



THE LABORATORY OF TREE-RING RESEARCH

presents a talk by

Malcolm K Hughes

(Regents' Professor of Dendrochronology-LTRR)

'Blue rings' in multi-century bristlecone pine from near upper tree limit in California and Nevada

Wednesday, October 26, 2016 - 12:00pm to 1:00pm

Room: Bannister 110

Our strongly replicated collections of dendrochronologically dated tree-ring material of bristlecone pine (*Pinus longaeva*) from multiple locations in the high mountains of the Great Basin and nearby regions constitute a unique environmental archive. Their tree-ring widths have yielded multi-millennial histories of moisture availability, tree growth, temperature and tree-line elevation as well as of the chronology and influence of climatically effective, explosive volcanic eruptions. The latter study used the known link between an anomaly of wood anatomy, frost rings, and such volcanically induced events. We report a new environmental record in these materials, based on a different wood-anatomical feature, the presence of unlignified tracheids in some rings. Piermattei et al. (2014) demonstrated the presence of such 'blue rings' in young *Pinus nigra* from Italy and suggested a link to cold periods in the late growing season. The same methods were applied to multi-century increment cores from eleven bristlecone pine from three distinct sites. 15-20 μm thin sections were double stained with safranin and astra blue, revealing cellulose-rich cell walls in blue and lignified cell walls in red. Failure to lignify leaves the walls stained blue. We identified multiple such 'blue rings' in eight of the eleven cores examined. They were not limited to young trees and occurred in all centuries examined, back to the twelfth century AD. We will discuss whether these 'blue rings' occur simultaneously in different individual trees and locations and whether they co-occur with frost rings or other features. It will be possible to extend the 'blue ring' record back several millennia with existing bristlecone pine collections. We will examine the likely benefits of such an exploration.