Relocation of Earthquakes along the northern North Atlantic Ridge

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Project description

- Done in cooperation with NORSAR (Kjeller, Akershus)
- Goal: Precise location of earthquakes in Mid-Oceanic Ridges
- Motivation: Important to understand the tectonics
- Problem: Lack of stations makes precise loaction difficult

Project description cont.

- However: Possible to use time shifts between Rayleigh waves from earthquakes close to each other (Cleveland & Ammon, 2013)

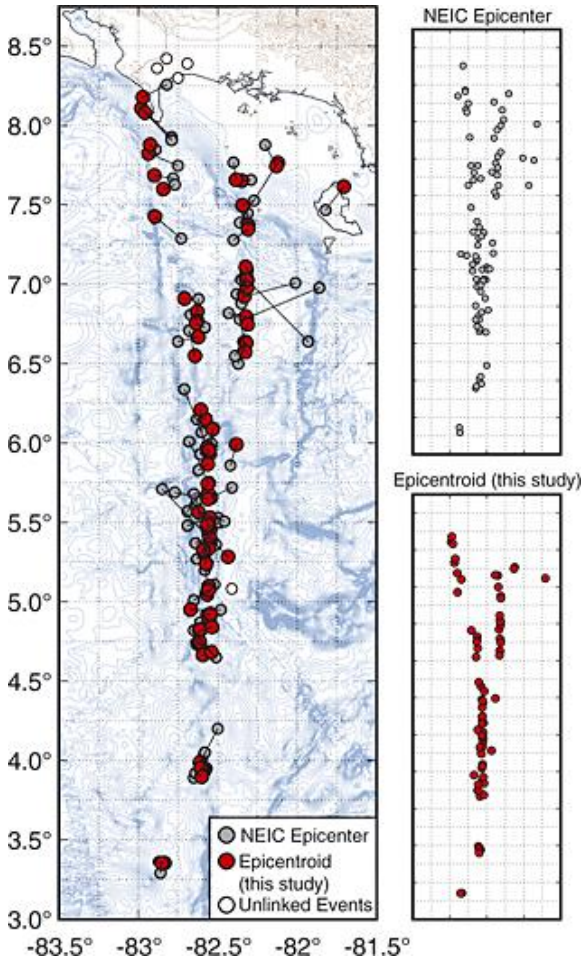
- This gives the relative location or relocation

- Needs to be done a catalog search from seismological networks

Method

- The method have been successful in the Panama Fracture Zone region

- Gives more tectonical consistent epicenter locations



- Relocation of 81 strike-slip earthquakes
- Mean shift of 14 km
- Origin time changes less than ±2 s
- M_w between 4.7 and 6.5

Method cont.

- Pros for using surface waves:

- They are well observed for moderate-large shallow earthquakes
- More sensitive to location because of lower propagation velocity

Con for using surface waves:

- Dispersion and sensitivity to faulting geometry

Earthquake location

- Use cross-correlation to waveforms gathered from the catalog search to measure relative time shift precisely

- The time shifts are used in a double-difference inversion procedure

Earthquake location cont.

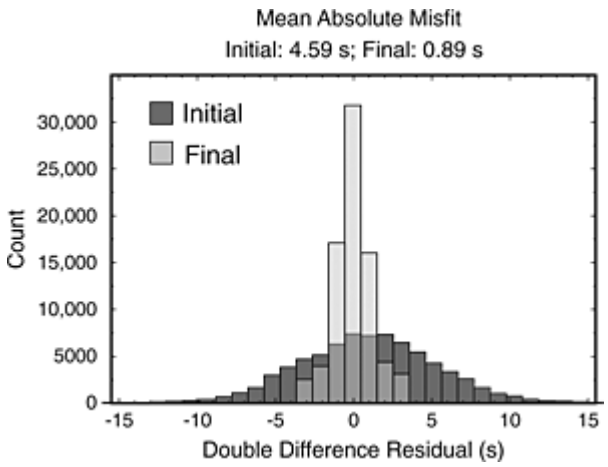
- Double difference equation:
- $dr_k^{ij} = (t_k^i - t_k^j)^{obs} - (t_k^i - t_k^j)^{cal}$

(Waldhauser & Ellsworth, 2000)

→ The system is represented by the linear equation $\boldsymbol{WGm = Wd}$

Earthquake location cont.

- This process leads to the result of the mean misfit



Based on:

- Mimimum cross-correlation value
- Maximum linking distance
- Minimum number of stations to link two events

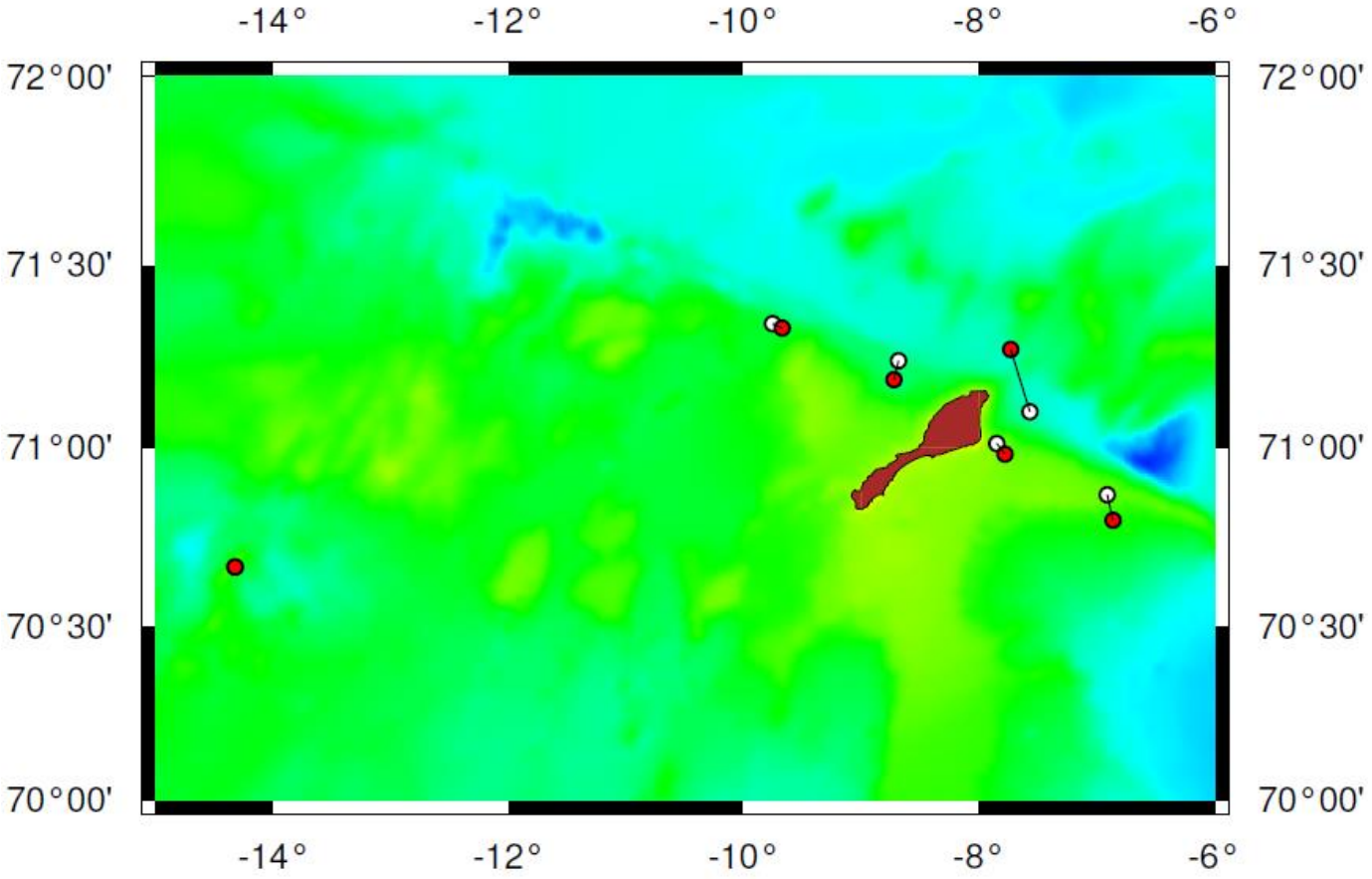
Earthquakes in the northern North Atlantic

- Use the same procedure as Cleveland & Ammon (2013)

- Looking at oceanic earthquake faults from Iceland to Svalbard

Earthquake in the northern North Atlantic cont.

Earthquake in the northern North Atlantic cont.



Takk for meg!