



Wir schaffen Wissen – heute für morgen

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**Tree growth decline and mortality processes under drought
from a physiology and climate sensitivity perspectives using
stable isotopes**

Research questions

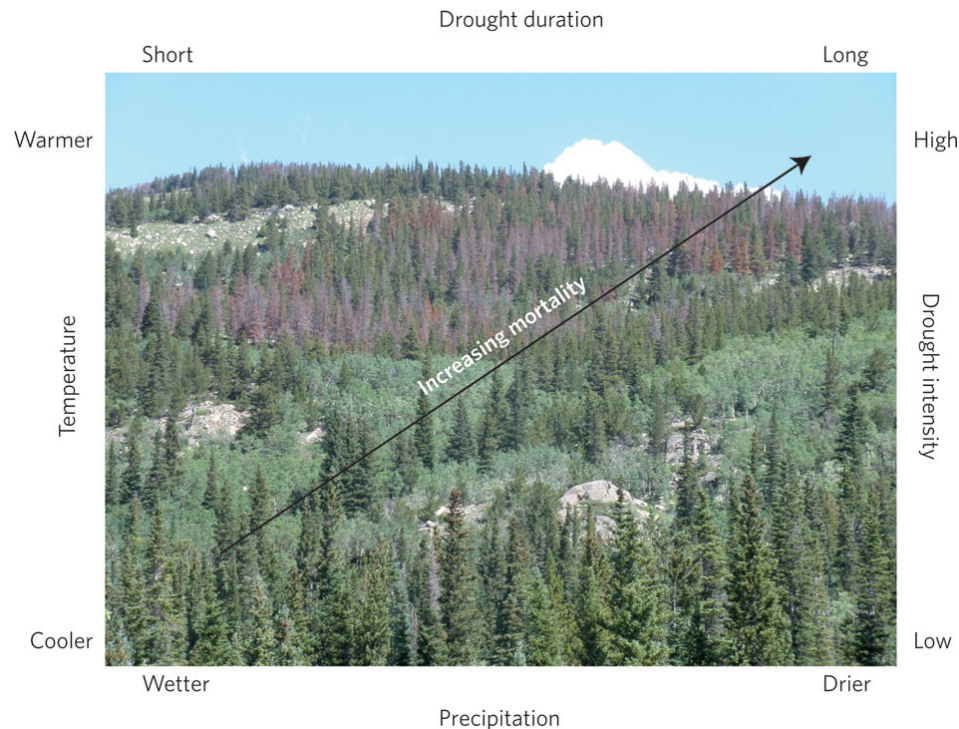


Figure adapted from Birdsey & Pan, 2011, Allen, 2010

- What are the physiological mechanisms of tree mortality: e.g. carbon starvation, hydraulic failure, impacts of insects and pathogens or cavitation or another? Combination of different mechanisms?
- How different are tree-ring isotope signals of dead and living trees over the past ca. 100years in terms of water-use efficiency and climatic sensitivity?
- What is the stable carbon and oxygen isotope response to irrigation?

Tree-rings

- Dead trees:

26 stem disks were sampled in October, 2013 from 17 dead trees (5 trees from the control plots, 12 from outside area of the plots), last 100 years for each C & O

Living trees (healthy and declining group based on crown transparency):

1 tree from each plot (2 cores), 4 trees in total per treatment (16 cores) will be sampled in March-April, 2014, last 100 years for each C & O

Seasonal samples for characterization of water isotopes

- Needles, twig, soil and water samples:

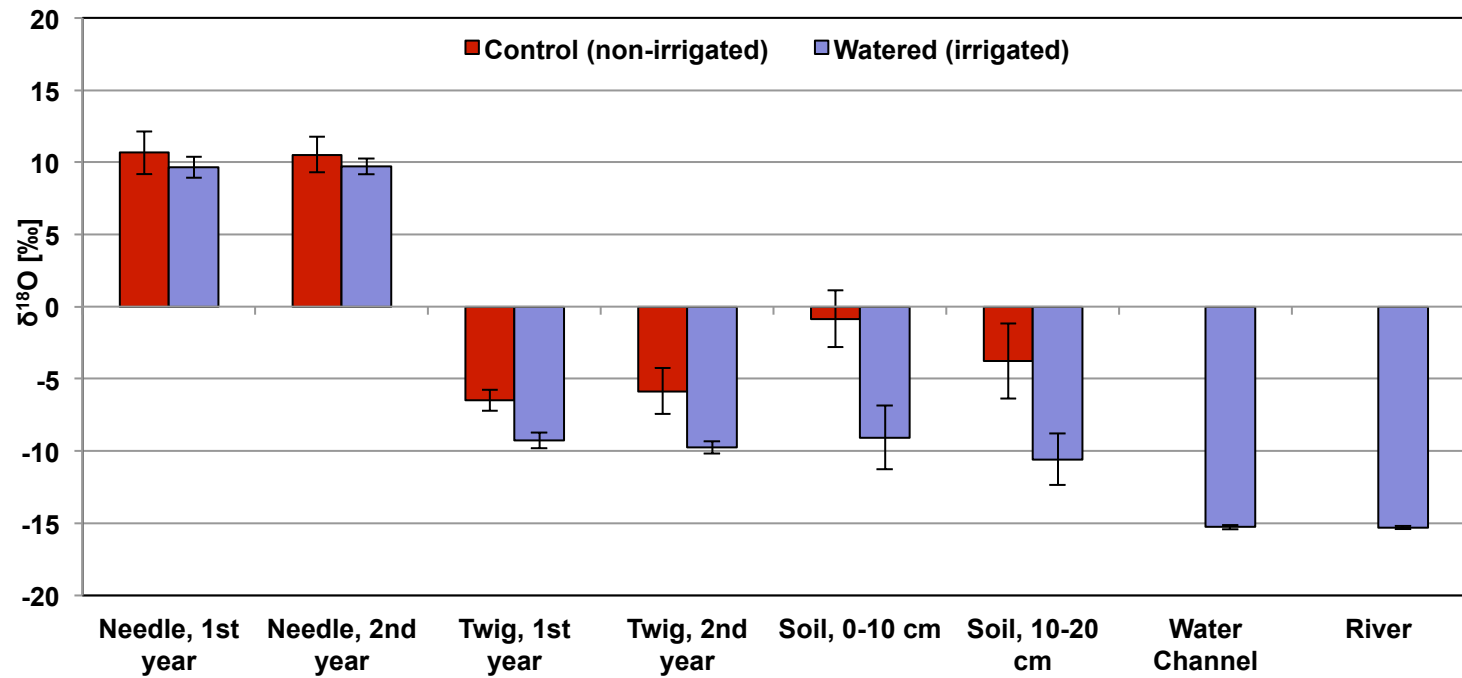
From 2 trees per 2 control and 2 irrigated plots (8 trees in total) were sampled in August and October, 2013. There will be further samplings in December, February, April, June, August and October 2014.

- TRW chronologies from dead and living trees
- C & O chronologies from dead and living trees
- Seasonal source water data from needles, twigs, soil and water samples
- Calculations based on model for the enrichment, intrinsic water-use efficiency
- Climate correlations and statistical analyses

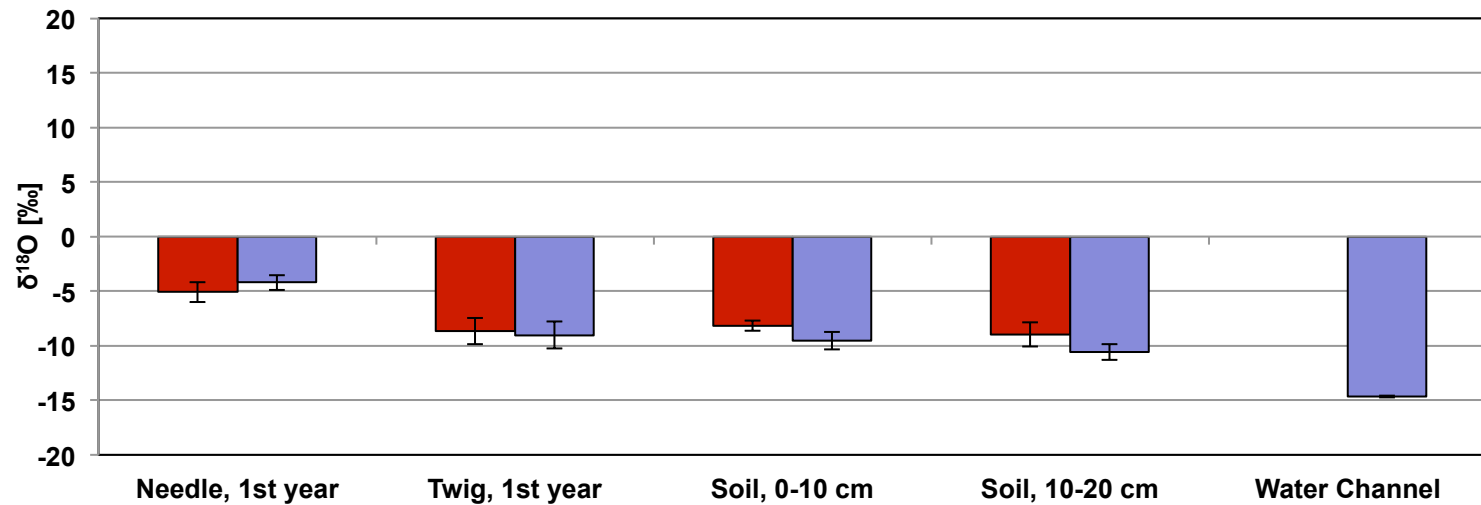
- Tree growth
- Cambium activity
- Wood anatomy
- Tree physiology, e.g. leaf gas exchange
- Mistletoes
- Soil properties, e.g. soil moisture

Preliminary results

August,
2013



October,
2013



Thank you for your attention!

