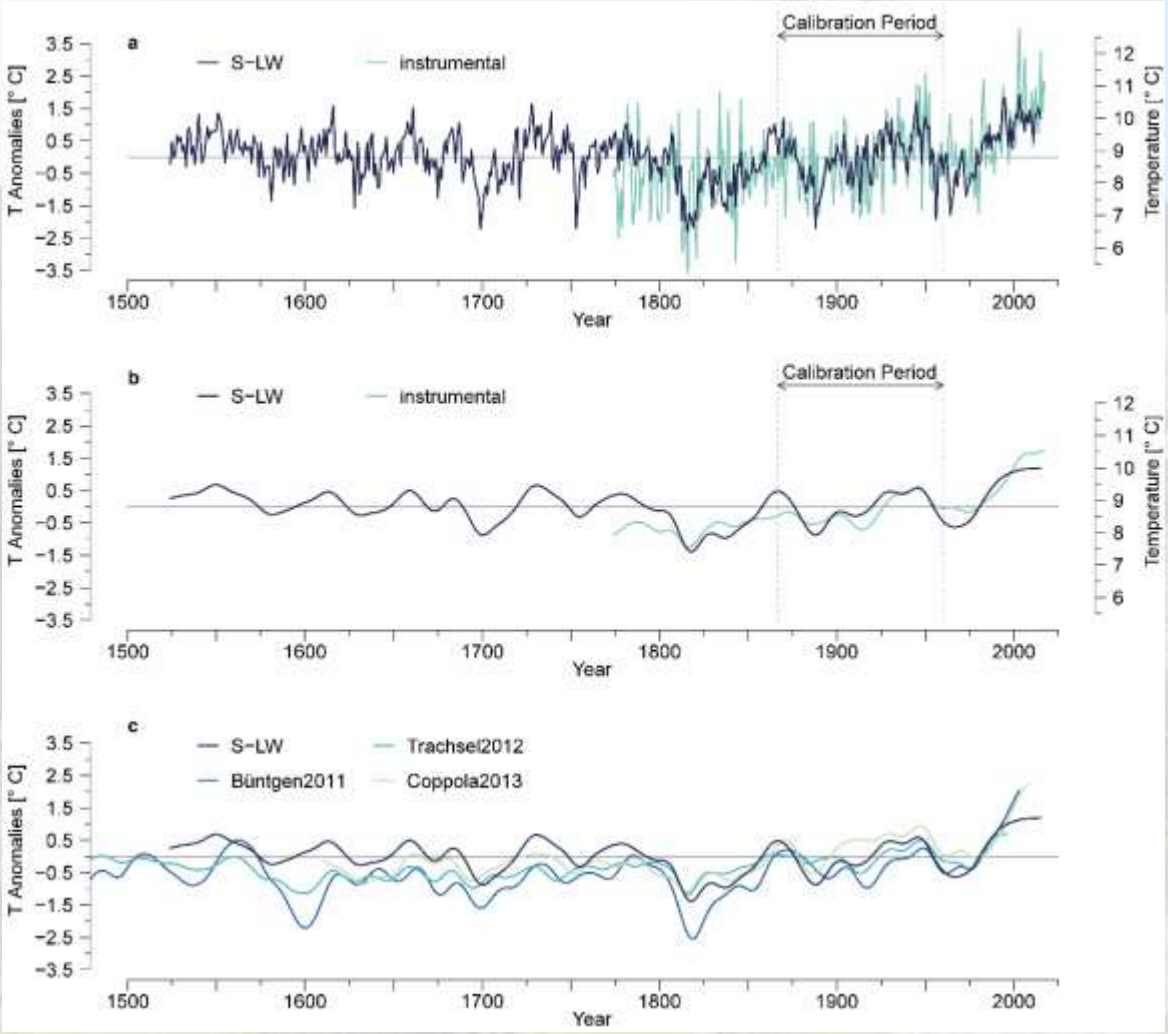


COPPOLA A., LEONELLI G., SALVATORE M.C., PELFINI M. and BARONI C. (2013) - *Tree-ring- Based summer mean temperature variations in the Adamello-Presanella Group (Italian Central Alps), 1610-2008 AD*. Climate of the Past, 9 (1), 211–221. DOI: 10.5194/cp-9-211-2013



Dendroclimatic reconstructions

A second reconstruction was proposed for the Ortles-Cevedale Group derived from the most ancient living European larch wood in the Rhaetian Alps called «Bosco Antico».

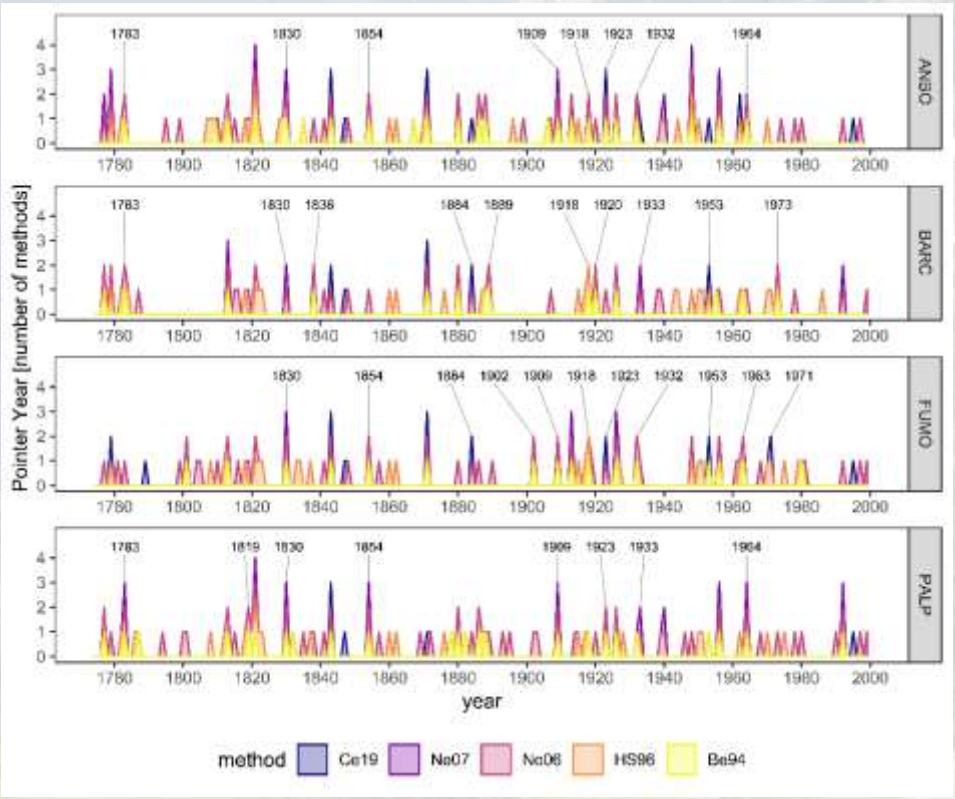


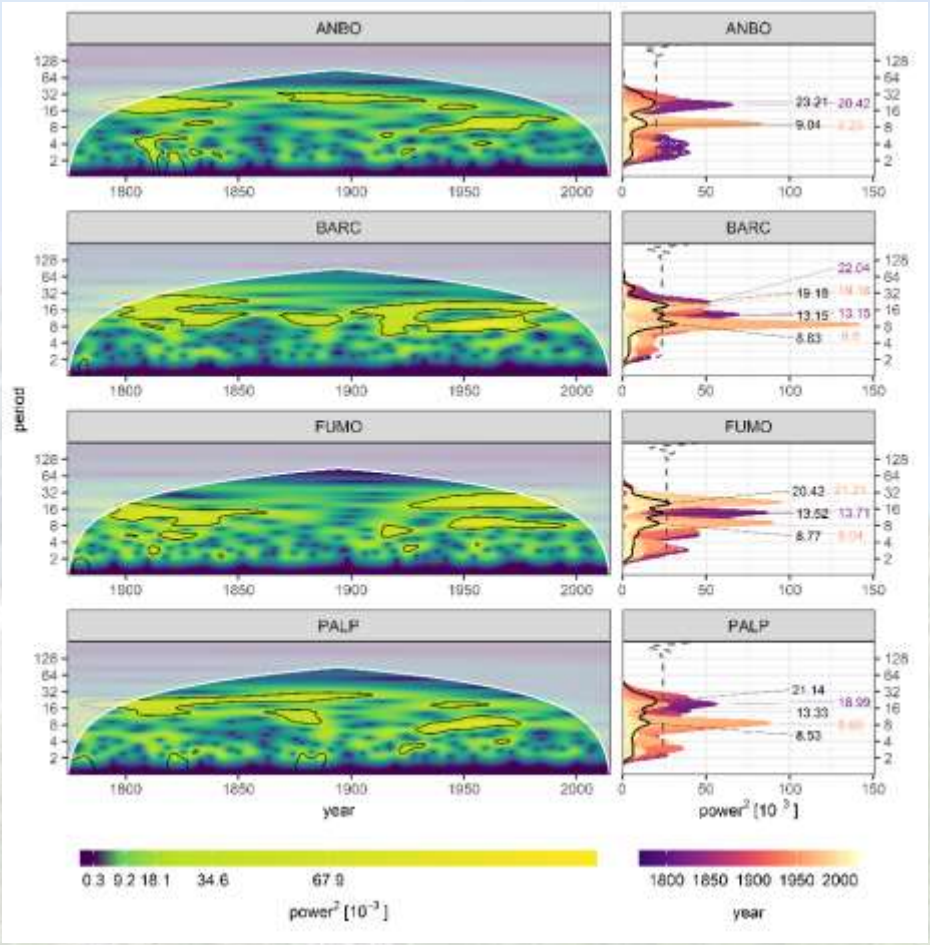
This reconstruction span between 1520 to 2015 elongating the previous reconstruction of a hundred years.

CERRATO R., SALVATORE M.C., BRUNETTI M., COPPOLA A. and BARONI C. (2018) - *Dendroclimatic relevance of "Bosco Antico", the most ancient living European larch wood in the Southern Rhaetian Alps (Italy)*. Geografia Fisica e Dinamica Quaternaria, 41 (1), 35–49. DOI: 10.4461/GFDQ.2018.41.3

Insect population dynamics

Dendrochronology was also used to reconstruct the Larch Budmoth recurrent outbreaks in the Alps and to study their timing

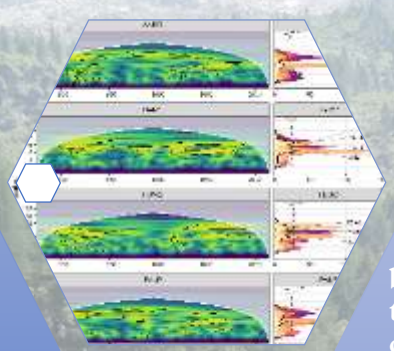




CERRATO R., CHERUBINI P., BÜNTGEN U., COPPOLA A., SALVATORE M.C. and BARONI C. (2019) - *Tree-ring-based reconstruction of larch budmoth outbreaks in the Central Italian Alps since 1774 CE*. iForest - Biogeosciences and Forestry, 12 (3), 289–296. DOI: 10.3832/ifor2533-012

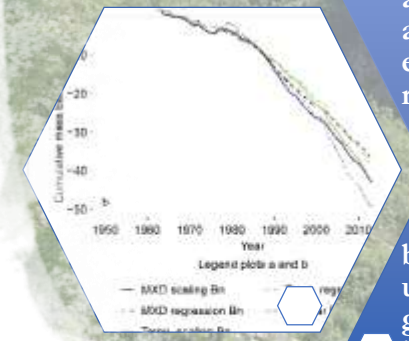
Take home messages

Dendrochronology, beyond other applications, can:

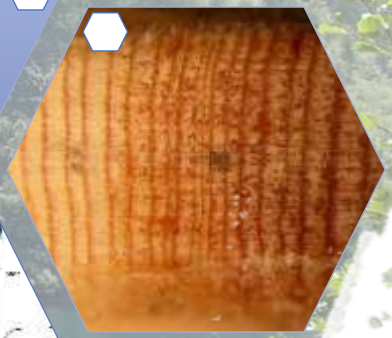


supplies data on how the climate changes affect the high-altitude environments and related features

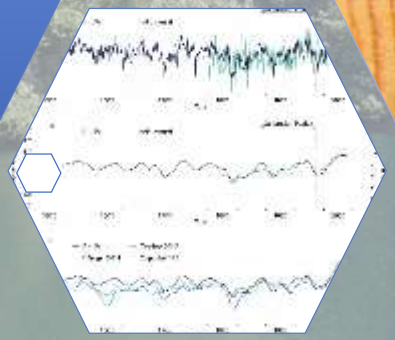
be an excellent tool to understand the climate variability in the past with an annual or seasonal resolution



be used to quantify the climatic variability that affect a certain area in a certain period



be useful to understand the glaciers' mass balance changes in period of time for which data is lacking



Thanks for your kind attention

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