exNGT: Analysis of overlap periods of existing and re-drilled cores

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This document analyses the overlap periods of the available pairs of original and re-drilled NGT isotope records. The results are summarised in a table at the end of the document.

Obtain the relevant data:

```r
source("init.R")

# all NGT anomaly records
NGT <- processNGT()

# add the stacks across the old and across the new records
NGT <- cbind(NGT, stackOldAndNew(NGT, use_NEGIS_NEEM = FALSE)[-1])
```

Loop over running mean window sizes and calculate the overlap statistics for each core:

```r
# set running mean window sizes
w <- c(1, 3, 5, 7, 11, 21)

# record IDs which have old and new records available
sites <- c("B18", "B21", "B23", "B26", "NGRIP", "stack")

# calculate running mean averages
filteredRecords <- sapply(w, simplify = FALSE, function(x) {
  filterData(NGT, window = x)
})

# calculate overlap statistics for each core and window size
overlapStats <- sapply(sites, simplify = FALSE, FUN = function(s) {

  res <- sapply(w, simplify = FALSE, function(x) {

    rec <- filteredRecords[[match(x, w)]]

    res <- data.frame(window = x)
    res <- cbind(res, calculateOverlapStatistics(rec, site = s)$stat)

    return(res)

  })

  do.call(rbind, res)
})

# arrange as single data frame
```

```r
overlapStats <- do.call(function(...){rbind(..., make.row.names = FALSE)},
                        overlapStats)
```

Arrange as a nice data frame:

```r
meta <- overlapStats %>%
  dplyr::filter(window == 1) %>%
  dplyr::transmute(corePair = corePair,
                   overlap = paste(startOverlap, endOverlap, sep = " - "))

emptyRows <- data.frame(
  corePair = rep("", length(w) - 1), overlap = rep("", length(w) - 1))
df <- data.frame()
for (i in 1 : nrow(meta)) {df <- rbind(df, meta[i, ], emptyRows)}

df <- cbind(df, dplyr::select(overlapStats, window, sdErrorOverlapOld,
                              sdErrorOverlapNew, diffMeanOverlap, corrOverlap))
```

Print the table:

```r
caption <- paste("Statistics for the overlap periods of original and re-drilled",
                 "NGT isotope records for the sites where record pairs are available,",
                 "depending on the length of the running mean filter window applied",
                 "on the data.")
knitr::kable(df, row.names = FALSE, digits = 2,
             col.names = c("Record pair", "Overlap period (yr CE)", "Filter window (yr)",
                           "SE (old) (\u2030)", "SE (new) (\u2030)",
                           "Mean difference (\u2030)", "Correlation"),
             caption = caption)
```

Table 1: Statistics for the overlap periods of original and re-drilled NGT isotope records for the sites where record pairs are available, depending on the length of the running mean filter window applied on the data.

Record pair	Overlap period (yr CE)	Filter window (yr)	SE (old) (‰)	SE (new) (‰)	Mean difference (‰)	Correlation
B18	1865 - 1992	1	0.14	0.13	-0.27	0.25
		3	0.11	0.10	-0.26	0.33
		5	0.10	0.09	-0.26	0.38
		7	0.09	0.08	-0.26	0.43
		11	0.07	0.06	-0.25	0.57
		21	0.06	0.04	-0.23	0.75
B21	1887 - 1993	1	0.14	0.15	0.04	0.16
		3	0.11	0.11	0.03	0.19
		5	0.09	0.09	0.02	0.19
		7	0.08	0.07	0.02	0.19
		11	0.07	0.06	0.03	0.20
		21	0.05	0.05	0.06	0.43
B23	1882 - 1993	1	0.16	0.14	0.05	0.20
		3	0.13	0.10	-0.03	0.17
		5	0.11	0.08	-0.04	0.22
		7	0.09	0.06	-0.04	0.29
		11	0.07	0.05	-0.04	0.41
		21	0.04	0.03	-0.03	0.49

Record pair	Overlap period (yr CE)	Filter window (yr)	SE (old) (‰)	SE (new) (‰)	Mean difference (‰)	Correlation
B26	1928 - 1994	1	0.17	0.19	0.22	0.19
		3	0.12	0.14	0.23	0.35
		5	0.09	0.12	0.24	0.43
		7	0.08	0.10	0.24	0.54
		11	0.05	0.09	0.25	0.66
		21	0.03	0.07	0.31	0.71
NGRIP	1965 - 1995	1	0.32	0.26	-0.17	-0.25
		3	0.20	0.17	-0.15	-0.19
		5	0.15	0.13	-0.13	-0.15
		7	0.11	0.09	-0.12	0.08
		11	0.08	0.05	-0.08	0.27
		21	0.06	0.04	-0.04	0.24
stack	1865 - 1995	1	0.06	0.09	0.09	0.30
		3	0.05	0.08	0.09	0.49
		5	0.04	0.07	0.09	0.59
		7	0.04	0.07	0.09	0.64
		11	0.03	0.05	0.09	0.62
		21	0.02	0.03	0.11	0.47