

Interactive comment on “Relating ring width of Mediterranean evergreen species to seasonal and annual variations of precipitation and temperature” by W. Nijland et al.

Anonymous Referee #2

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Title: Relating ring width of Mediterranean evergreen species to seasonal and annual variations of precipitation and temperature

General comment:

The presented study deals with climate-growth relationships of two Mediterranean tree species (*Quercus ilex* and *Arbutus unedo*) on different soil substrates based on

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dendrochronological studies. So far, only a few studies have been performed in the Mediterranean climate. Analyses of the climate-growth relationships based on tree rings (dendroclimatology) are important for a better understanding of tree physiology and of possible impacts of future climate scenarios. The study is well conducted using adequate techniques for analysis and modeling of climate-growth relations. However, there are some concerns which should be considered by the authors.

Specific comments:

Abstract: Page 356; line 6: Please mention authors and family of the studied tree species when citing the species names for the first time.

1. Introduction: Page 357; lines 4-12: The author focus on possible negative impacts on forests productivity in the background of a changing climate. What about the impacts on biodiversity and other environmental services which the Mediterranean forests deliver?

Page 360; line 6: After citing the full name of the genera *Quercus* and *Abutus*, it is sufficient to use initials when citing the genus, Q. and A., respectively.

2. Methods: 2.1 Study area: A small map which could be integrated in figure 1 would be nice for a better understanding of the location of the study site. 2.2 Trees: The existing knowledge about the potential for dendrochronological studies should be clearer indicated for the two tree species. 2.3 Data Collection: Page 362; lines 27/28: The method of cross-dating should be better described. This method is crucial to (1) identify missing, false and wedging tree rings and (2) to evaluate, if there is an external oscillating factor which triggers tree growth leading to the formation of similar temporal sequences of ring widths or other wood anatomical parameters between different individuals of a species in a certain region. Cross-dating can be performed either by Skeleton plots (Stokes and Smiley 1968) or by comparing ring-width curves. In the second case also non-statistical parameters such as “Gleichläufigkeitsprozent” and statistical parameters (T-values, correlation coefficients) are used to verify the correct dating of tree rings

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(Schweingruber 1989).

3. Results: Page 364; lines 2-4: These two sentences are part of the methodology.

Page 364, lines 5-9: How did cross-dating techniques contributed for the exact dating of tree rings in the case of anomalies in ring formation described at the lines 10-21?

Page 364, lines 25-27: What is the basis for this statement? "The root mass is large compared to the shoot and leaf biomass in this first growth phase and competition for light and water is greatly reduced. Around five years after the logging the canopy closes, resulting in a decrease and stabilisation of ring widths". Is this based on other published studies, unpublished data, personal observations or hypotheses?

Page 365; lines 18/19: How are these similarities between the indexed ring-width chronologies expressed? The authors should provide a table indicating the statistical basis for these similarities. This table should also provide the statistical basis to build up the (a) one single chronology representing all series regardless of tree species and substrate; (b) two species-specific chronologies; and (c) three substrate-related chronologies.

Page 365; lines 20/21: How do the authors define pointer years? Please include the definition in the methodology.

Page 366; lines 1-14: The use of "vegetation period" would improve the understanding of the highlighted climate-growth relationships. For instance (lines 2-4): "This means that tree growth benefits from high temperatures at the beginning of the vegetation period and that growth is reduced if summer temperatures are high" or lines 13/14: "The growth potential in autumn is low because of the declining temperatures and day length at the end of the vegetation period".

Page 366; lines 15-18: Should be moved into the discussion part.

Page 367; lines 10-19: The comparison with GPP data should be already mentioned in the methodology section.

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Page 367; lines 20-30: The relation between the GPP curves and the ring-width obtained in the years 2004 and 2006 should be better expressed.

4. Discussion and Conclusions:

Page 369; lines 5-10: It should be mentioned that the potential of dendroclimatology is underused for the Mediterranean and also tropical regions, however, for temperate and boreal climate zones there a huge number of chronologies is available.

Page 369; lines 21-23: This database for such a statement is not sufficient in my point of view. (1) the detected climate-growth relationships in this study explain only a part of the stem growth, but for sure there might be other abiotic and biotic factors which triggers stem growth. (2) The authors should also consider that the obtained climate-growth relationships from 1970-2008 have been established in a period with already increasing temperatures. To evaluate the impact of a future climate on tree growth climate reconstructions it is necessary to highlight climate-growth relationships for periods before increased greenhouse gas concentrations.

Figures: Figure 1: Please describe the meaning of the dotted line (standard deviation of monthly temperature or minimum/maximum values).

Figure 2: Is the indicated scale of 5 mm valid for all 4 photographs? If yes, please mention it in the figure legend. If not, please indicate the scale in each picture.

Figure 4: Format the title of the y-axis: "RingWidthIndex".

Figure 5-7: Indicate the title of the y-axis.

Figure 8: Indicate the units of GPP at the second y-axis.

Technical corrections: Page 370; line 4: Change "moths" to "months".

Page 370; line 10: Change "august" to "August".

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