Part 2: Modelling a building using CTSM-R

2a: 2-state model of a single room

We will estimate

```
# Load data
if (Sys.info()[7] == "davidipsen")
  {path <- "~/Documents/DTU/3. Semester (MSc)/Advanced Time Series/Assignments/3-Assignment/CompEx3_E18/"}
} else {path <- "CompEx3_E18/"}
load(paste0(path,"Exercise3.RData"))
D = AllDat
head(D)
```

```
##                   date    t yTi1 yTi2 yTi3 yTi4   Ta    Gv        Ph1         Ph2
## 1 2014-12-22 09:00:00 1233 23.6 22.3 22.7 22.1  4.9 0.084 10.700257 12.65397467
## 2 2014-12-22 10:00:00 1234 24.4 22.6 23.1 22.4  8.4 0.202 10.460387 10.38274844
## 3 2014-12-22 11:00:00 1235 24.4 22.8 23.5 22.7 10.8 0.315 10.046700  6.56453906
## 4 2014-12-22 12:00:00 1236 24.6 23.0 23.7 23.0 12.9 0.375  9.560008  2.42302757
## 5 2014-12-22 13:00:00 1237 25.1 23.2 23.6 23.2 15.1 0.390  8.922674  0.00000000
## 6 2014-12-22 14:00:00 1238 25.2 23.2 23.7 23.3 15.9 0.351  8.628342  0.03939882
```

```
tail(D)
```

```
##                     date    t yTi1 yTi2 yTi3 yTi4   Ta    Gv Ph1 Ph2
## 3106 2015-04-30 18:00:00 4338 26.6 26.0 25.9 25.3 23.6 0.319   0   0
## 3107 2015-04-30 19:00:00 4339 26.4 25.9 25.9 25.1 23.2 0.171   0   0
## 3108 2015-04-30 20:00:00 4340 26.2 25.8 25.8 25.0 20.2 0.038   0   0
## 3109 2015-04-30 21:00:00 4341 25.9 25.6 25.6 25.0 21.0 0.001   0   0
## 3110 2015-04-30 22:00:00 4342 25.8 25.6 25.5 24.9 22.4 0.000   0   0
## 3111 2015-04-30 23:00:00 4343 25.7 25.5 25.4 24.9 22.1 0.000   0   0
```

Visualisations

```
plot(D$Ta * D$Gv, D$yTi1)
```
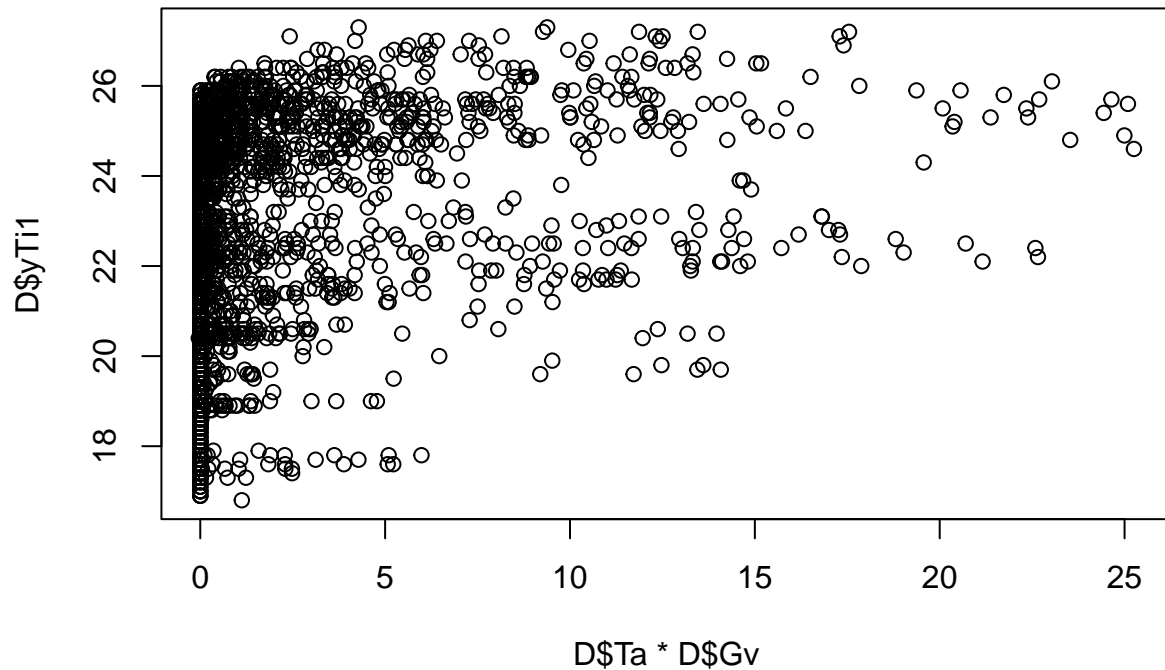
Let's try expanding the model. 1. Note how the effect of the temperature in room 3 and 4 affects only room 1 through the medium of room 2. In other words: Y_1 is *conditionally independent* of Y_3 and Y_4 when Y_2 is known. —- disadvantage: Time delay for a change in T2 before it enters T1 -> enter Tm before -> Make Tm also a function of T2? == Men hey, er det ikke bare via Thermal Mass (Tm) at room1 bliver påvirket? 2. Dvs. dTm = ... Org.... + 1/R_21*(T2-T1x)