Quantifying the effect of springs on tree-growth

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A large number of studies have been held on tree rings all over the world. Dendrochronology was invented in the early 1920's in Arizona, USA, and is defined as being the study of annual tree rings, analyzing the changes in the rings' growth through time. Dendrochronology applications' field has been growing since then, and today many studies such as fire management, trees demography and even geological studies depend on it.

Dendroclimatology uses tree rings to infer past climatic conditions. Humidity affects tree rings' growth, and precipitation is agreed to be one of the main factors infering on the tree rings' width. However, springs' effect on tree growth has never been documented.

We studied growth responses of *Pinus Ponderosa* trees to springs' flow variability across the South-West of the United States on various slopes and elevations. We gathered a total of 50 tree cores at 8 different spring locations around Flagstaff, Arizona. We wanted to show that springs affect trees situated next to them, and even that the springs' flow could be seen in the growth records. The soil characteristics were similar for trees near and away from springs, so that soil effect could be neglected. We compared the rings' width of each specimen to the characteristic patterns of dry (marker) and wet years of chronologies, compiled previously from various trees near Flagstaff. After drying, mounting and dating the cores, we calculated the mean sensitivity of each sample and compared them together.

We hypothesized that spring flow would covary closely and positively with tree growth - and thus tree rings width, and that trees next to springs would be more complacent to dry years. We also predicted that growth sensitivity to springs' perenniality would be higher at steeper slopes.