[**Item S1** for NPH1691]

Longer-term trends in climate at Korup and their correlations with SST

Background and methods

Korup is situated *c*. 5°N, 8°E. Following Camberlin *et al.* (2001), sea surface temperature (SST) for the ENSO indicator NINO3 (5°N-5°S, 150°-90°W) and the southern (SATL; 0°-20°S, 30°W-10°E) and northern (NATL; 5°-20°N, 60°-30°W) Atlantic indices (Climate Prediction Center, NAOO, USA: www.cpc.ncep.naoo.gov/data/indices) were found for each of the four 3-month seasons (S1–S4), and for all seasons combined (SA), for the years 1974–2004 (where S1 for 1974 was December 1973 and January–February of 1974, S2 was March–May 1974, etc.). Monthly means of daily rainfall and radiation at Bulu, Ndian, were averaged for S1–S4 over the same years. SST values were taken for seasons in the previous year to give 1-yr lagged SSTs. To remove any trends in rainfall and radiation over the period (Fig. 1), residuals to linear regressions of each of these variables on time, separately in S1–S4, were also considered.

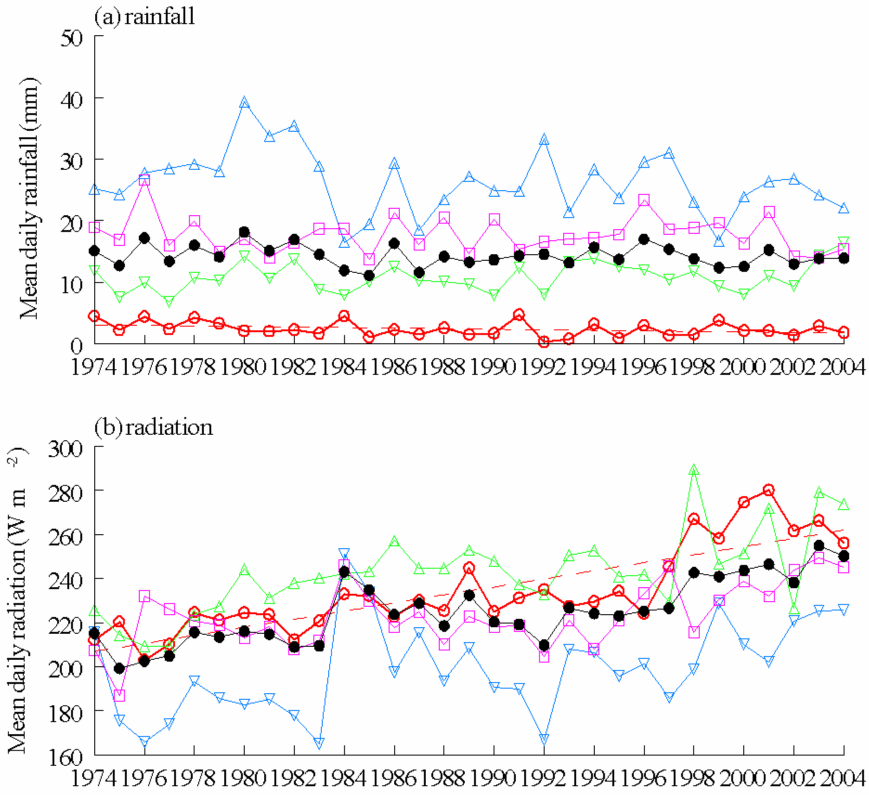

Fig. 1 Mean daily (a) rainfall and (b) radiation in seasons S1 (Dec–Feb; open red circles), S2 (Mar–May; open green triangles), S3 (Jun–Aug; inverted open blue triangles), S4 (Sep–Nov; open magneta squares) and all season (closed black circles), from 1974 to 2004 (*n* = 31 yr) at Bulu Station, Ndian Division, SW Cameroon. The month of December is that of the previous year indicated for the season.

Long-term trends

Rainfall declined marginally significantly in S1 (F = 3.57, df = 1,29; P = 0.069: rainfall [mm] = 88.9 - 0.0435·year, where year = 1974 ... 2004) but there were no significant relationships for S2-S4 nor for SA (P = 0.111 – 0.518). Radiation, however, increased strongly and significantly in S1 (F = 70.85, df =1,29, P < 0.001; radiation [W m^{-2}] = -3404 + 1.830·year), and likewise significantly for S2-S4 and SA (P = 0.014 – < 0.001). Rainfall and radiation were variously intercorrelated over the time period: S1 (r = -0.246, P = 0.182), S2 (r = 0.502, P = 0.004), S3 (r = -0.694, P < 0.001), S4 (r = -0.031, P = 0.867), and SA (r = -0.399, P = 0.026). A change from strong positive to strong negative correlation between S2 and S3 was evident.

NINO-SST3

Rainfall values in S2-S4 and SA were not significantly correlated with the corresponding NINO3 SST-values ($P = 0.131 – 0.824$) but were marginally so in S1 ($r = -0.327$, df = 29, $P = 0.072$) . Radiation was not significantly correlated with any SST-values in S1–S4 and SA ($P = 0.120 – 0.809$). Correlations of rainfall and radiation with lagged SST-values ($P = 0.333 – 0.771$) were similarly weak apart from again rainfall in S1 ($r = 0.392$, $P = 0.029$). Correlations with the residuals of linear-trend adjusted rainfall and radiation affected the results little: only significant was rainfall in S1 with the corresponding SST3 lagged values ($r = 0.415$, $P = 0.002$), but not SST3 itself ($r = -0.312$, $P = 0.087$), and otherwise $P = 0.096 – 0.712$. Correlations of rainfall and radiation in S2-S4 with SST3 in the season before of the same year (i.e. S1–S3) were rarely significant: rainfall and SST3 ($P = 0.488 – 0.842$), radiation with SST3 ($P = 0.079 – 0.478$), rainfall with lagged SST3 ($P = 0.069 – 0.961$) , radiation with lagged SST3 ($P = 0.500 – 0.947$; except for radiation in S3 with SST3 in S1 and S2 – $r = 0.475$ and 0.397, $P = 0.007$ and 0.027, respectively).

Considering the period in which fruiting of *M. bisulcata* was studied, 1989 - 2004, there were no significant correlations ($P > 0.05$) for any of the variables considered above. For rainfall and SST3, and lagged SST3, in S1 the correlations decreased (to $r = -0.259$ and 0.233, $P = 0.332$ and 0.384, respectively).

In conclusion, the relationships between NINO-SST3 values and Korup climate were very weak or non-existent with the marginal exception of rainfall in the dry season (S1) being negatively correlated with SST3 and positively correlated with 1-yr lagged SST3.

NATL and SATL-SST

Correlations between NATL- and SATL-SSTs and corresponding rainfall in S1–S4 and SA showed no significance ($r = -0.203 – 0.169$, $P = 0.273 – 0.914$), except for SATL and rainfall in S3 ($r = -0.611$, $P < 0.001$) and SA ($r = -0.436$, $P = 0.014$). Rainfall in S3 was also significantly negatively correlated with SATL-, but not NATL-, SST in S1, S2, S4 and SA ($r = -0.413 – -0.603$; $P = 0.018 – < 0.001$, respectively); and otherwise there were no pronounced sets of correlations for S1, S2 and S4.

For radiation the correlations were very strong, especially with the SATL-SST values. With NATL-SST it was only significantly correlated in S4 ($r = 0.517$, $P = 0.003$) and SA ($r = 0.379$, $P = 0.035$). For SATL-SST the majority of correlations between all combinations of seasons' radiation and SST-values were significant (18/25 cases at $P \leq 0.05$; 16/25 at $P \leq$

0.01). The correlations between radiation and SATL-SST were the strongest in S3 (r = 0.678, P < 0.001). As with rainfall, radiation in S3 was strongly correlated with the other seasons' SATL-SST values (r = 0.495 – 0.693, P = 0.005 – < 0.001). Correlations between rainfall and lagged NATL- and SATL-SST values were generally very weak: none and one out of 25 correlations significant (P # 0.05) respectively. Radiation in S1–S4 and SA and their correponding lagged NATL-SST values, however, were significant in S1 (r = 0.459, P < 0.001), S4 (r = 0.382, P = 0.034) and SA (r = 0.481, P = 0.006), and in other combinations of S1–S4 and SA with all seasons NATL-SST often (positively) significant (10/20 cases at $P \leq$ 0.05). By contrast radiation was weakly correlated with lagged SATL-SST values in corresponding seasons (all P > 0.05) and overall in the combinations (4/20 cases significant $P \leq$ 0.05). Hence, radiation in current seasons was best correlated with current SATL-SST and with lagged NATL-SST.

Residuals of rainfall in S1–S4 and SA were not significantly correlated with NATL-SST values in the same seasons (r = 0.023 – 0.156, P = 0.402 – 0.901), and only in the case of S3 with SATL-SST values (r = -0.548, P < 0.001; otherwise r = -0.352 – 0.102, $P \leq$ 0.05). Radiation residuals were weakly correlated with NATL-SST in S1–S4 and SA (r = -0.199 – 0.166, P = 0.282 – 0.733), and none of the other 20 correlations of the seasonal combinations were significant ($P \leq$ 0.05). Again, by contrast, radiation residuals were better correlated with SATL-SST values, though not quite as strongly as with the original data: 12/25 combinations were significant at $P \leq$ 0.05; the strongest correlations being for S3 and SA (r = 0.607, P < 0.001; r = 0.518, P = 0.003; respectively). Residuals of radiation in S3 were also well correlated with the other seasons' SATL-SST values (r = 0.379 – 0.569; P = 0.035 – 0.001). Thus, even when any long-term linear trends were removed the variation the radiation in S3 was still strongly correlated with the SATL-SST. Correlations of residuals of rainfall and radiation in S1–S4 and SA with lagged NATL- and SATL-SST values in the same seasons were all non-significant (P > 0.10).

In conclusion, SATL-SST was the best indicator of radiation at Korup, particularly in in S3 (middle wet season), and only of rainfall in S3 but not S1 (the dry season).