20 An ecophysiological framework for interpreting sap flow data

20.1 Example Sap Flow data and scenarios

The following examples show Raw Heat Pulse Velocity (HPV) data from the stems of *Eucalyptus* trees. They are designed to provide background reference to aid in the interpretation of sap flow measurements and troubleshooting when installing SFM1 Sap Flow Meters.

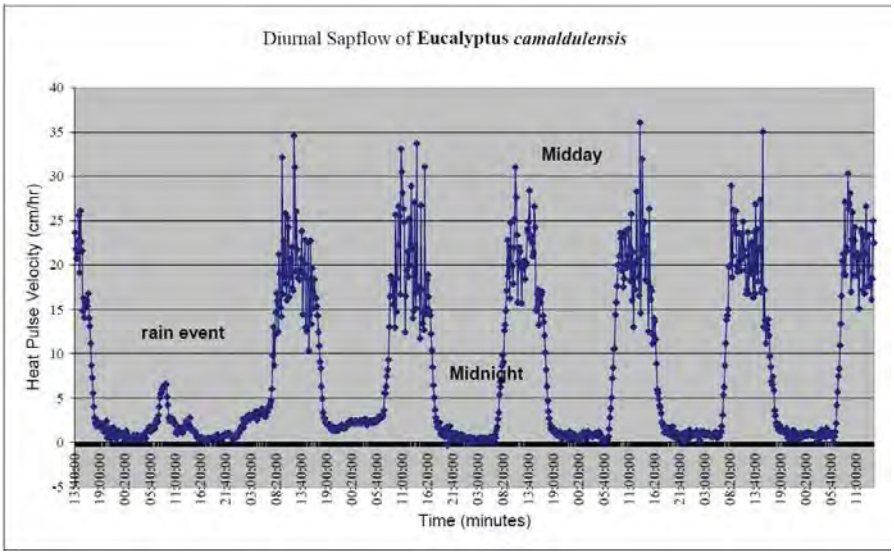

Figure 119: A typical diurnal heat pulse velocity pattern of a *Eucalyptus camaldulensis* with very 'clean' HRM data and no obvious problems; needles well in conducting sapwood over a period of 1 week. Zero flows are experienced at night time with fluctuating peaks throughout the day in response to changing light conditions and evaporative demand. In this example the effect of a rainfall event on sap flow can be clearly seen.

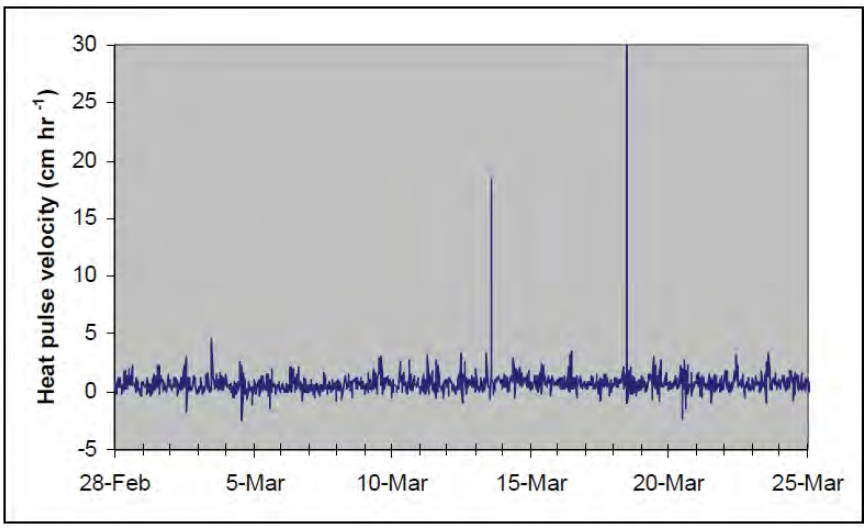

Figure 120: Data from probes installed in wood with poor hydraulic conductance: This is typically what you might see if these TC junctions were located in non-conducting heartwood or cambium/bark tissue. There is only a very slight diurnal pattern of heat pulse velocity (HPV). Note also that minimum HPV is very well aligned with the zero line, indicating that probe alignment in this example was quite good, assuming there was next to zero sap flow at this measurement point.

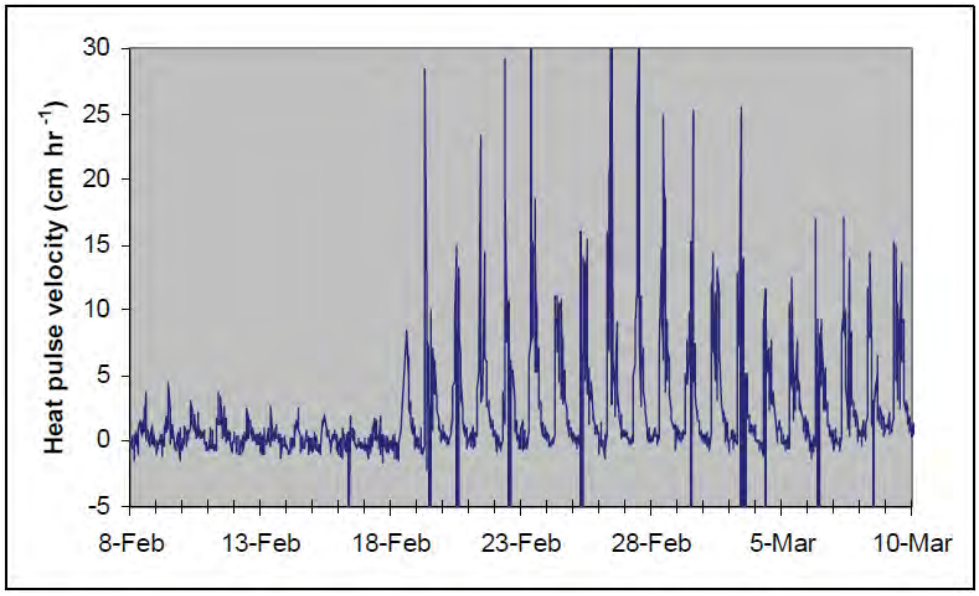

Figure 121: Data from a sensor that had developed a significant wound around the drill holes, followed by data obtained from the same probe set after it was re-installed nearby on the same stem: Note how wounding has severely reduced the magnitude of HPV measurements and dampened the diurnal pattern compared to the 'true' measurements from the fresh installation.

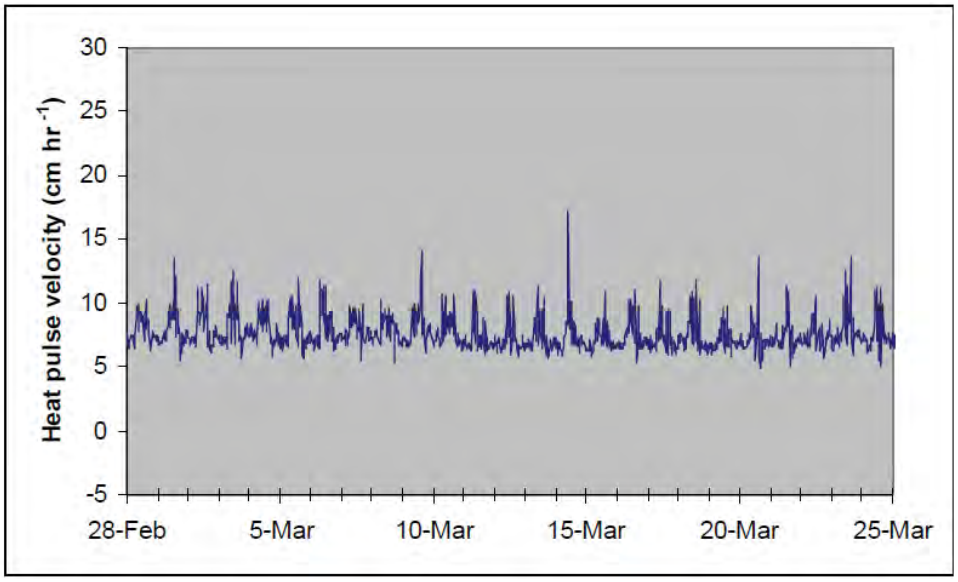

Figure 122: Data from a sensor that has been poorly installed such that one or more probes is badly out of alignment, resulting in an elevated (or decreased) baseline during periods of zero or near zero sap flow: The HRM has a provision to correct for bad probe spacing, but only to a certain extent (see Burgess et al. 2001). Nominally, probe spacing errors leading to baselines > +5 or < -5 cm hr^{-1} cannot be corrected and reinstallation is necessary (such as in the case above).

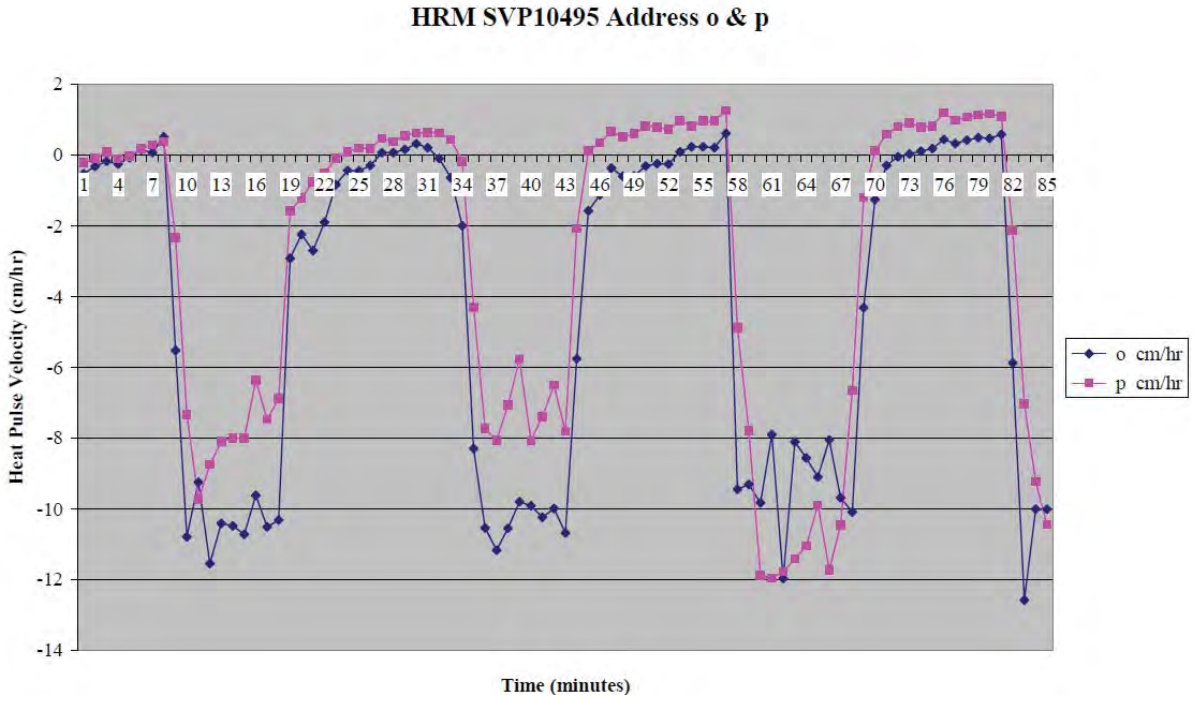

Figure 123: Example of HRM30 probes installed upside down. The diurnal pattern is correct except the values are negative. The upside down pattern is observed when the downstream temperature probe (black wire) is installed in the upstream position in the plant and vice versa. These problems are easily fixed, and furthermore, the data collected is not erroneous other than being inverted (also easy to fix as long as the user knows which way is up, particularly when working with roots!)