Is the upper timberline in subtropical mountains induced by drought?—A case study of *Pinus canariensis* along its elevation range in Tenerife, Canary Islands

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Tree growth of *Pinus canariensis* forests on Tenerife, Canary Islands, has been suggested as being mainly controlled by physiological limitations due to drought-induced stress, in agreement with the general pattern for subtropical mountains (Jonsson et al. 2002; Morales et al. 2004). However, aspect position of mountain slopes harshly influences local water input and controls vegetation distribution (Fernández-Palacios & de Nicolás 1995), as trade winds maintain humid weather conditions on windward slopes, while leeward slopes remain much more arid (Aboal et al. 2000). In this study, we assessed the effects of local climate and North Atlantic Oscillation (NAO) on the radial growth of *P. canariensis* along its elevation range on both slopes on Tenerife.

Wood cores were taken from six afforestations on both windward and leeward between 1,000 and 2,000 m a.s.l. Total tree-ring widths were used to explore common patterns of growth behaviour, using principal component analysis (PCA) for the period 1967-2006. Tree-ring growth responses to climate were evaluated by correlations. We used monthly gridded time series of mean (T) and maximum (Tmax) temperatures, precipitation (P), sea level pressure (SLP), vapour pressure (VP), and the North Atlantic Oscillation (NAO) index.

We found great differences in climate-driven growth patterns and in their responses to local and large-scale climate variation between slopes, with a greater response to winter Tmax and VP on windward, but annual P and autumn-winter SLP and NAO on leeward. This is probably due to the contrasting physiological effects of water inputs and radiation on both slopes caused by fog drip (Burgess and Dawson 2004). By contrast, altitudinal gradients showed to be irrelevant on tree growth, with the only exception of the lowest stand on windward. We conclude that physiological limitations due to slope aspect, but not to increasing elevation, are mostly driving *P. canariensis* growth.

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