diveMove calibration example

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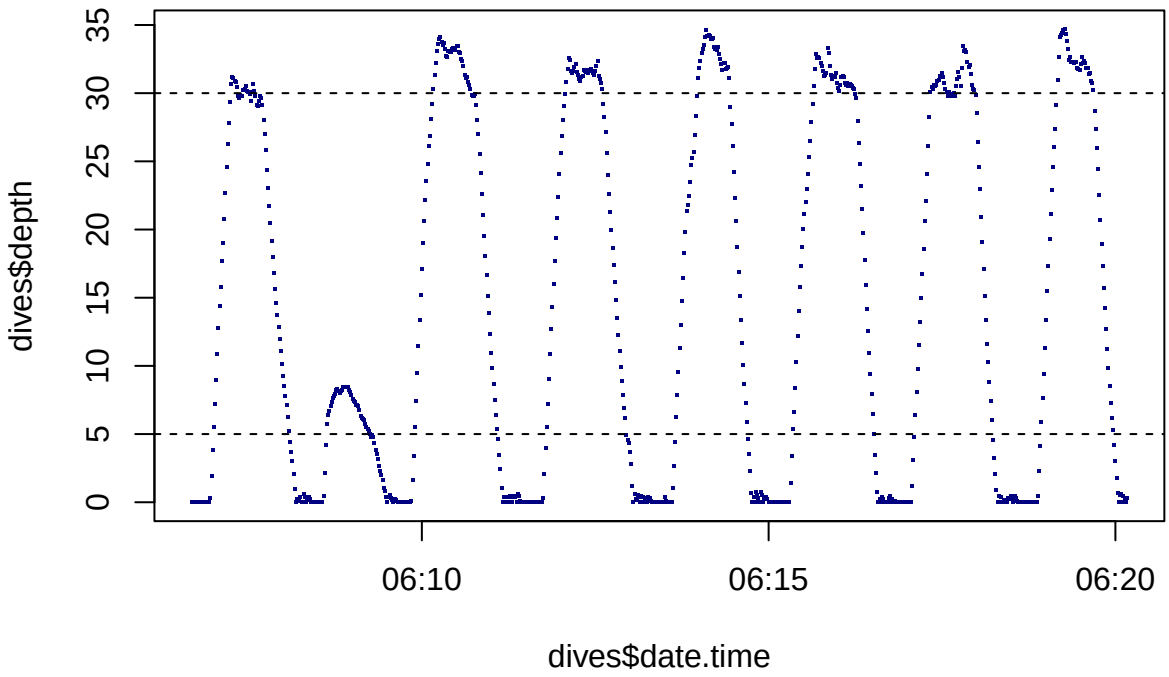
Introduction

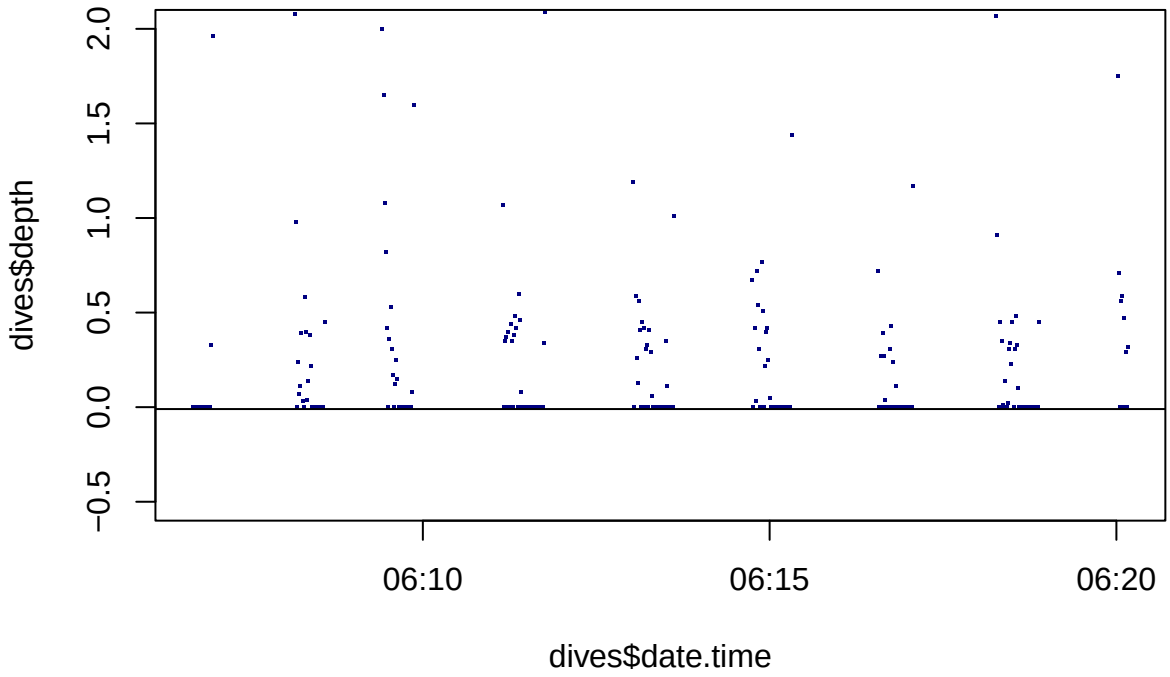
A simple calibration example showing that 'offset' in calibrateDepth is to 'correct the surface value'. 'offset' should not be used to ignore shallow dives (use 'dive.thr' for that). We've seen cases in published literature where these commands are confused.

```
library(tidyverse)
library(diveMove)
library(here)
```

```
# Import TDR dive data
dives <-  readRDS(here("data", "diveMove_example.rds"))
# Count how many dives are more than 5 m? Answer = 8.
plot(dives$date.time, dives$depth, pch = ".", col = "navy", cex = 2)  # plot the data
abline(h = 5, lty = 2) # add line at 5 m depth
abline(h = 30, lty = 2) # add line at 30 m depth
```



```r
# Zoom in at 0 m - there is no drift - no need to correct this TDR data
plot(dives$date.time, dives$depth, pch = ".", ylim = c(-0.5, 2), col = "navy", cex = 2)
abline(h = -0.01)  # add line at -0.01 m depth
```




```r
# No need to zero-offset correct this dive data

#now start creating the TDR dive object
filename = "Dive data"

tdr <- createTDR(time = dives$date.time,
                 depth = dives$depth,
                 speed = FALSE,
                 dtime = 1,   #  sampling interval used in seconds
                 file = filename)

show(tdr)
```

```
## Time-Depth Recorder data -- Class TDR object
##   Source File          : Dive data
##   Sampling Interval (s): 1
##   Number of Samples    : 810
##   Sampling Begins      : 2019-01-07 06:06:41
##   Sampling Ends        : 2019-01-07 06:20:10
##   Total Duration (d)   : 0.009363426
##   Measured depth range : [0, 34.68]
```

```r
#--------------------------------------
# The calibrateDepth step is important
#--------------------------------------
# Can use the filter method: this code ignore all dives shallower than 5 m.
# Correctly identifies 8 dives
tdr.calib <- calibrateDepth(tdr,
                            dive.thr = 5,       # only select dives deeper than 5 m.
                            zoc.method='filter',
                            k=c(3, 5760),
                            probs=c(0.5, 0.02),
                            #dry.thr=3600, wet.thr=30, interp.wet=FALSE,
                            smooth.par=0.1,
                            knot.factor=20,
                            descent.crit.q=0.01, ascent.crit.q=0.01,
                            na.rm=T)
```

```
## Record is truncated at the beginning and at the end
## 1 phases detected
```

```
## 8 dives detected
```

```r
# Be careful with the offset method. The following code is not correct.
# zoc.method="offset" is not what dives to ignore, it is asking "how wrong is the surface
# layer, and how much should I adjust the surface value?"

# Using offset=5 with the default dive threshold (4m) ignores all dives shallower than 9m!
tdr.calib_offset <- calibrateDepth(tdr,
                                   zoc.method="offset",
                                   offset=5,
                                   # dive.thr = 4,  # default
                                   descent.crit.q=0.01, ascent.crit.q=0.01,
                                   knot.factor=60)
```

```
## Record is truncated at the beginning and at the end
## 1 phases detected
```

```
## 7 dives detected
```

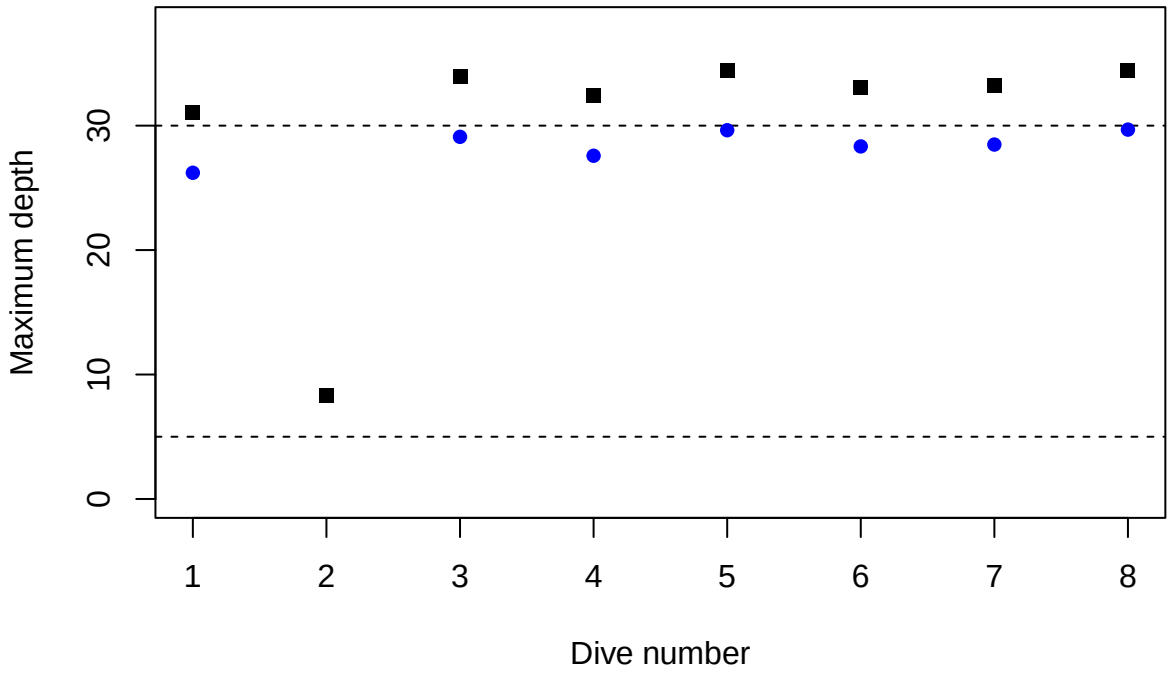
```r
# only identifies 7 dives in this example, but there are 8 dives deeper than 5 m.

# create dive summary metrics for each dive
tdr.dat = as.data.frame(tdr.calib@tdr)
dive.stats <- diveStats(tdr.calib)

# create dive summary metrics for each dive
tdr.dat_offset = as.data.frame(tdr.calib_offset@tdr)
dive.stats_offset <- diveStats(tdr.calib_offset)

# plot the max dive depths from the filter method
plot(dive.stats$maxdep, ylim = c(0,38), pch = 15, xlab = "Dive number", ylab = "Maximum depth")
abline(h = 30, lty = 2) # notice that max dep is all above 30 m, like the data.
abline(h = 5, lty = 2) # add line at 5 m depth
```

```r
# now add max dive depth from the offset method
# the max depths are under-estimated
# Dive 2 was not recognized, because is it shallower than 5 + 4  = 9 meter.
# (offset = 5 m and dive.thr = 4 m in calibrateDepth)
points(c(1, 3:8), dive.stats_offset$maxdep,  col = "blue", pch = 16)  # max dive depths
```



When 'offset=5' is incorrectly used there is a systematic bias in maximum depth (blue circles in the plot above) and some dives deeper than the 'target' threshold depth are missed.