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# Orienteering: training in endurance running sport with a map

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# ...few words about me



- O-runner since 1998, „former“ road and track runner and Ironman triathlete, floorball player, climber, hiker, MTB rider, ...
- PhD student in Sports Science, MUNI SPORT (S&C)
- At MUNI:
  - Teaching classes S&C, T&F, SS
  - Quality coordinator for study programmes
  - Research: running economy, data analysis, ...
- S&C coach in O, long-distance running, football, ...
- Lecturing in coaches training (T&F, O, floorball, football, karate, XC skiing, ...)
- Certified coach in O, T&F and DNS

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# Focus of the lecture

- Orienteering
  - Definition, rules, competitions, disciplines & principles
- Technical and tactical component of o-performance
- Physical preparation in orienteering
  - General principles in orienteering
  - Case study: female member of Czech national team

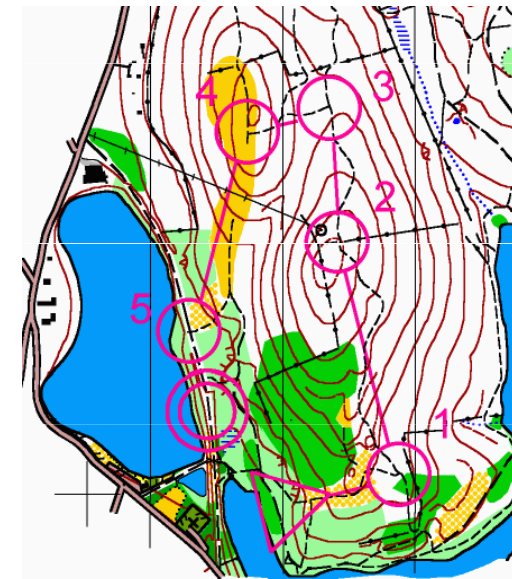






# Intro to orienteering

- Over 100 years of history and development (Scandinavia)
- Non-olympic outdoor sport
- Principle is to run through the check-points in the shortest possible time just with the help of map and compass





# O-competitions



## – Categories

- Gender: M or W
- Age groups: 10, 12, 14, 16, 18, 20, 21, 35, 40, ..., 95

## – Level:

- Local
- Regional
- National
- International (Continental and World Championship, World Cup, World Ranking Events)

# O-races

## Individual

- **Sprint** (12-15 min)
- **Middle** distance (30-35 min)
- **Long** distance (M 90-100, W 70-80)
- **Knock-out** sprint/eliminator  
(Q→4F→SF→F; Q=8 min, 6-8 for knock-out rounds)
- (night, free-order, ultralong, ...)

## Relay

- **Relay** (MMM or WWW; 30-40 min per leg)
- **Sprint relay** (MWMW; 12-15 per leg)
- (Team relay – Tiomila – 10 men's legs)



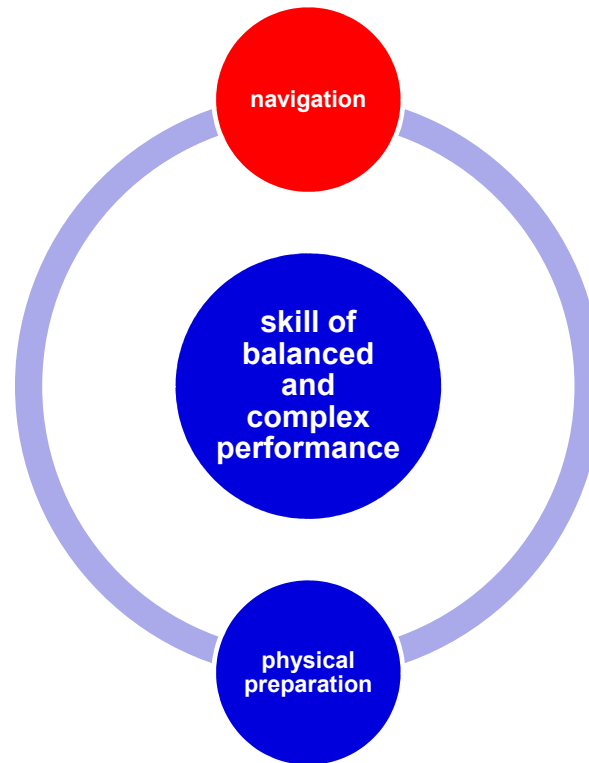
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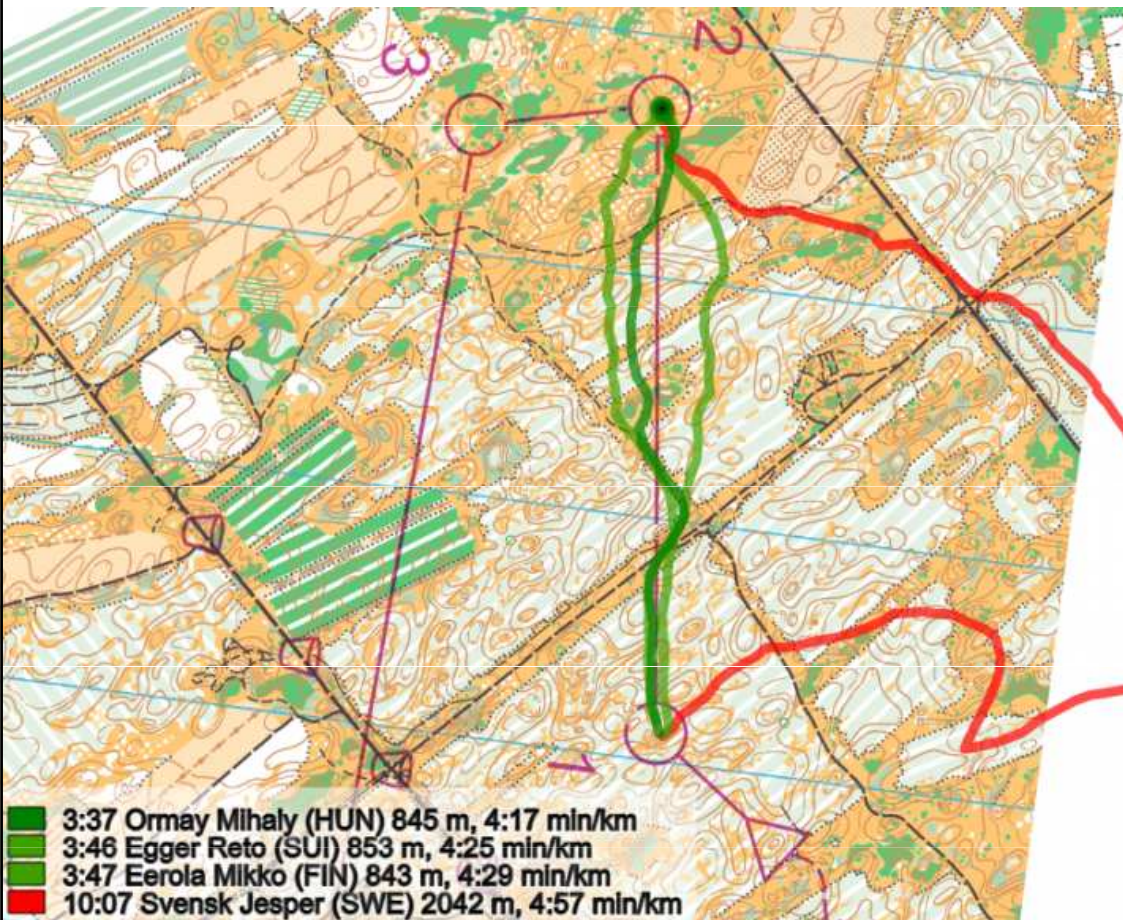




# O-performance



# Navigation



- Don't think about O as running race  
→ navigation instability
- The most important things are unobservable
- **Conscious** control of the race is the basis for **stabilizing** the O's performance



# Conscious & stable race

- Goals (in that order!):
  - No mistakes
  - Ideal routechoise
  - Fast (not running, but making a plan and realization afterwards)
- If you
  - finish the tasks successfully → proud & fix
  - don't finish the tasks successfully → dissatisfaction & analyze the mistakes
- General method for navigation is:
  - **continuous plan creation**  
In every second of the race I know where I am and have a clear idea what will be situation in a few moments

# Conscious control of the race

- „I have full control about my race.“
- „Performance over result.“
- „Just me, checkpoints, map and terrain.“
- „Orienteering is like driving a car. When you don't know where you are going to, you have to slow down or stop.“
- „Every routechoise is challenge to solve.“

# Navigation skill progression – basic level

ISOM 2017 Orienteering Map Symbols		
Land forms	Man-made features	Vegetation
Contour Index contour Form line Slope line Contour value Earth bank Earth wall Ruined earth wall Erosion gully Small erosion gully Knoll Small knoll Small elongated knoll Depression Small depression Pit Broken ground Very broken ground Prominent landform feature	Paved area Wide road Road Vehicle track Footpath Small footpath Less distinct small path Narrow ride Visible path junction Indistinct junction Railway Power line, cableway or skilift Major power line Bridge/tunnel Footbridge Wall Ruined wall Impassable wall Fence Ruined fence Impassable fence Crossing point Area that shall not be entered Building Canopy Ruin High tower, Small tower Cairn, Fodder rack Prominent line feature Prominent impassable line feature Prominent man-made feature	Open land Open land with scattered trees/bushes Rough open land Rough open land with scattered trees/bushes Forest: easy running Vegetation: slow running Undergrowth: slow running Vegetation: walk Undergrowth: walk Vegetation: fight Vegetation: impassable Forest runnable in one direction Cultivated land Orchard Vineyard Distinct cultivation boundary Distinct vegetation boundary Prominent large tree Prominent bush or tree Prominent vegetation feature
<b>Water and marsh</b> Uncrossable water Shallow water Waterhole Uncrossable river Crossable watercourse Small crossable watercourse Minor/seasonal water channel Narrow marsh Uncrossable marsh Marsh Indistinct marsh Well, fountain or water tank Spring Prominent water feature	<b>Rock and boulders</b> Impassable cliff Cliff Rocky pit, Cave Boulder, Large boulder Gigantic boulder Boulder cluster Boulder field Dense boulder field Stony ground: slow Stony ground: walk Stony ground: fight Sandy ground Bare rock Trench	<b>Overprinting symbols</b> Start Control point Control number Marked route Finish Out-of-bounds boundary Crossing point Out-of-bounds area Out-of-bounds route First aid post, Refreshment point
<p>© Maprunner 2017.            Copies of these map symbols and of the IOF pictorial control descriptions can be downloaded from <a href="http://www.maprunner.co.uk">www.maprunner.co.uk</a>            The ISOM 2017 specification can be downloaded from <a href="http://www.orienteering.org">www.orienteering.org</a></p>	<b>Technical symbols</b> Magnetic north line Registration mark Spot height	

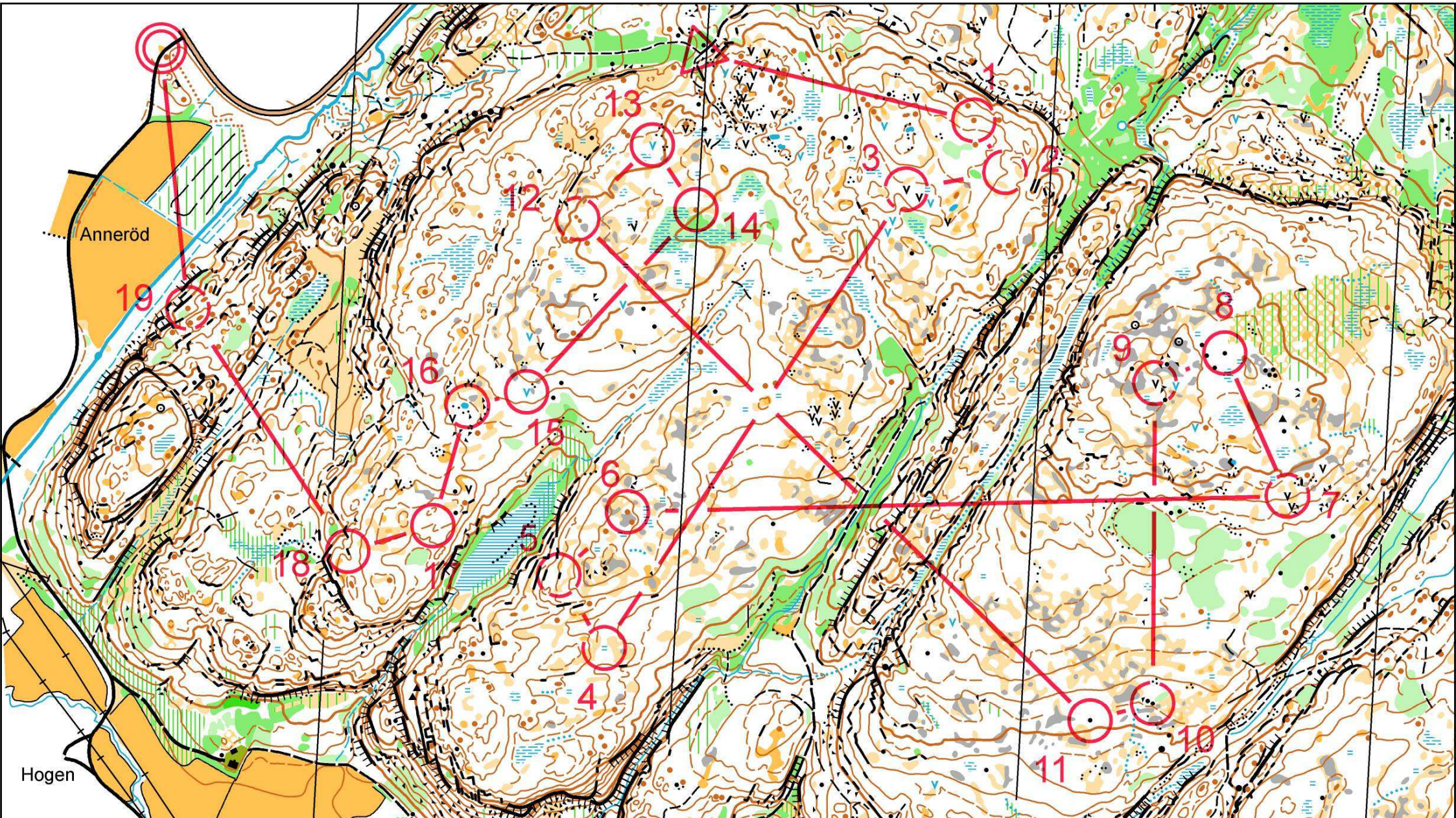
- Map symbols
- Terrain to map transformation
- Map to terrain transformation
- Map orientation (N)
- Distance estimate
- Plan creation and realization using „lines“



# Navigation skill progression – advanced

- Running straightforward (compass)
- Running at the same level (contour)
- Plan without „lines“
- Progression in running pace up to the physical barrier
- Navigation under the stress
- Extending terrain portfolio (next few slides)
- Specific peaking



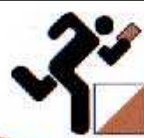




F-L-O-R-I-D-A



ORIENTEERING



# SHOCKLEY RANCH

OCALA NATIONAL FOREST - SEMINOLE RANGER DISTRICT

SCALE 1: 15000

CONTOURS 2.5m

YEAR 1999

## LEGEND

- Wide dirt road
- Vehicle Track
- Trail
- Narrow trail
- Less distinct trail
- Cutline, indistinct track
- Ruined fence
- Power line
- Contour
- Index contour
- Form line, slope line
- Dry ditch
- Earth wall
- Knoll, small knoll
- Depression
- Shallow depression, pit
- Open land, fast running
- Rough open with scattered trees
- Forest, fast running
- Forest, slow running
- Forest, difficult to run
- Scattered thickets, Undergrowth
- Undergrowth: slow running
- Distinct vegetation change

## CREDITS

Base map: Olaf Helgesen, a-kart-taam, Kongsberg, Norway.  
 Field Survey and artwork: Mark Adams, 1995.  
 Partially revised: Malcolm Adams, April - May, 1999.  
 Printing: MP Photo Reproductions Ltée., Montreal, Québec, Canada.

This Orienteering map has been produced through the gracious cooperation of the Seminole Ranger District of Ocala National Forest, Mr. Jim Thorsen, District Ranger.

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## WHAT IS ORIENTEERING

Orienteering is a recreational activity and competitive sport for people of all ages. It involves finding your way through unfamiliar terrain with the aid of a detailed topographical map. Using navigational skills and a compass to keep yourself orientated, you are free to select and follow the route you deem best between designated points on a course marked solely by a series of distinctive flags located at each point. Florida Orienteering hosts public events on a monthly basis at one of several central Florida venues. Everyone is always welcome at FLO events. Participate individually, or hike with a group. Instructions for first-timers are always available.

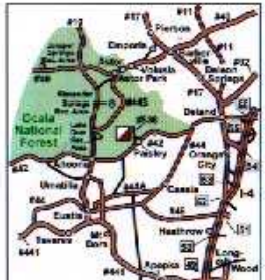
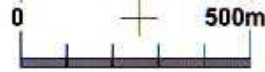
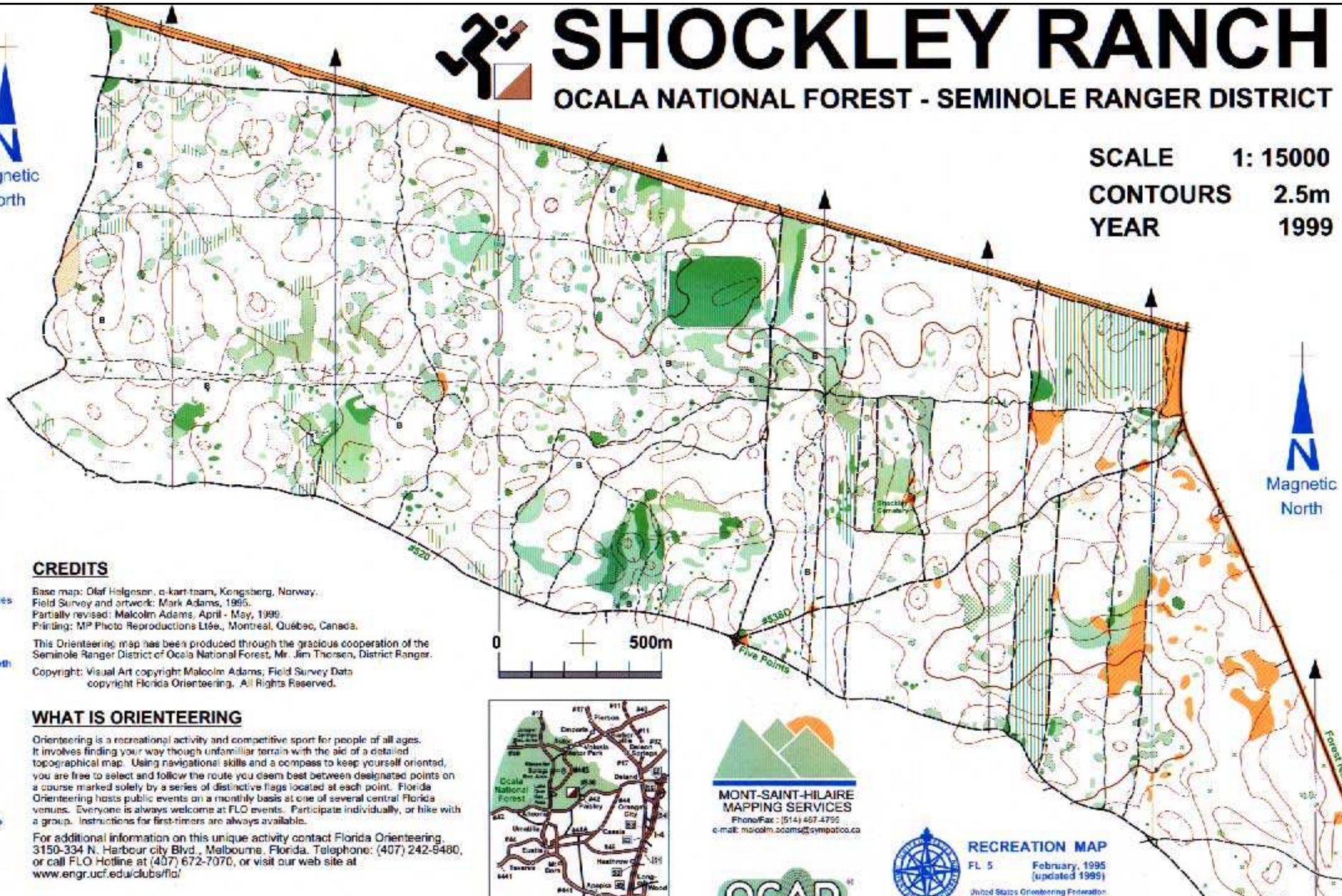
For additional information on this unique activity contact Florida Orienteering, 3150-334 N. Harbour city Blvd., Melbourne, Florida. Telephone: (407) 242-9480, or call FLO Hotline at (407) 672-7070, or visit our web site at [www.engr.ucf.edu/clubs/flo/](http://www.engr.ucf.edu/clubs/flo/)

## SPECIAL SYMBOLS

- Hunter's platform
- Cultural object
- Root stock
- Oak or palmetto thicket
- Distinct dead pine or palm tree

## TRAILS

- Bike trail (yellow blaze)



**MONT-SAINT-HILAIRE**  
**MAPPING SERVICES**  
 Phone/Fax: (514) 467-4755  
 e-mail: [malcolm.zooms@sympatico.ca](mailto:malcolm.zooms@sympatico.ca)



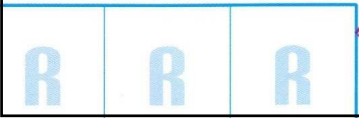
RECREATION MAP

FL 5 February, 1995 (updated 1999)

United States Orienteering Federation



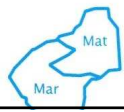
**WORLD RANKING EVENT**  
23. b. 2018 CHLĚBSKÉ



1	33	▲		1	○
2	45	▲		1	○
3	49	↖	▤		○
4	50		▤		○
5	53	▤		<	
6	54	▲		1	○
7	43	▲		2	○
8	56	↘	▤	2	└
9	60	↘	▲	1	○
10	72	▲		1	○
11	71	▤			✓
12	75	↓	▲	1	○
13	83	∩	—		
14	88	▲		1	○
15	91	▲		1,5	○
16	96	•		1	○
17	114	▤			└
18	116	▤		<	
19	119	▲		1	○
20	121	↓	▤		↖
21	136	▲		1,5	○
22	131	↘	▲	1,5	○
23	125	▲		1,5	○
24	135	▤		2	└
25	139	▤		2	○
26	100	∪		1	

Zvláštní mapové značky  
 ▲ plošina  
 ▤ přístřešek, lavička,  
 × malý dřevěný objekt,  
 informační tabule

Evidence map OB: 181B10210  
 Mapovali a kreslili (X/2017-V/2018, ISOM2017):  
 Petr Mareček (OCAD10), Petr Matula (Momap)  
 Hlavní kartograf: Petr Mareček  
 Mapové podklady: © ČUZK: DMR 5G, ortofoto  
 Vydal: © KOS TJ Tesla Brno, www.tbm.cz



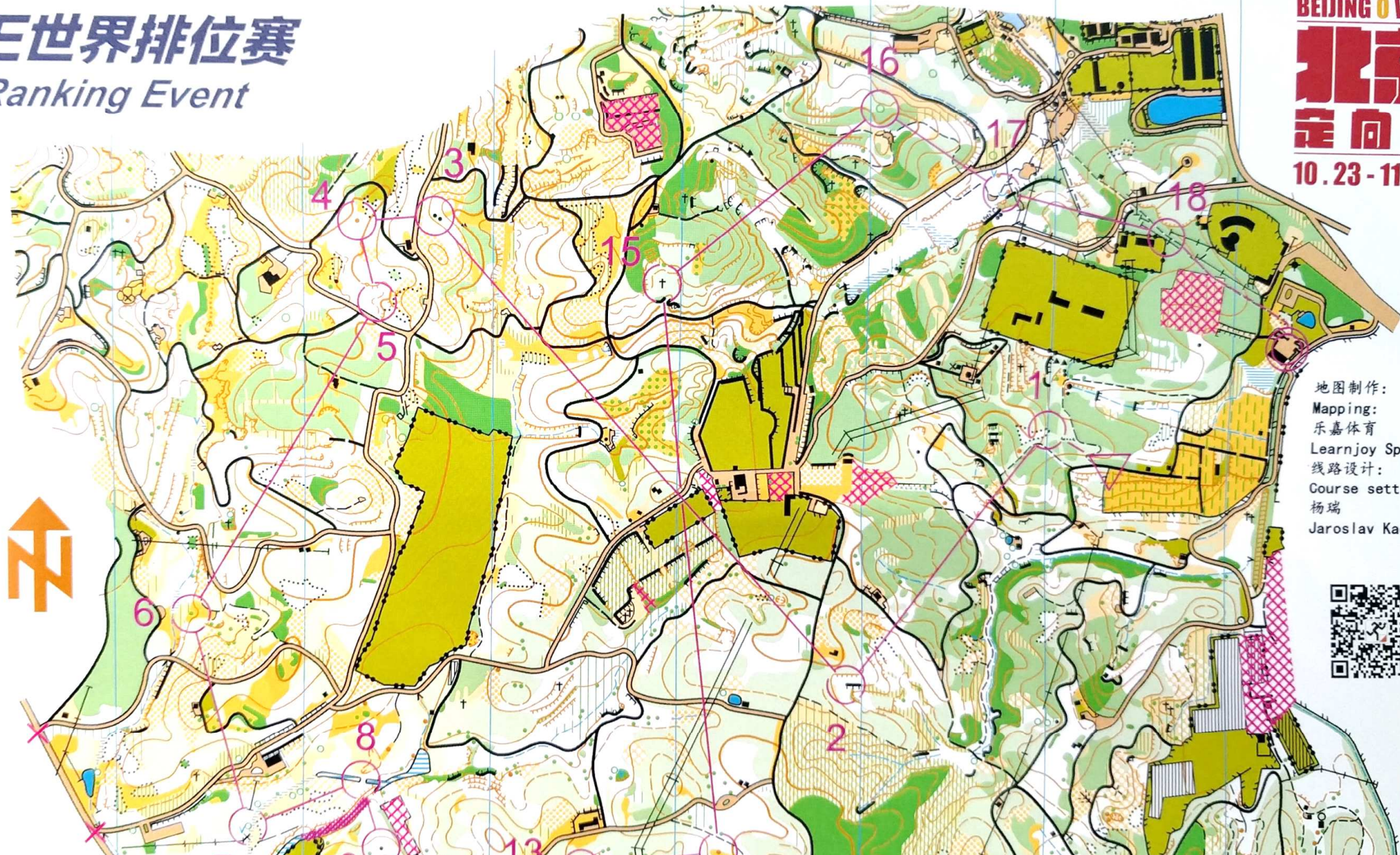
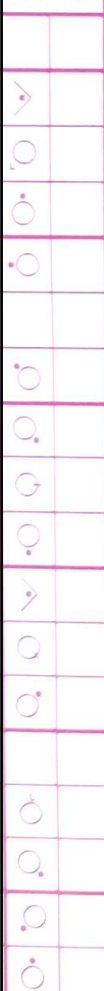


# WRE世界排位赛

World Ranking Event

BEIJING O WEEK  
**北京**  
**定向周**  
10.23-11.02

270 m



地图制作:  
Mapping:  
乐嘉体育  
Learnjoy Sports  
线路设计:  
Course setter:  
杨瑞  
Jaroslav Kacmarci





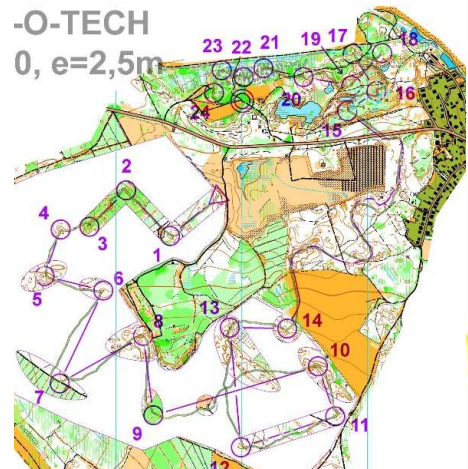
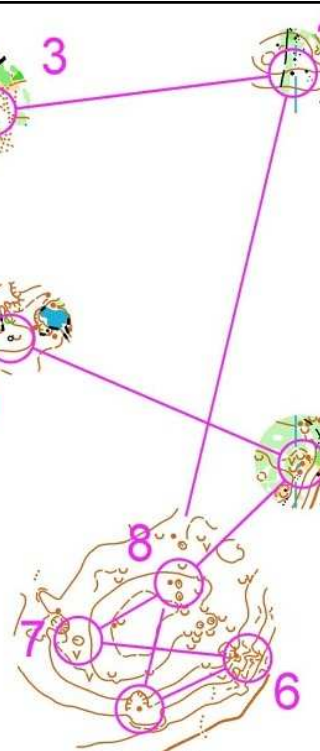
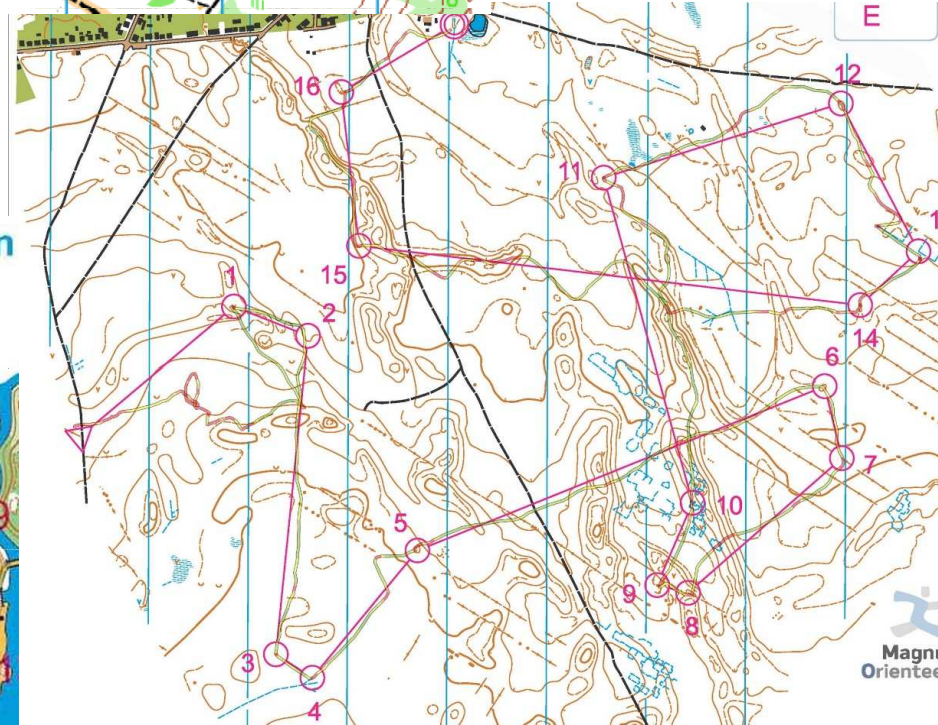
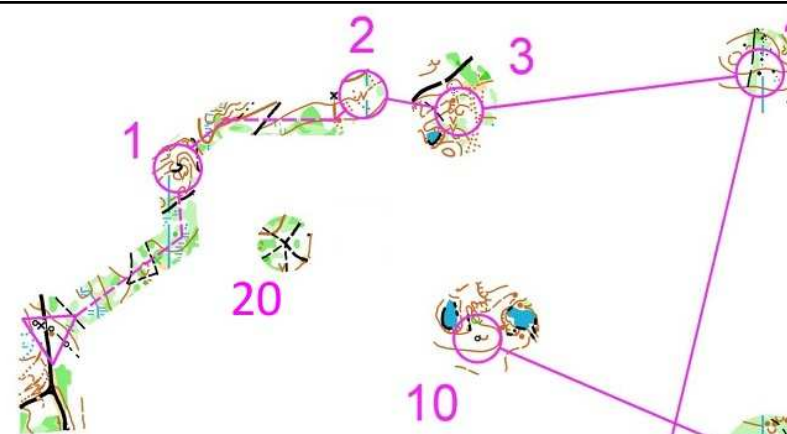
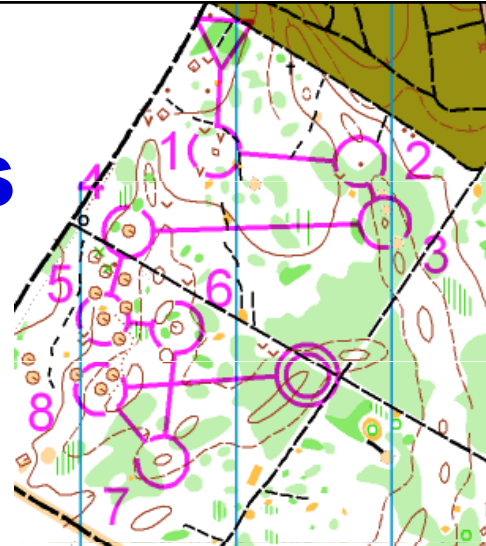
# Process of navigation

- **WHERE?** Routechoice
- **HOW?** Continuous selection of significant and visible orienteering points and linking them
  - Visually and/or
  - with navigation skill (straight, contour running, ...)

# Map training types

## – Basic o-navigation skills

- Develop, refresh and fix!
- Exmaples:
  - Only brown-color map
  - „White spaces“
  - „Necklace of beads“
  - Limited map reading
  - Lines
  - Checkpoint description reading
  - Combinations



**Ruins of Yuanmingyuan**  
 scale 1 : 4000  
 contours 2 m



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# Map training types #2

## – Map/terrain portfolio

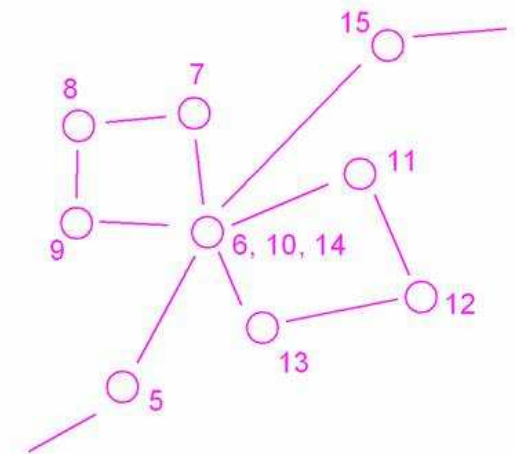
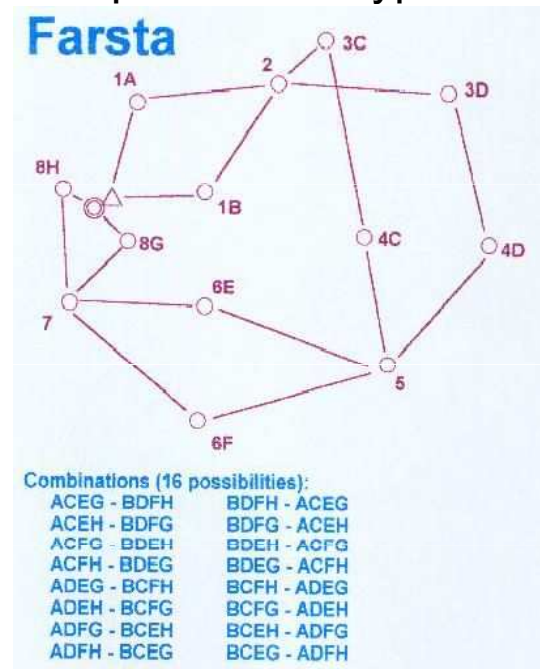
- Different terrains → different techniques
- More robust o-performance, more independent on type of terrain, map generalization, surface, visibility, vegetation

## – Race specific situation

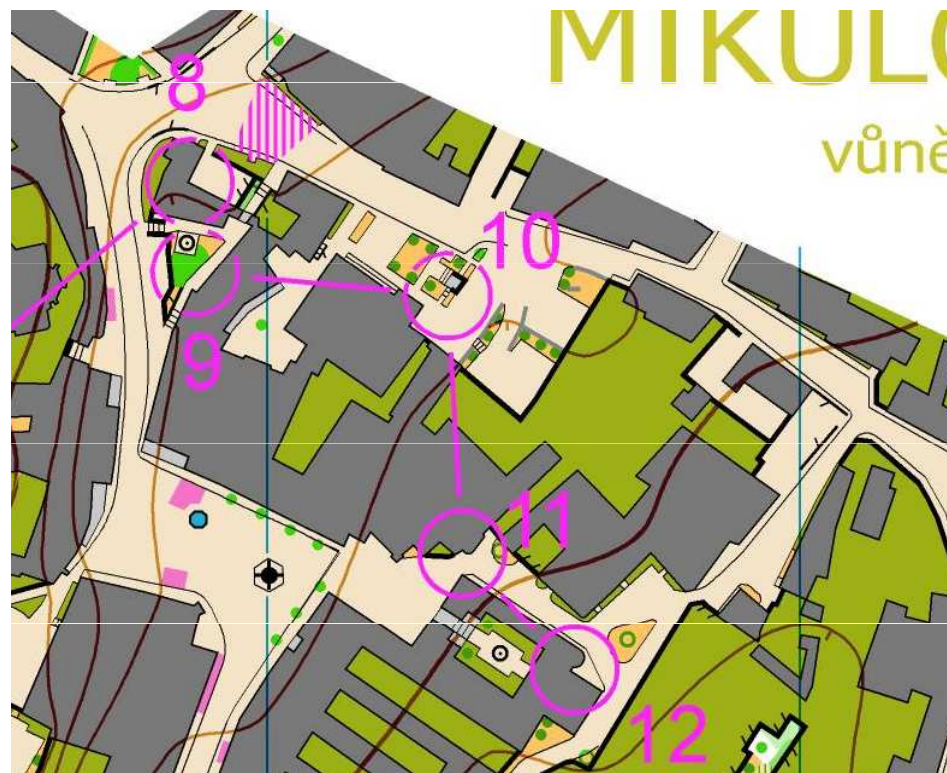
- Mass start
- Contacts (relays, pursuit, ...)
- Refreshment
- Short/long leg
- Forks (farsta)/butterfly

## – Complex

- Race, training race
- Map loops, course simulation



# Select the shortest way from 10 to 11



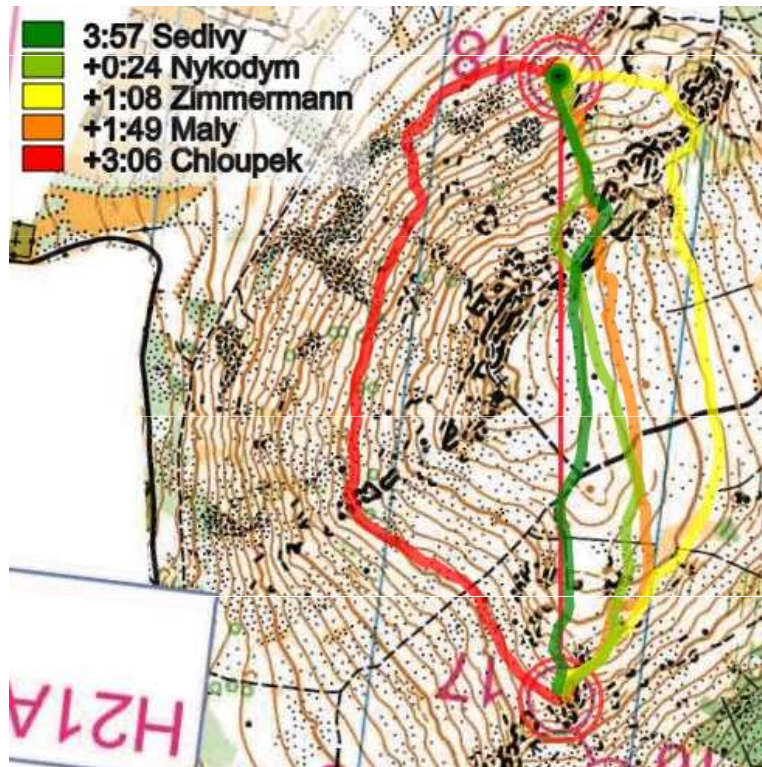
# Shortest way from 10 to 11 - solution





# The shortest in not (everytime) the fastest

Forrest

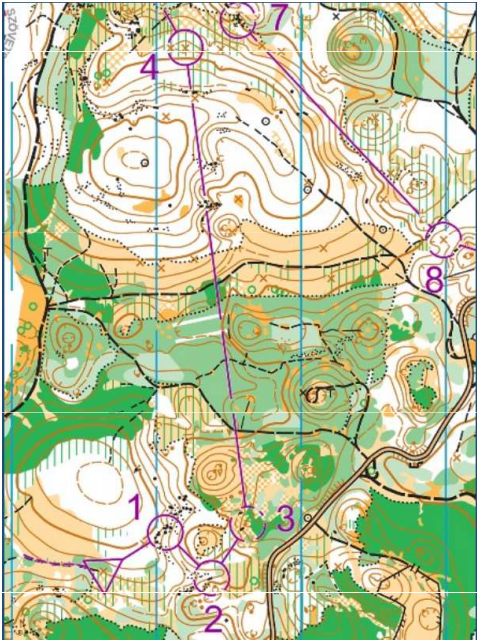


City

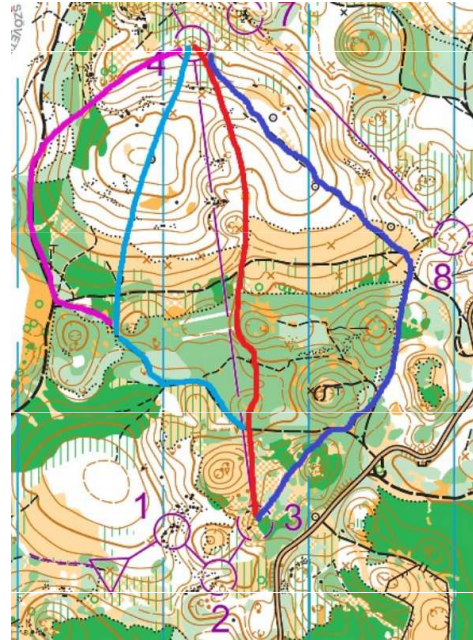
BTW: It's Brno! 😊



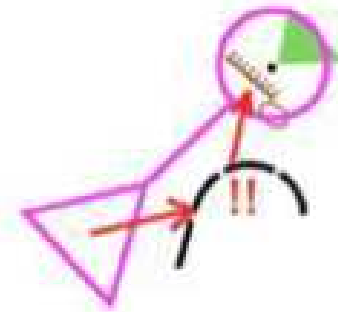
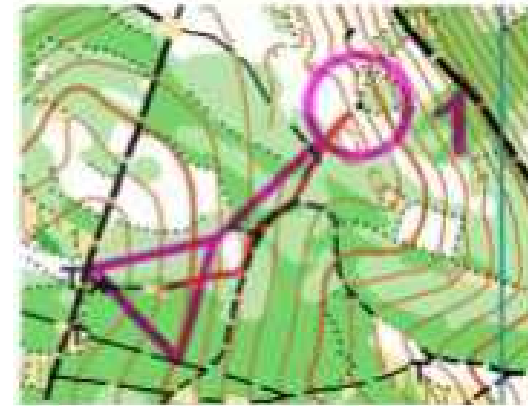
# Orienteering process



Read the map



Route choice



Select proper skills, combine them and execute





**TOVE ALEXANDERSSON  
TRAINING IN GUARDAMAR, SPAIN**

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# O-map practice in elite runners

- World class runners up to 30-50 % of running is with map
- Map training should be considered as aerobic training
- Club trainings and race → often reason for high ratio of high intense training (risk of injury or overtraining)
- Needs for time and space without pressure – technique first then increasing running pace
- *Question: continuously or concentrated in training camps?*

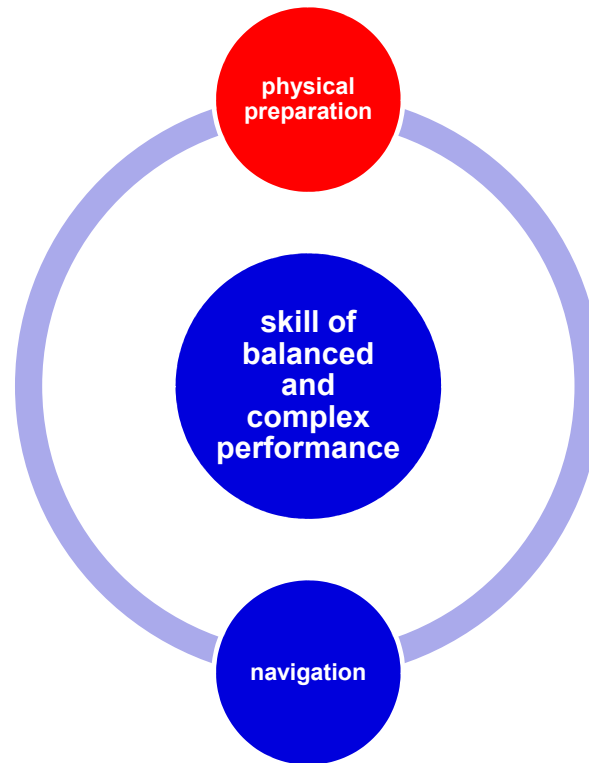
# Coffee break?

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# Physical preparation in O

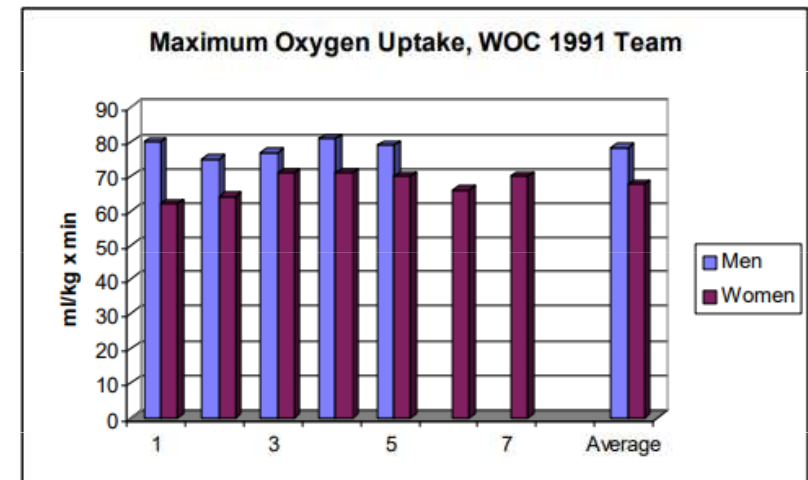




# Physical determinants

- High aerobic power and capacity
- High AT
- High AN capacity
- Duration: 8 minutes to 2 hours w/ variable physiological effort
- Strength: Forest X city – hips X ankles
- Stability: ankle, knee, hip, core (variable surfaces and slopes)

We know from previous studies on elite orienteers that a top orienteer today must have both a high aerobic and a high anaerobic capacity. A study carried out on the Swedish national team directly after the 1991 World Champs in Czechoslovakia showed that elite runners had very high values for both maximal oxygen uptake ( $\text{VO}_2 \text{ max}$ ) and maximal lactate level. Women in the team had an average  $\text{VO}_2 \text{ max}$  value of 68 ml/kg x min with a range of 62-71 ml/kg x min, while the men had an average value of 78 ml/kg x min with a range of 75-81 ml/kg x min.



The most surprising result of the study was that orienteers had very high lactate levels at maximum exertion, which suggested that they were used to eliminating and tolerating lactic acid during exertion. Women had an average value of 12 mmol/litre with a range of 8.4-14.0 mmol/litre, while the men had an average value of 12 mmol/litre with a range of 10.0-17.0 mmol/litre.

[https://www.britishorienteering.org.uk/document/ba28e3f6e2579412bce23d09f7ce892/international\\_squadtrainingbook4\\_the demands of orienteering.pdf](https://www.britishorienteering.org.uk/document/ba28e3f6e2579412bce23d09f7ce892/international_squadtrainingbook4_the demands of orienteering.pdf)

# Orienteering versus XC running

Bird, S. R., Bailey, R., & Lewis, J. (1993). Heart rates during competitive orienteering. *British journal of sports medicine*, 27(1), 53–57.

Bird, Steve & George, M & Balmer, J & Davison, Richard. (2003). Heart rate responses of women aged 23-67 years during competitive orienteering. *British journal of sports medicine*. 37. 254-7.

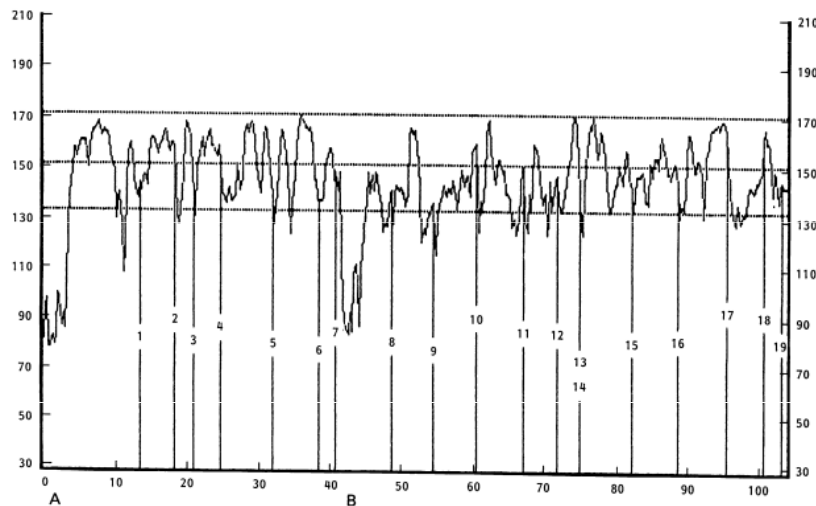


Figure 1. A typical heart rate profile for an event. Numbered vertical lines indicate the arrival at each control site (19 in total). 'A' indicates the point at which time was spent copying down the first half of the course at 'master maps' and 'B' indicates the drop in heart rate associated with copying down the second part of the course at 'second master maps'

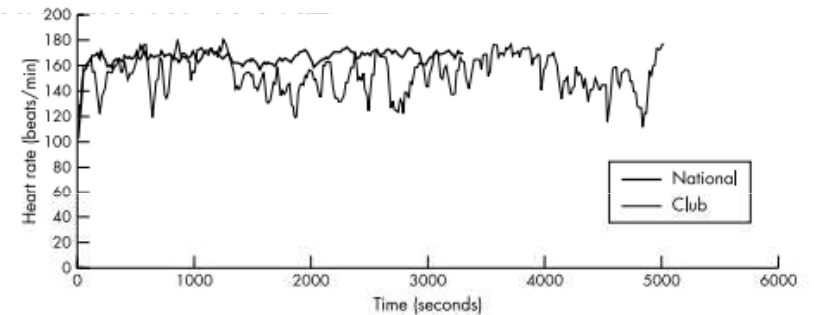


Figure 1 Heart rate profiles of a national standard (aged 41 years) and club standard (aged 37 years) orienteer.



# Orienteering versus XC running

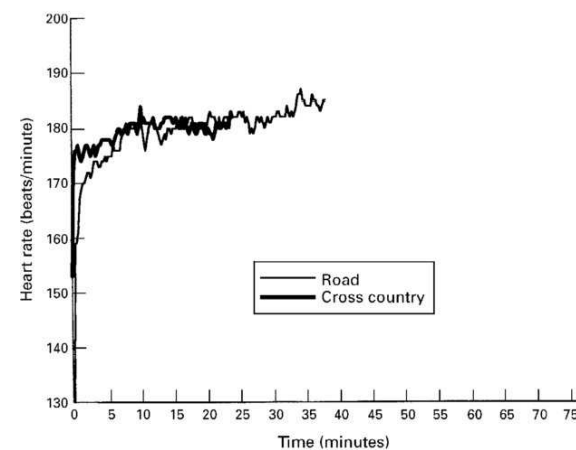
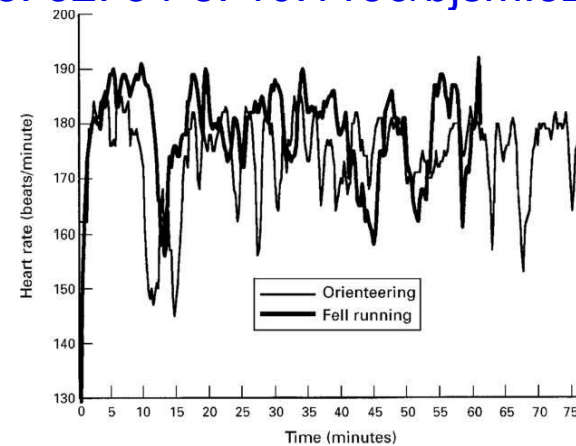
Creagh, U & Reilly, T & Nevill, Alan. (1998). Heart rate response to "off-road" running events in female athletes. British journal of sports medicine. 32. 34-8. 10.1136/bjism.32.1.34.

*Heart rate (beats/minute)*

	<i>Road</i>	<i>Cross country</i>	<i>Fell</i>	<i>Orienteering</i>
Mean	182	180	176	172
Standard deviation	10	8	8	10
Minimum	170	174	163	142
Maximum	190	187	186	186
Range	20	13	23	44

*Variance*

	<i>Road</i>	<i>Cross country</i>	<i>Fell</i>	<i>Orienteering</i>
Mean	3.12	3.35	14.15	48.51
Standard deviation	3.13	3.02	12.44	30.45
Minimum	0.77	1.13	5.31	14.20
Maximum	15.12	11.60	61.66	125.23



# Endurance

## Continuous methods

- LSD (typically up to 3 hours)
- Easy (active regeneration)
- Fartlek
- Alternatives: XC skiing, bike, DWR
- COMPETITIONS (up to 40 races/year, but up to 10 with A-priority)

## Intermittent methods

- Tempo runs
  - 2x20min
- Track intervals
  - 4x4min
  - 10x1km
  - 2x3x200m VS 2x20x200m
- Hills and flats
  - 2x5x10-20sec uphill
  - 3x7min steep uphill



# Intensity & volume

Tønnessen, Espen & Svendsen, Ida & Rønnestad, Bent & Hisdal, Jonny & Haugen, Thomas & Seiler, Stephen. (2015). The Annual Training Periodization of 8 World Champions in Orienteering. International journal of sports physiology and performance. 10. 29-38. 10.1123/ijsp.2014-0005.

	Men (n = 6)	Women (n = 2)
World championship gold medals (career total)	3 (1–7)	3 (2–4)
Age at time of analyzed season (y)	25 (21–31)	29 (25–32)
Height (m)	1.81 (1.77–1.85)	1.73 (1.68–1.78)
Weight (kg)	71 (56–78)	56 (55–57)
Maximal oxygen uptake (mL · min <sup>-1</sup> · kg <sup>-1</sup> )	83 (81–85)	72 (70–75)
Annual training volume (h)	636 (547–731)	613 (537–689)

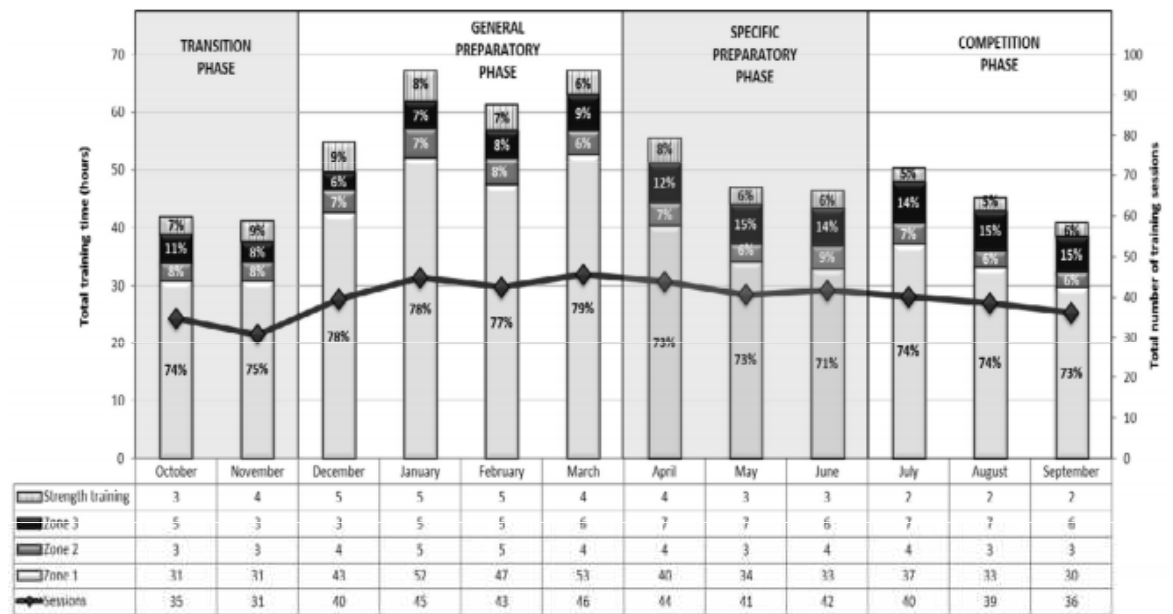


Figure 1 — Training phases and monthly training time for strength training and endurance training in each of the 3 intensity zones (bars) and training frequency (line) in the year leading up to winning a world championship. Values are group means.

# Running specificity

- Orienteering has own specificity in running technique (depended on surface and strength capacity)
- Grass, sand, vegetation (tree branches, thorns, ...), paved paths, stones, swamps, ...
- Every step is unique
- Runners are limited approach to terrain/map
- $VO_2$ max is better to develop in T&C manner, but AC in O manner





 NOKIAN TYRES  
WORLD ORIENTEERING  
CHAMPIONSHIPS

# Case study

- YoB 1991 (27yo), PhD student in Microbiology
- Background in karate, started in O in 13yo
- Member of Czech nat. Team since junior category
- Now #45(middle+long) / #51 (sprint) in World Ranking
- Best results:
  - 6th place, relay, WOC 2015
  - 22nd place, sprint, WOC2017
  - 18th place, long, WOC2017
- Cooperation with me started after repeated AT/calf injuries (strength deficit)
- On the other hand, there is no S&C coach in O-world. All the pieces makes a picture!
- Since 2018 coordinating all phys. prep.



# Key principles for O-training (in elite adults)

This is our training philosophy, but there are so many road to Rome...

- You can't compete all year long.
- Sometimes you have to push harder (camps) and draw back (peaking, off-season).
- Only consistency leads to the top.
- Setting short-, mid- and long-term priorities (with respect to SMART rule).
  - Short: next training block
  - Mid: year
  - Long: WOC 2021 in CZE
- Weak point identification.
- Polarized-intensity training.
- Top elite o-runner should do a lot of „boring“ stuff – theoretical preparation, S&C, analyzing GPS data, travelling, ...
- Plan should be written by apencil, not a pen. (Injuries, sickness, work/school, family, ...)
- Collect (not over-collect) data & proper evaluation.
- O is about experience, that's the reason why O-runners hit the top performance in late 20s
- Runners should run the highest recoverable volume (BUT quality-oriented!), future progression could be done with transformation unspecific cross-training to specific modality (running).
- Runners should run when they can. When they can't, do what they are able to do. On the other hand – you can't run exclusively

# Mid-term priorities (ATP)

2016/2017 = 420h (only 278h running, A.T. injury)

plan 2017/2018: 470h + TOP10 EOC/WOC long; reality 450h (but 351h running) + 37th place

	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT
			1 Nový Rok									
			2									
			3									
			4									
			5									
So	1		6									
Ne	2	O-Gala	7									
	3		8									
	4		9									
	5		10									
	6		11									
	7		12									
	8		13									
	9		14									
	10		15									
So	11		16									
Ne	12		17									
	13		18									
	14		19									
	15		20									
	16		21									
	17		22									
So	18		23									
Ne	19		24									
	20		25									
	21		26									
	22		27									
	23		28									
	24		29									
So	25		30									
Ne	26		31									
	27											
	28											
	29											
	30											
	31											
dni												
	4	0	3	1	13	3	11	8	17	14		5
Akce RD:												

# General preparatory phase

Rest week between camps (over 11 hours/w)

19.2	AM: rest PM: hills with map
20.2	AM: swimming PM: gym
21.2	AM: rest PM: 5x9'
22.2	AM: DNS warm-up KTB halo 20 reps 10 kg KTB TGU 4x12,5 kg, half TGU 3x 15 kg barefoot goblet squat 5x6 24 kg (tempo 2120) KTB complex (10kg): 6x [1xclean(LRLR = change after set) + 3x front squat + 6 (3+3) lunges forward a 6 (3+3) reverse lunges + 3x front squat] calf raise 3x20 (lift toes with 2 plates, ecc phase 2 sec) 67766 scap pull-up, 67766 box push-up, 67766 TRX row 10x 8+8 one-hand swing 10 kg, start on 1:00 PM: farlek 60-70' in hills, second half more intense
23.2	AM: 25' jogging w/ 8x10" hill/flat odpo: 50' jog, 5x flat + running drills (no club night-O training)
24.2	AM: WU+flats+drills+ABC, 4x1000m (start@4:00/km)/200m walk PM: swimming/yoga/rest
25.2	AM: RRR+ABC, middle-to-long preparation race in city (60min), CD PM: rest

	C5	9,9	7,1	0,0	0,8	1,9	0,0	0,0	0,0	0,0	1,6	3,3	0,0	0,0	0,8	0,3	0,0
19.2	Ranní jóga a DNS cviky	1,6	1,3		47						47	28					
20.2	Ranní jóga a DNS cviky	1,1	0,0														
21.2	TVO Posilka, nějak mi TGU s 15 kg dalo zabrat	1,3	1,3									30			45		
22.2		2,7	1,5			67						25					
23.2	Ranní klus 33' a rovky, na ledu 8x10"	1,4	1,3									73				3	
24.2	4x1 km (3:57 - 3:53 - 3:46 - 3:43) MZCH 2', R, R, ABC, 3TR, V, p mám radost, docela to šlo. První bolela nejvíc, a pak jak kdybych si rozpomínala jak to dělat :) Ale má to i :( protože mne fakt bolel ten zadek	0,8	0,7									25				16	
25.2	BZL, 47:35. R,R,V. Snažila jsem se držet nasazení, Mapa na prvním místě, disciplína a šlo to. Já vím, jak na to, Kázeň a víra (Kázeň na tlačit na to dost, neuhýbat terénu a zvolenému postupu a víra, v sebe, že na to mám	1,1	1,1			47					47	18					



# Next week in GPP

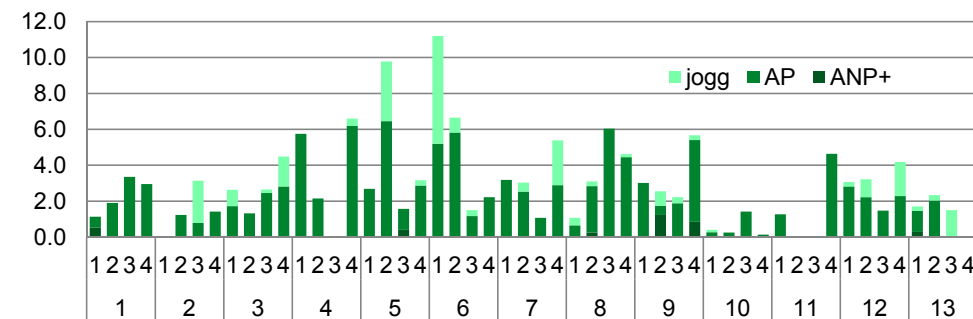
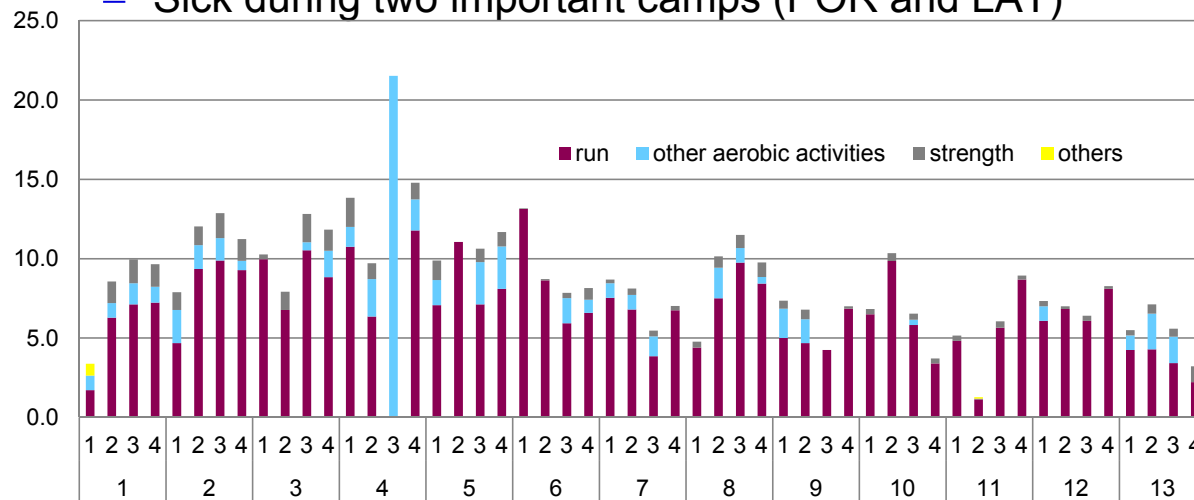
Traning camp w/ National team in similar terrain for EOC

	C5	T2		11,1	11,1	3,3	4,0	2,2	0,3	0,0	0,0	6,5	1,3	0,0	0,0	0,0	0,0	0,0
26.2		40 min volně se ZBM na ledu :) Super, ale já jsem na ledu srágora	<b>AM:</b> rest <b>PM:</b> easy w/ club	0,7	0,7	40												
27.2	TVO - bolela mne hlava, po večerním nečekanm setkání		swimming or rest	0,0	0,0													
28.2	Odlet do Milána	Seznamovák Cunardo - Fakt za tmy konec. Jde to, mapa je taková všelijaká	<b>AM:</b> travelling <b>PM:</b> intro to typical situation in terrain (AP1)	1,4	1,4		76					76	7					
1.3	Taverne koučův downhill. Do kopce mi všichni utíkají, ale z kopce mi to šlo. Lehce pocukrovaný terén, na běh pořád dobré. Uphill 30, Downhill 53	Middlové úseky ve sněhu. Primární cíl se nezabít splněn, trošku rozčarování z časů - nebo nasazení a chyb v potocích!! (7:40 - 12:50 - 21:17 - 18:48)	<b>AM:</b> loops (AP1) <b>PM:</b> middle intervals (AP2)	2,6	2,6	53	53	50				103						
2.3	Alternativa sněžnému longu - výběh na rozhled - 107 min		<b>AM:</b> long 2h (AP1) <b>PM:</b> regeneration/rest	1,8	1,8	107												
3.3	Štafety 18:35 - 20:30 - 24:08 - 20', R, V hodně sněhu, kluzalo to, nechápeme se s mapou, a měla jsem moc velká očekávání	Downhill slide 70 min a narazila jsem si koleno	<b>AM:</b> repeated mass starts (AP3) <b>PM:</b> downhill (AP1)	3,0	3,0		70	82				152	28					
4.3	Sprint comano: 16:10, výkl 15, rozkl 11 rozcv 7, mega chyba na 7K. Fyzicky se cítím pomalá, jako kdyby to ve mně bylo, ale já k té skřínce s rychlostí neměla klí a páčidlem se do ní nejde dostat. Bolí mne to naražené koleno, zadek byl v klidu	Arogno, volně, sníh nad kotníky R a V 15', koleno bolí, zadek jen lehce, ale mám pocit, že z toho klouzání mne zase chytá SI a trochu bederka	<b>AM:</b> mix relay race (AP3) <b>PM:</b> picking downhill (AP1)	1,6	1,6		40		16			57	41					



# Evaluation of season 2017/2018

- No injuries! Almost consistent training all year long.
- Fully implemented strength preparation to GPP.
- Better both-way communication (Strava/Garmin connect, IM) – extremely time consuming
- Stagnation on 3K test (very important for WOC 2020 – sprints discipline only)
- Selected just for one race at WOC (weakest discipline) – 37th place in F (much more better in Q) → successfully switched from focusing from long to sprint
- Sick during two important camps (POR and LAT)





# What about this season?

- She was very tired after final WC round → sick for 2 weeks → blood test (vit. D deficit) → sick again and again → mononucleosis → 1,5m break → almost no basis for competing in spring → decided to skip first WC round for building volume/intensity and now fully focused on selection races for WOC 2019 in Norway (long & relay)
- Is she going to be at TOP10? We don't know, but we are on good way!

**Thank you for you attantion!**

**Q&A**

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