144°02'17"E). Only four reef flat samples predate 1950 AD while all beach sediments are younger than ~1970 AD, indicating a remarkably short residence time for sediment on the reef flat. Calibrated ^{14}C ages increase from the outer reef flat to the island consistent with the main transport pathways. At all sample sites, percent modern carbon (pMC) decreases as shell degradation increases (poorly abraded tests are ca. 10-20 yrs older than pristine tests). While the maximum residence time for foraminiferal sediment on the reef flat is in the order of 100-200 yrs, the bulk of sediment reaches the island within 10-15 yrs. These findings are of significant importance to the future stability and sustainable management of reef islands because such rapid exchange of sediment from the reef flat to the island would suggest a high degree of sensitivity to environmental change and an immediate island geomorphic response to any alteration to the reefs ability to produce sediment.

MIGRATION VS. SPECIES TURNOVER IN HOLOCENE FOREST DYNAMICS AS A RESPONSE TO CLIMATE CHANGE: CASE STUDIES FROM COLOMBIA AND MAURITIUS

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Climate change may force species to find a new balance between environmental conditions and plant specific ecological tolerances. Adaptation of individual taxa and plant associations often occur by latitudinal or altitudinal migration. As many taxa characterizing an ecosystem change in concert, large parts of biomes seem to migrate as a unit. Taxa which occurred already at the limits of their ecological tolerance may disappear and change the composition of an ecosystem in terms of taxonomic composition and/or abundance. Small oceanic islands hardly allow ecosystems to migrate. One may wonder how these ecosystems are able to respond to changing environments. We show species turnover based on the new 30,000 yr pollen record from Kanaka Crater in Mauritius. We compare these results with the new 14,000 yr pollen record of Lake La Cocha in the Colombian Andes where altitudinal migration is the main response to climate change.
While temperate ecosystems are mainly driven by temperature, pollen records from tropical ecosystems suggest to respond to environmental change in a more complex way. Assessing the impact of selected scenarios of future climate change, and developing strategies for a sustainable environment are necessarily complex and require a good understanding of mechanisms at work.

SEASONALLY RESOLVED CLIMATIC RECONSTRUCTIONS FROM LAKES IN THE CHILEAN ANDES

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Climate in the central Chilean Andes is characterized by strong seasonal and interannual variability. In summer, dry conditions dominate, related to a strong South Pacific Anticyclone. In winter, however, weakening of the anticyclone allows for the northward progression of the westerly wind belt, controlling temperature, wind and precipitation patterns between ca. 32-65 °S. Therefore, seasonally resolved proxy records are required to reconstruct past climate variability and mechanisms in this region. This study aims to test the strength and seasonal representation of novel and established proxies derived from lake sediments, by comparison to meteorological and reanalysis data. A sediment core from Laguna Chepical, a high-alpine lake in the central Chilean Andes (32.16 °S, 70.30 °W, 3050 m. a.s.l.) was analysed for C/N, total biogenic silica and total organic carbon from AD 1900 to present at 2 mm resolution. In addition, scanning reflectance spectroscopy (380-730 nm; VIS-RS) was used to infer past summer temperatures. The chronology of the core was based on detailed ^{210}Pb dating, constrained by SCP counts and a clear ^{135}Cs peak. Detailed chrysophyte stomatocyst analysis was also carried out to test its performance as a cold-season temperature proxy. The calibration-in-time approach was used to i) determine the season reflected by each of the proxies and ii) test the performance of each proxy. Next, the same methodology was applied to a number of lake cores from the 'Region de Araucanía' (37-39°S). The results from this study indicate that several of the applied methods can be used to generate long-term, quantitative, season-specific climatic reconstructions from a region for which currently few – in particular cold-season temperature – reconstructions are available.

COLD-SEASON TEMPERATURE VARIABILITY IN THE SWISS ALPS SINCE AD 1100; A QUANTITATIVE RECONSTRUCTION USING CHRYSOPHYTE STOMATOCYSTS

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To fully understand past climatic changes and their forcing factors, detailed reconstructions of past summer and winter temperatures are required. Winter temperature reconstructions are scarce, however, because most biological proxies are biased towards the growing season. This study presents a detailed, quantitative reconstruction of cold-season (mean Oct – May) temperatures from the Swiss Alpine region since AD 1100, based on chrysophyte stomatocysts (silicious cysts formed by so-called 'golden algae'). Chrysophyte stomatocyst analysis was carried out on varved sediments from Lake Silvaplana (1791 m a.s.l.) at annual to near-annual resolution. The strength of stomatocysts as a proxy for cold-season temperature was demonstrated by direct comparison to measured monthly mean temperatures from the nearby meteostation for the period AD 1870 – 2004 ($R = -0.6$; $p < 0.001$). The full cold season temperature reconstruction shows relatively stable conditions until ca. AD 1300, followed by large changes in multi-decadal variability reaching particularly cool conditions around AD 1500, 1650-1700 and the early 20th century. Although cold-season temperatures in the most recent part of the record were well above average, similar warm periods were reconstructed during two earlier periods, suggesting that recent warming (until 2001) was highly unusual, but not unique in a thousand year context.

SHIFTING ZONAL PATTERNS OF THE SOUTHERN BOREAL FOREST IN EASTERN CANADA ASSOCIATED WITH CHANGING FIRE REGIME DURING THE HOLOCENE

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In eastern Canada, the closed-crown boreal forest corresponds to two ecological regions separated along 49°N, the northern black spruce (*Picea mariana*) zone and the southern balsam fir (*Abies balsamea*) zone. We compare *in situ* Holocene fire histories of balsam fir stands from the southern fir zone with stands from the northernmost patches of fir forest located far beyond the fir zone boundary, into the spruce zone. We then assess the existence of a sub-continental shift in past fire activity that could have triggered a change in the Holocene zonal pattern. Macrofossil analysis of charcoal in mineral soils was used to reconstruct the stand-scale and regional Holocene fire histories. Stands of the balsam fir zone were submitted to recurrent fire disturbances between 9000 and 5000 cal. yr BP. Local fire histories suggest that four sites within the fir zone escaped fire during the Holocene. Such sites allowed the continuous maintenance of the balsam fir forest in the southern boreal landscape. Stands of the spruce zone were submitted to recurrent fires from 5000 cal. yr BP to present. Local fire histories indicated that no site escaped fire in this northern zone. Published palaeoecological data suggest that balsam fir migrated to its extant northern limit sometime between 7300 and 6200 cal. yr BP. A change of the fire regime 5000 years ago caused the regional decline of the balsam fir forest and its replacement by black spruce forest. The consequence was a sub-continental reshuffling of the fir and spruce zones within the closed-crown boreal forest.

MODERN POLLEN-VEGETATION-CLIMATE DATA SET BASED ON SURFACE AND RODENT MIDDEN SAMPLES FROM THE ATACAMA DESERT (CHILE) AND ITS POTENTIAL APPLICATION TO LATE QUATERNARY RECONSTRUCTIONS

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