# Earthquake swarms in West Bohemia/Vogtland and South-West Iceland

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# Outline

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# Motivation

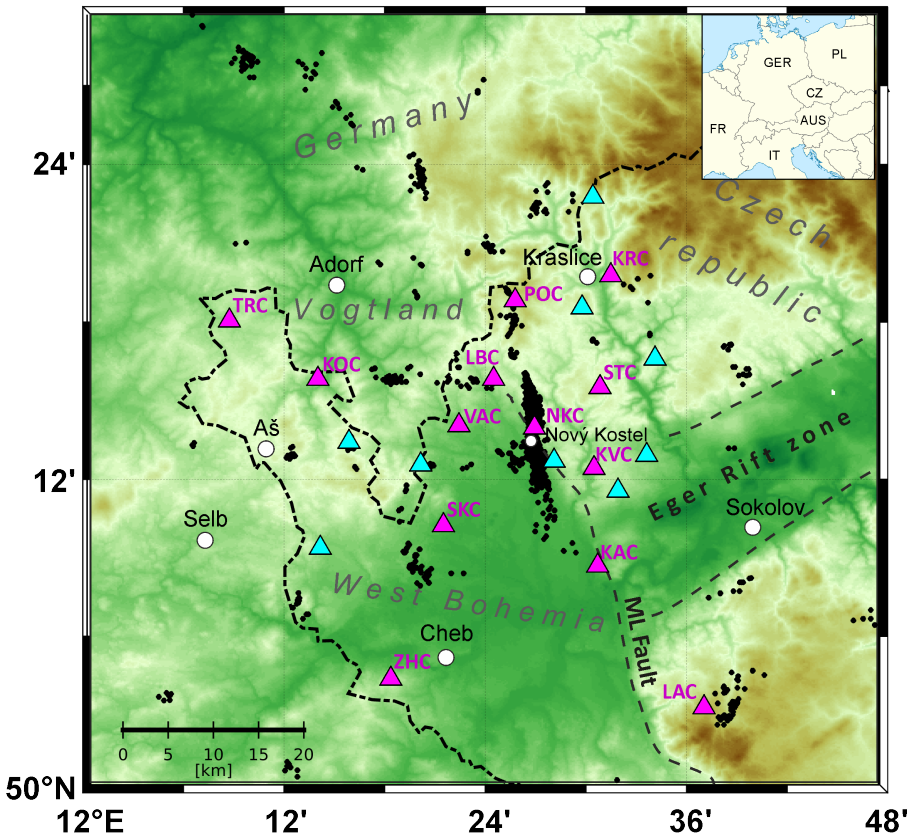
West Bohemia/Vogtland and South-West Iceland are two regions of essentially different tectonic basis

$\rightarrow$ we want to find some common features of swarm-like activities in these areas to generalize basic characteristics of earthquake swarms.

# Outline

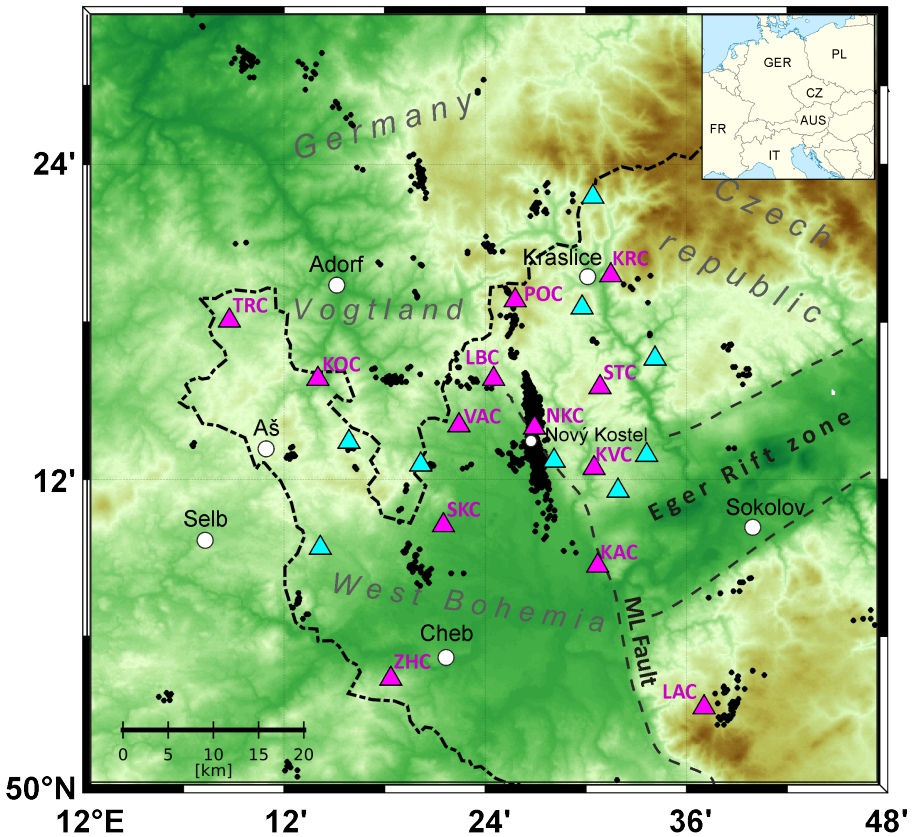
# West Bohemia

- intraplate tectonic area
  - Eger ridge, Mariánské lázně fault
  - Nový Kostel - 90% of total seismic moment
- main focal zone
  - $\sim$ 9x2 km; depths 6-11 km
  - strikes 170°, dips 80°
- WEBNET network
  - 13 online, 9 offline stations



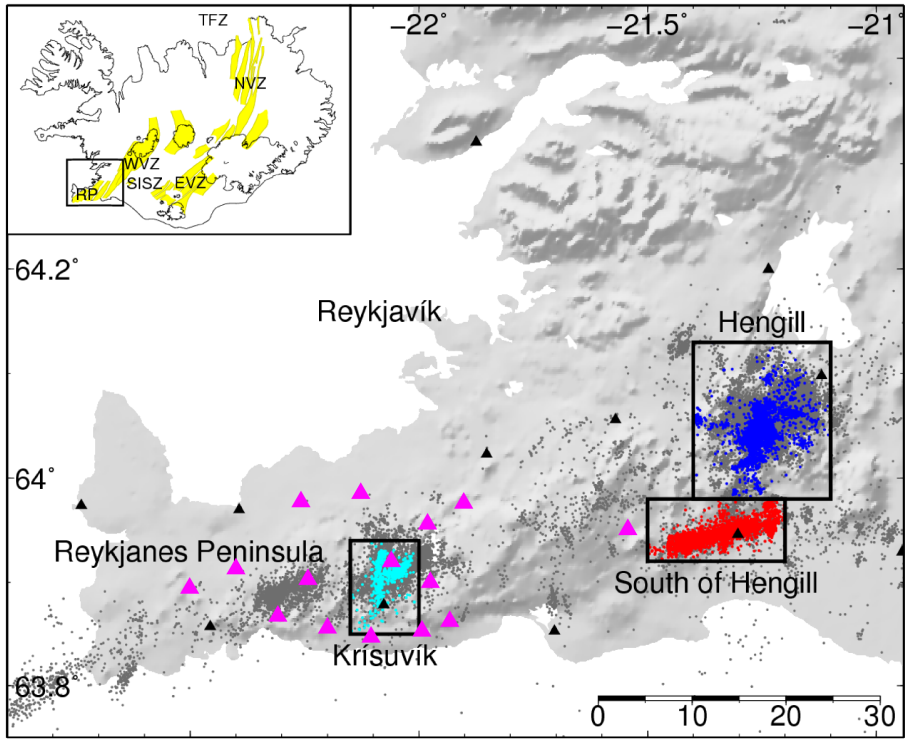
# West Bohemia

- earthquakes - mostly of $M_{Lmax} < 4.0$
  - historical swarms:
    1897, 1900, 1903, 1908
  - recent swarms:
    1985/86, 1997, 2000, 2008, 2011, 2013
  - mainshock-aftershock sequence in 2014



# South-West Iceland

- interplate tectonic area
  - Mid-Atlantic Ridge
- strongly influenced by the Icelandic hot spot
- swarm activities: $M_{Lmax} \sim 5.5$
- networks:
  - REYKJANET (GFÚ)
    - ... local - Reykjanes peninsula
    - ... 15 stations
  - SIL (IMO)
    - ... regional - whole Iceland
    - ... 57 stations



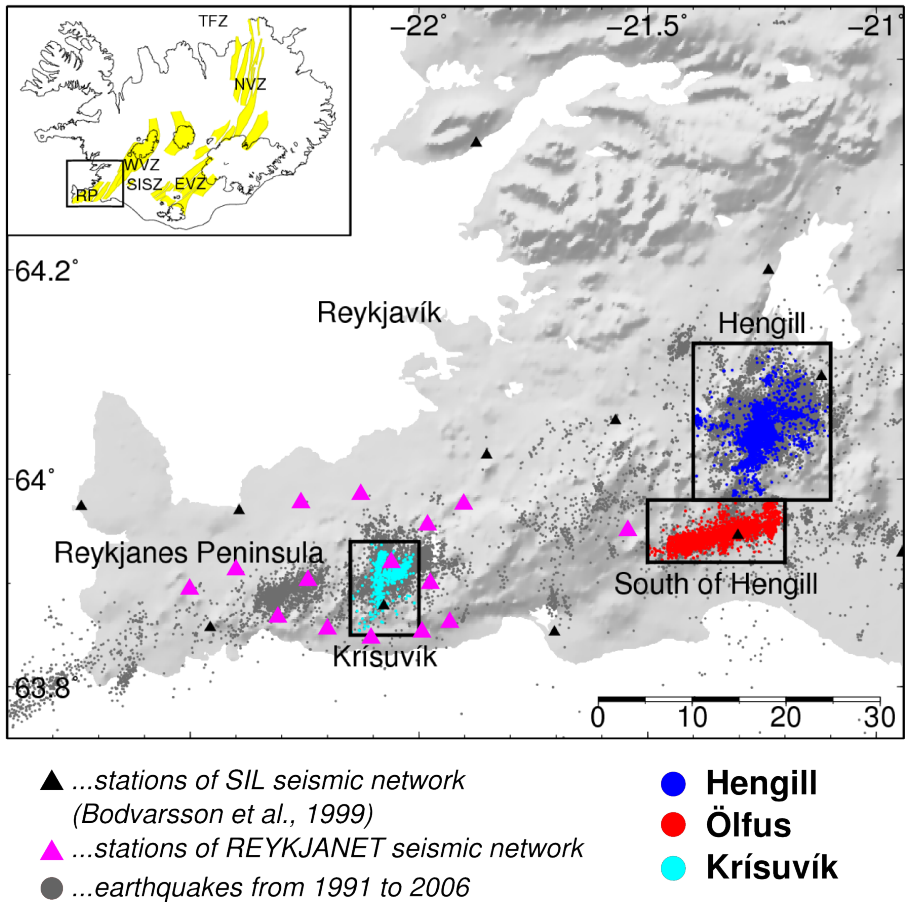
# South-West Iceland

Areas of our interest:

**Hengill** volcanic area

**Ölfus** the edge of a zone where typically mainshock-aftershock sequences occur

**Krísuvík** boundary of tectonic plates

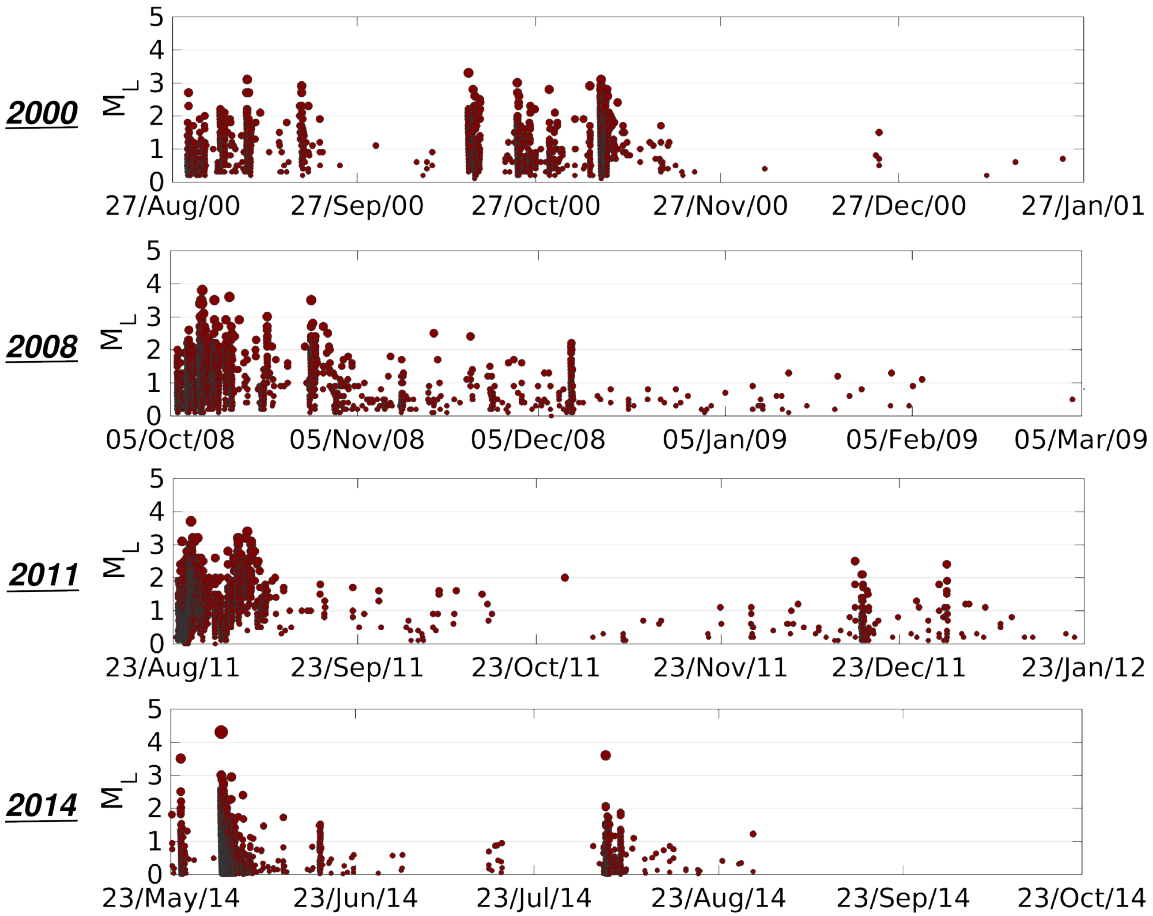


# Intense seismic sequences

| | Activity | Duration [days] | Num. of ev. ($M_L \geq 0$) | $M_{Lmax}$ |
|---|---|---|---|---|
| *West Bohemia:* | 1997 | 10 | 530 | 3.0 |
| | 2000 | 90 | 3800 | 3.3 |
| | 2008 | 70 | 4400 | 3.8 |
| | 2011 | 30 | 5700 | 3.7 |
| | 2014 | 90 | 2800 | 4.3 |
| *S-W Iceland:* | Hengill | 54 | 3211 | 3.7 |
| | Ölfus | 28 | 4394 | 4.2 |
| | Krísuvík | 6 | 939 | 3.6 |
| | Reykjanes | 1000 | 2108 | 3.2 |

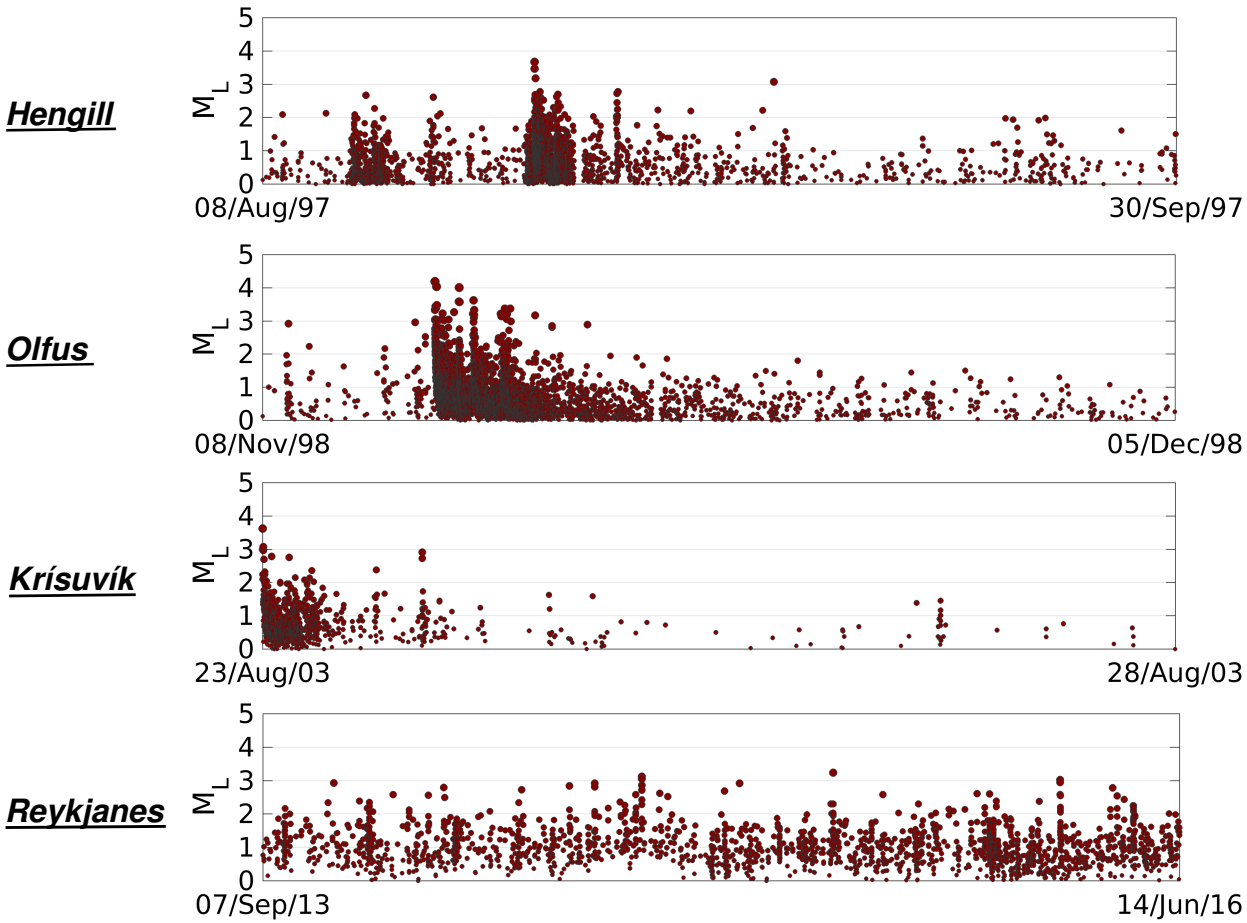
# Outline

# Time distribution of events - West Bohemia/Vogtland



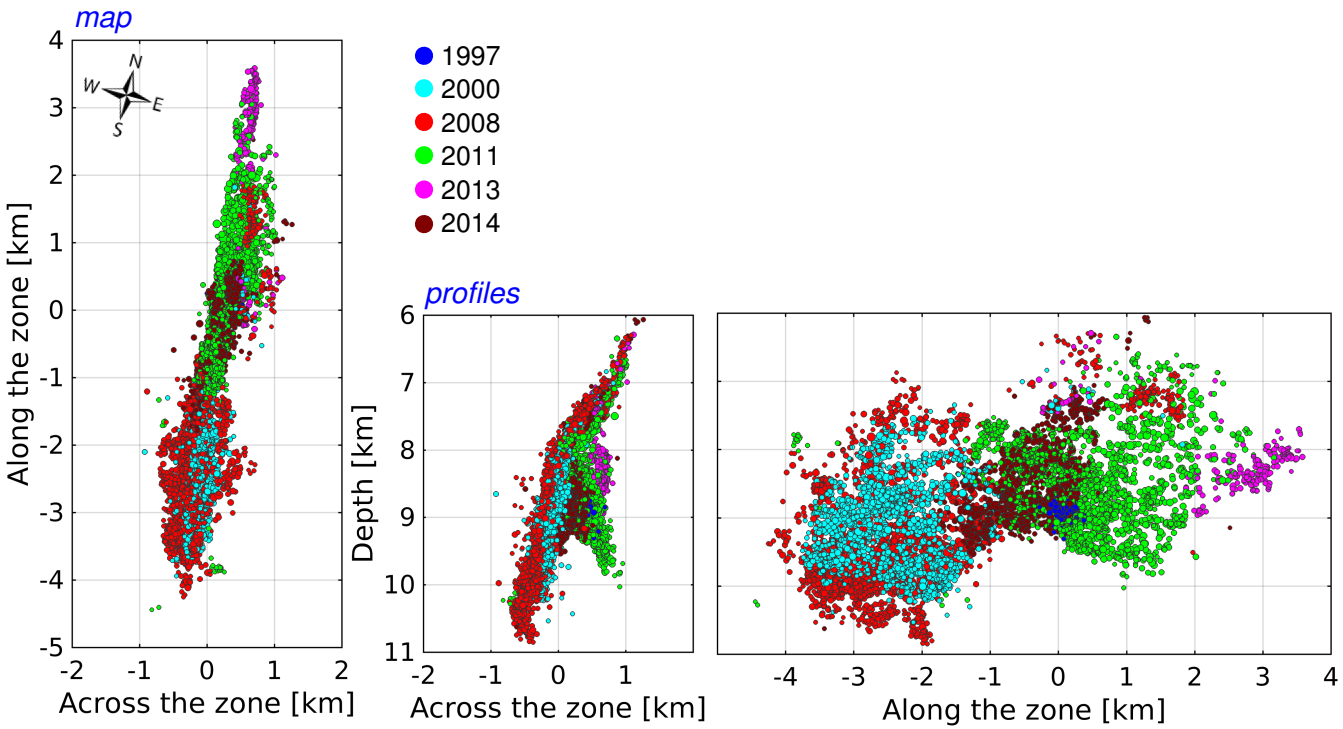

- duration of activities is shortening with time
- swarms - continuous weak seismicity between strong events
- 2014 - clear phases of each mainshock

# Time distribution of events - South West Iceland



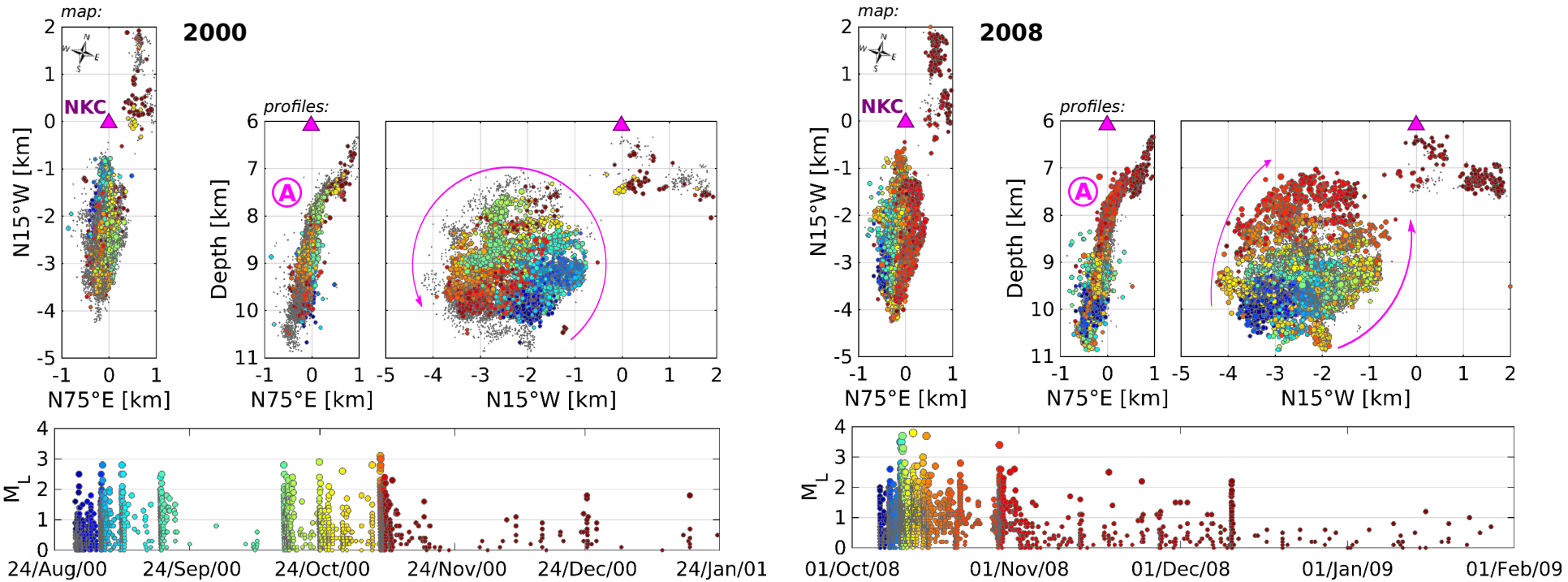

- noticeable phases
- strongest events of $\approx$ one magnitude unit stronger than in West Bohemia
- Reykjanes 2013-2016 - continuous seismicity, with 27 events of $M_L = 2.5$ to 3.2

# Space-time distribution of events - West Bohemia



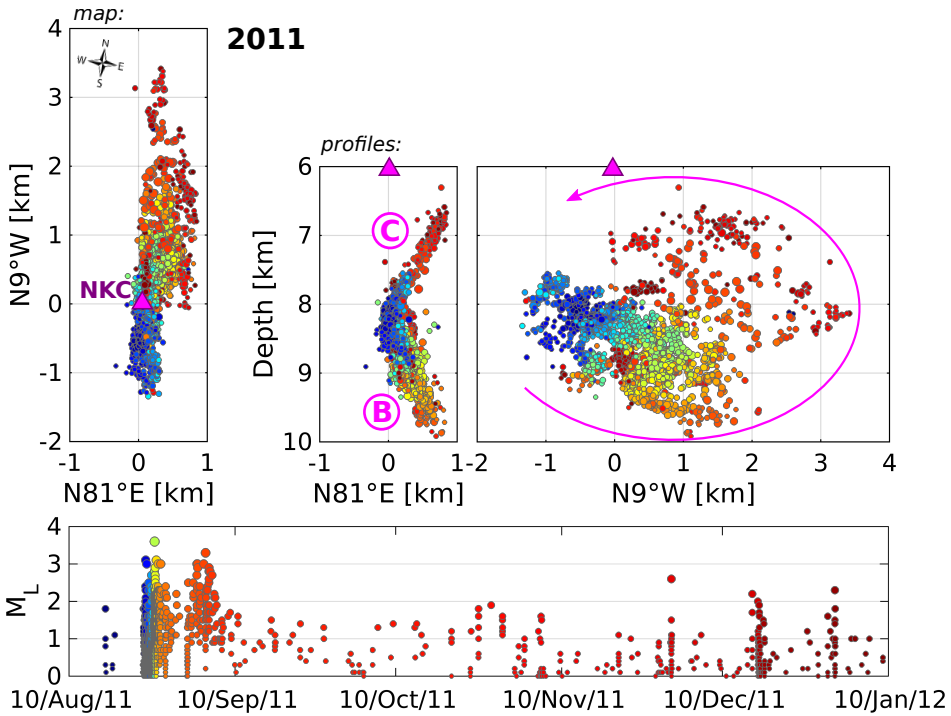

- swarms nicely map the fault segments in the NK zone
- 2014 - directly in the boundary between the northern and southern part of the NK fault zone

# Space-time distribution of events - West Bohemia



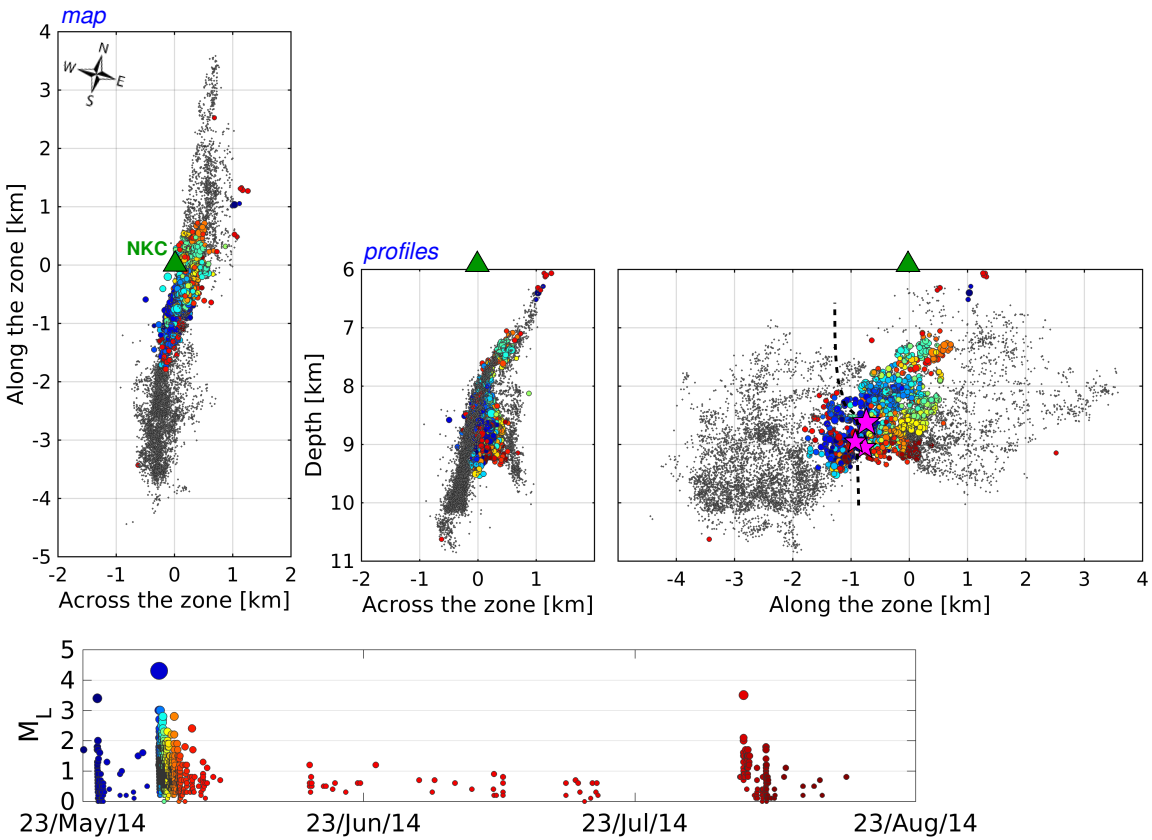

- swarms 2000 and 2008 are on the same fault segment (A)
- both show migration in space and time

# Space-time distribution of events - West Bohemia




- noticeable migration in space and time
- two fault segments discovered (B,C)

# Space-time distribution of events - 2014 sequence



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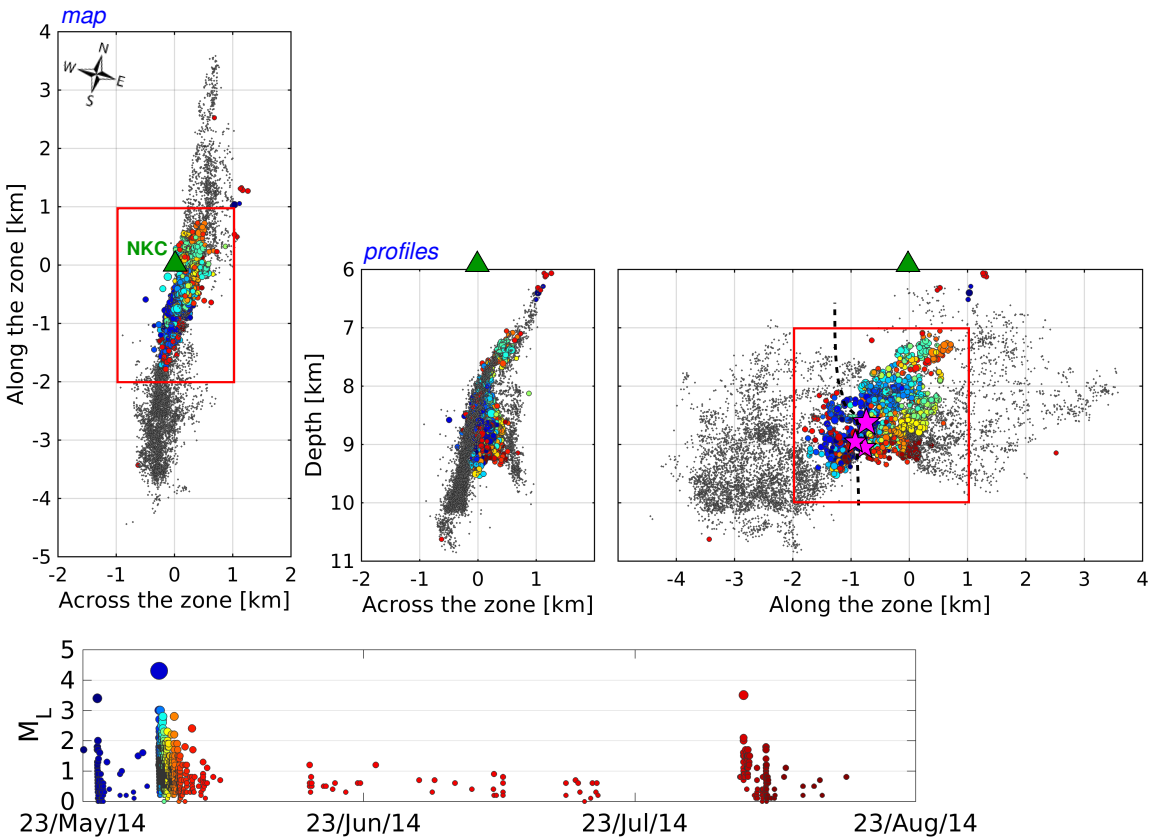

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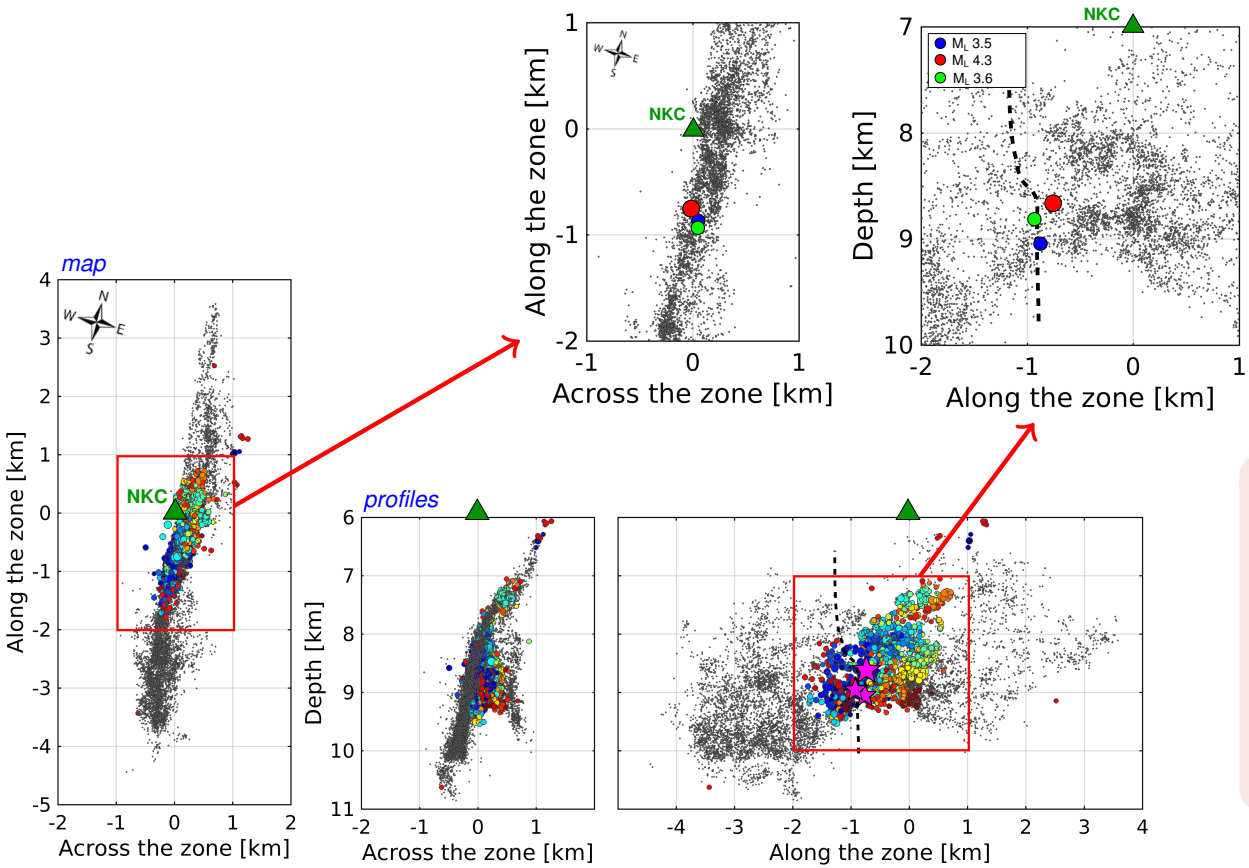
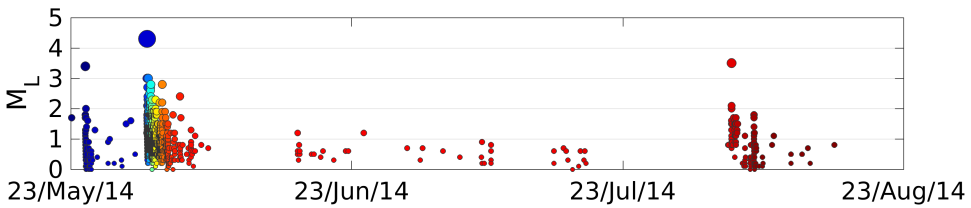
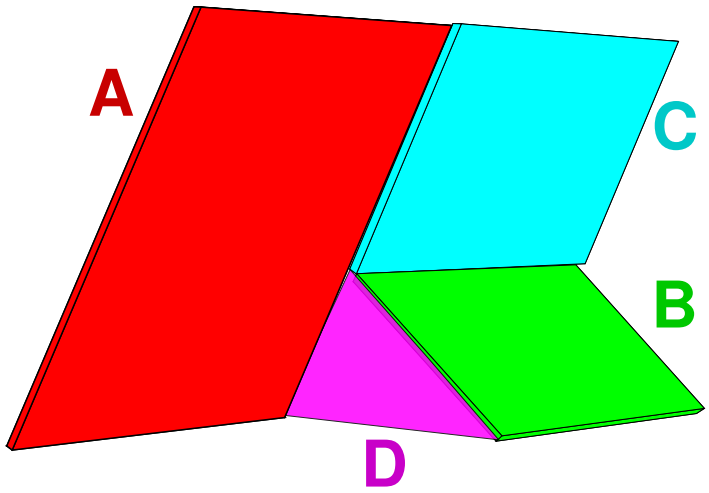



- noticeable migration in space and time
- all the three mainshocks exactly in the boundary between north and south

# Scheme of Nový Kostel fault zone



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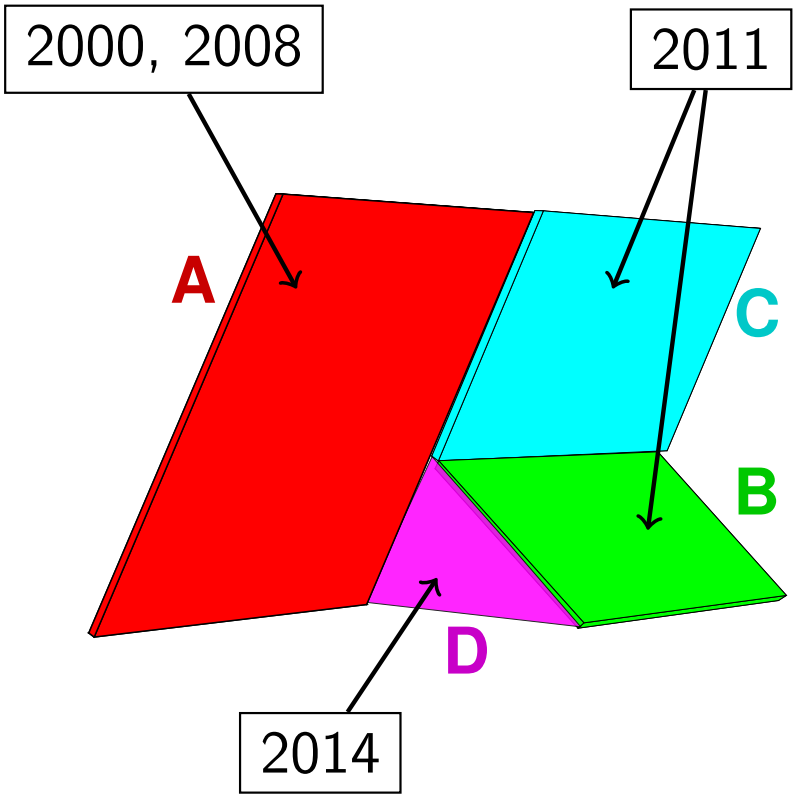
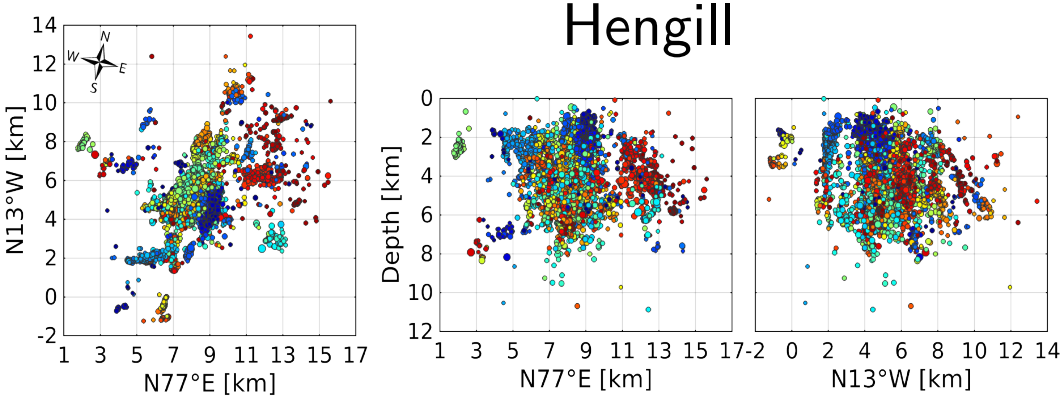


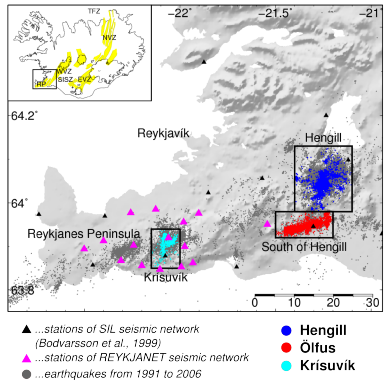

- segments of swarm-like seismicity - A,B,C

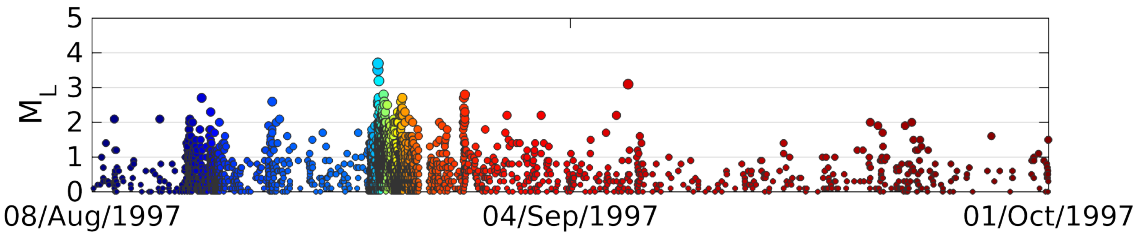
- segment D - mainshocks triggering aftershocks in A,B,C

# Space-time distribution of events - South-West Iceland

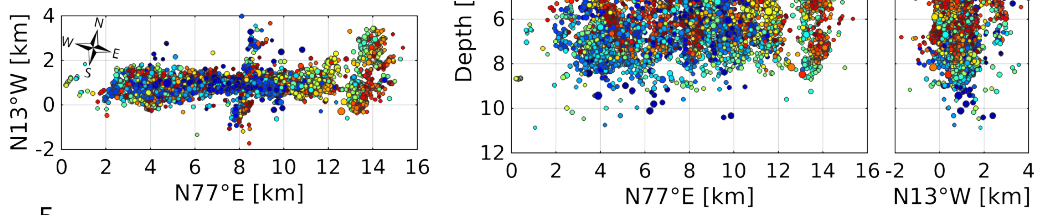
## Hengill

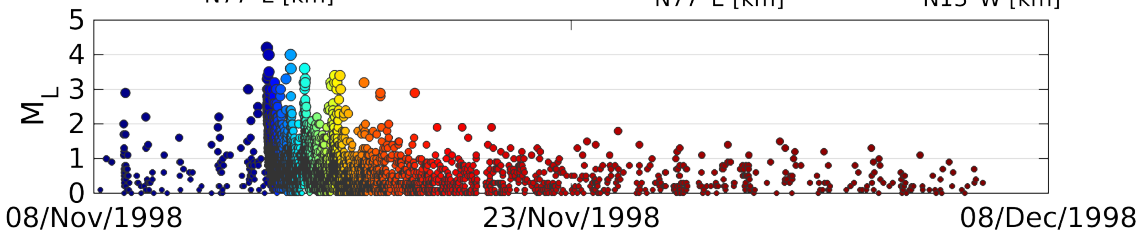



## Ölfus

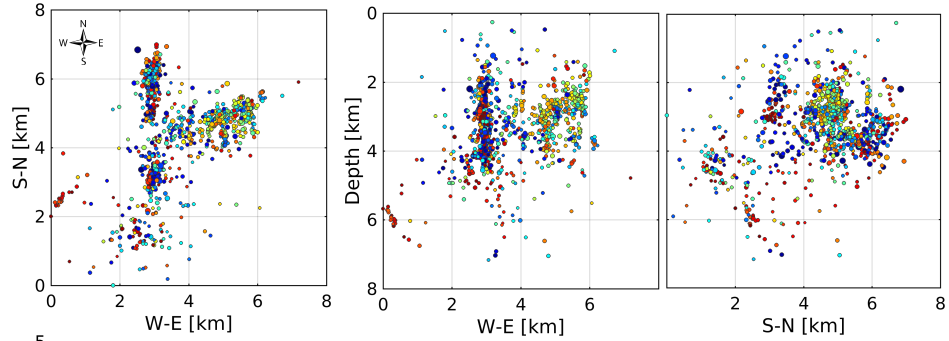


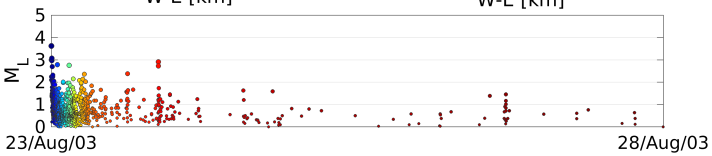



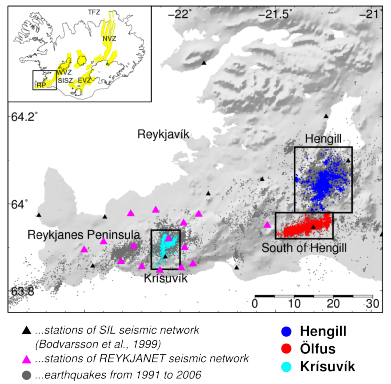

- migration in both space and time

# Space-time distribution of events - South-West Iceland

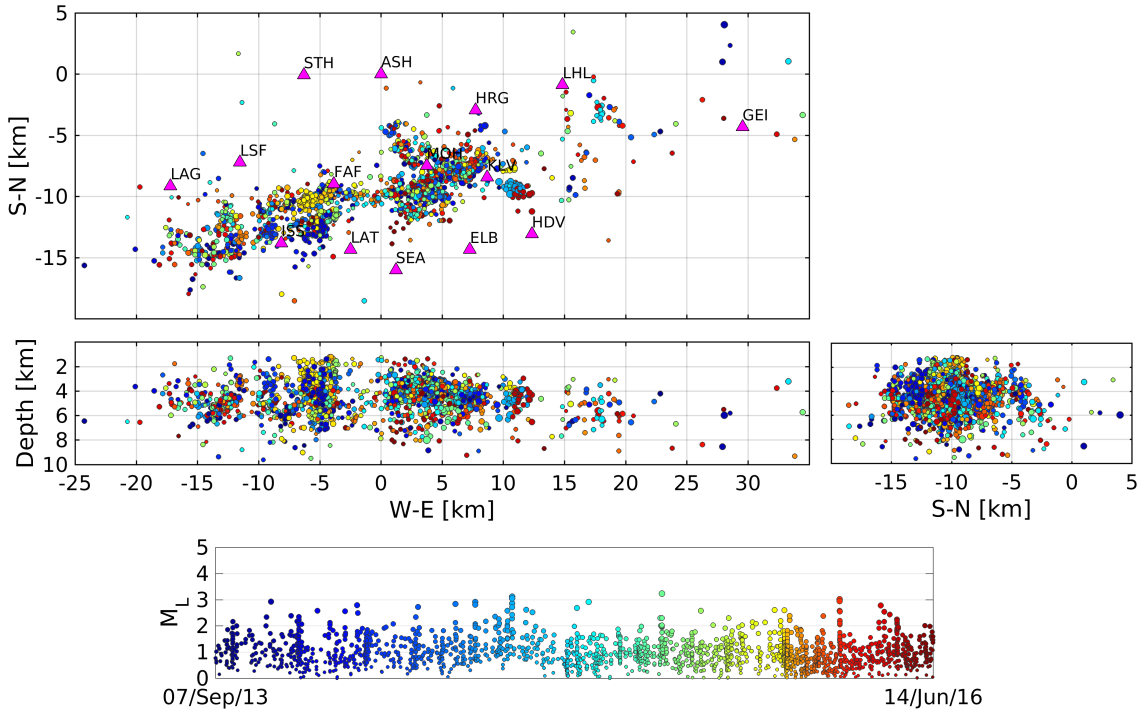
## Krísuvík




## Reykjanes 2013-2016




- migration slightly scattered

Thank you for attention!