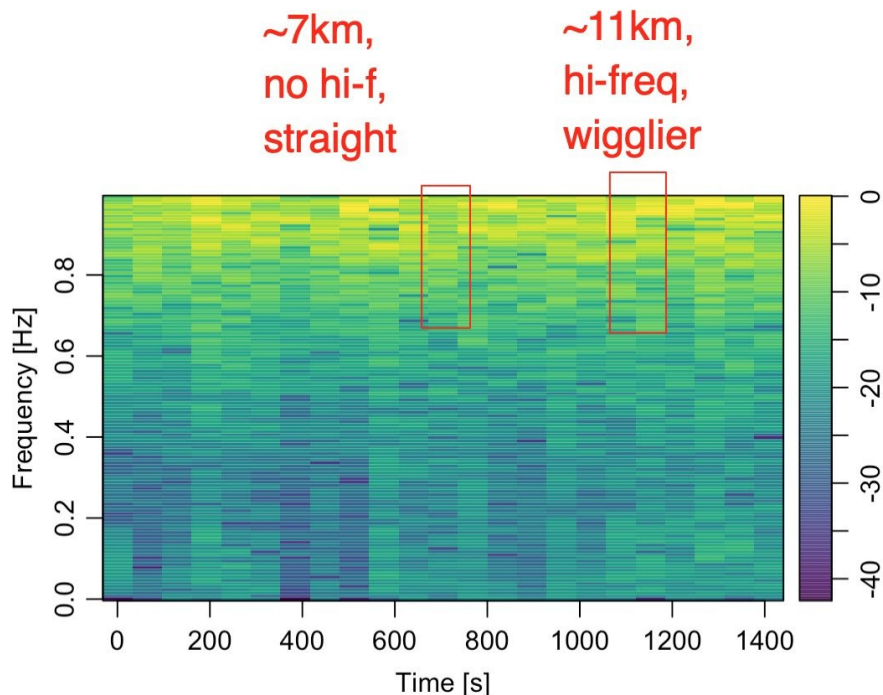If I'm reading it right, I think the following spectrogram *does* show some possible differences in wiggliness for different segments along the stage?

The question then becomes: what signal (as a function of distance along line) to use? The above spectrogram is based on the perpendicular distance of the route from the straight line connecting the start and end points of the route.

```
# trj is a trajr route
straight = st_linestring(data.matrix(rbind(head(trj[,c('x','y')], 1),
                                           tail(trj[,c('x','y')], 1))))

straight_sf = st_sfc(straight,
                     crs=st_crs(utm_routes))

trj_d = TrajRediscretize(trj, 10)
utm_discretised = trj_d %>%
                    sf::st_as_sf(coords = c("x","y")) %>%
                    sf::st_set_crs(st_crs(utm_routes[route_index,]))

# Get the rectified distance from the midline
# Can we also get whether it's to left or right?
perp_distances = data.frame(d_ = st_distance(utm_discretised,
                                             straight_sf))
# Returned distance is given as units
perp_distances$d = as.integer(perp_distances$d_)

perp_distances$i = 10 * (1:nrow(perp_distances))
#perp_distances$i = units::set_units(10 * (1:nrow(perp_distances)),
'm')
```

We can then do something like a low pass filter:

```
library(signal)

# High pass filter
bf <- butter(2, 0.9, type="high")
perp_distances$d_hi <- filter(bf, perp_distances$d)
```

and generate the spectrogram show above:

```
# We could just plot this direct
spec = specgram(perp_distances$d_hi)

# Or make pretty
# Via: https://hansenjohnson.org/post/spectrograms-in-r/
library(oce)
# discard phase information
P = abs(spec$S)

# normalize
P = P/max(P)

# convert to dB
P = 10*log10(P)

# config time axis
t = spec$t

# plot spectrogram
imagep(x = t,
       y = spec$f,
       z = t(P),
       col = oce.colorsViridis,
       ylab = 'Frequency [Hz]',
       xlab = 'Time [s]',
       drawPalette = T,
       decimate = F
)
```

However, it would possibly make more sense to use something line the angle of turn, convexity index, or radius of curvature at each 10m step as the signal…

Hmmm…