

TRACE 2021

Tree Rings in Archaeology,
Climatology and Ecology

BOOK OF ABSTRACTS

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Tree ring analysis of *Araucaria angustifolia* in response to hydropower plant operation in Southern Brazil

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The Paraná Electric Energy Company, “COPEL GeT” (research and development), is running the “ANEEL (National Agency of Electric Energy)” project (PD-06491-0405/2015) with Federal University of Paraná and “SIMEPAR (Paraná Meteorological System)”. The aim of this study was to use meteorological series and *Araucaria angustifolia* tree ring chronology to investigate possible changes in local climate due to the construction of a hydropower plant in Paraná State, southern Brazil, in 1980. Hydropower plants are important sources of energy supply, but the climate impacts of dams are still poorly understood. In order to identify those climate changes, tree ring analysis emerges as a valuable tool. Dendrochronological analyses were developed from wood cores of 30 trees, extracted by an increment borer. Historical climate data were obtained from

local and nearby weather stations. Data were evaluated by principal component analysis, analysis of variance and means test. Tree ring responses to climate variables were analyzed by fitting generalized linear mixed models and Spearman correlation. Time span ranged from 1800 to 2016, but EPS was satisfactory from 1920 (>0.7). Oldest and youngest trees were 143 and 38 years-old and the average length of series was 62.1 years. Our results detected evidence that hydropower plant may have changed local climate, mainly influencing hydrological cycle. We identified a statistically significant increase in monthly precipitation over other weather stations. Tree ring responses were found to be related to minimum temperature, dam construction and water level (which is probably influencing other derived variables).