RO Wave Energy EDA

Luke Durell

The Data

```
# load data
load("/Users/lukedurell/Box Sync/education/summer program/data cleaning/RO-Wave/roenergyMoWater.rda")
ls()
```

```
## [1] "fulldata"
```

```
dim(fulldata)
```

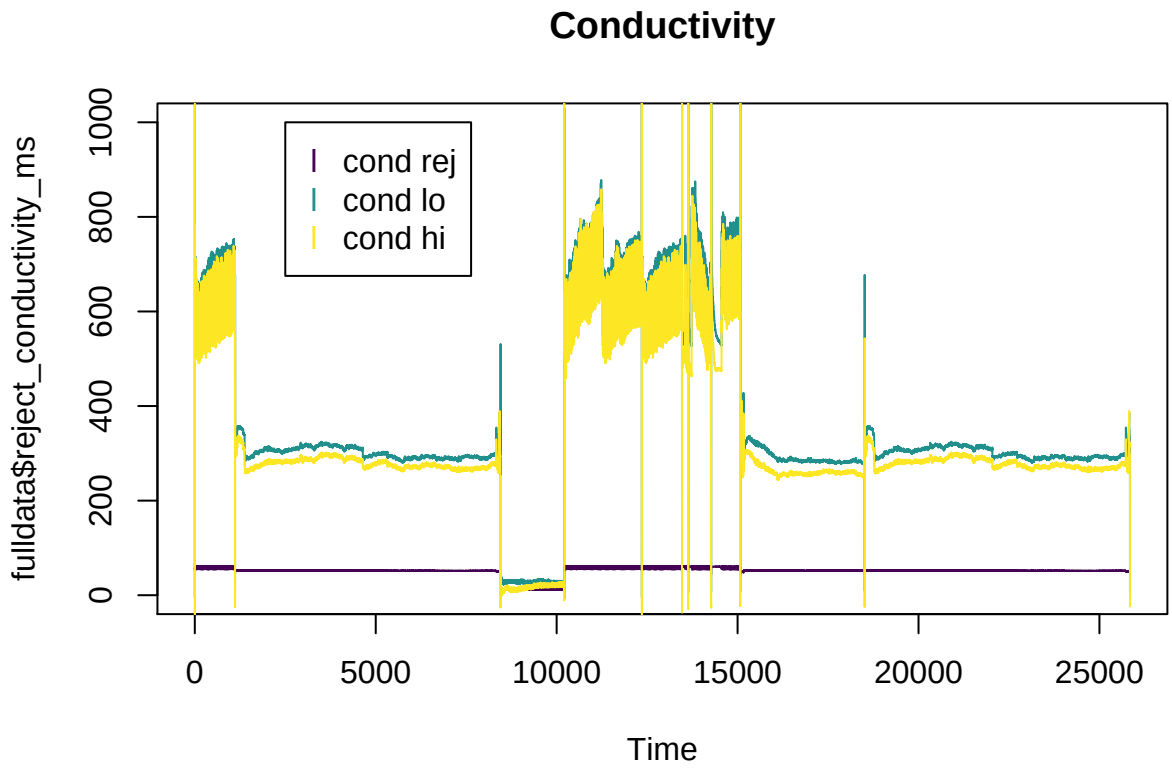
```
## [1] 25844    24
```

```
str(fulldata)
```

```
## 'data.frame':    25844 obs. of  24 variables:
##  $ date                           : Date, format: "2019-05-02" "2019-05-02" ...
##  $ time                           : chr  "9:15:00 AM" "9:16:00 AM" "9:17:00 AM" "9:18:00 AM" ...
##  $ runtime_h                      : num  0.000784 0.017464 0.034131 0.050798 0.067464 ...
##  $ iteration                      : num  0 227 467 707 947 ...
##  $ permeate_conductivity_high_us : num  1269.1 -72.8 -83.1 781.5 685.4 ...
##  $ permeate_conductivity_low_us  : num  1388.26 -4.08 -3.98 1599.22 855.81 ...
##  $ reject_conductivity_ms         : num  57.2 53.3 57.5 61.7 61.5 ...
##  $ feed_pressure_psi              : num  498.67 4.12 521.62 651.23 788.41 ...
##  $ feed_volume_l                  : num  20.9 20.7 19.9 19.7 20 ...
##  $ feed_temperature_c             : num  17.4 17.1 17.3 16.9 17.2 ...
##  $ permeate_flowrate_l_min        : num  0.1729 0.0868 0.0237 0.6732 0.7912 ...
##  $ reject_flowrate_l_min          : num  4.403 0.055 4.611 5.188 5.185 ...
##  $ feed_flowrate_l_min            : num  4.576 0.142 4.635 5.861 5.976 ...
##  $ feed_pump_power_pct            : num  0 0 46.6 59.4 68.5 ...
##  $ temperature_valve_open_pct     : num  80 80 80 80 80 80 80 80 80 80 ...
##  $ reject_valve_open_pct          : num  100 23 23 23 23 23 23 23 23 23 ...
##  $ water_flux_lmh                 : num  3.85 1.933 0.527 14.993 17.621 ...
##  $ total_permeate_l               : num  0 0.0926 0.124 0.5956 1.1097 ...
##  $ permeate_tank_level            : chr  "FULL" "FULL" "FULL" "FULL" ...
##  $ feed_cleaning_valve_state      : chr  "CLOSED" "CLOSED" "CLOSED" "CLOSED" ...
##  $ permeate_discharge_valve_state: chr  "OPEN" "OPEN" "OPEN" "OPEN" ...
##  $ system_mode                    : chr  "Manual" "Manual" "Auto Feed Pressure (Fixed)" "Auto Feed Pr
##  $ experiment                     : int  1 1 1 1 1 1 1 1 1 1 ...
##  $ ac_current_a                   : num  NA NA NA NA NA NA NA NA NA NA ...
```

Conductivity

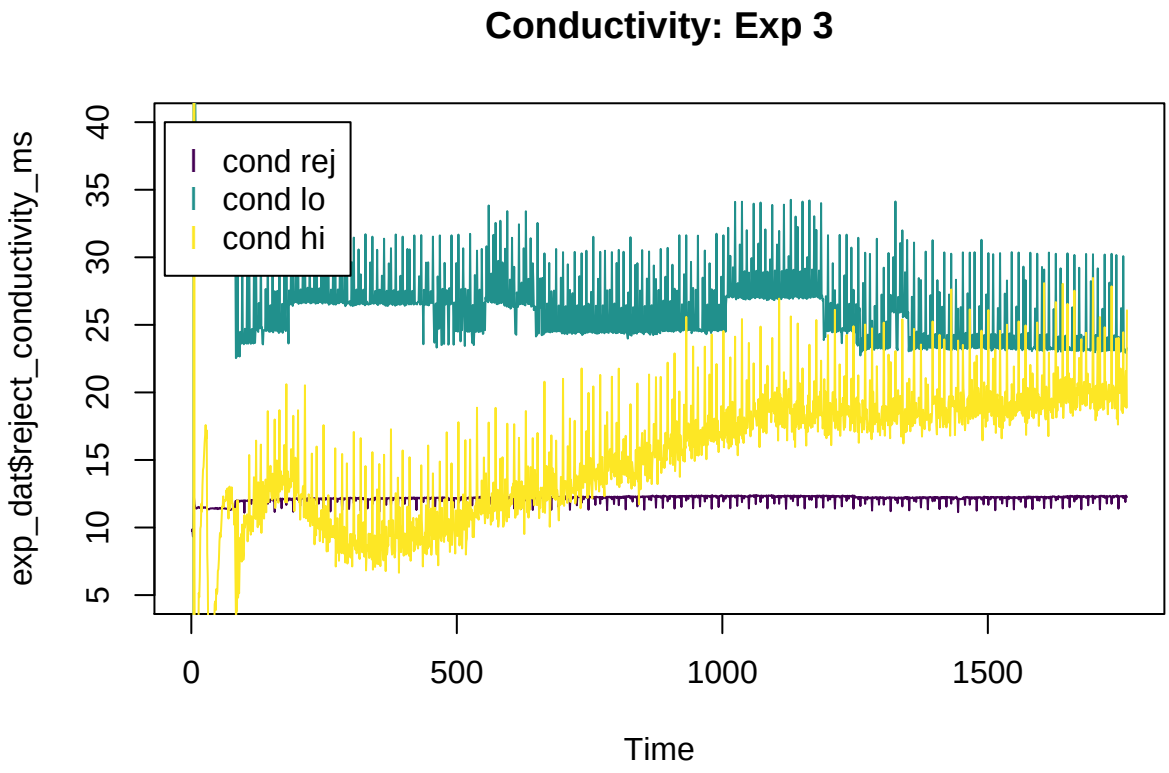
```
cols <- viridis(3)
ts.plot(fulldata$reject_conductivity_ms,
        ylim = c(0, 1000), col = cols[1], main = "Conductivity")
lines(fulldata$permeate_conductivity_low_us, col = cols[2])
lines(fulldata$permeate_conductivity_high_us, col = cols[3])
legend(2500, 1000, c("cond rej", "cond lo", "cond hi"), col = cols, pch = "l", bg = "white")
```



Just for experiment 3

```
exp_dat <- fulldata[which(fulldata$experiment == 3),]

ts.plot(exp_dat$reject_conductivity_ms,
        ylim = c(5, 40), col = cols[1], main = "Conductivity: Exp 3")
lines(exp_dat$permeate_conductivity_low_us, col = cols[2])
lines(exp_dat$permeate_conductivity_high_us, col = cols[3])
legend(-50, 40, c("cond rej", "cond lo", "cond hi"), col = cols, pch = "l", bg = "white")
```



What about water flux over time?

```
ts.plot(exp_dat$water_flux_lmh,
        ylim = c(5, 40), col = cols[1], main = "Water Flux & Conductivity: Exp 3")
lines(exp_dat$permeate_conductivity_high_us, col = cols[3])
legend(-50, 40, c("water flux", "cond hi"), col = c(cols[1], cols[3]), pch = "l",
       bg = "white")
```