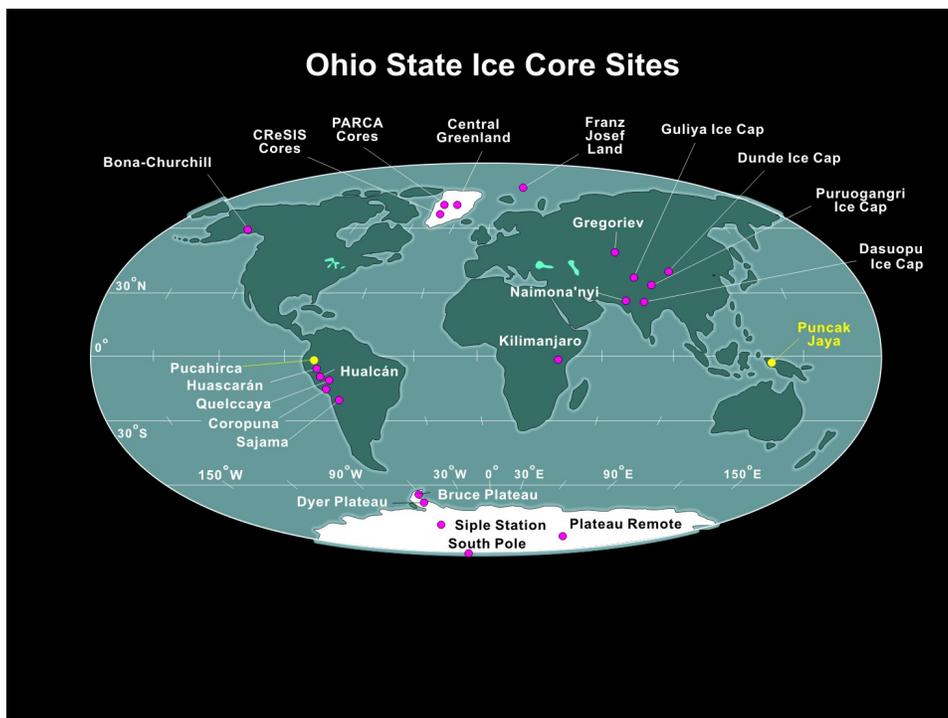
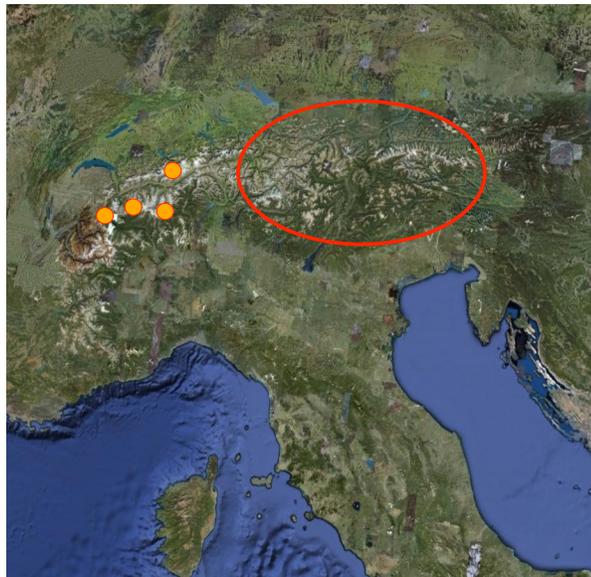
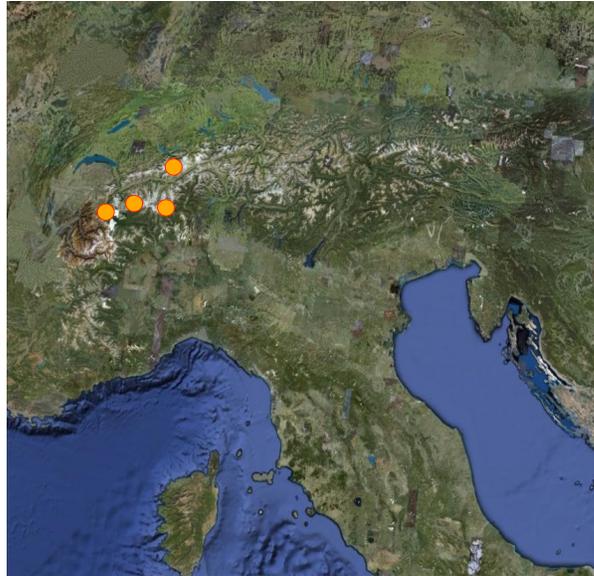


# Lo studio delle carote di ghiaccio in Alto Adige: dall'Ortles al gruppo del Sella

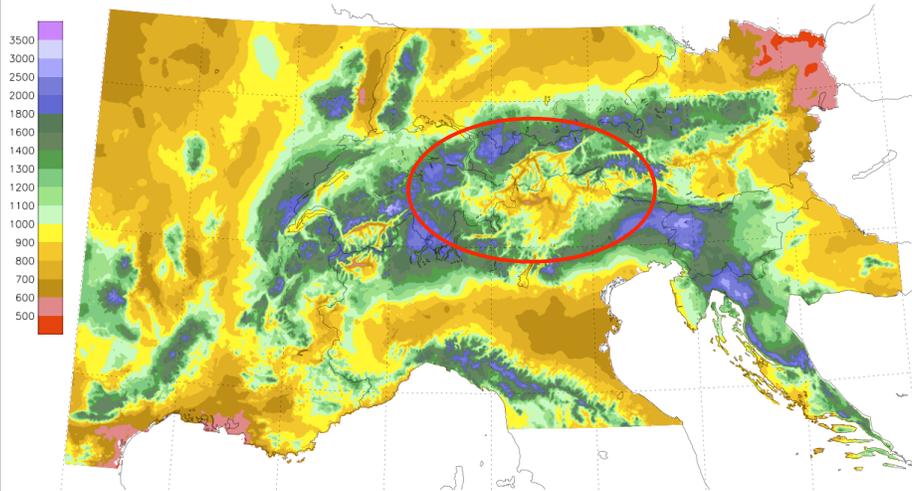
Paolo Gabrielli, The Ohio State University



# Ice cores drilling sites in the western Alps



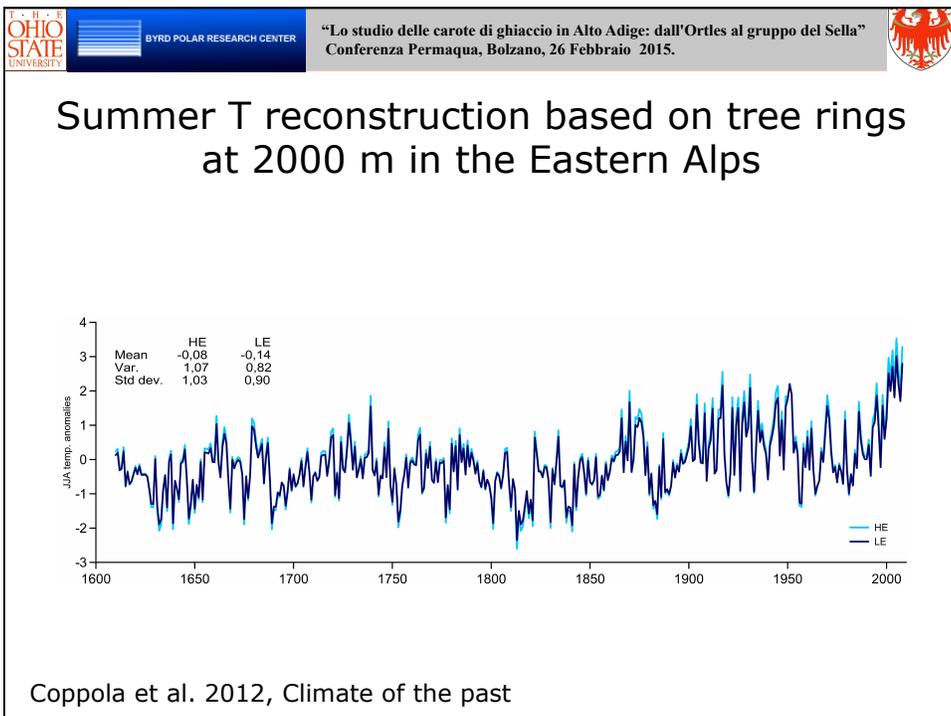
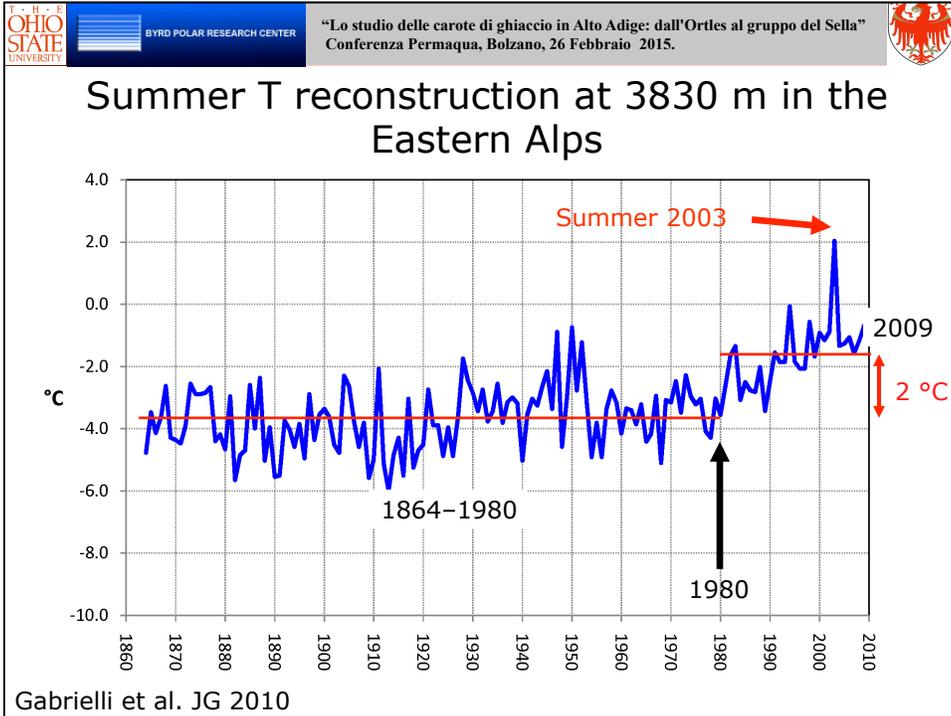
## Mean annual precipitation 1971-1990 [mm]



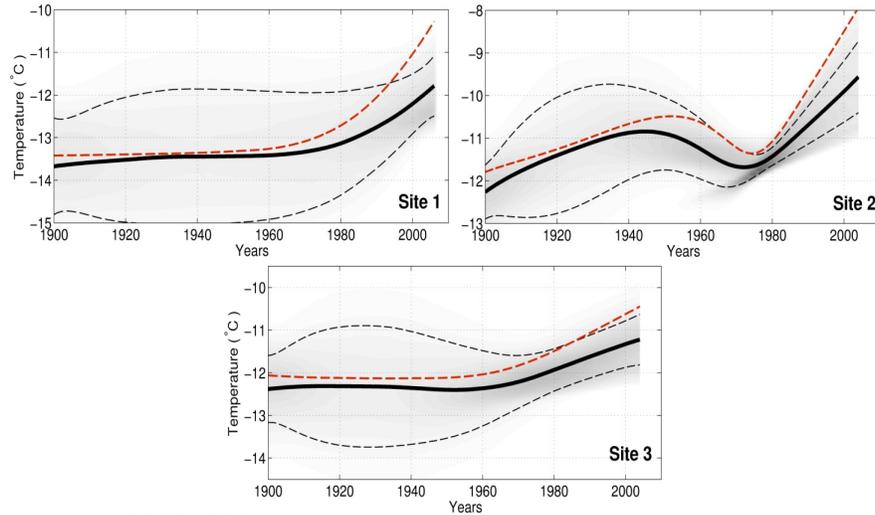
Schwarb, 2000, PhD Thesis, ETH, Switzerland

## Why do we need a new ice core from the Alps?

- ✓ Obtaining the first high altitude paleoclimate-record from the Alps (stable isotopes, dust, major ions)
- ✓ Studying past snow accumulation and aerosol deposition in this unique rain shadow (stable isotopes, major ions, trace elements)
- ✓ Reconstructing past mining, biomass burning and soil changes in Tyrol (trace elements, black carbon and levoglucosan, pollen types)
- ✓ Detailing the impact of post-Industrial Revolution emissions on the Eastern Alps (trace elements, PHA, POP)
- ✓ Assessing the impact of the first world war on Mt. Ortles (trace elements)

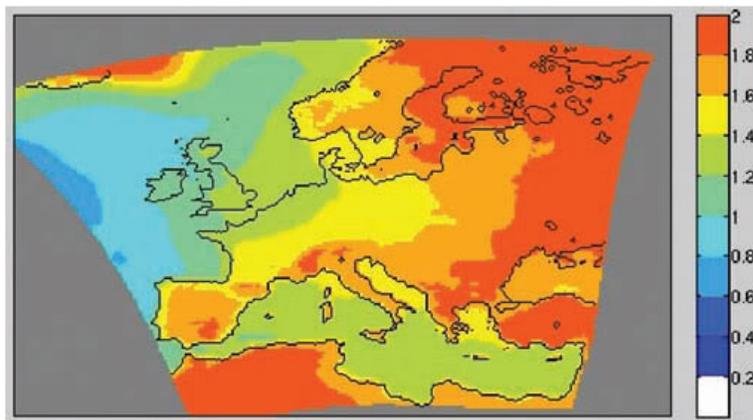


## Borehole temperature at 4300 m in the Western Alps



Gilbert et al. 2013, GRL

## Strong warming predicted in Southern Europe



Mean 2021-2050 minus mean 1961-1990 temperature

[http://ensembles-eu.metoffice.com/docs/Ensembles\\_final\\_report\\_Nov09.pdf](http://ensembles-eu.metoffice.com/docs/Ensembles_final_report_Nov09.pdf)

## Mt. Ortles was the highest mountain of the former Habsburg Empire (AD 1278-1918)



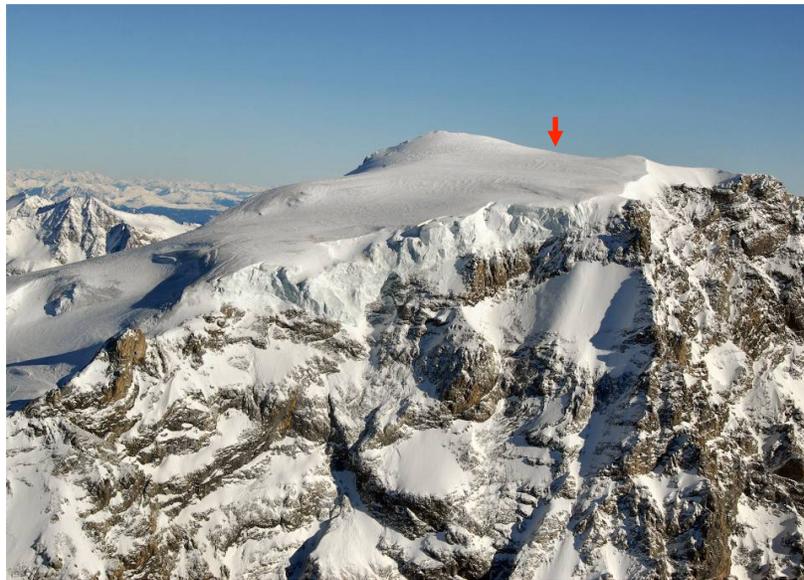
Glacier Alto dell’Ortles

Surface: 105 ha

Max. elevation: 3905 m

Min. elevation: 3018 m

Exposition: NW



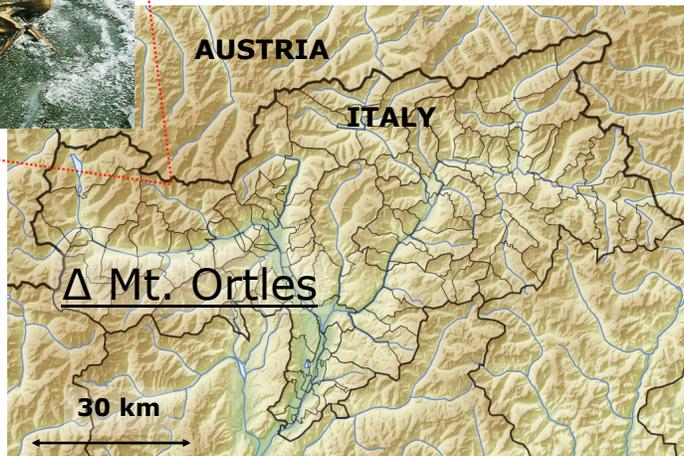
## Visible ice layers down to bedrock



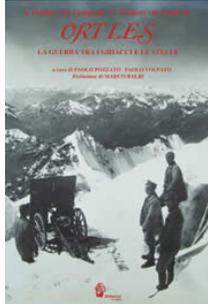
## The 5.2 kyr old “Tyrolean Ice Man”



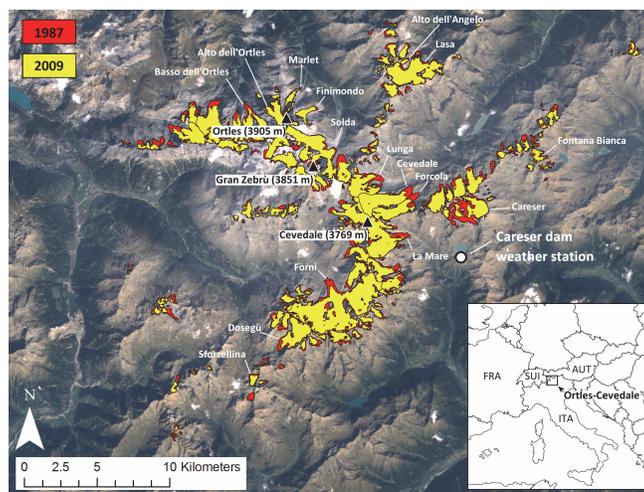
5.2 kyr old ice?



## Mt. Ortles was the front of World War I (AD 1915-1918)



## Area of the Ortles group glaciers shrank 23% during the period 1987-2009



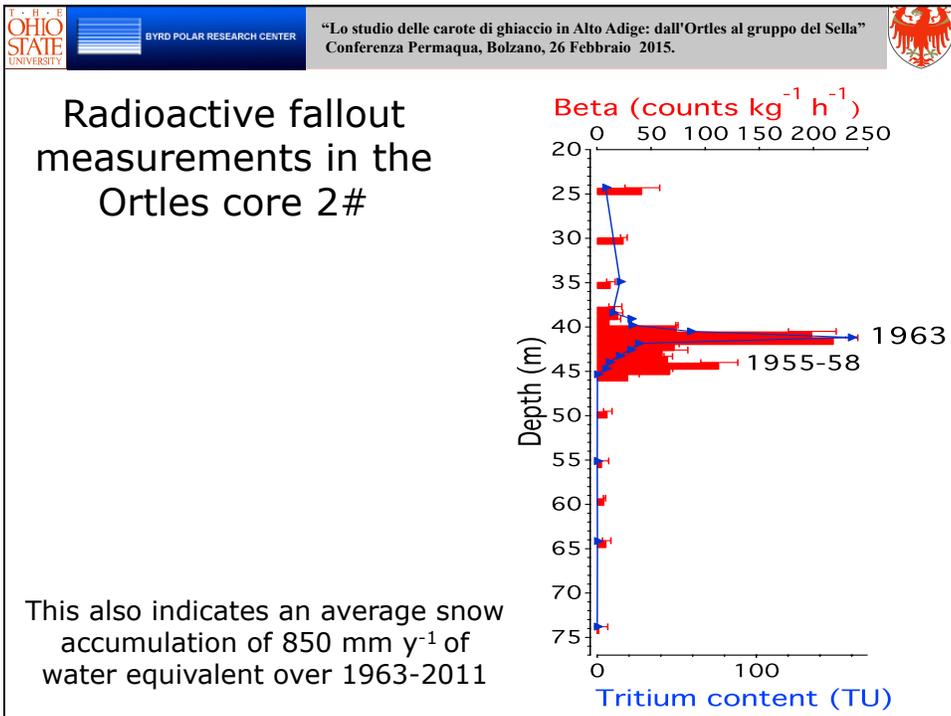
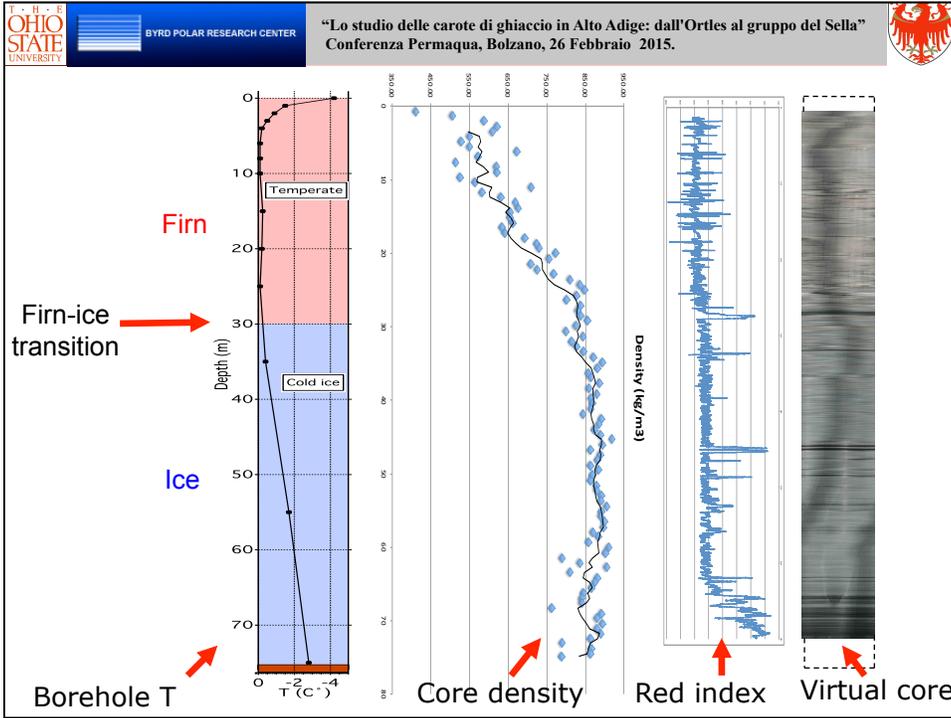
Carturan L., Filippi R., et al. 2013, The Cryosphere

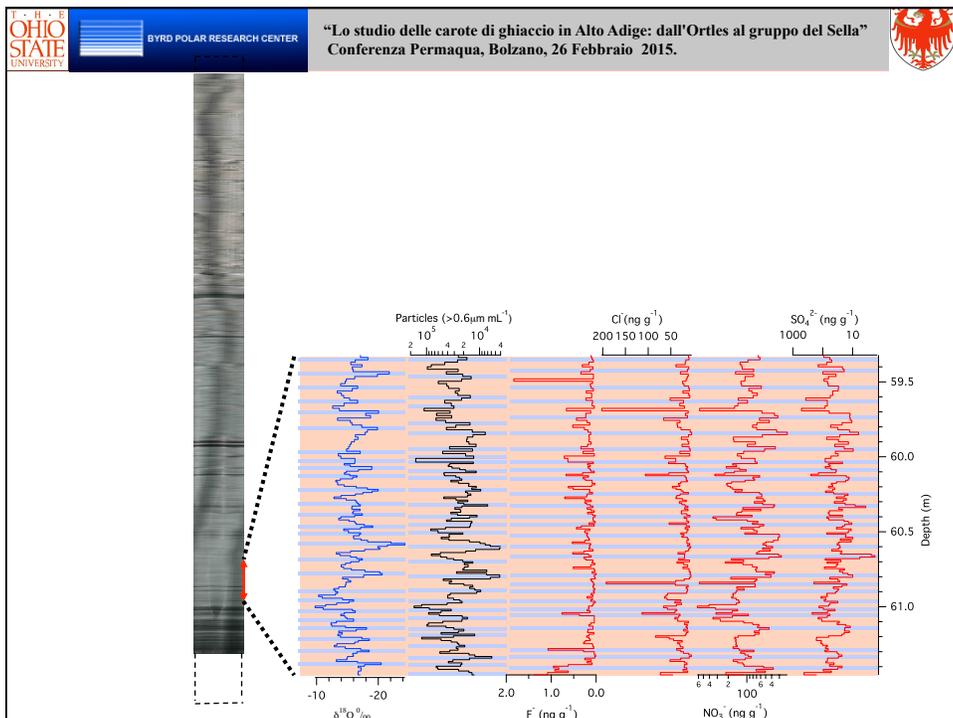
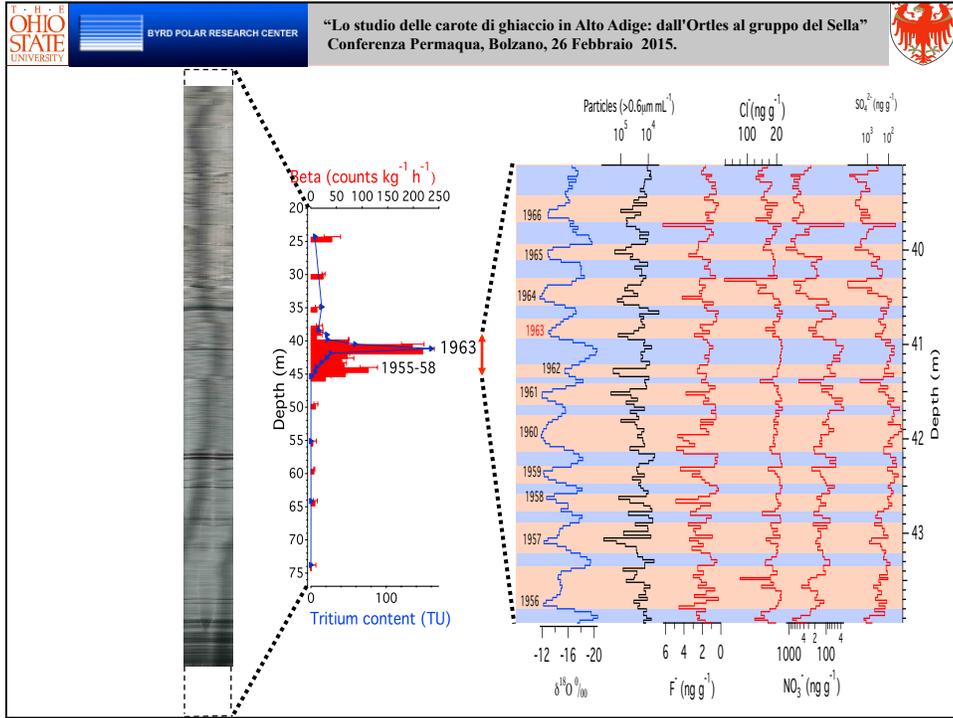
## The 2011 ice core drilling operation



## Four ice cores extracted during two weeks





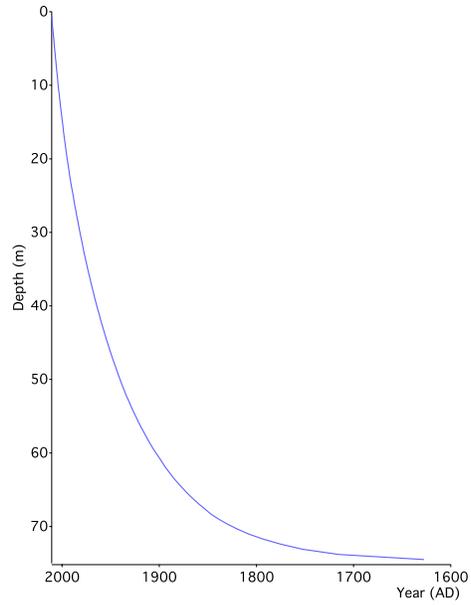


### Dating

Projection of the Nye flow model for the Ortles cores

Constrains:

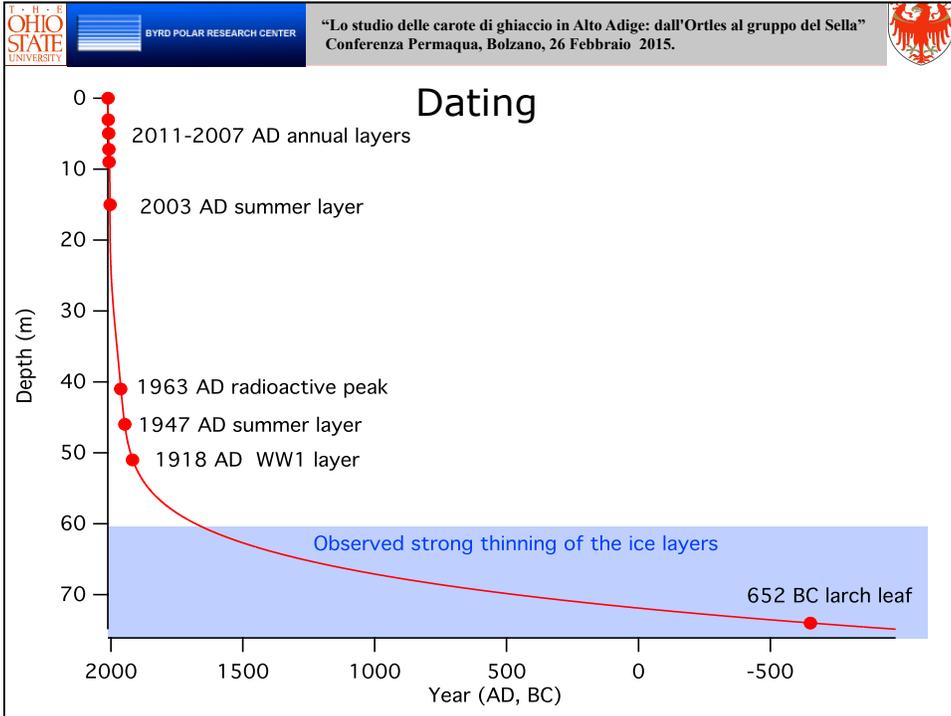
- 2011 at the surface
- 1963 at 41 m of depth



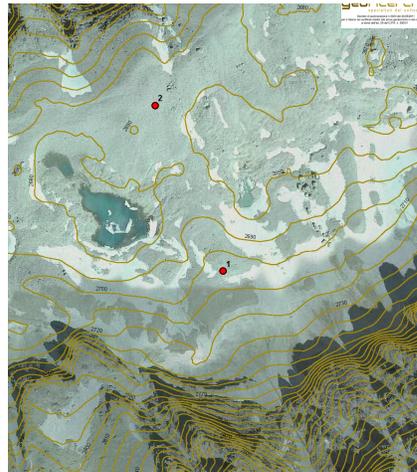
### Carbon 14 dating of an organic fragment



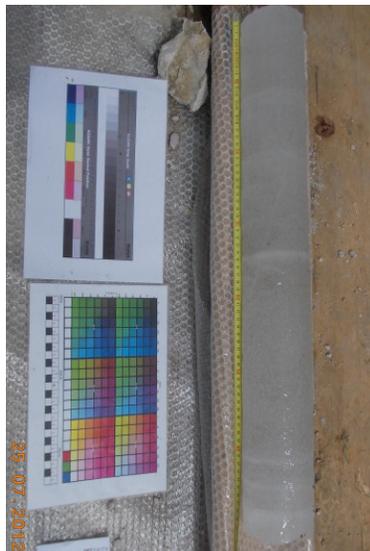
Larch leaf age:  
 $652 \pm 166$  BC



# The Sella ice core project



# The Sella ice core project



## Objectives and Plan

