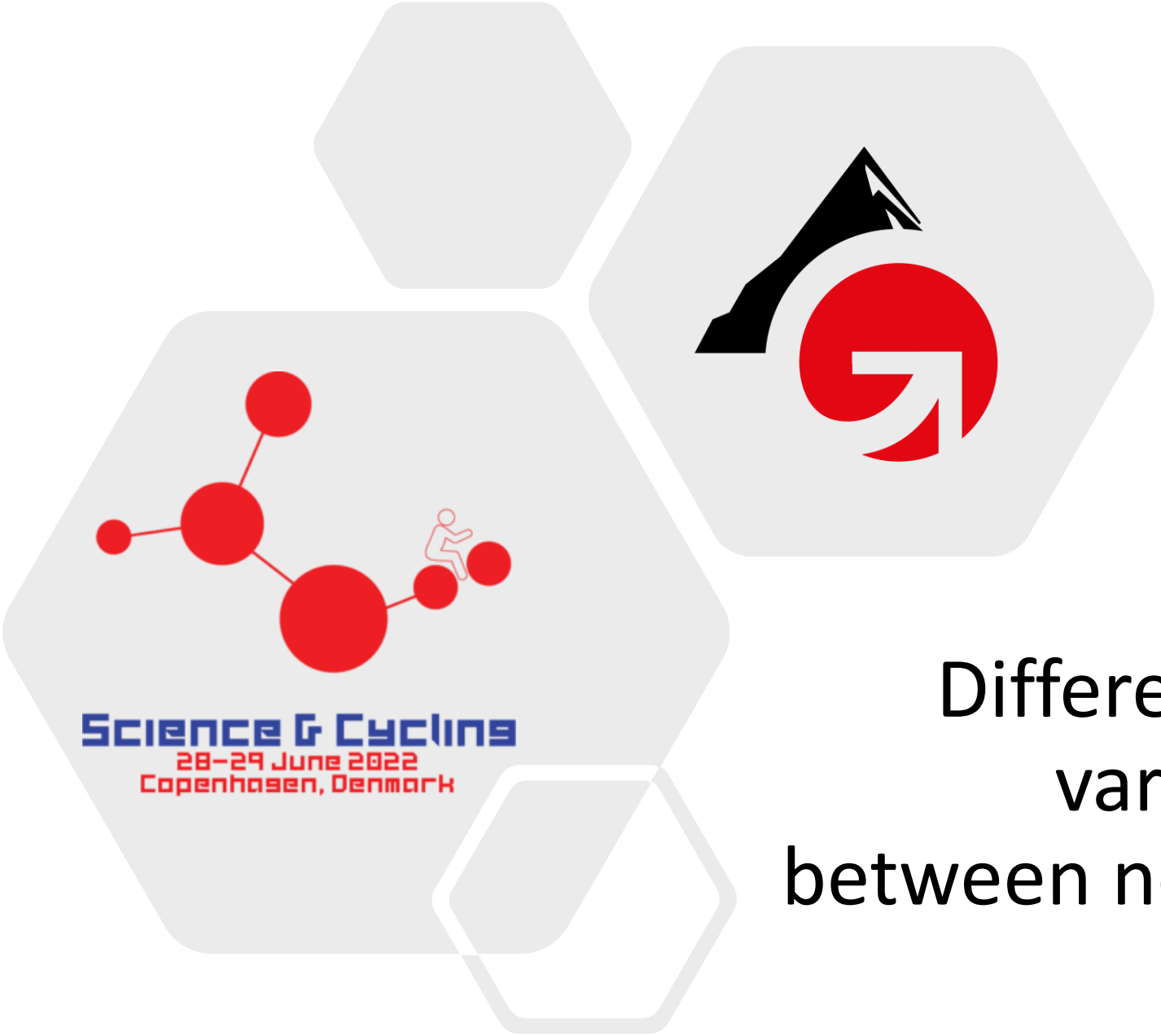


Glomser and Leo

Differences in physiological variables of U23 cyclists between normoxia and hypoxia

Denver, Colorado

1700m

August 10th, 1991

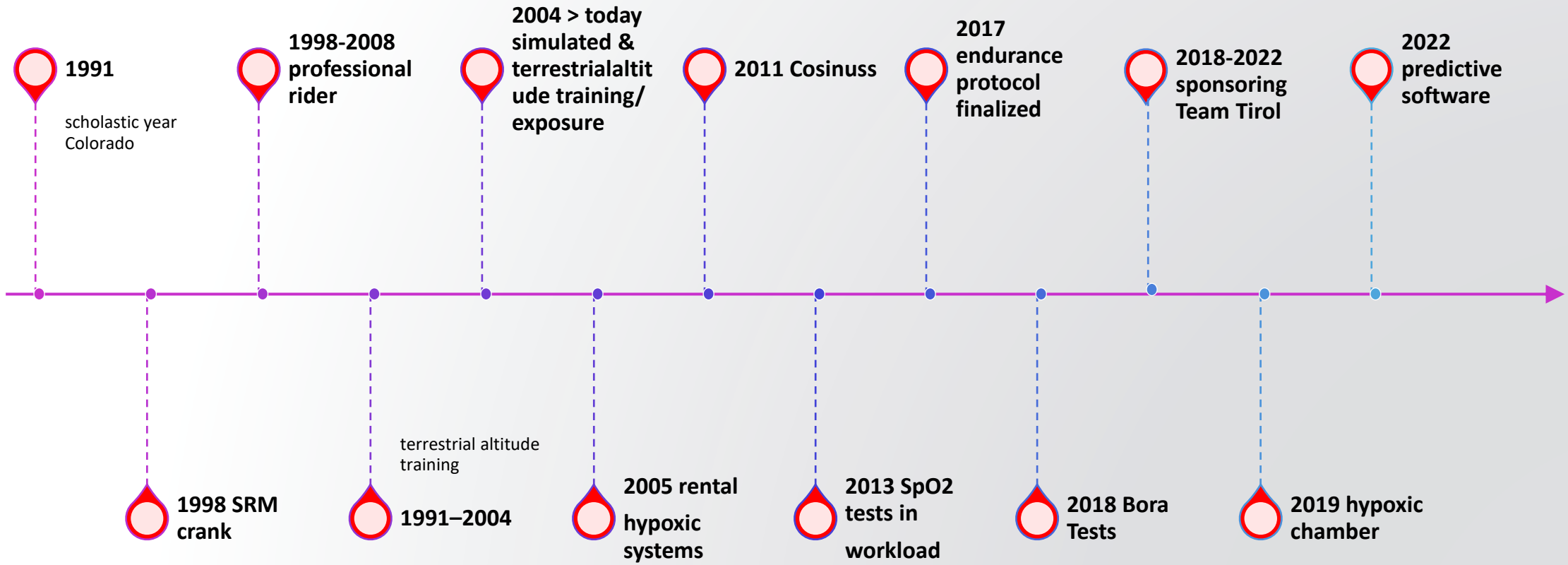
Tour de France 2003/04

Team Saeco

1991-2004 conventional altitude training

2005 to today conventional and simulated altitude training and exposure

Gerrit Glomser



Personal experience

- 95% use altitude to prepare competition in lowland
- For altitude response there is no standard measuring method yet (SRM – early 90‘s)
- altitude a matter of coaches passing on their own experience to athletes
- copying others

Monitoring athletes 2005 - 2017

- EXPECTATIONS
- altitude exposure only - sleep high train low
- morning readings SpO2 and heart rate at rest immediately after waking up + training data
- indication of how good adaptation to altitude will work
- reaction to stimulus not dependant on age, fitness or gender

- <u>unstable morning</u> readings or irregularily taken

Altitude and cyclists

1. Increasing data quality
- stabilizing data by applying SpO2 readings to work load
- first tests with befriended cyclists
  > striking parallels to already existing morning readings

2. Turn around procedure - first tests then monitoring
- unknown cyclists > predict adaptation > validate by monitoring
- ex-post information to altitude output
  > prediction would be ground breaking

3. additional test at 1800m altitude – increase in precision and prediction

Comparative tests - lowland vs. 1800m
2015 <

- Setup in 2015:
  Cyclus2 ergometer
  pulsoxymetry (Geratherm)
  ramp test protocol 100/20/1
  same day, 3-4 hours apart
  2018 < with spiroergometry (Cortex Metalizer 2B)

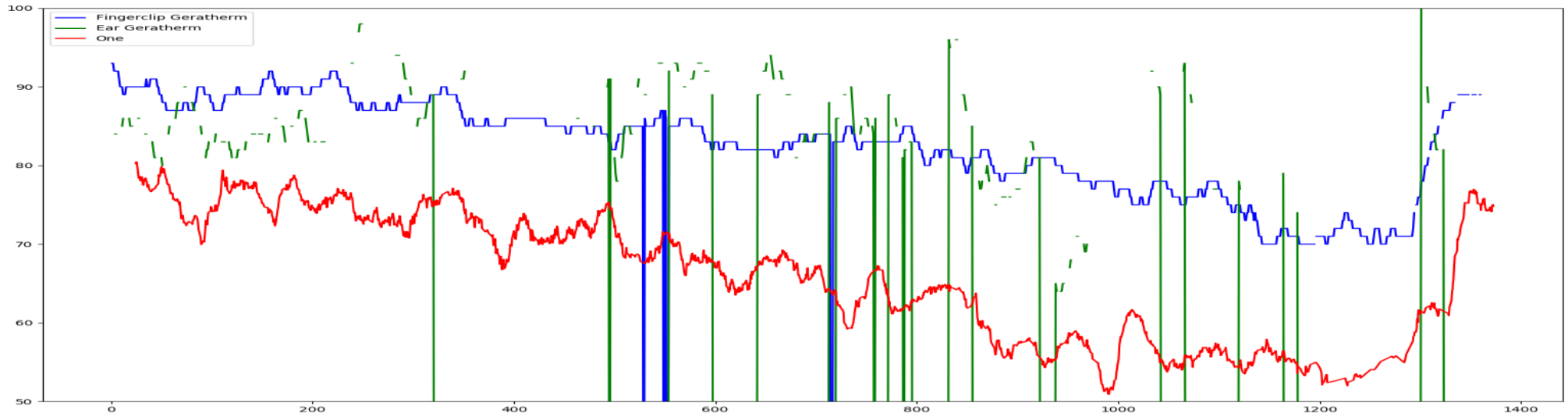
Tests show:

- *if athletes react at all*
- *how long adaption will take – EXPECTATIONS - timeframe*
- optimizing potential to set hypoxic periods in accordance to athletes race programm

Bora 2018

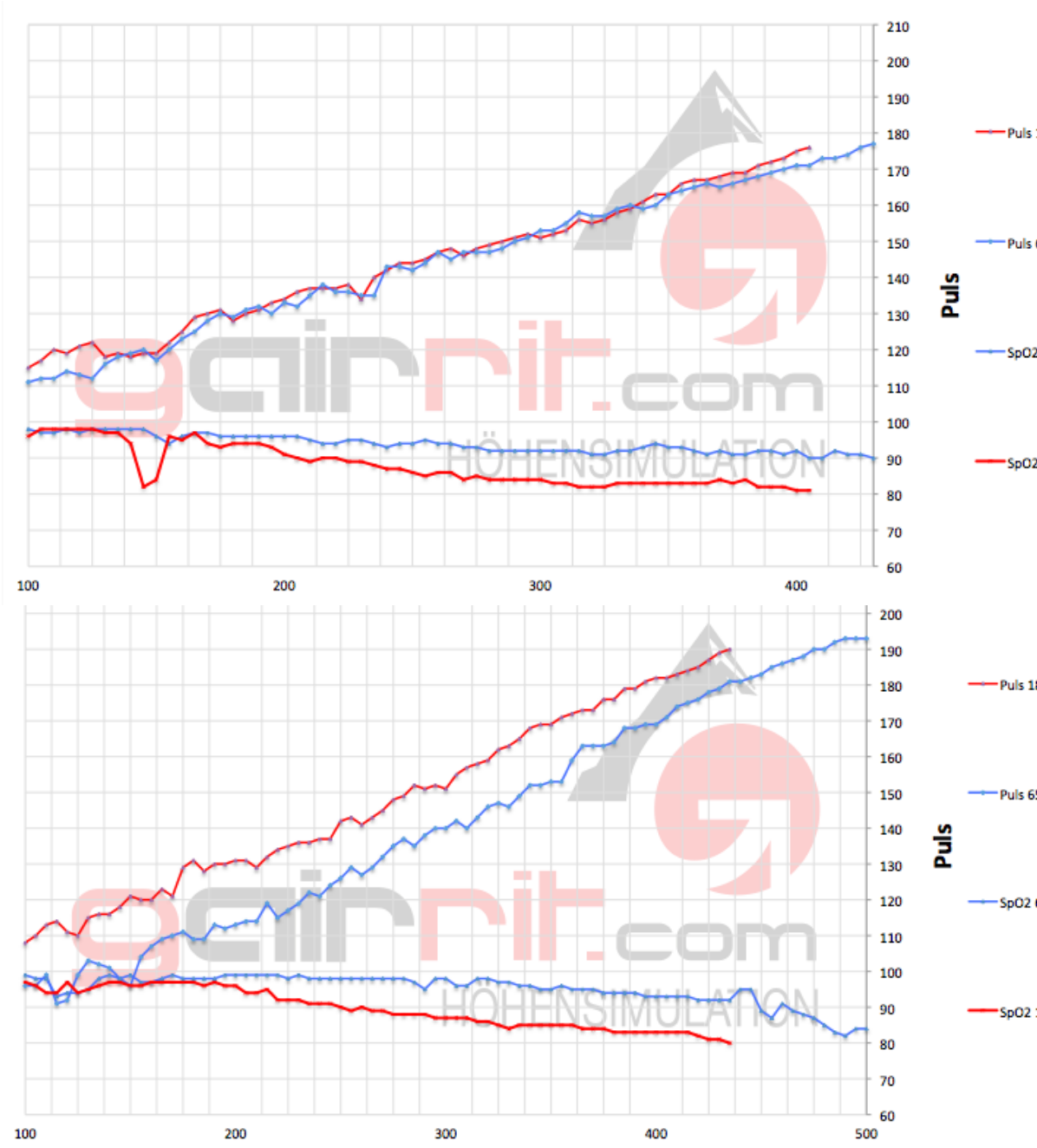
Scientifically supported by Peter Leo

Spo2 c_2400



U23 Tirol Cycling >2018

Scientifically supported by Peter Leo



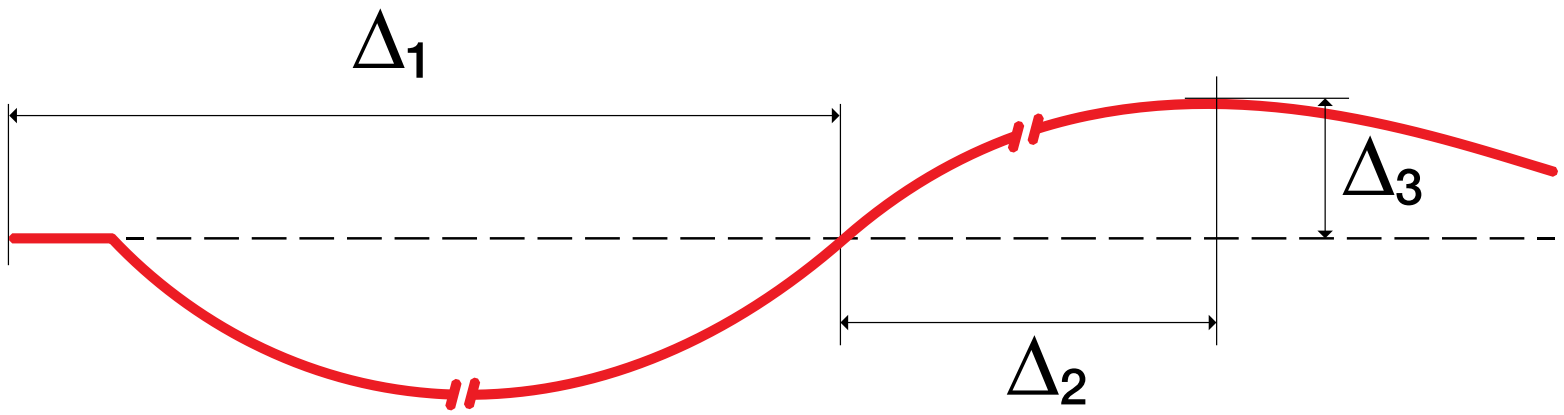
Abstract

- 12 double tests from U-23 riders
- comparing tests give feedback on how acute altitude exposure effects riders performance
- Enables how timing should look like towards goal
- recommendation for training training zones

Predictive forcasting

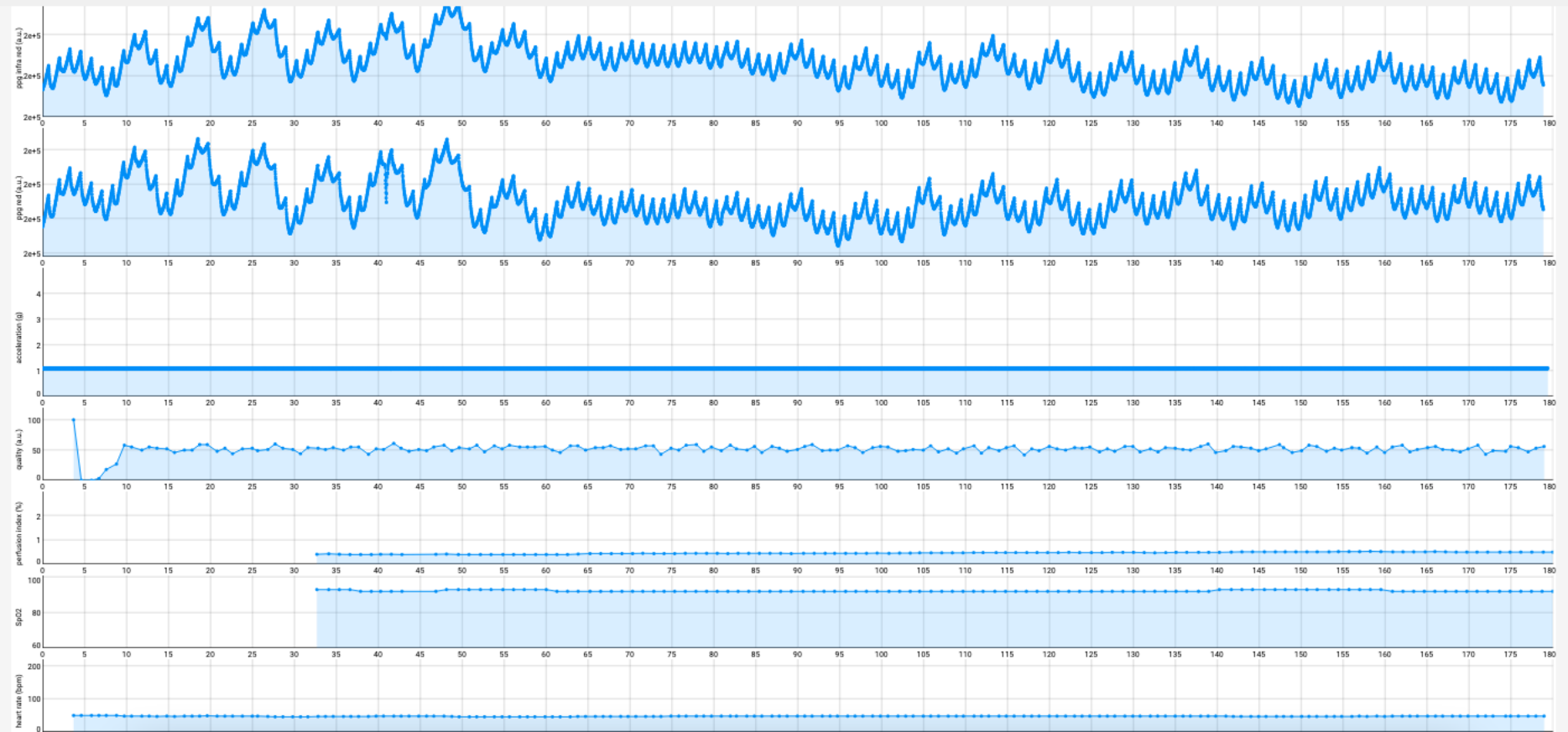
- protocol allows classification of how one copes with altitude in the long term
  - double test very sport specific + practical
  - Total hemoglobin mass measurements are very expensive and difficult to access
  - double tests can be done at athletes home base

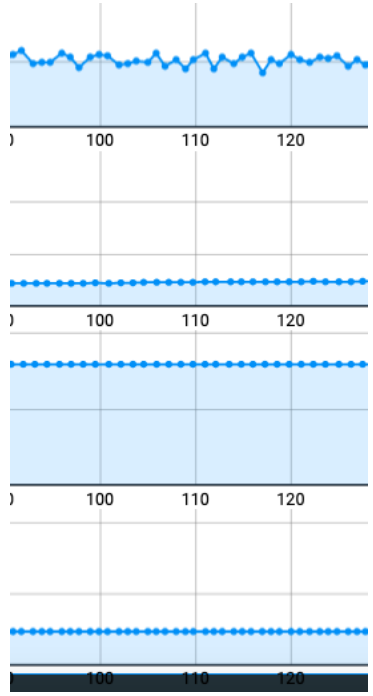
Delta-Time – action plan – adaption curve



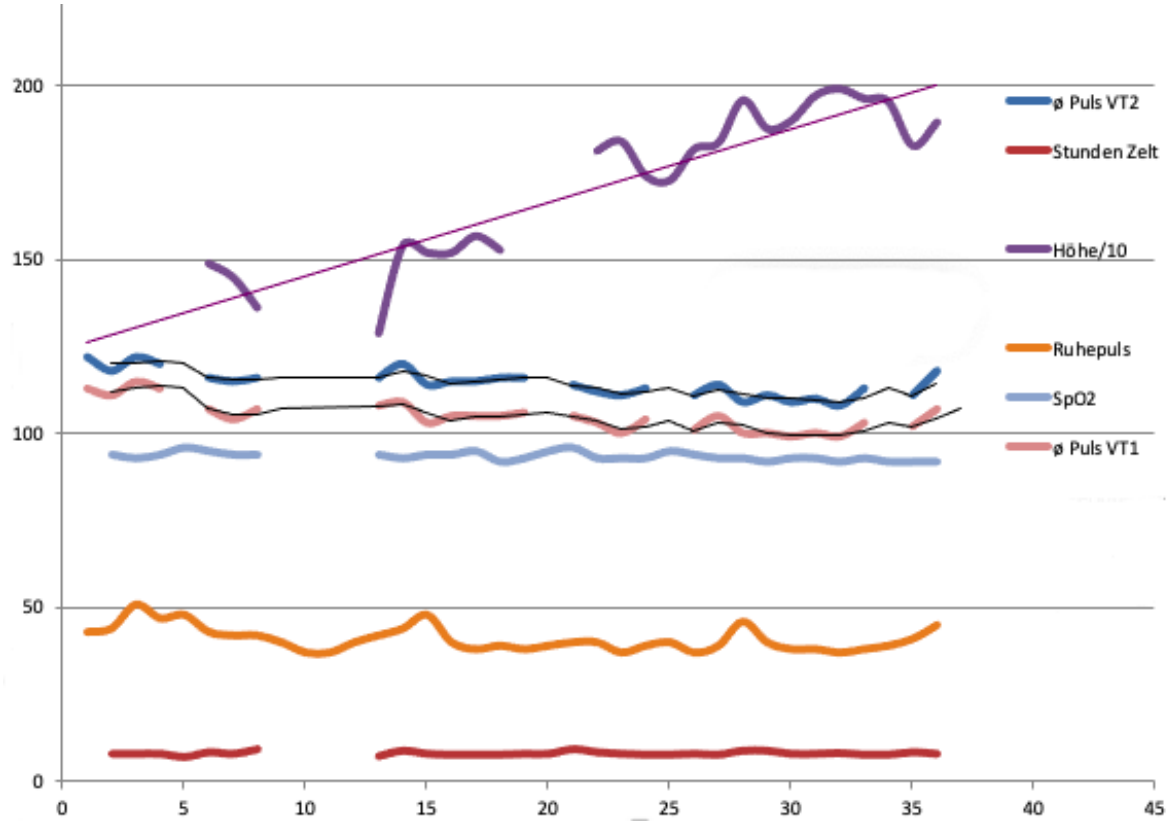
Monitoring Setup

Detailed information





Athlete altitude profile



- ✓WHEN precisely at
- ✓WHAT exact altitude is
- ✓WHICH performance gain possible

Take home

- initial altitude stimulus sufficient 1000m +/- 250m
- average 150 hours of normoxia to reach starting performance level
- average 250 hours of normoxia, to reach maximum output
- Normoxia enables to individually adapt stimulus to althlete

Questions?

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HÖHENSIMULATION