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## Exploring the climate signal in tree-ring density of Clanwilliam cedar, South Africa

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High-resolution annual precipitation and temperature proxies are largely lacking in Southern Africa, partly due to the scarcely available tree species that are suitable for dendrochronology. Clanwilliam cedar (*Widdringtonia cedarbergensis*) from Cape Province, South Africa, is a long-lived conifer with distinct tree rings and thus a strong dendroclimatic potential. However, the climatic signal in its tree-ring width (TRW) is weak and other tree-ring parameters such as density need to be explored to extract climatic information from this proxy. Here we investigate the climatic signal of density parameters in 17 Clanwilliam cedar samples (9 trees) collected in 1978 (Dunwiddie & LaMarche, 1980). We use a non-destructive X-ray Computed Tomography facility to develop minimum density (MIND) and maximum density (MXD) chronologies from 1900 until 1977. EPS for both density series exceeded 0.85. For the period 1930-1977 (reliable instrumental records), MIND correlates negatively with early-growing season precipitation (Oct-Nov), whereas MXD correlates negatively with end-of-season (March) temperature. The spatial correlation between MIND and spring precipitation spans the winter rainfall zone of South Africa. Clanwilliam cedar can live to be 356 years old and the current TRW chronology extends to 1564 CE. Full-length density chronologies for this long-lived species could provide a precipitation reconstruction for southern Africa, a region where historical climate observations are limited and where societal vulnerability to future climate change is high.

### References:

Dunwiddie, P. W., & LaMarche, V. C. (1980). A climatically responsive tree-ring record from *Widdringtonia cedarbergensis*, Cape Province, South Africa. *Nature*, 286(5775), 796–797.