On the influence of tree size on the climate–growth relationship of kauri

Seasonal growth characteristics

图片包含 图示

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Kauri growth characteristics—annual time scale. Correlation function between annual growth of small (black) versus large (grey) trees and a temperature, b precipitation and c SOI. Significant correlations are indicated for both chronologies with a grey or black positive/negative sign, significant differences between the chronologies with a red asterisk. Significance levels: Two signs (??/--/\*\*) for p\0.001, one sign (?/-/\*) for 0.001 \p\0.05. SON: austral spring (September, October, November); DJF: austral summer (December, January, February); MAM: austral autumn (March, April, May); JJA: austral winter (June, July, August) of current year (t) and previous year (t-1).

Temperature

图表, 直方图

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Temperature thresholds and dormancy of kauri. Black solid lines maxima and minima of weekly air temperature (2 m, under canopy). Grey solid line half-hourly air temperature records (2 m, under canopy). Vertical dashed lines beginning and end of xylem growth (estimated from micro-cores). Red dashed line 17.5 oC

1. The seasonal climate–growth relationship of kauri is size dependent. Small trees with less than 40 cm DBH show different climate responses and contain a weaker climate signal.

2. For kauri of all sizes, most of the xylem formation occurs during the austral spring months October and November, i.e. the time where the ENSO signal on New Zealand climate is usually strongest (Gordon 1986).

3. Kauri dormancy coincides with a period characterized by maximum weekly air temperatures below ca. 17–18 oC and daily temperature minima below ca. 8oC.

4. Daily kauri growth rate (measured as stem radial increment [SRI], Downes et al. 1999) is mainly influenced by air temperature and soil moisture of the previous day with the strength of this relationship being highly time-varying.

5. The flexible Kalman filter regression is a powerful tool to reveal time-dependent influences on seasonal tree growth.