PAUL SCHERRER INSTITUT

Wir schaffen Wissen – heute für morgen

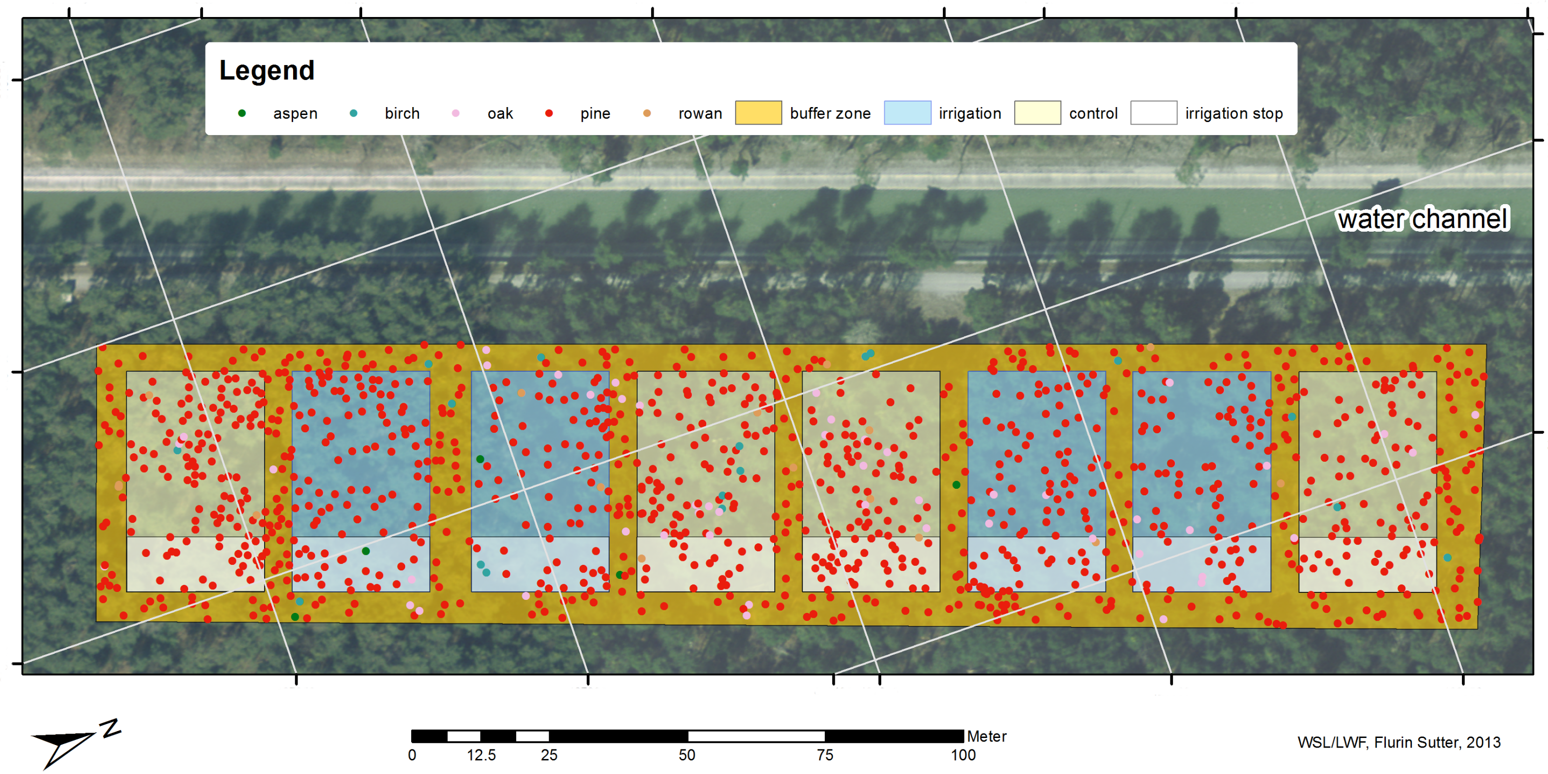
Paul Scherrer Institut

Galina Timofeeva

The relationships between stable isotopes, water-use efficiency and tree mortality under drought

Supervisors: Prof. Harald Bugmann and Dr. Matthias Saurer

Study Site



Pfynwald: 46°18' N, 7°36' E, 615 m a.s.l.

Mean temperature: 9.2°C, mean precipitation: 657 mm, 1961-1990, 30 yrs

Tree age: ~ 100 yrs, top height: 10.8 m

Stand density: 730 stems/ha, basal area: 27.3 m^2/ha

Tree species: Scots pine (*Pinus sylvestris*), total N of trees: 800

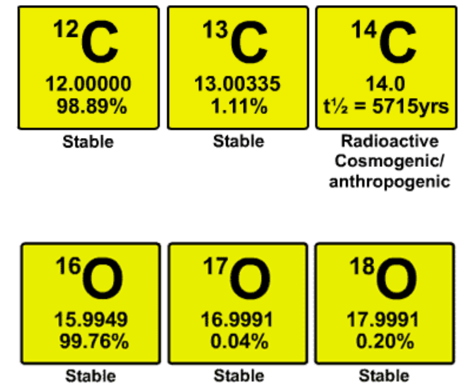
Experimantal site area: 1.2 ha (the site is split up into 8 plots of 1000 m^2 each), irrigation: 4 random plots from April till October since 2003

Data & Methods

Dead trees

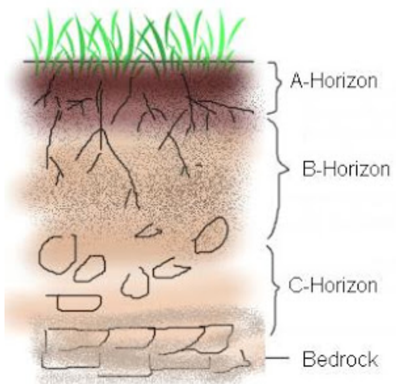
Living trees: healthy vs. unhealthy

TRW measurements



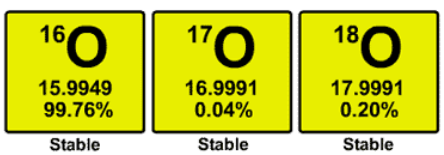
C&O isotopes analysis

Needles & twigs



Soil (0-10 cm, 10-20 cm)

H_2O extraction



O isotope analysis

Data & Methods

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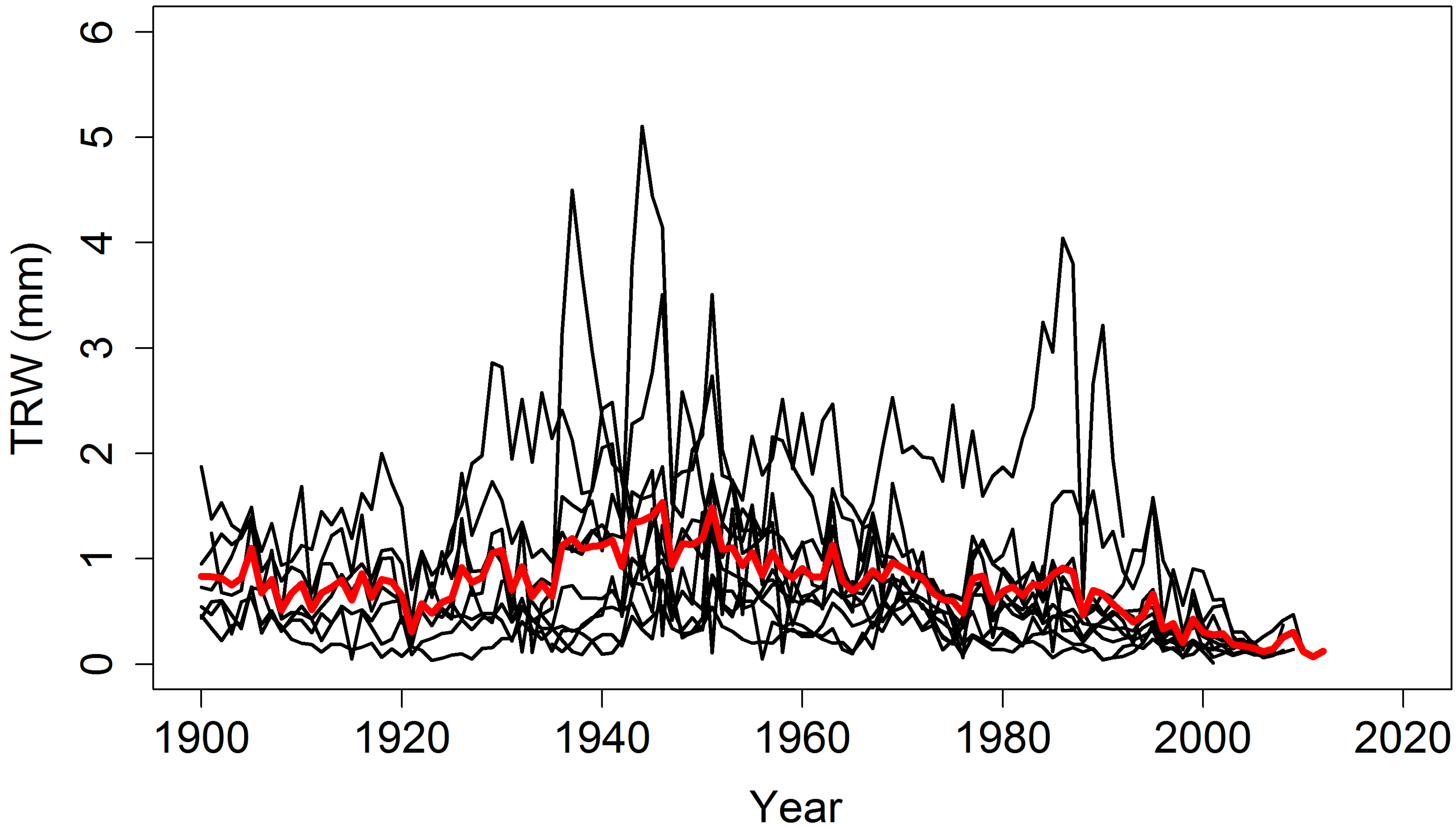
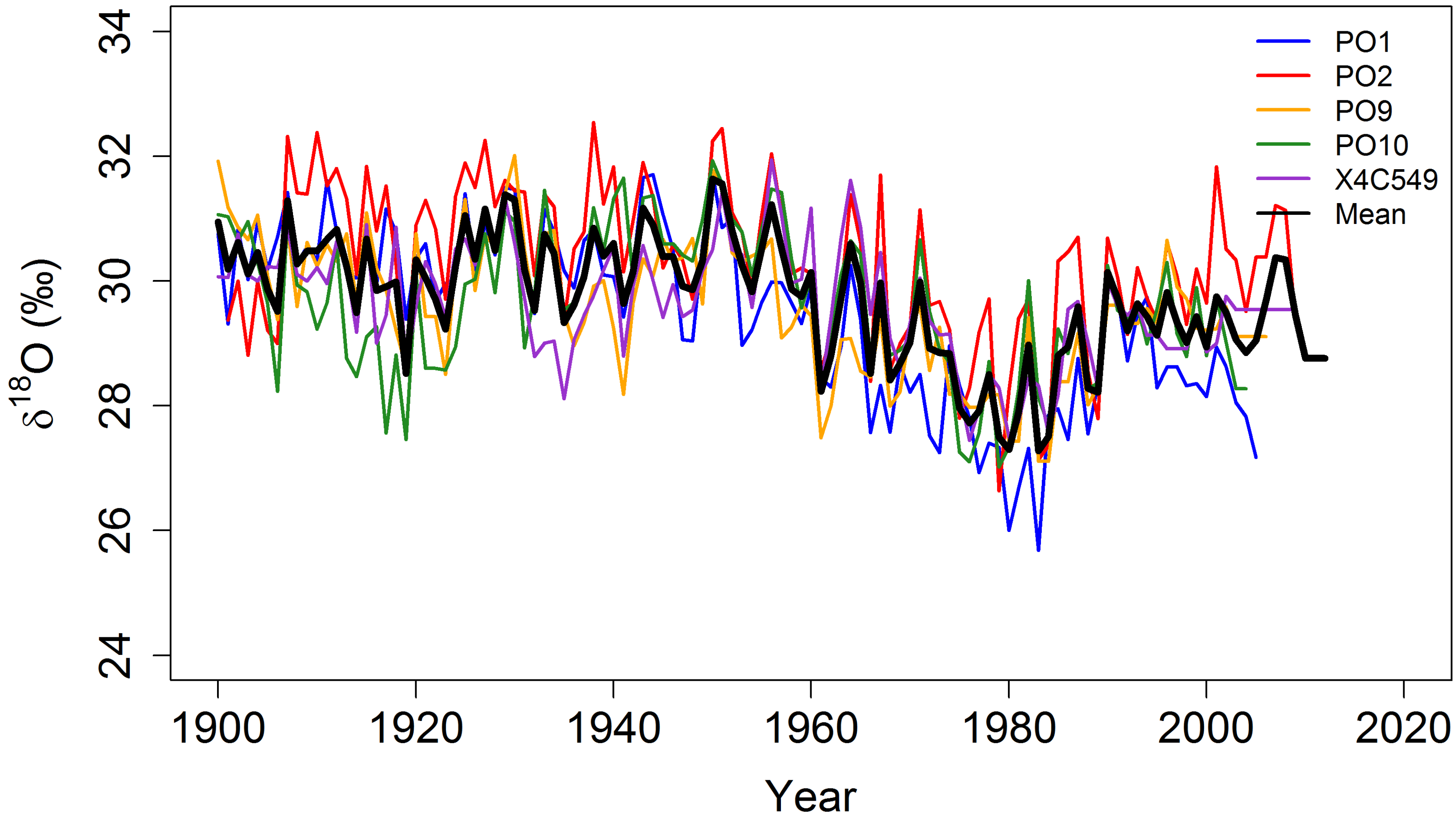
Data & Methods

Preliminary results



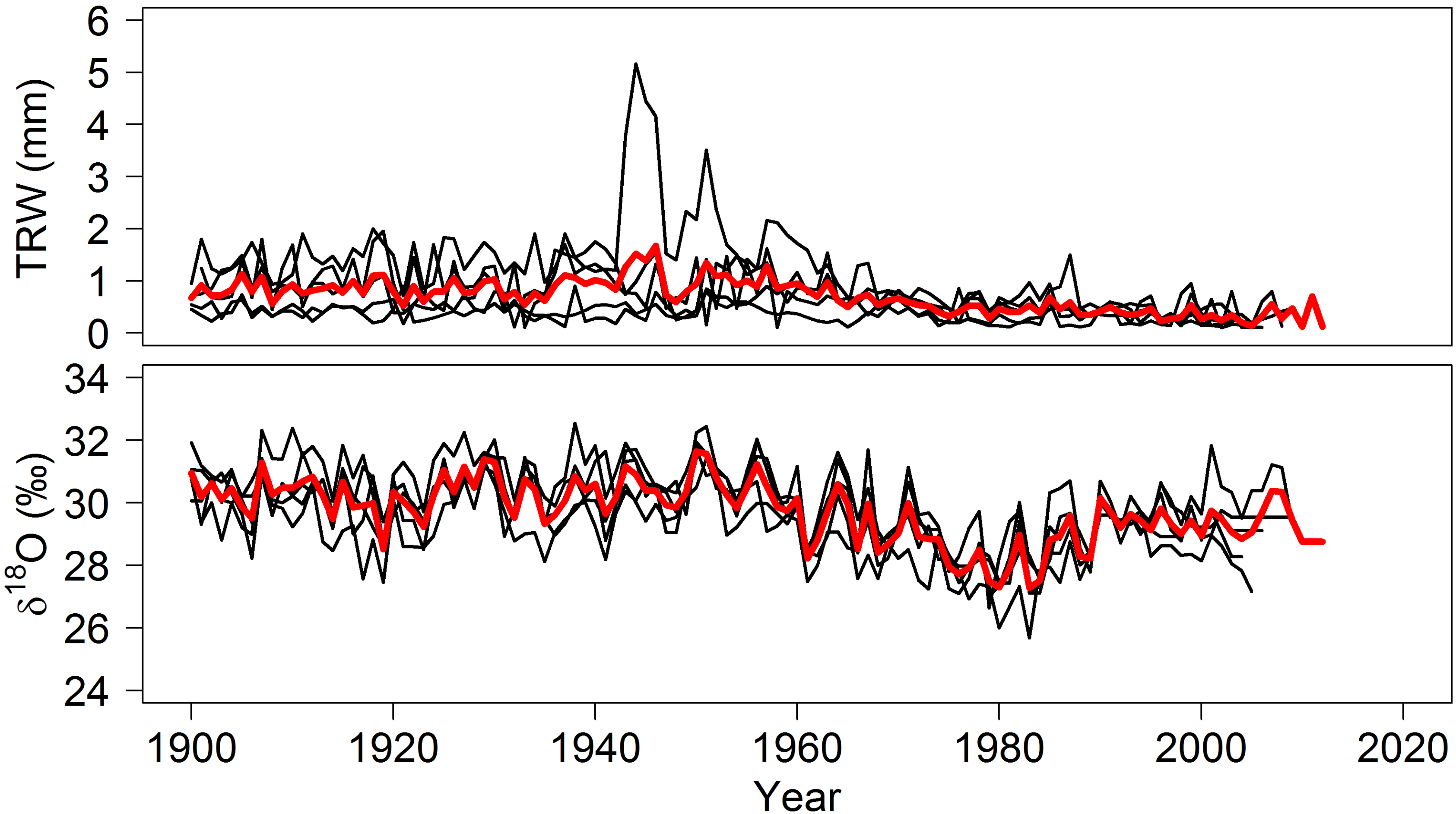
Tree-ring width raw data for the period 1900-2012 (5 trees): dead trees

Preliminary results



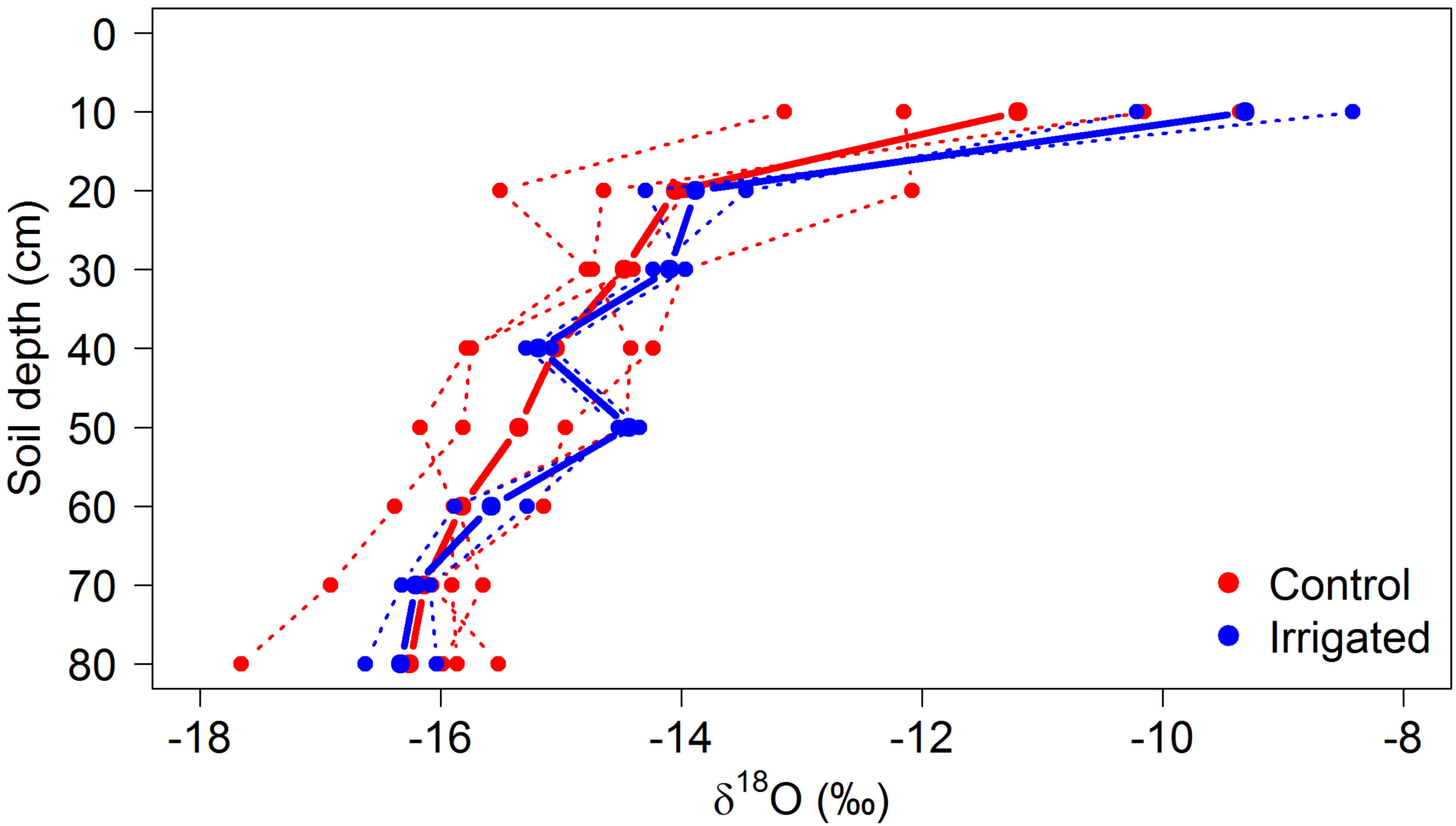
$\delta^{18}O$ data for the period 1900-2012 (5 trees): dead trees

Preliminary results



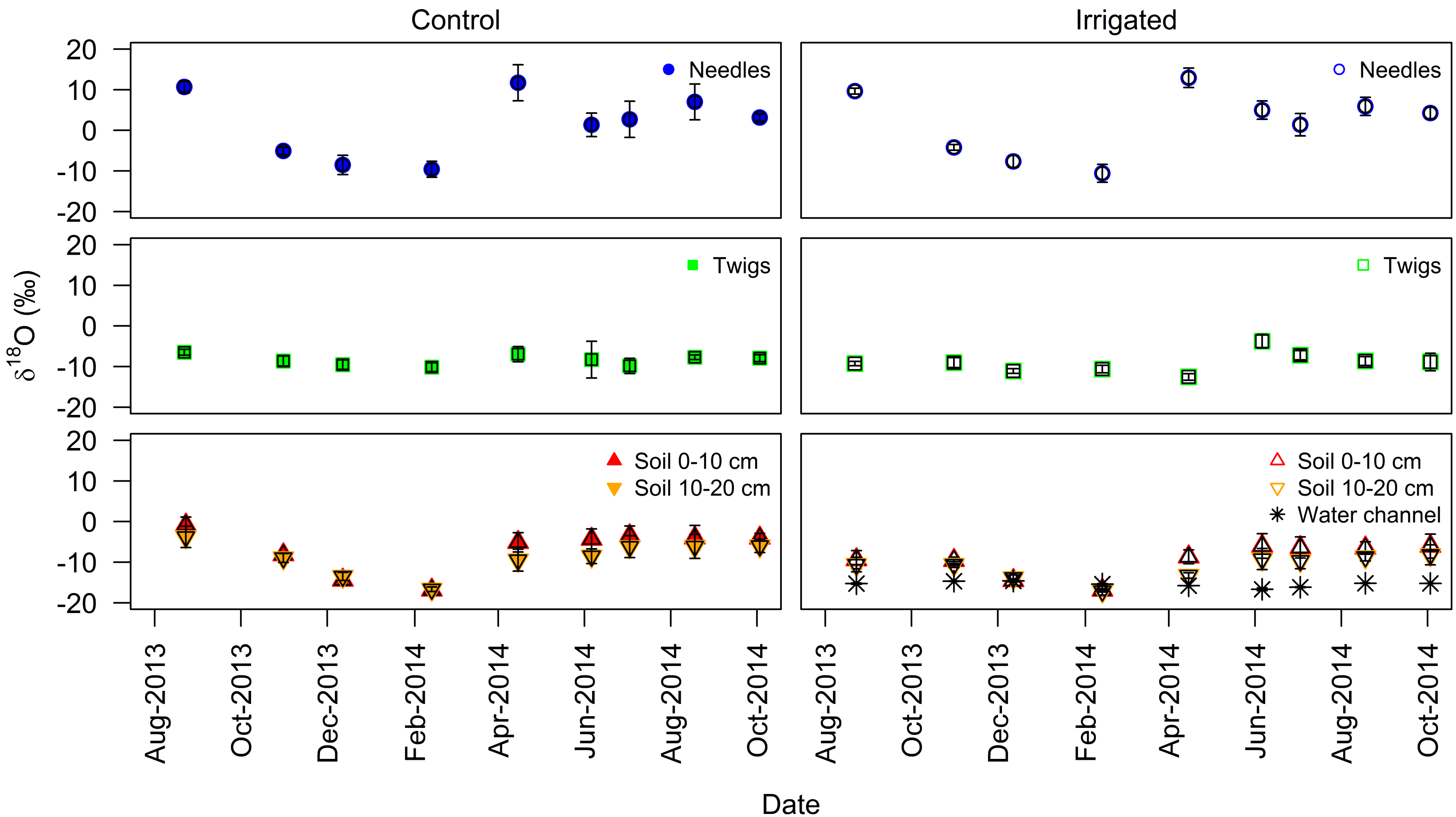
Tree-ring width raw & δ^{18}O data for the period 1900-2012 (5 trees): dead trees

Preliminary results



Soil profile from 2 irrigated and 4 control plots (date of sampling: 09.04.2014, before irrigation started)

Preliminary results



Seasonal changes in δ^{18}O of different water pools: 4 trees per treatment

Outlook

- Continue TRW measurements of living trees, cross-dating
- Preparation for the isotope analysis (splitting, cellulose extraction, packing, etc.)
- Data analysis
- And having a looots of fun with paper writing!

Thank you for your attention!