Sub-Saharan Climatic Catastrophe Forewarned by AMS

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With one notable exception, World leaders have accepted the irrefutable evidence that climate change is happening and represents one of the most important issues - if not the most important issue - that affects all corners of our planet and our collective future along with it. The denialist point-of-view continues to be trumpeted from some quarters and as such has to be refuted through fact gained via scientific measurements that show that this is not only happening in the here and now, but will worsen into the future unless appropriate measures are taken with all due haste.

The evidence presented here is derived from an ongoing study of baobab trees in sub-Saharan Africa in which growth patterns are shown to be correlated with temperature and dryness. Along with results that stretch as far back as the beginning of the twentieth century, these correlations are well-reproduced by climate models and therefore their predictions that sub-Saharan Africa will become hotter and dryer have to be taken seriously along with all consequences thereof.

By their nature, baobabs do not grow within a forest, a wood or even a copse but stand apart from each other as sentinels of the savannah so that there is no closed arboreal canopy. As such they are excellent indicators of the dryness of the environment in which they grow and since dryness is intimately correlated with temperature, they give a record of the temperature at that location. This was derived from the measurement of the ratio of the two stable isotopes of Carbon, namely Carbon-12 and Carbon-13 as shown in figure 1. However, baobabs tend to be multi-stemmed, that is they do not have a single trunk with a single set of growth rings. Moreover, when it is too dry, baobabs will not lay down an annual growth ring in one or any of the multi-stems of the fused trunk. In fact, they may not lay down a growth ring for decades or may grow up to five or six rings in a single year. Thus, this necessitates the explicit dating of each ring via radio-carbon measurements as undertaken with Accelerator Mass Spectrometry (AMS) in order to date the Carbon-12/Carbon-13 ratios and hence the climate characteristics derived from them. The AMS facility at the TAMS department of iThemba LABS has undertaken a considerable number of Carbon-14 measurements for this project and the latest results will be presented.

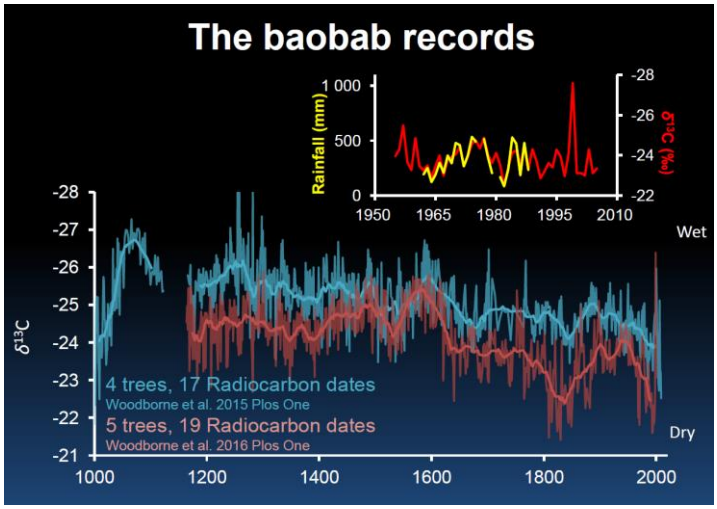

Figure 1 : $\delta^{13}C$ values for baobab trees dated with C-14 AMS measurements. The $\delta^{13}C$ values extracted from tree rings illustrate how wet or dry the environment in which the tree was growing at that time shown on the x-axis (calculated calendar year) as derived from the C-14 AMS results.