Reconstruction of daily time series for temperature dependent fluxes within 4C.

When respiration is calculated as a constant fraction of annual NPP, NPP and respiratory fluxes of the living trees are not directly available at a daily resolution within 4C. However, because respiration varies with temperature an estimate of the intra-annual course of these fluxes can be derived in a post-processing step.

For any of the fluxes at first the daily fraction of the annual flux is calculated from the temperature records:

$$F_{daily} = F_{annual} \frac{Q_{10}^{\frac{T_{daily}-15}{10}}}{\sum_{year}\left(Q_{10}^{\frac{T_{daily}-15}{10}}\right)}$$

In the case of root respiration, the annual flux of fine root respiration is calculated from the specific respiration rates and the annual integral of all autotrophic respiratory fluxes (= GPP-NPP). The fraction of the total respiratory flux emitted by the roots is then given by:

$$f_{r,roots} = \frac{r_{sw} M_{cr} + r_{fr} M_{fr}}{r_{sw}\left(M_{sw} + M_{cr} + M_{br}\right) + r_{fr} M_{fr}}$$

and the annual root respiratory flux, F_{roots} by:

$$F_{r,roots} = f_{r,roots} F_{GPP-NPP}$$