

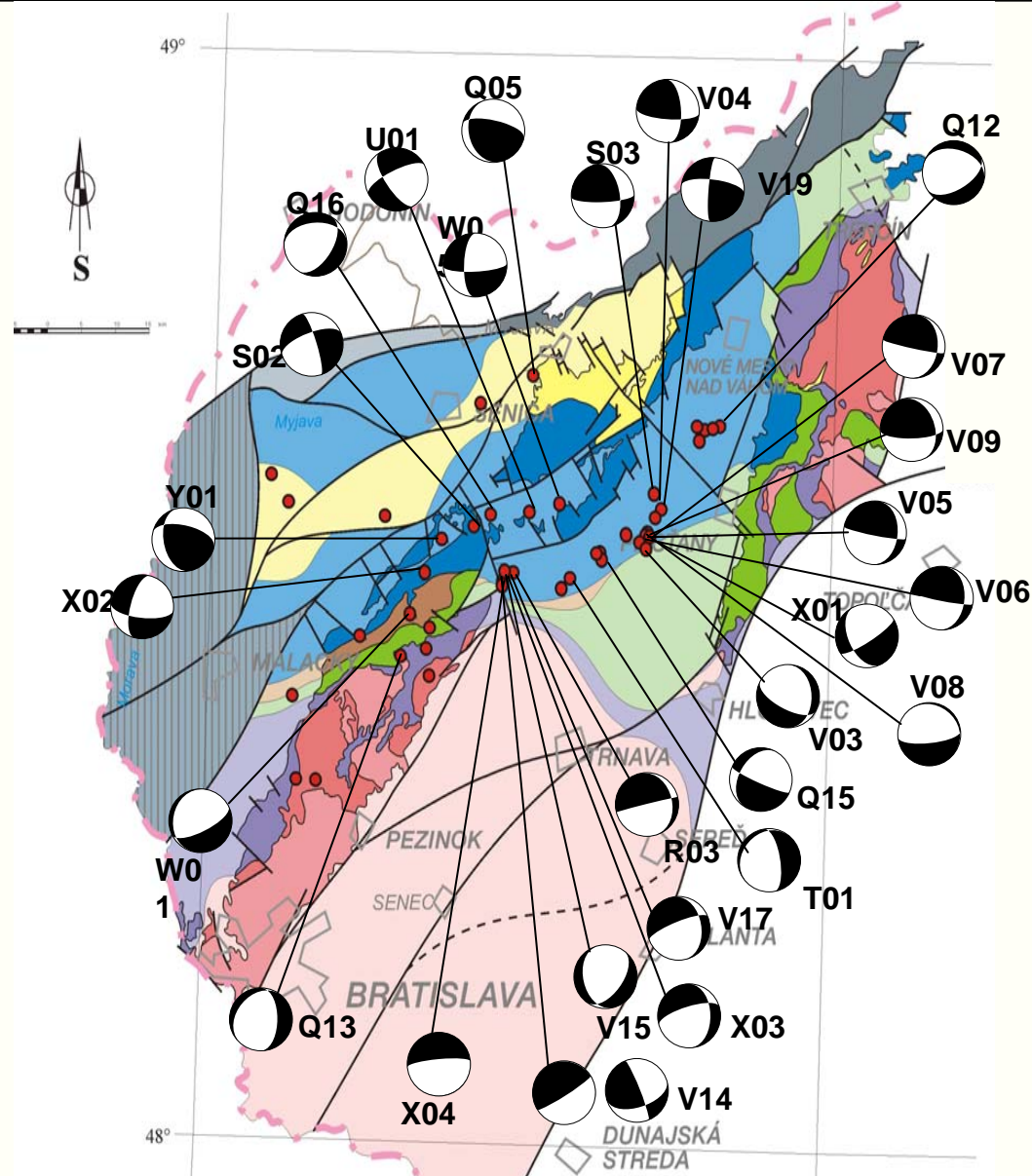
**Niektoré metodologické aspekty určenia  
ohniskových mechanizmov  
slabých lokálnych zemetrasení  
inverziou vlnového poľa**

**Aplikácia na dáta z oblasti  
Malých Karpát**

Lucia Fojtíková, Miriam Kristeková, Václav Vavryčuk

# Metódy určenia ohniskových mechanizmov

- určenie mechanizmu zo znamienok prvých nasadení - FOCMEC
- určenie momentových tenzorov z amplitúd P vln - AMT
- určenie momentových tenzorov z vlnových obrazov - ISOLA



# Invezria z vlnových obrazov

Najviac diskutovaná metóda inverzie pre slabé javy

## Výhody

- Umožňuje získať mechanizmus z malého množstva staníc

## Nevýhody

- veľmi citlivá na dáta
  - veľmi citlivá na model
- => Použitie S a povrchových vln

Na určenie dolného intervalu frekvencií pri inverzii  
použitá  
časovo-frekvenčná analýza

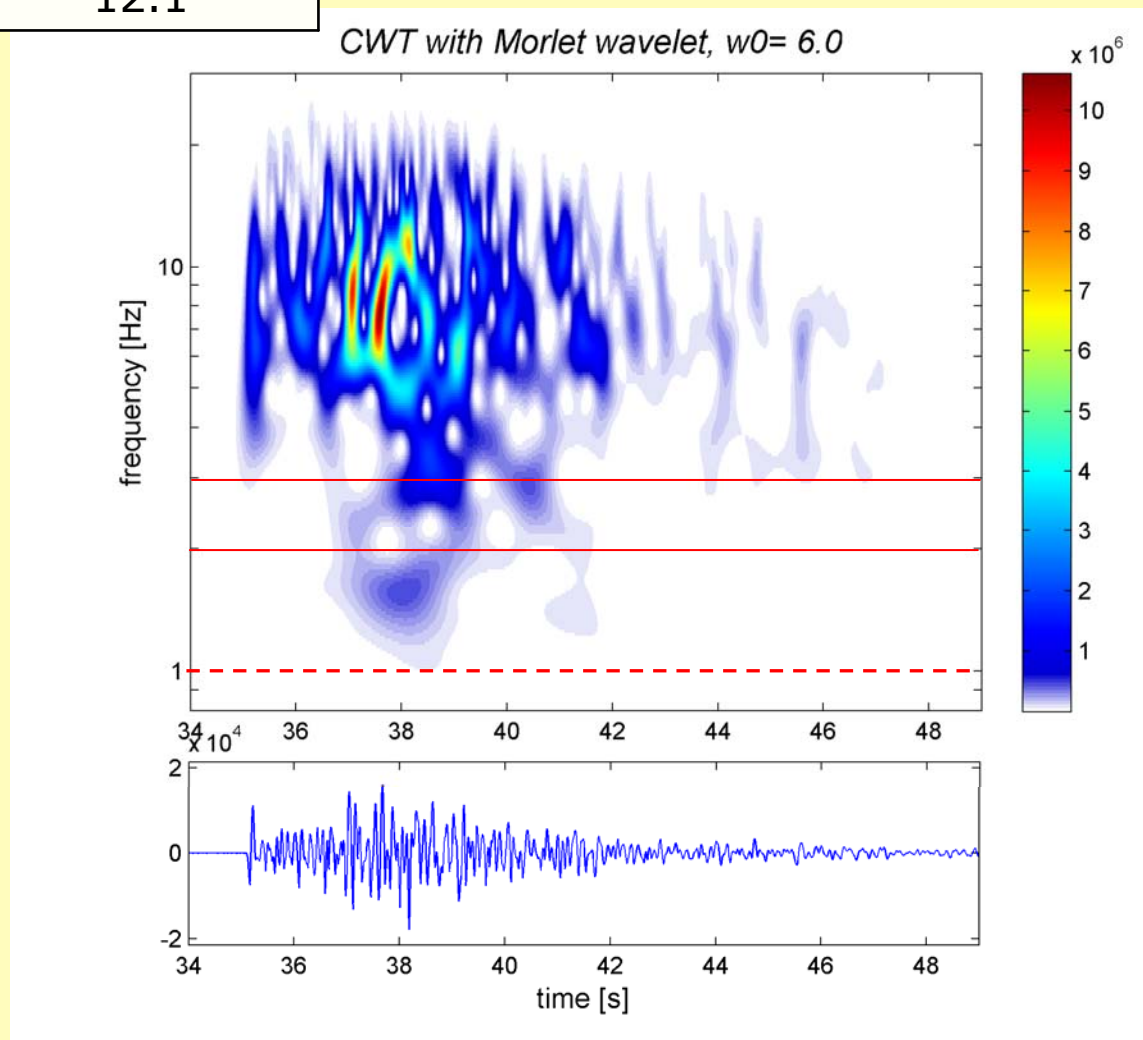
## **Continuous Wavelet Transform**

*(program RCWT, Kristekova et al 2006)*

# Časovo-frekvenční analýza

azimuth [°]	distance [km]
9.2	12.1

HRA-Z

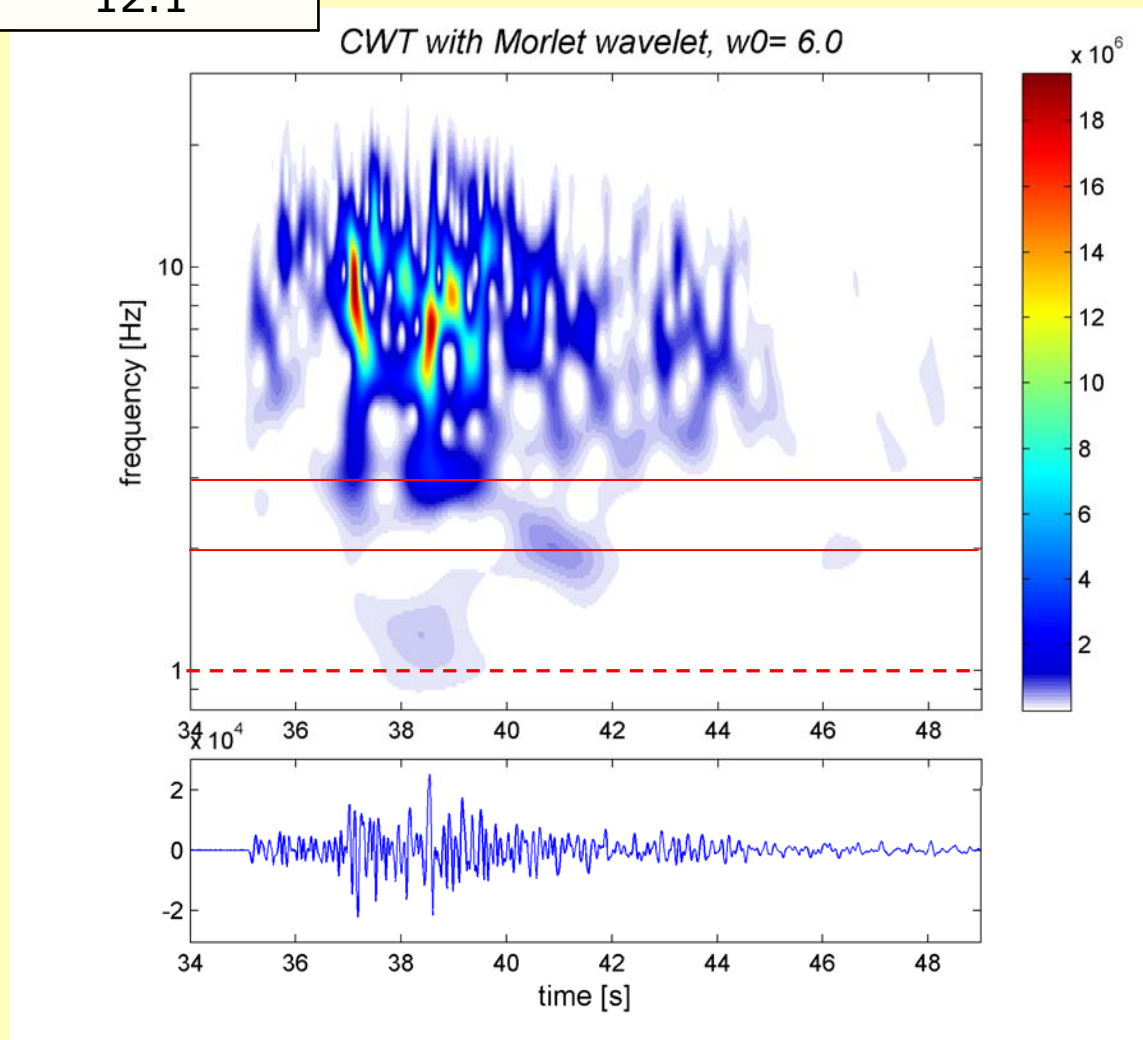


V14 Lat=48.516 Lon=17.680 h=5.23 MI=2.2

# Časovo-frekvenční analýza

azimuth [°]	distance [km]
9.2	12.1

HRA-N

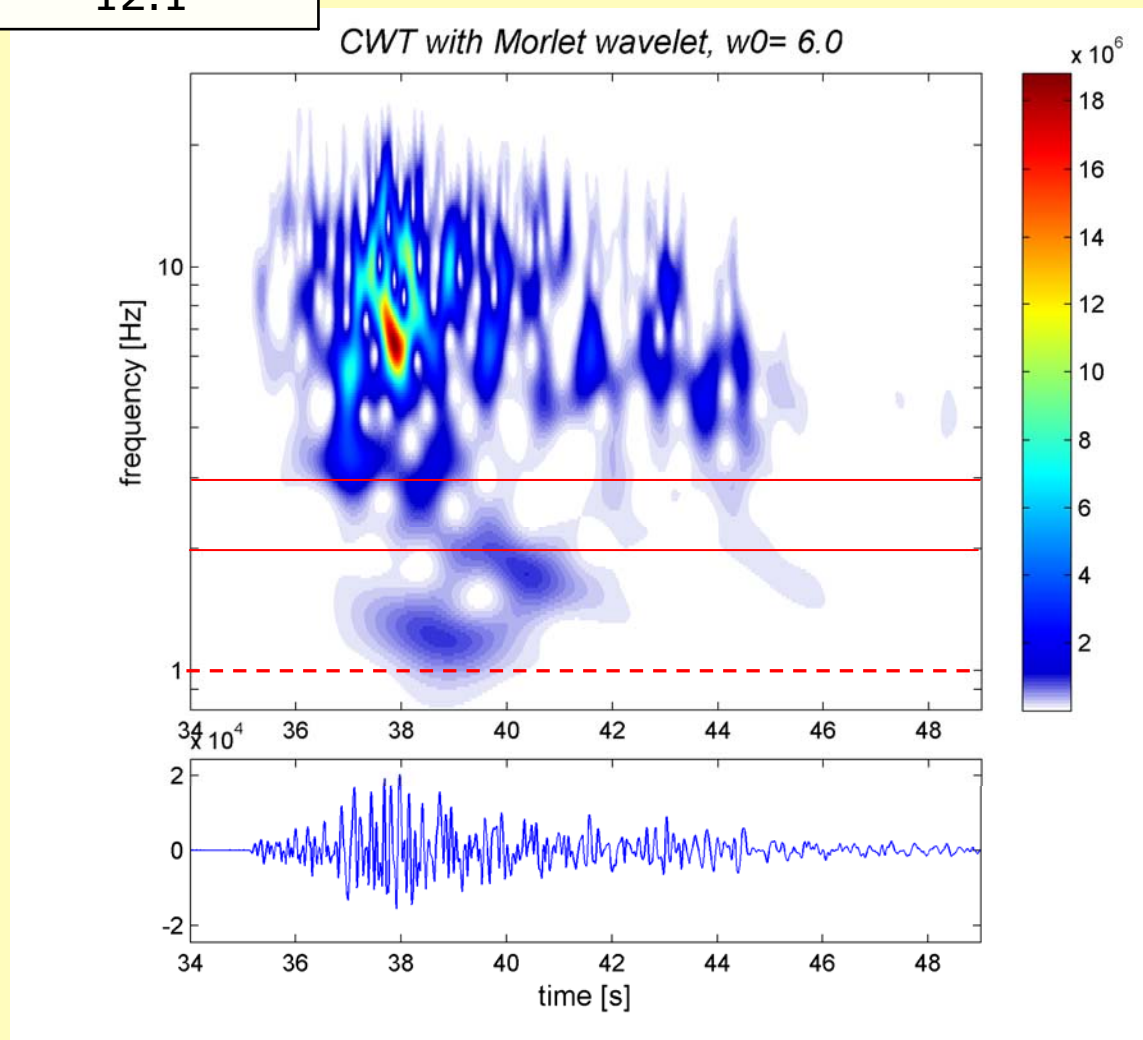


V14 Lat=48.516 Lon=17.680 h=5.23 MI=2.2

# Časovo-frekvenční analýza

azimuth [°]	distance [km]
9.2	12.1

HRA-E



V14 Lat=48.516 Lon=17.680 h=5.23 MI=2.2

# Inverzia z vlnových obrazov pre 3 stanice: KAT, DVO a HRA

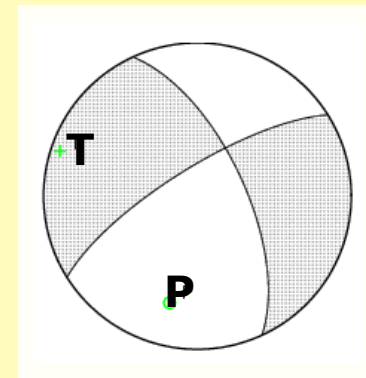
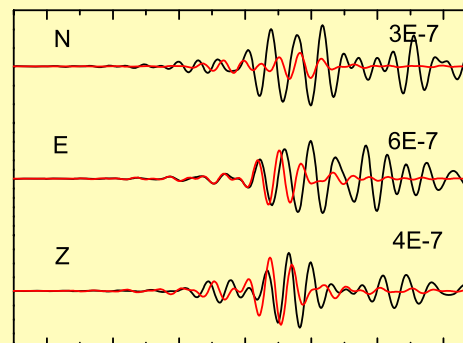
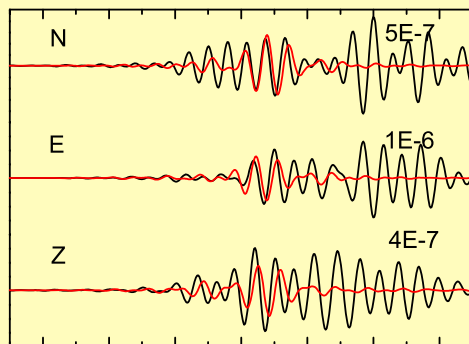
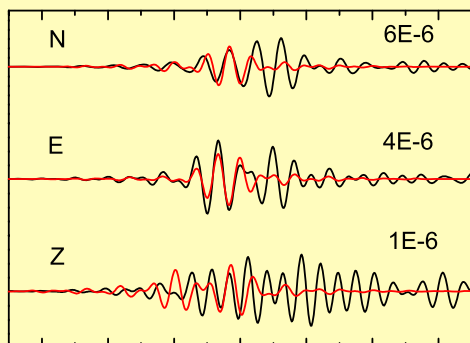
station	azimuth [°]	distance [km]
KAT	59.0	7.2
DVO	25.8	11.2
HRA	9.2	12.1

band-pass filter 1.2 -1.8 Hz

KAT

DVO

HRA

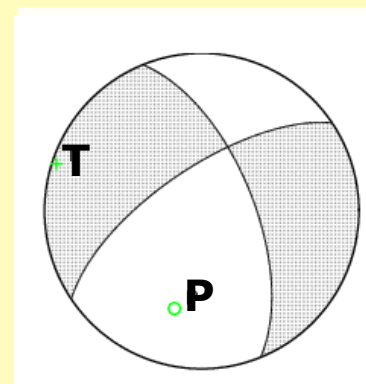
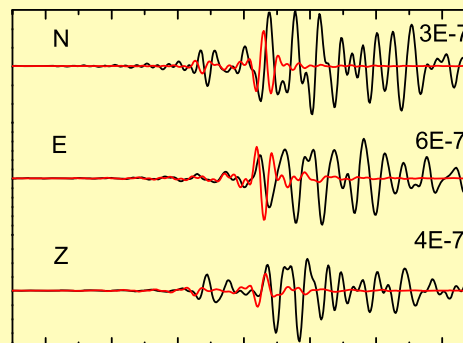
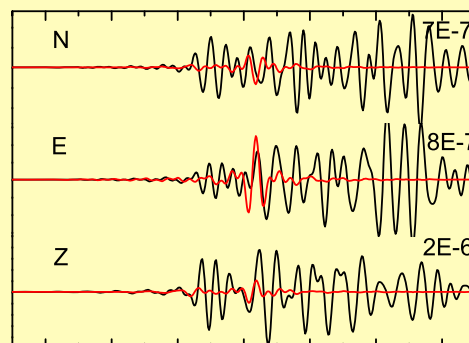
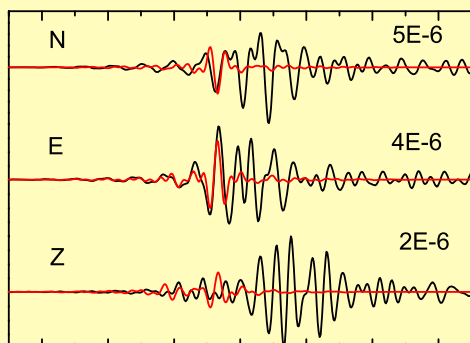


band-pass filter 1.2 -3.0 Hz

KAT

DVO

HRA

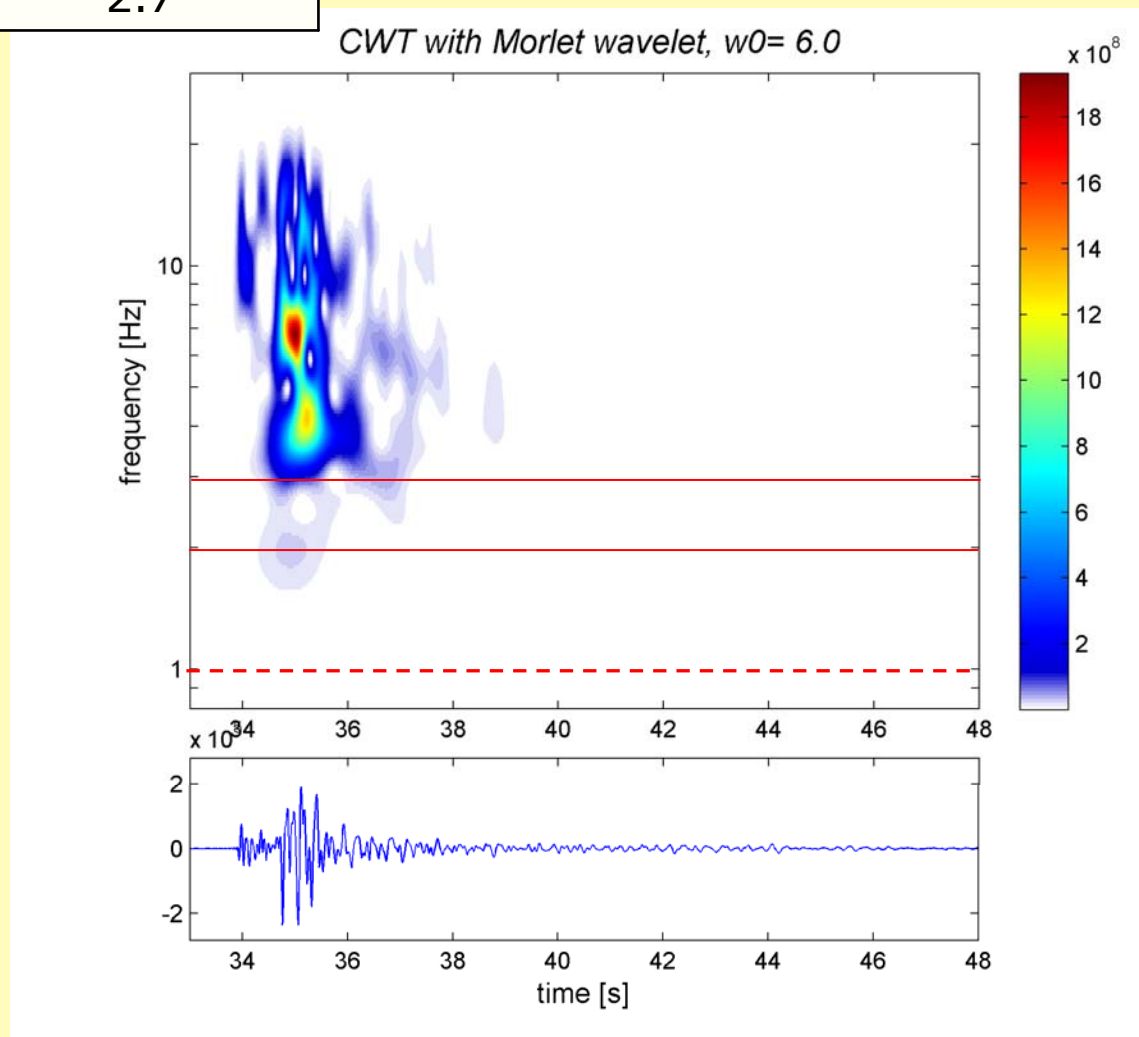


V14 Lat=48.516 Lon=17.680 h=5.23 MI=2.2

# Časovo-frekvenční analýza

azimuth [°]	distance [km]
265.0	2.7

SMO-Z



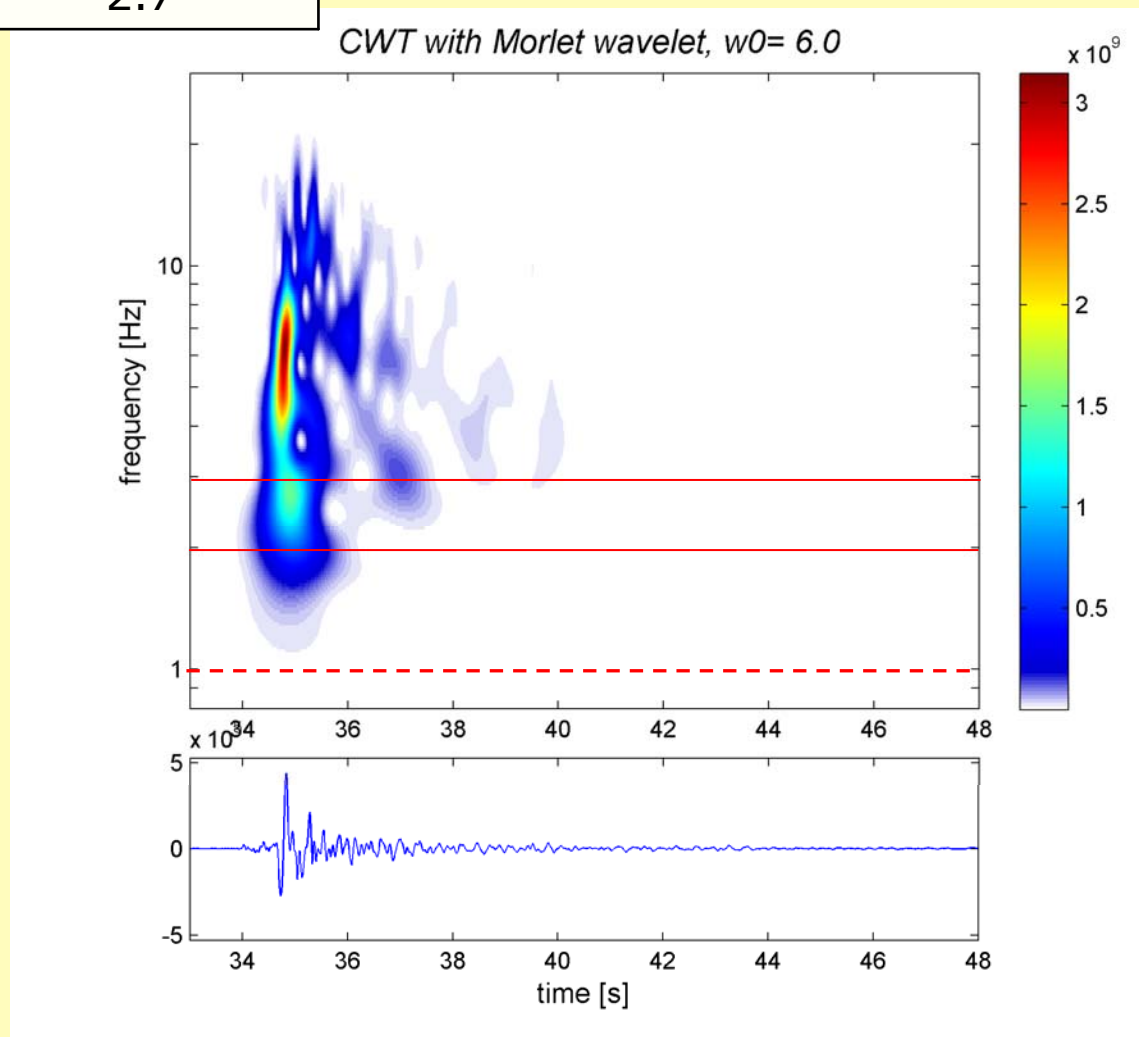
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# Časovo-frekvenční analýza

azimuth [°]	distance [km]
265.0	2.7

SMO-N

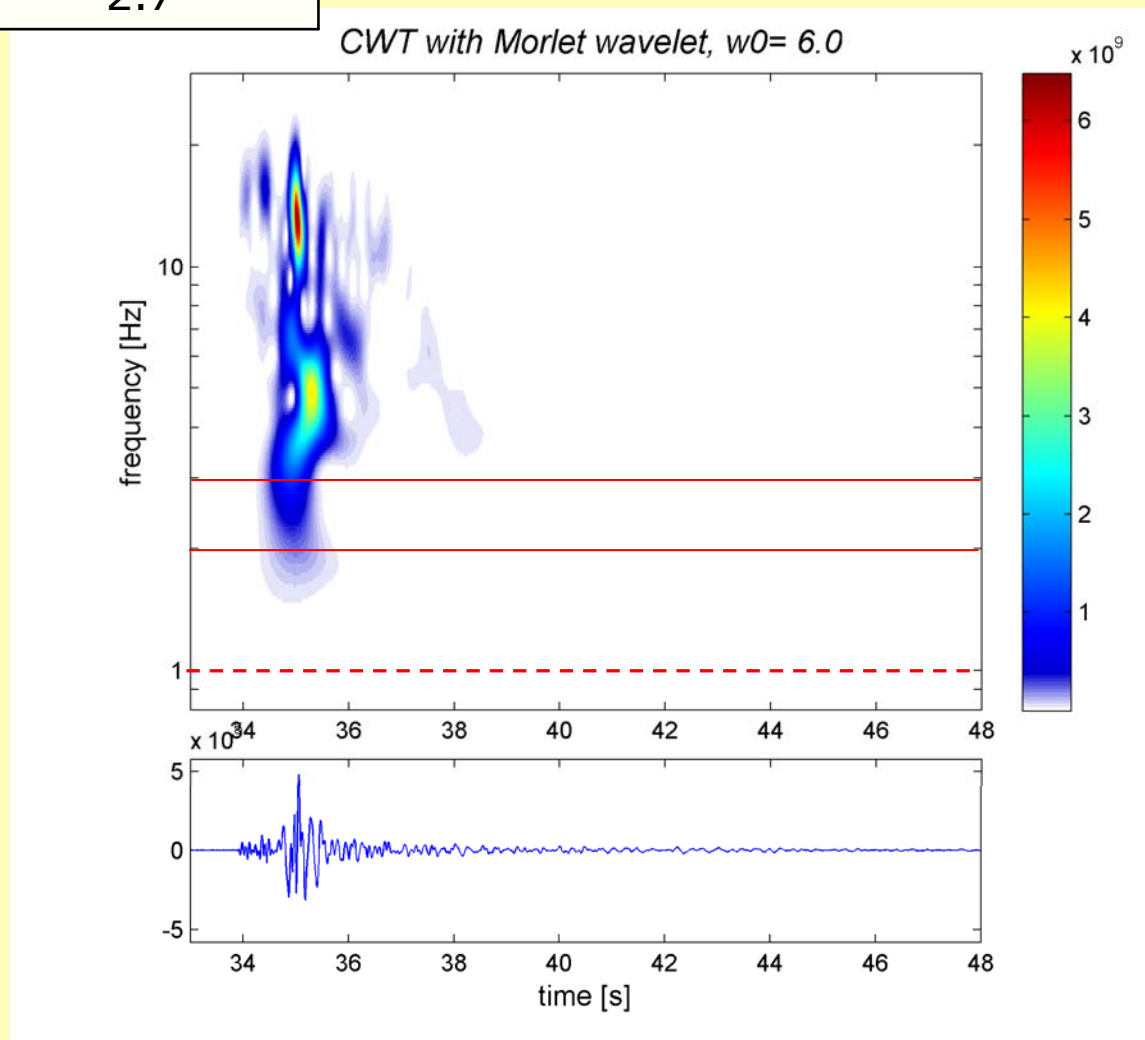


V14 Lat=48.516 Lon=17.680 h=5.23 MI=2.2

# Časovo-frekvenční analýza

azimuth [°]	distance [km]
265.0	2.7

SMO-E



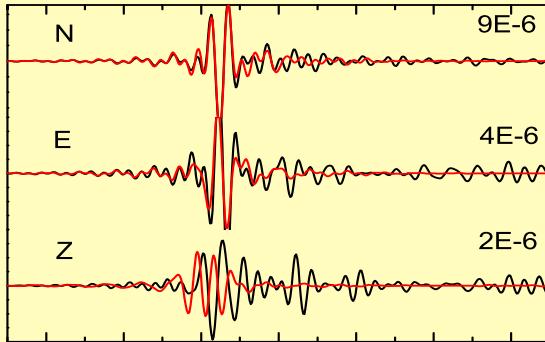
V14 Lat=48.516 Lon=17.680 h=5.23 MI=2.2

# Inverzia z vlnových obrazov pre 1 stanicu: SMO

station	azimuth [°]	distance [km]
SMO	265.0	2.7

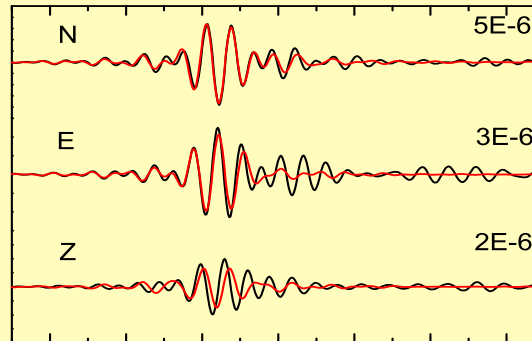
band-pass filter  
1.2 -1.8 Hz

SMO



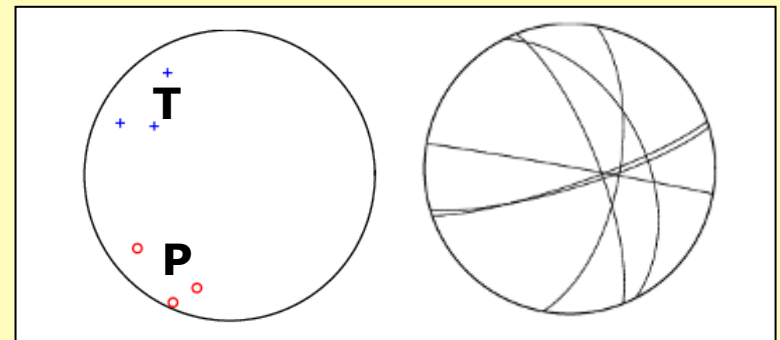
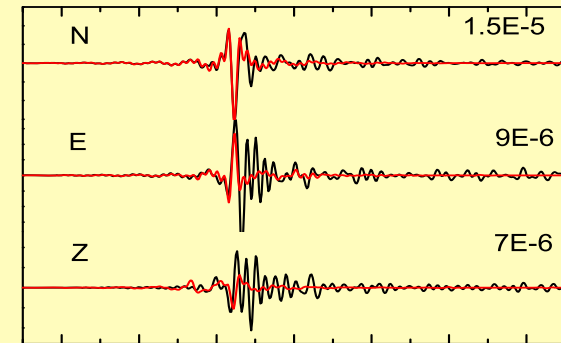
band-pass filter  
1.2 -3.0 Hz

SMO

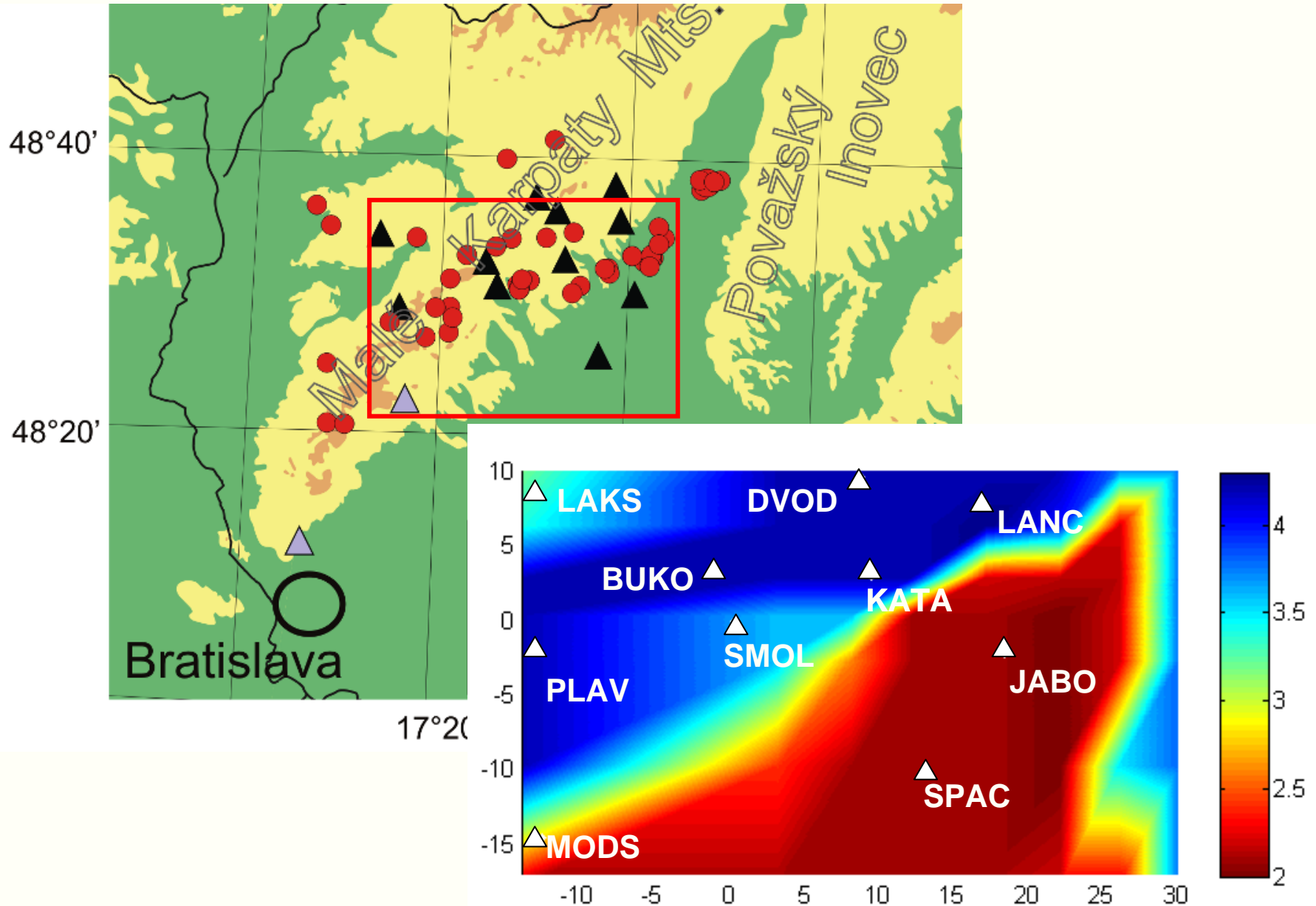


band-pass filter  
1.2 -5.0 Hz

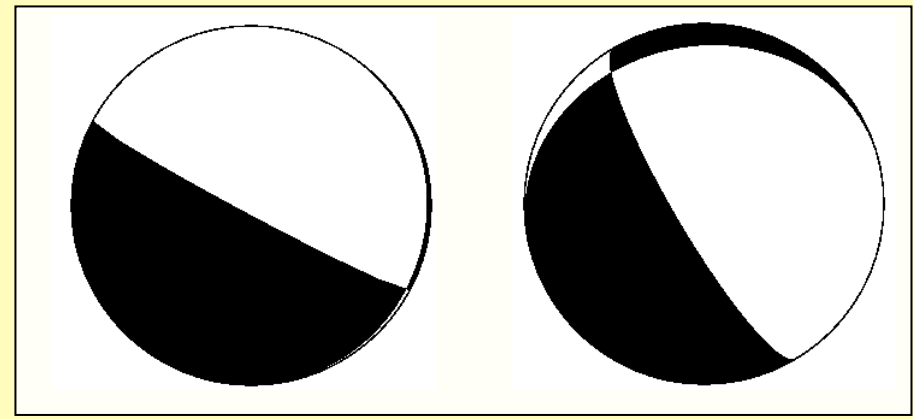
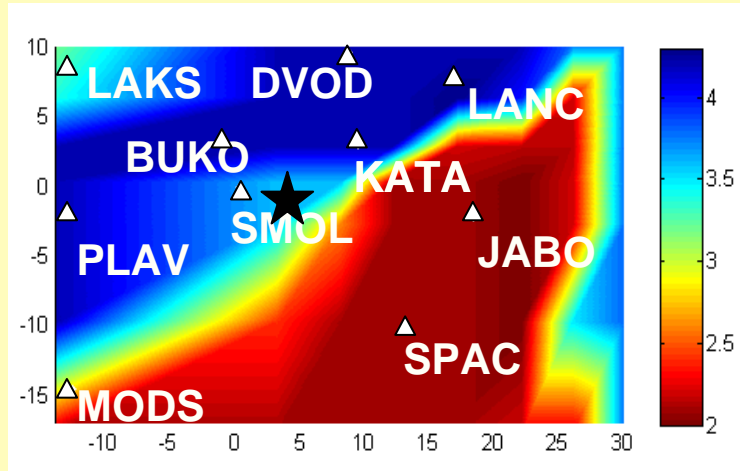
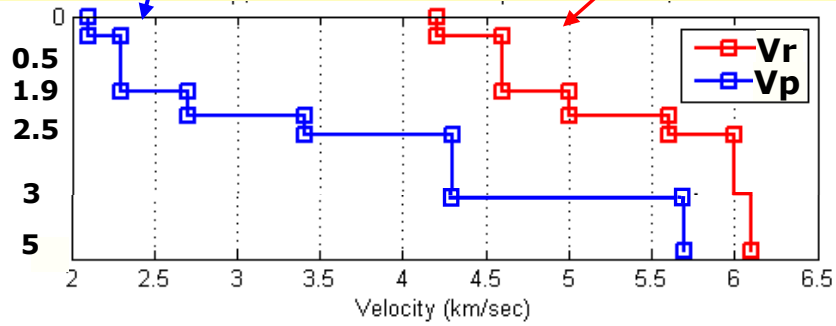
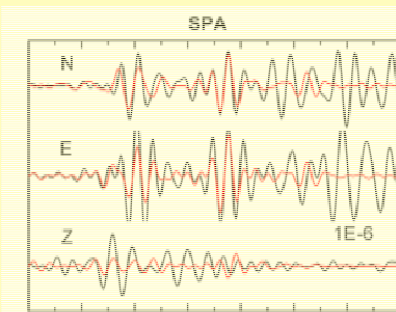
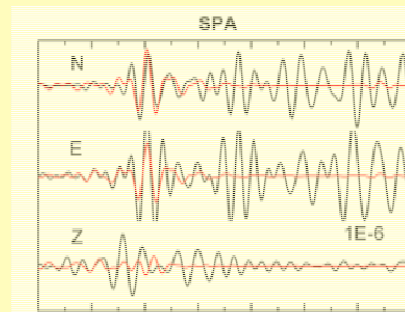
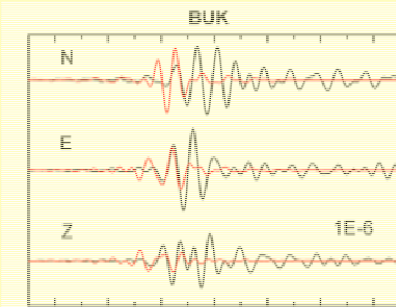
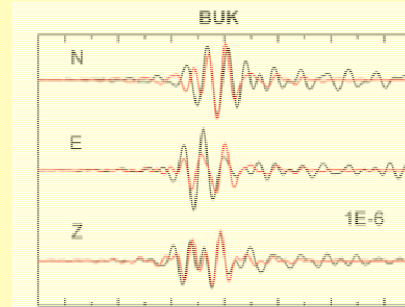
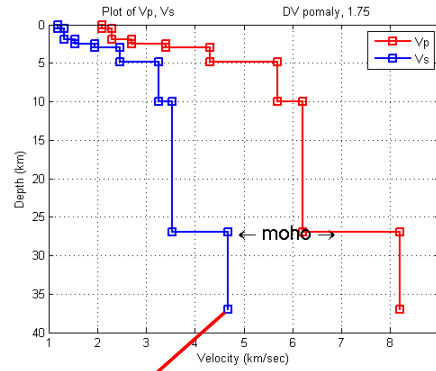
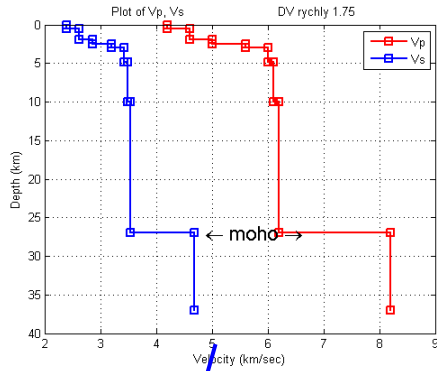
SMO



# Malé Karpaty

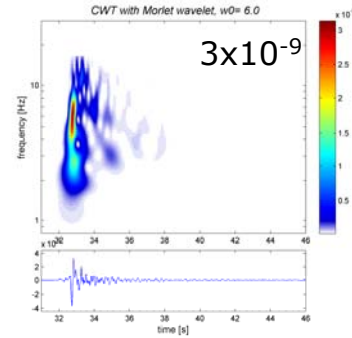


# Vplyv modelov prostredia

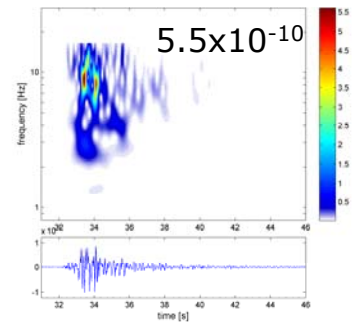


# Využitie TFA na určenie anomálie v seizmickom zázname

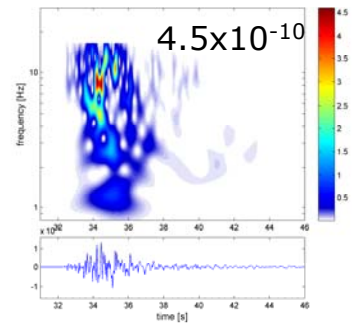
SMO 2.7 km



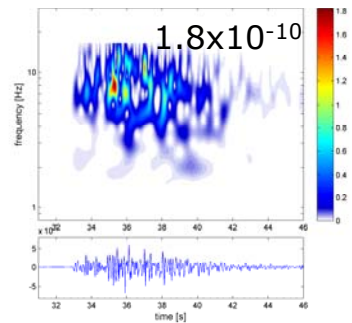
BUK 5.3 km



KAT 7.2 km



DVO 11.2 km

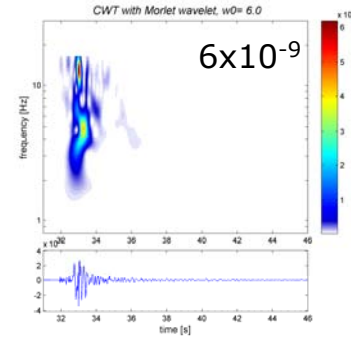
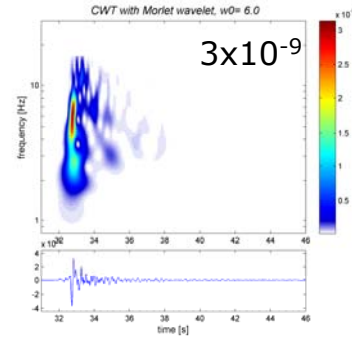


Amplitúdy  
so vzdialenosťou  
klesajú

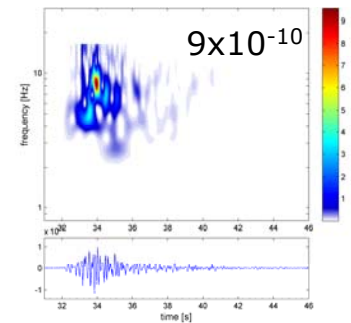
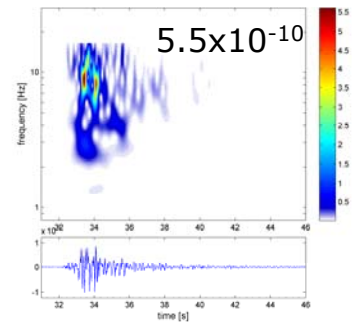
Trvanie pohybu  
sa predlžuje

# Využitie TFA na určenie anomálie v seizmickom zázname

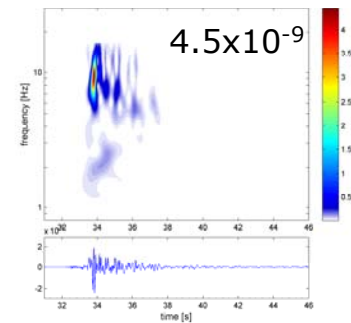
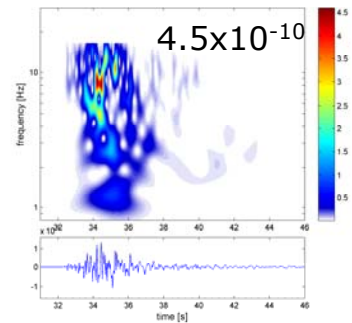
SMO 2.7 km



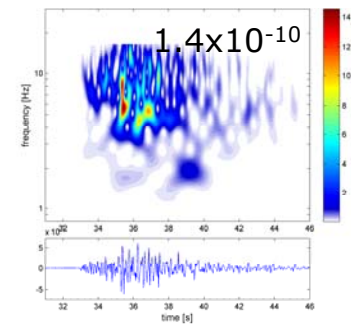
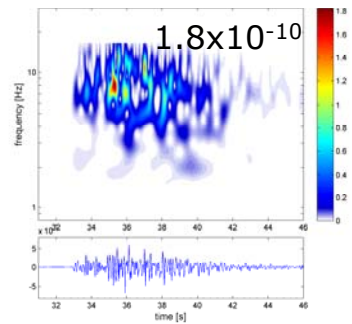
BUK 5.3 km



KAT 7.2 km



DVO 11.2 km



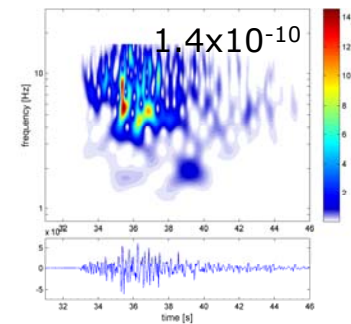
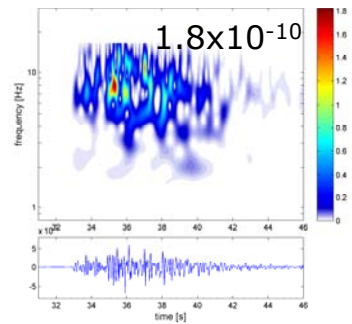
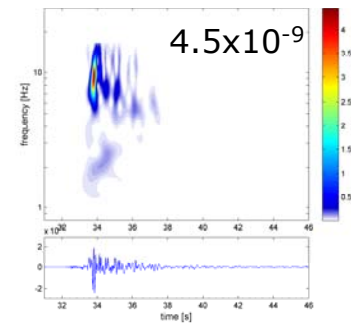
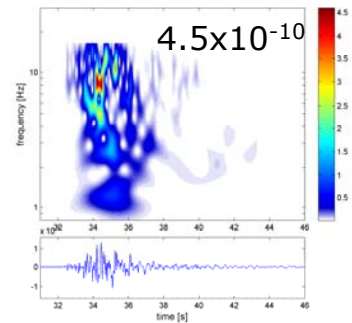
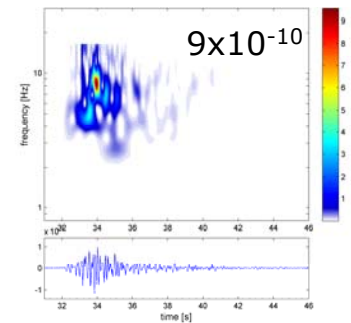
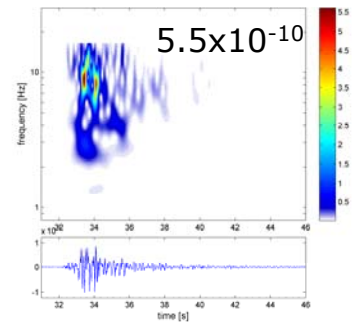
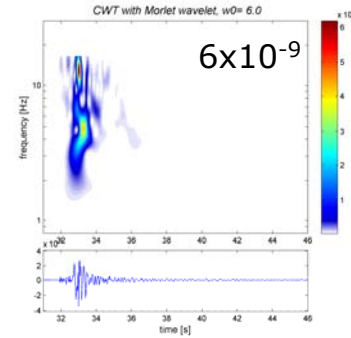
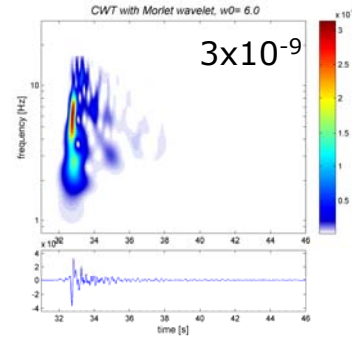
# Využitie TFA na určenie anomálie v seizmickom zázname

SMO 2.7 km

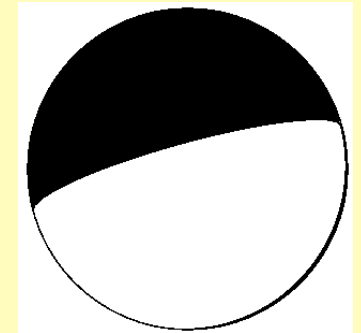
BUK 5.3 km

KAT 7.2 km

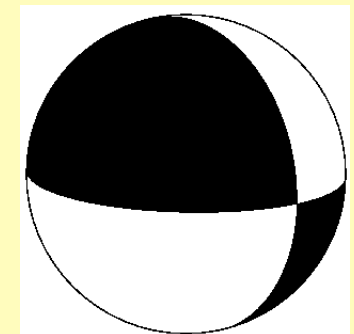
DVO 11.2 km



Inverzia **s**  
**E** zložkou  
KAT



Inverzia **bez**  
**E** zložky  
KAT





# Závery

- inverzia v intervale 1Hz-2Hz je „legálna“ lebo v seizmogramoch bol identifikovaný seizmický signál na týchto frekvenciách a nie len šum
- rôzne vhodne zvolené intervaly inverzie dali podobné výsledky aj keď zhodnosť syntetických a reálnych seizmogramov pre vyššie frekvencie klesá
- modely prostredia majú značný vplyv na inverziu MT z vlnových obrazov
  - časovo-frekvenčná analýza – vhodný nástroj na identifikovanie anomálií v seizmickom pohybe
- rôzna úroveň zhody pre rovnaký jav a rôzne stanice a tiež časovo-frekvenčná reprezentácia seizmických záznamov indikuje významné laterálne variácie rýchlostí v tomto regióne
- z analýz vyplynula nutnosť **dobrej znalosti modelu prostredia**



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