Modeling of Physical Health Parameters based on GIS and Sensor Integration

"Cardio topographic map",
a study for modern GPS and GIS driven
sports and fitness applications

Ahorn 2012, Davos Session 2 – Verkehr, Tourismus, Sport

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http://www.radlabor-mobil.com
http://www.gesundes-bergsteigen.com
http://www.gesundes-radfahren.com

Energy as parameter for Routing

On the Road:

„eco-routing“

For Fitness and Outdoor:

„Cardio Topographic Map“

Image: www.garmin.de

Christian Hessing, Manfred Buchroithner

On the Road: „eco-routing“ uses vehicle sensors

Image: www.garmin.de

New Approach for Fitness Applications

Modules for GIS modeling of physical and health relevant information

- **Available map data base with static and dynamic parameters**:
- **Sensor determined individual personal parameters**:
- **Medical expertise**:
- **Processing / Achievable output**

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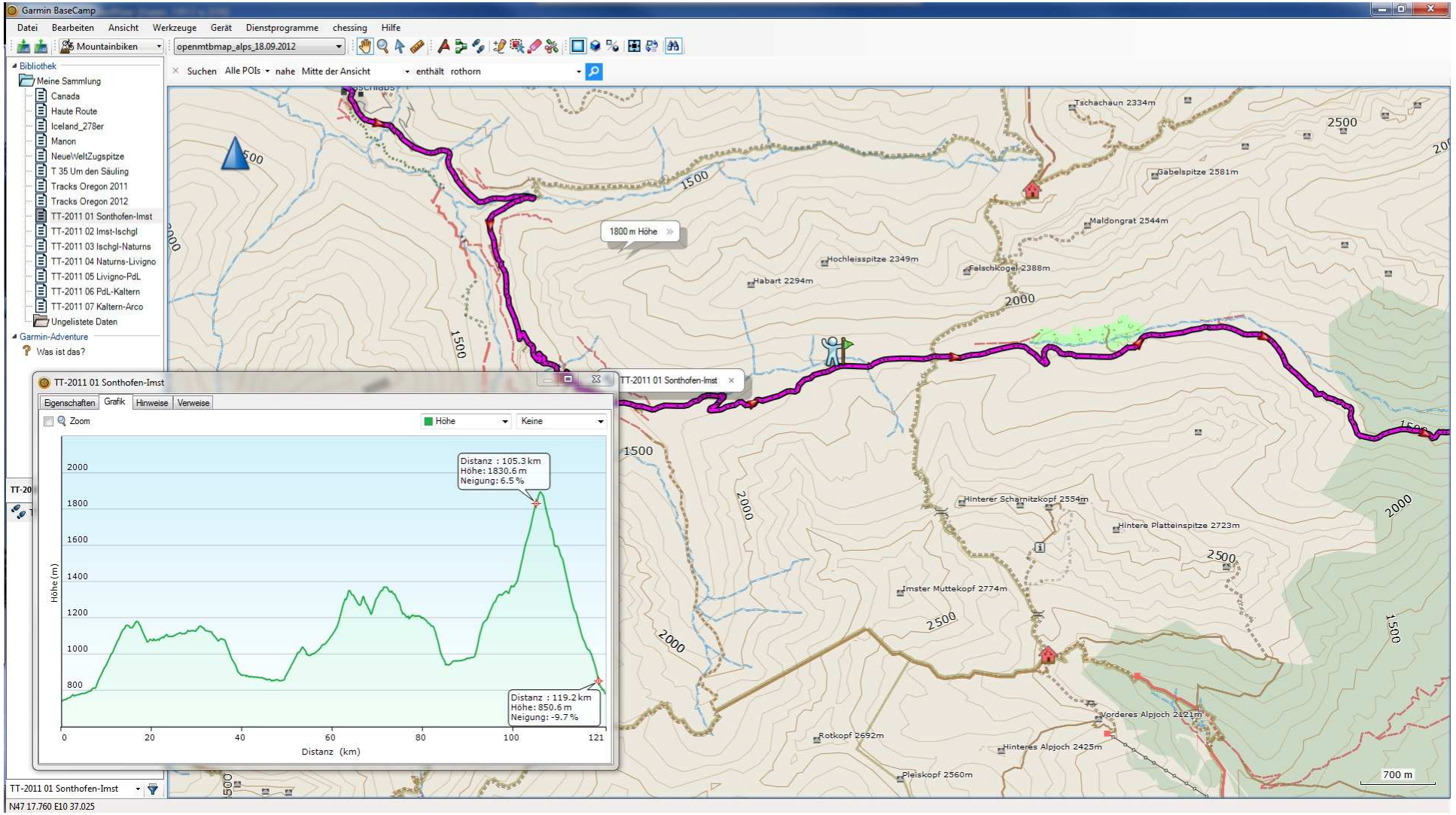
GIS Basis


Garmin BaseCamp
Datei Bearbeiten Ansicht Werkzeuge Gerät Dienstprogramme chessing Hilfe
Mountainbiken
openmtbmap_alps_18.09.2012
Bibliothek
Meine Sammlung
Canada
Haute Route
Iceland_278er
Manon
NeueWeltZugspitze
T 35 Um den Säuling
Tracks Oregon 2011
Tracks Oregon 2012
TT-2011 01 Sonthofen-Imst
TT-2011 02 Imst-Ischgl
TT-2011 03 Ischgl-Naturns
TT-2011 04 Naturns-Livigno
TT-2011 05 Livigno-PdL
TT-2011 06 PdL-Kaltern
TT-2011 07 Kaltern-Arco
Ungelistete Daten
Garmin-Adventure
Was ist das?
Suchen Alle POIs nahe Mitte der Ansicht enthält rothorn
1800 m Höhe
Tschachaun 2334m
Gabelspitze 2581m
Maldongrat 2544m
Hochleisspitze 2349m
Falschkogel 2388m
Habart 2294m
Hinterer Scharnitzkopf 2554m
Hintere Platteinspitze 2723m
Imster Muttekopf 2774m
Vorderes Alpjoch 2421m
Rotkopf 2692m
Hinteres Alpjoch 2425m
Pleiskopf 2560m
700 m
TT-2011 01 Sonthofen-Imst
Eigenschaften Grafik Hinweise Verweise
Zoom
Höhe
Keine
Distanz : 105.3 km
Höhe: 1830.6 m
Neigung: 6.5 %
Distanz : 119.2 km
Höhe: 850.6 m
Neigung: -9.7 %
Höhe (m)
Distanz (km)
N47 17.760 E10 37.025

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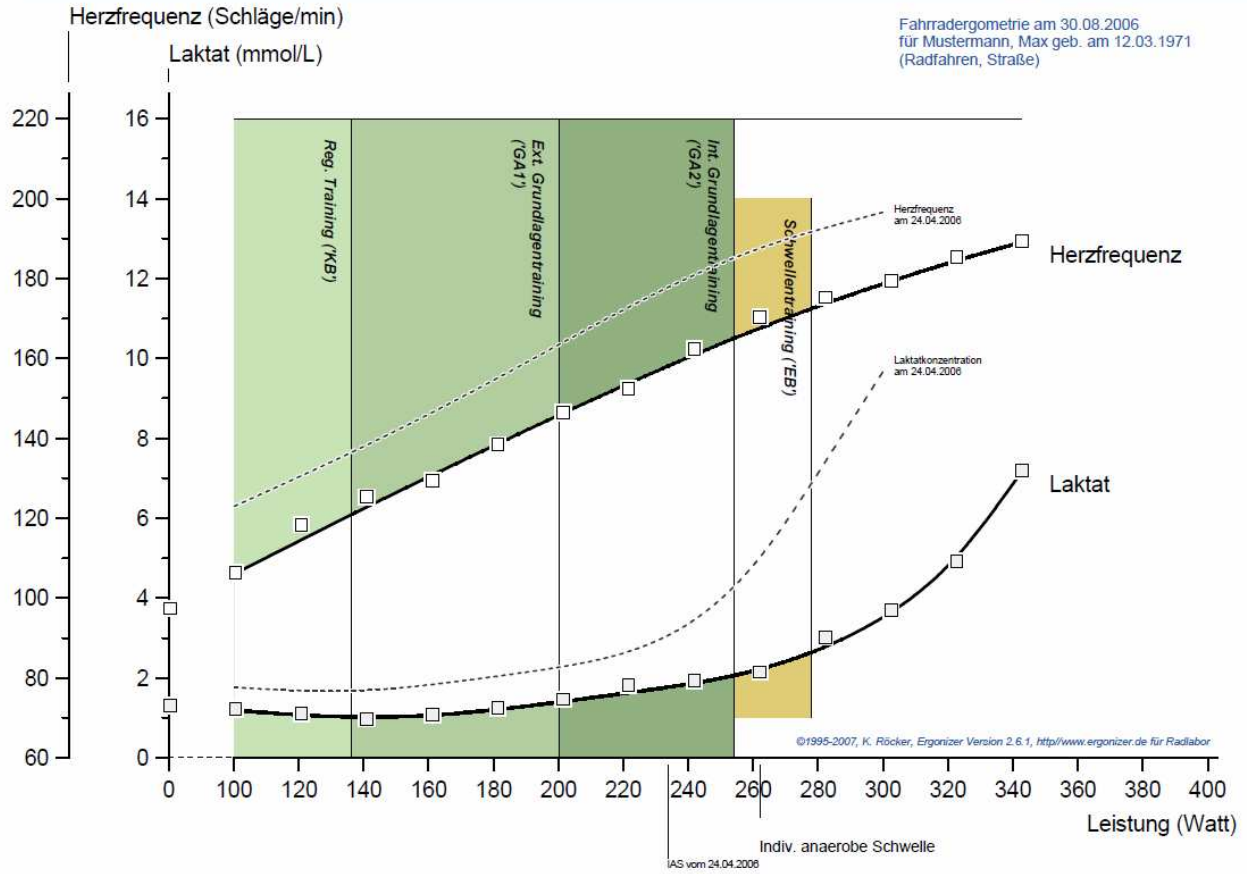
Measurable Human Parameters

Measurable Human Parameters

Time Period: 7 Days 30 Days All Days

Measurement	Mon, 15 Aug 2011
Weight	76,0 kg
Body Fat	14,2 %
Body Water	59,8 %
Bone Mass	3,2 kg
Muscle Mass	61,9 kg
Physique Rating	5
Visceral Fat	6
Metabolic Age	31 years
Daily Caloric Intake	3.318 C

Individual parameters



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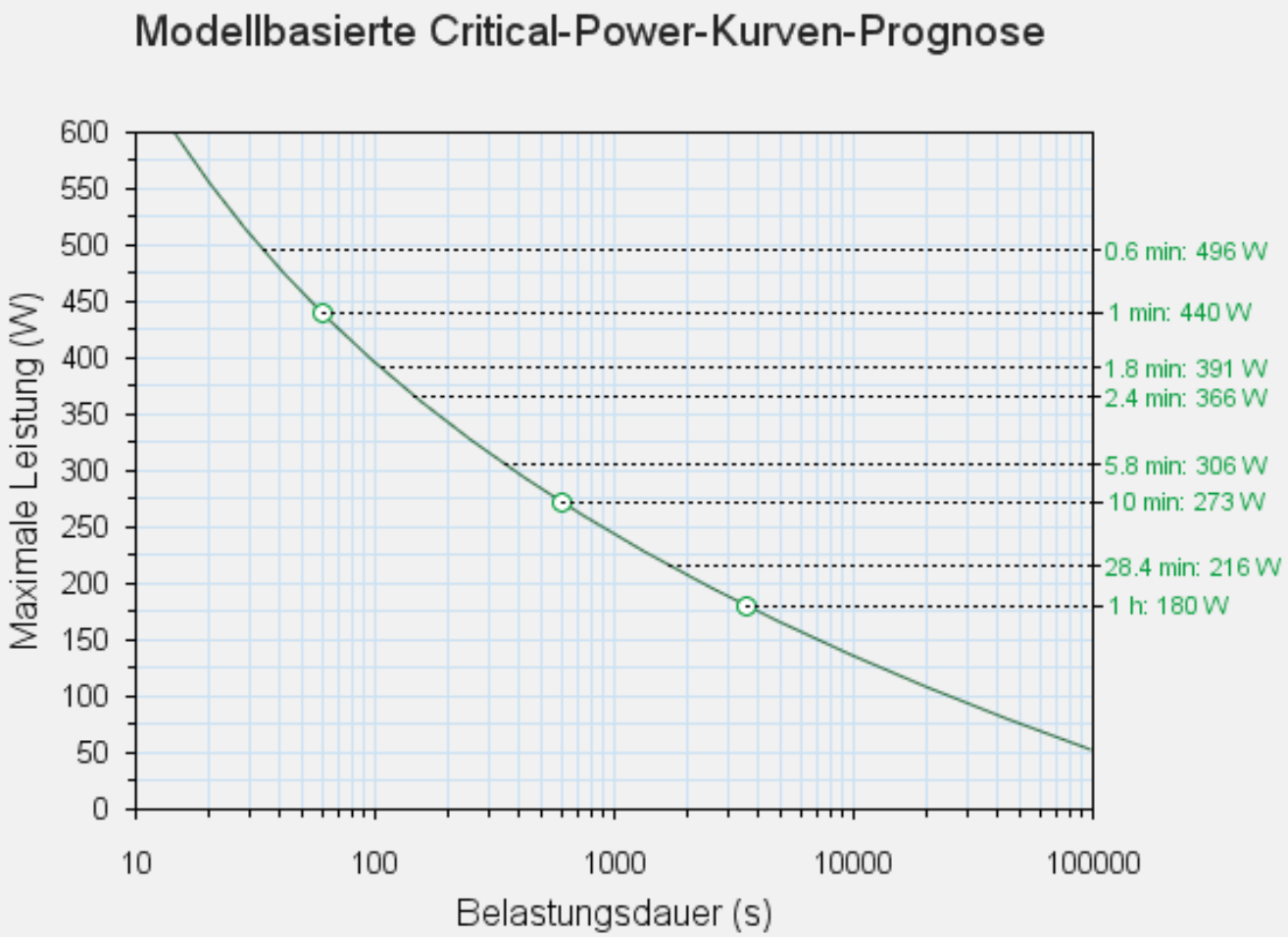
- **Medical expertise**:
  Basics on exercise testing and prescription: Information on relevant physical and health parameters and thresholds, training theory, medical background on target groups, latest sports-medical science research results “Critical Power Concept”



Mustermann, Heiner am 13.07.2000 (Fahrradergometer)
©1991-2011, K. Röcker, Ergonizer Version 4.0.0 Build 5, http://www.ergonizer.de

Critical-Power-Concept angelehnt an Monod und Scherrer, 1965

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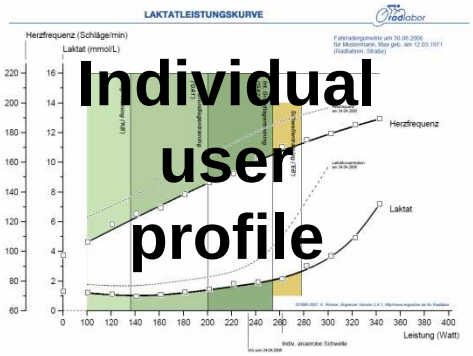
- **Achievable output**
  - Suggestion on dedicated trails, training time and efficiency for different use cases
  - Energy consumption
  - Individual training plan/schedule for any natural or outdoor environment
  - Exercises intensity
  - Information on Individual fitness status



Individual user profile

Health & Fitness Modell

Topographic & Trail Information

- **Health Relevance**
- **Training Intensity**
- **Outdoor Experience**

Use Cases and Traget Groups

- **Health Relevance**
  improve training, give new motivation
- **Outdoor Experience**
  use the natural topography for efficient training
- **Training**
  receive individual recommendations

Rehabilitation:
- **Cardio issues,**
- **Adiposity**

Prevention:
- **Fitness, - Popular/Amateur Sports**
- **Company Health Programs**
- **Tourist Region Marketing**
- **….**

Pro-Training:
- **Professional Athletes**

Additional Aspects

➢ Aspects on Motivation

- New Aspects on how to motivate people to do efficient exercises
- Suggestion for company health programs (interesting for large companies)
- Concept for Integration in European Health Insurance Programs

➢ New Markets / Products

- Applications for electric bikes (pedelecs)
- Support for fitness and training computers and software solutions
- Realistic virtual training partner
- Training concepts for different use cases