2a Temporal Model: Generating synthetic temporal ETAS catalogues

```r
library(ETAS.inlabru)
library(ggplot2)
library(dplyr)
library(magrittr)
# library(tidyquant)

# Increase num.threads if you have more cores on your computer
INLA::inla.setOption(num.threads = 2)
```

Create catalogue

- define ETAS parameters
- define model domain
- specify a history
- generate ETAS sample
- plot the results

```r
mu <- 1070. / 365
K <- 0.089
alpha <- 2.29
c <- 0.011
p <- 1.08


modelledDuration <- 10 # [days]


M0 <- 2


theta_etas <- data.frame(mu = mu, K = K, alpha = alpha, c = c, p = p)

Ht <- data.frame(ts = c(0., 1.5), magnitudes = c(6.7, 7.))

combined.M7.ETAS.cat <-
  generate_temporal_ETAS_synthetic(
    theta = theta_etas,
    beta.p = log(10),
    M0 = M0,
    T1 = 0,
    T2 = modelledDuration,
    Ht = Ht,
    format = "df"
  )
combined.M7.ETAS.cat$ID <- seq_len(nrow(combined.M7.ETAS.cat))

ggplot(combined.M7.ETAS.cat) +
  geom_point(aes(x = ts, y = magnitudes, color = factor(gen))) +
  xlim(0, modelledDuration) +
```
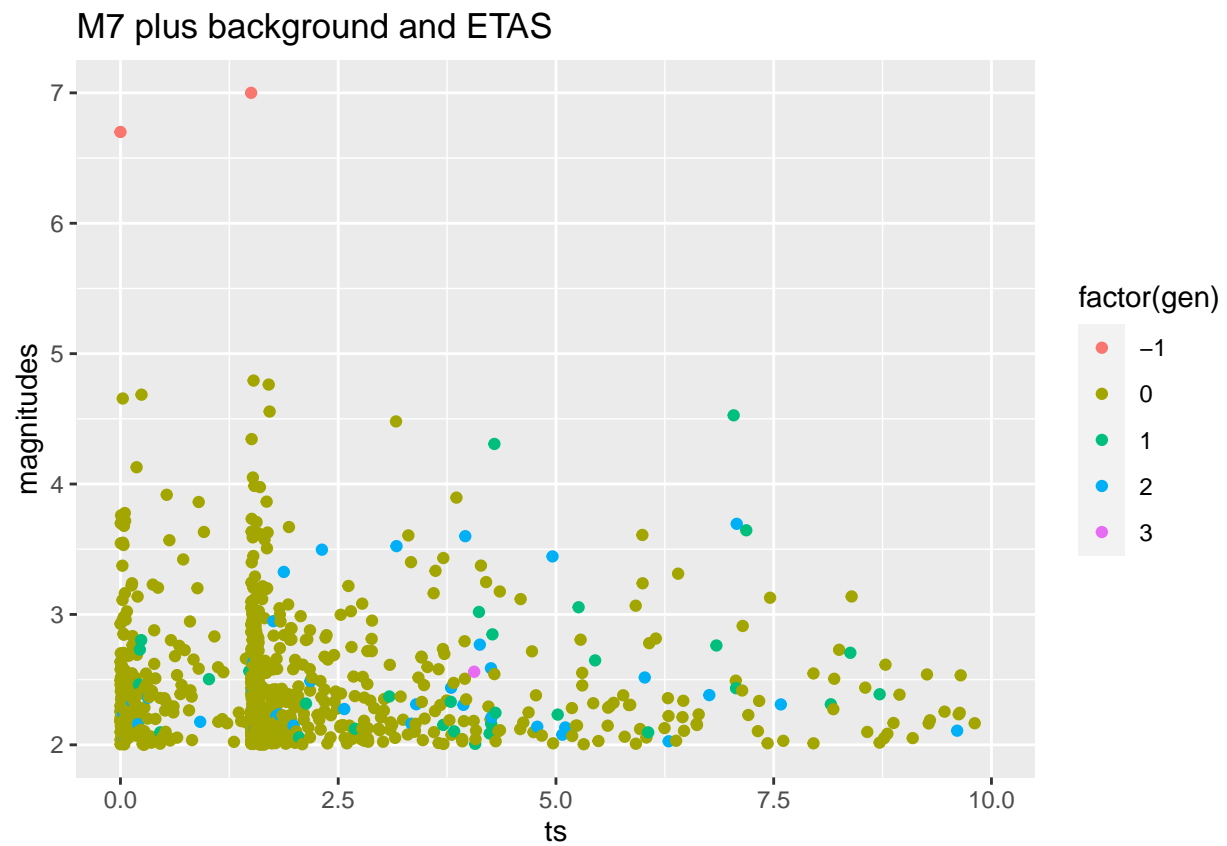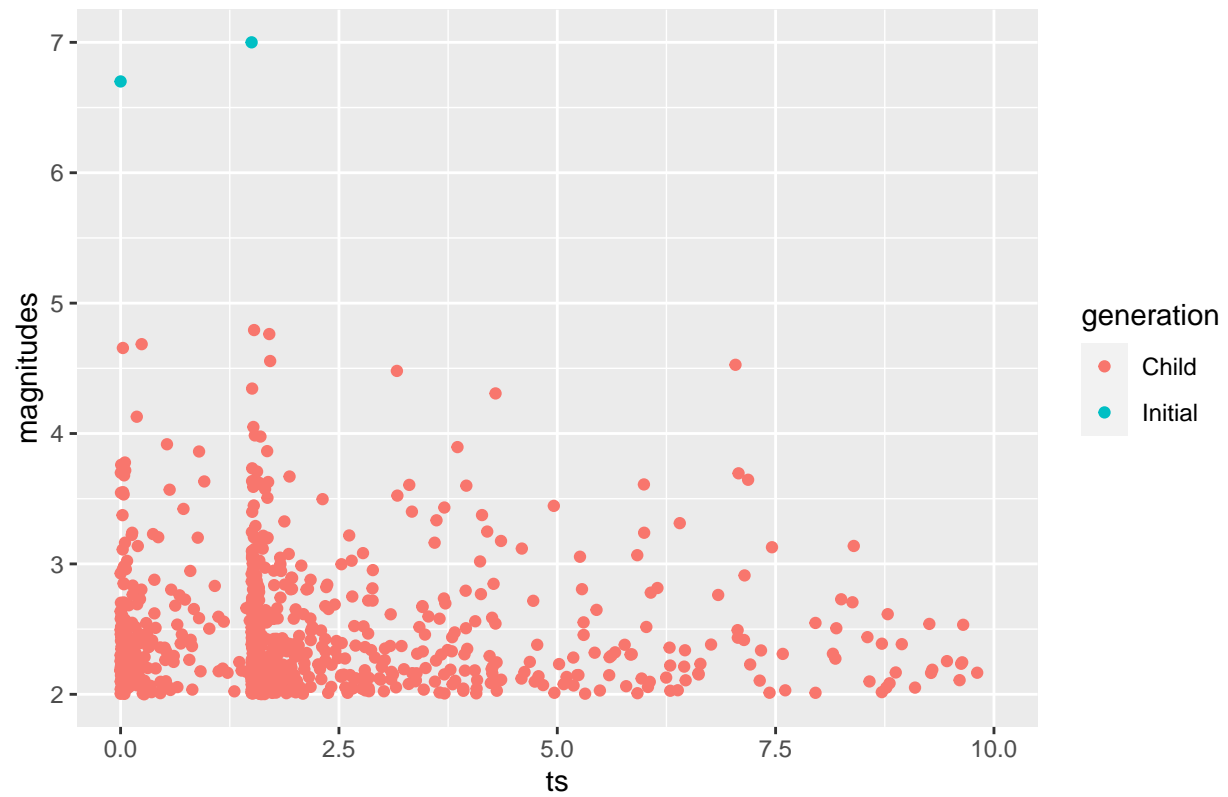
```
ggtitle("M7 plus background and ETAS")
```

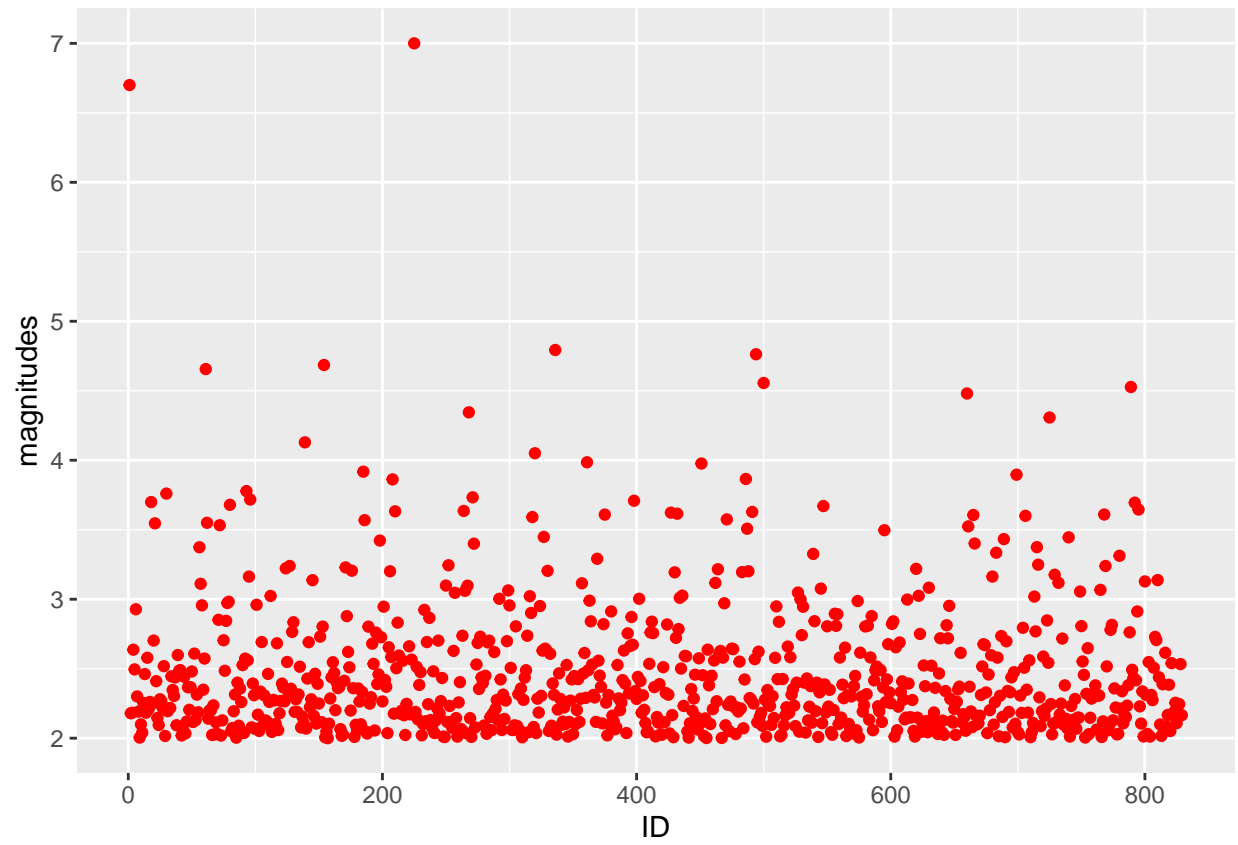## M7 plus background and ETAS


```
ggplot(combined.M7.ETAS.cat %>%
        mutate(generation = if_else(gen == -1, "Initial", "Child"))) +
  geom_point(aes(x = ts, y = magnitudes, color = generation)) +
  xlim(0, modelledDuration) +
  ggtitle("M7 plus background and ETAS")
```

M7 plus background and ETAS


```
ggplot() +
  geom_point(data = combined.M7.ETAS.cat, aes(x = ID, y = magnitudes), color = "red") #+
```

```
#  geom_ma(data = combined.M7.ETAS.cat, aes(x=ID, y=magnitudes), ma_fun = SMA, n = 10)
```