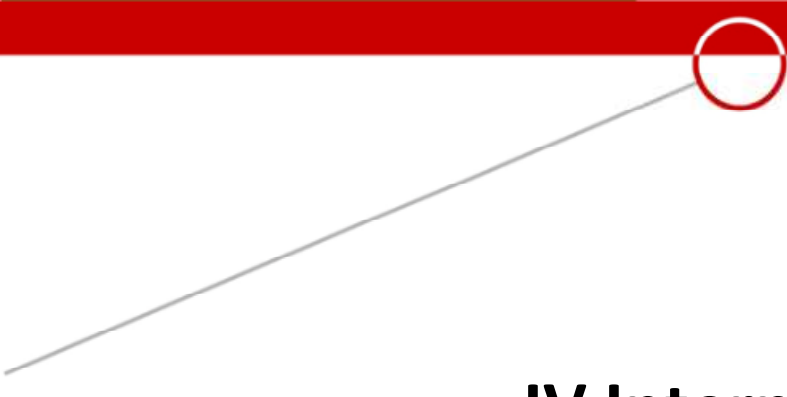




IV International Conference “Scientific-Research Cooperation between Vietnam and Poland” (POL-VIET)

20 – 22 November 2017

AKADEMIA GÓRNICZO-HUTNICZA IM. STANISŁAWA STASZICA W KRAKOWIE
AGH UNIVERSITY OF SCIENCE AND TECHNOLOGY



**POL-VIET
2017**





**INTERNATIONAL
CONFERENCE**
SCIENTIFIC-RESEARCH COOPERATION
BETWEEN VIETNAM AND POLAND



Relative secular variations of the geomagnetic field along the Zgorzelec- Wiżajny profile, Poland

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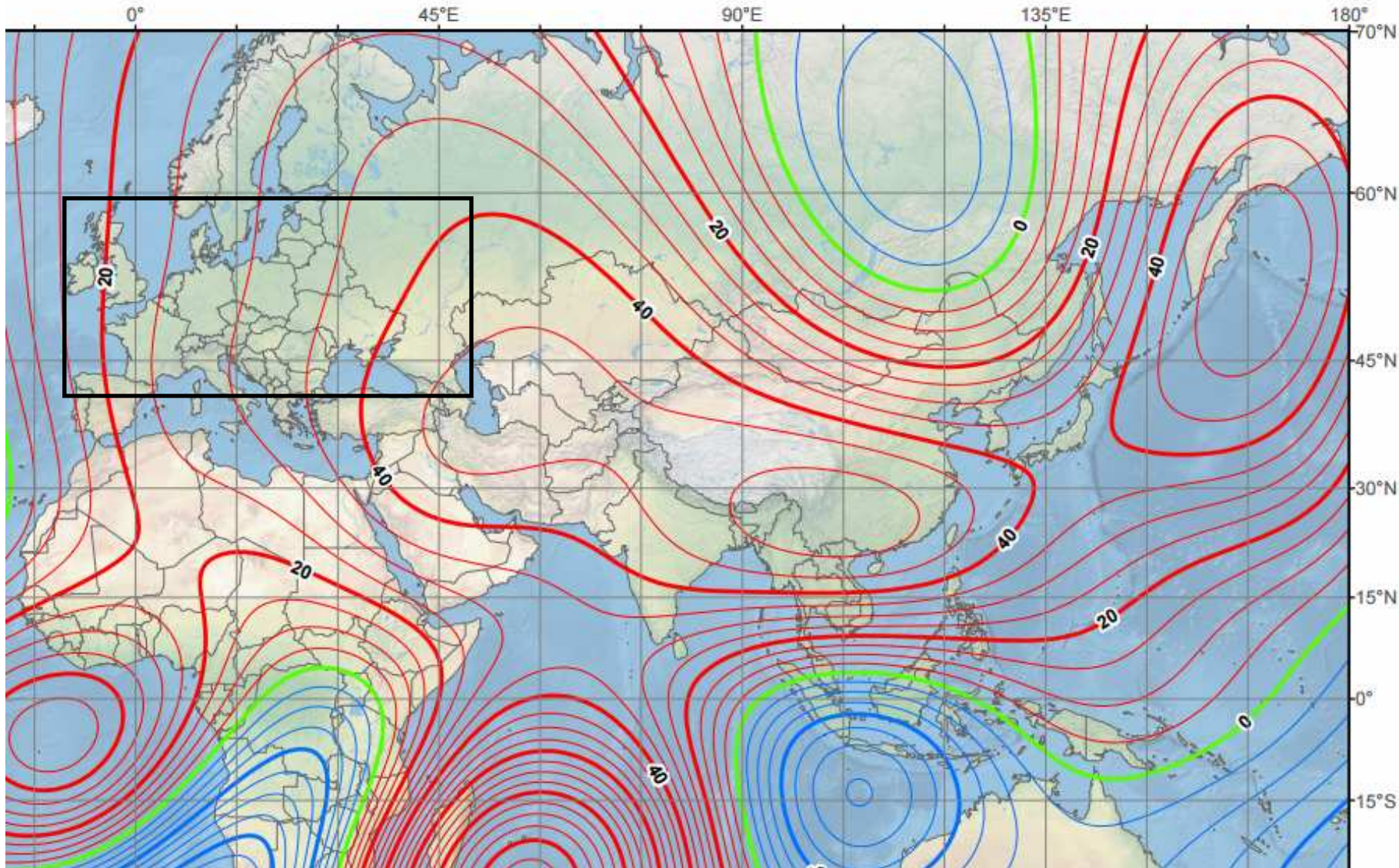
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Annual Change, Total Magnetic Intensity, Epoch 2015.0

Poland
33 nT/year



The study of relative secular variations of total magnetic intensity of the geomagnetic field



Prof. Stanisław Małoszewski (1921-2000)

Zgorzelec-Wiżajny profile

the 700 km long profile crossing the area of Poland
167 secular points separated by about 4 km

1966

31 secular points

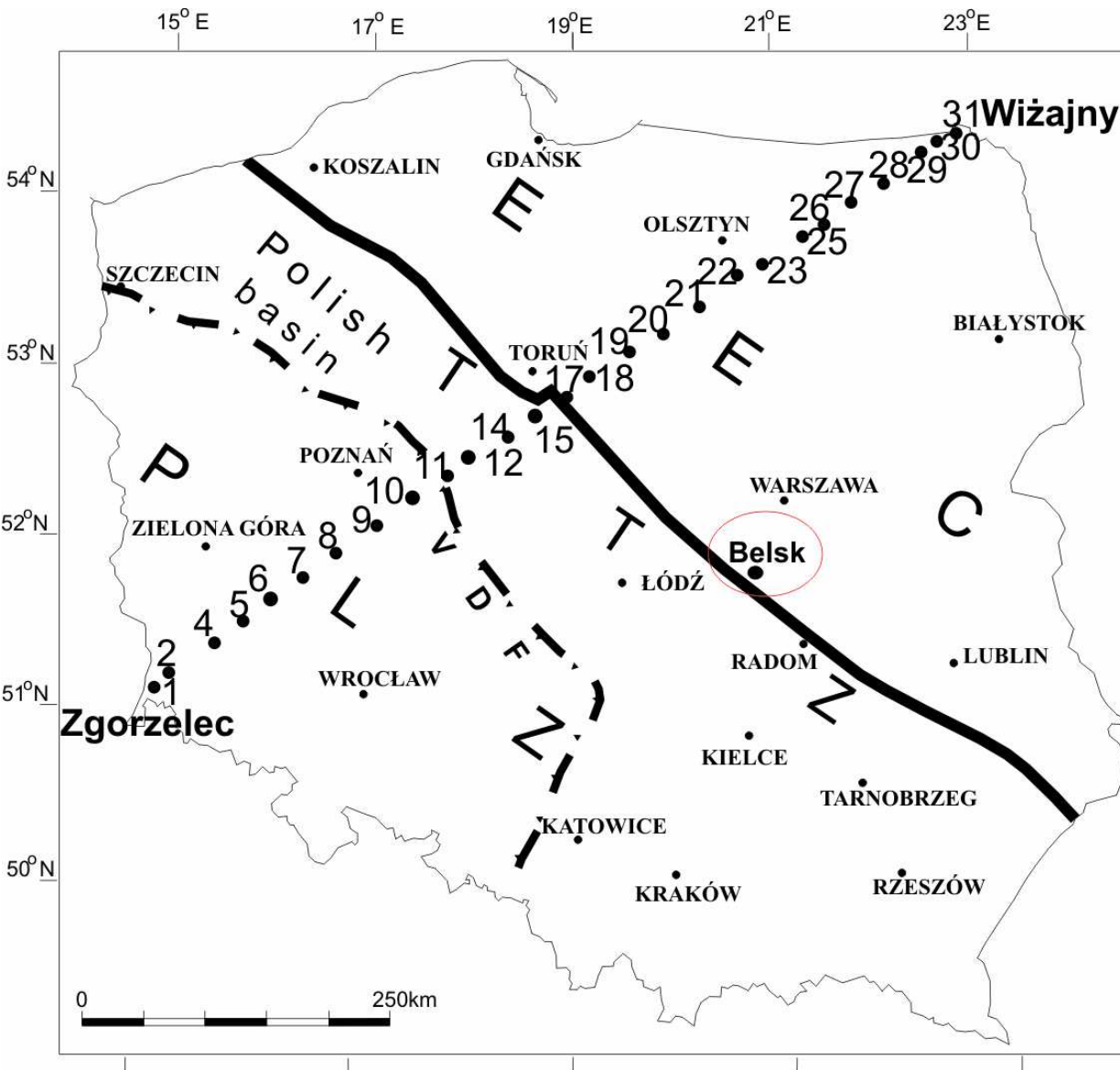
2003

27 secular points separated by about 22 km

Surveys between 1966 and 2016 →

51 measurement series !

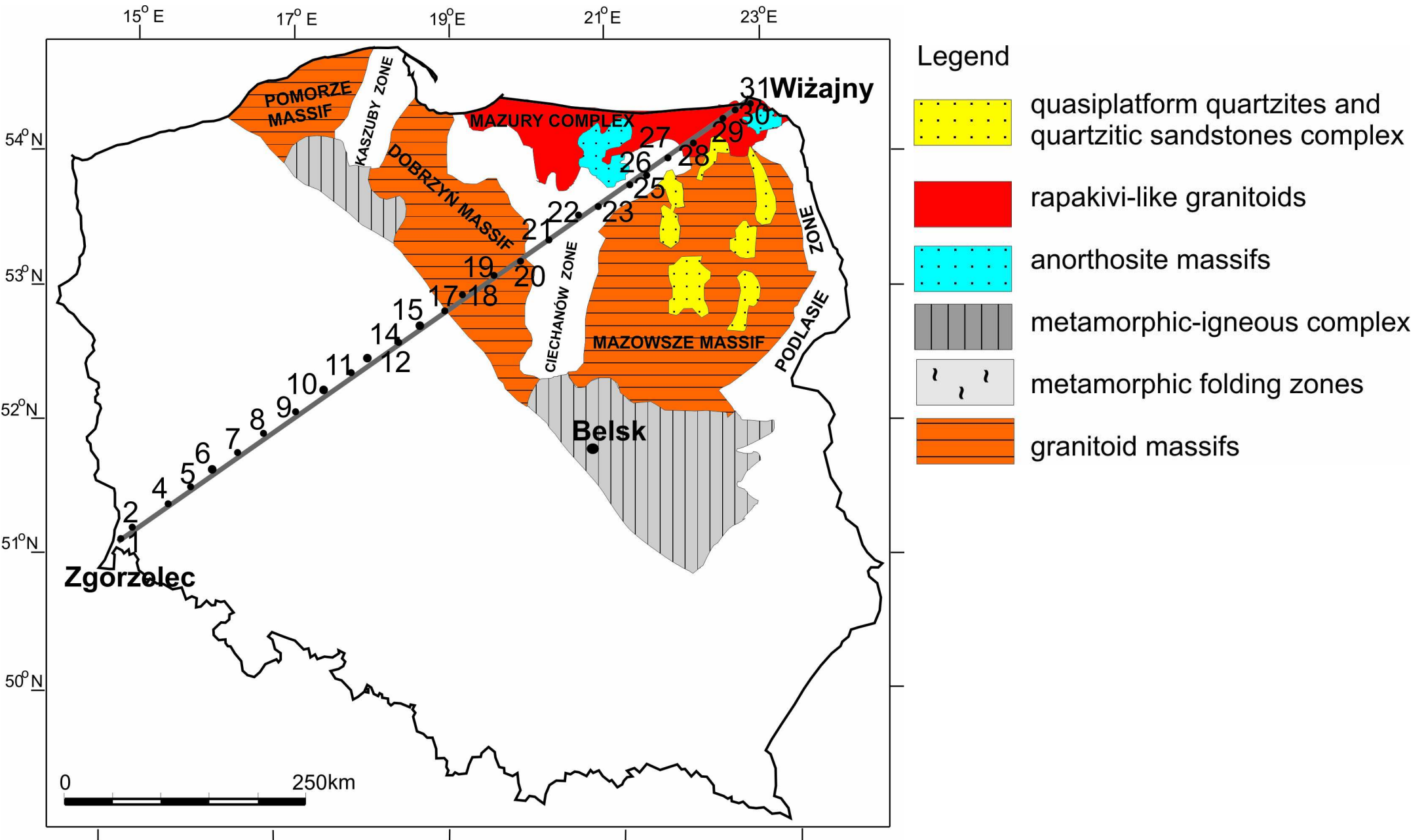
Location of secular points along the Zgorzelec-Wiżajny profile



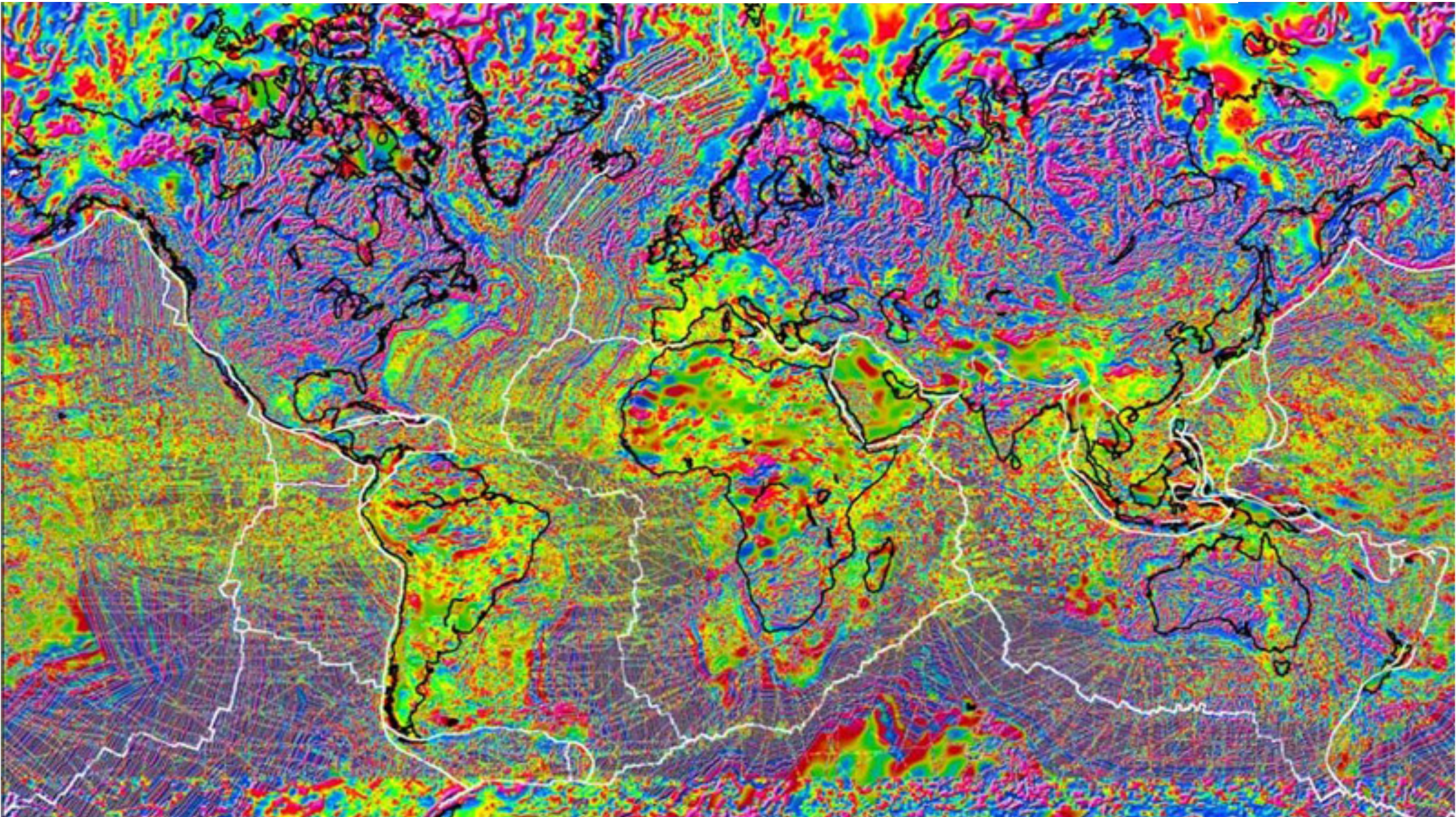
Annual surveys of TMI, proton magnetometer, 0.1nT sensitivity.

-  Teisseyre-Tornquist Zone (TTZ)
after Narkiewicz et al., 2015
-  Variscan Deformation Front (VDF)
-  secular points
- EEC** East European Craton
- PLZ** Palaeozoic Platform of Central and Western Europe

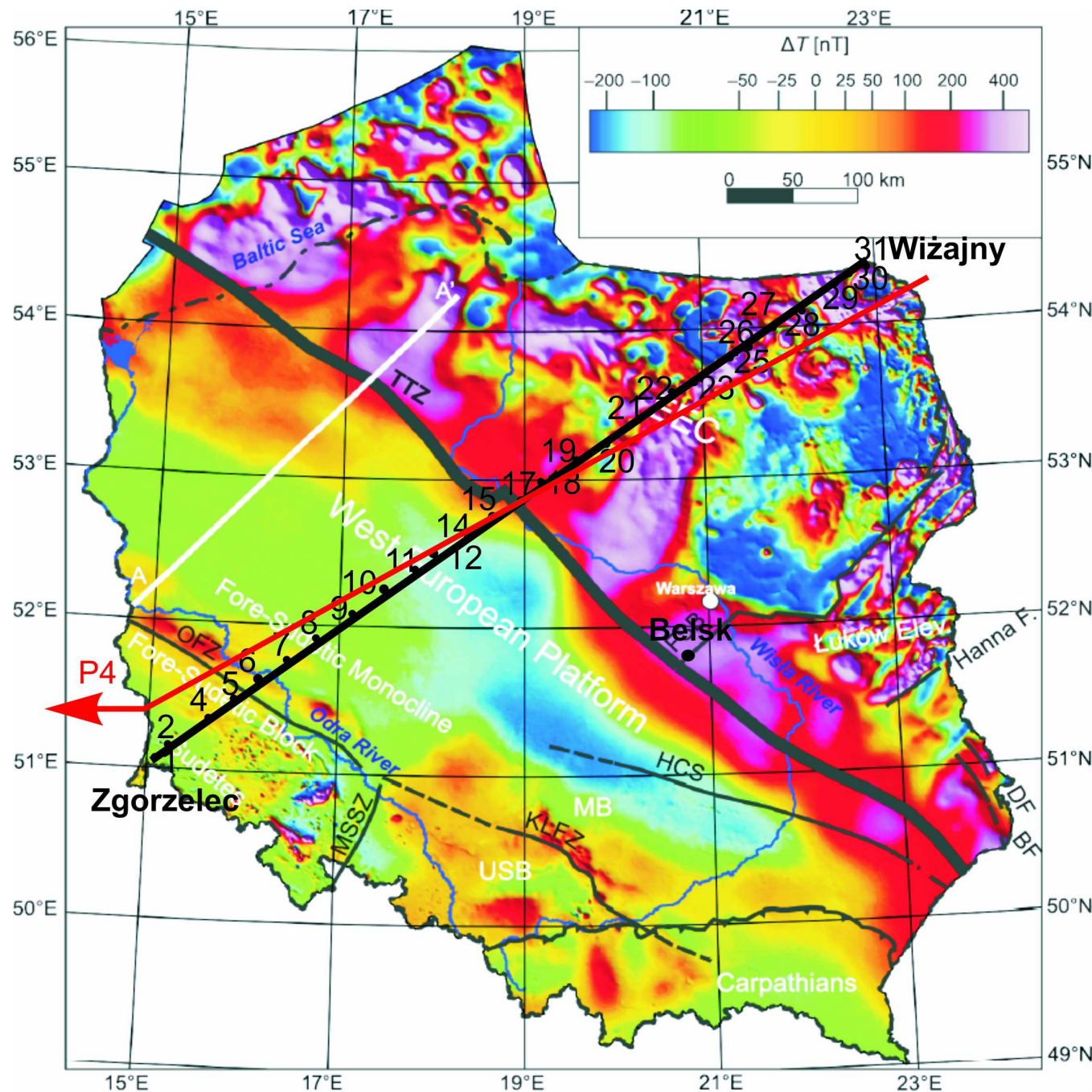
Location of the Zgorzelec–Wiżajny magnetic profile



Magnetic Anomaly Map of the World



Total intensity magnetic anomaly map of Poland



according to
Petecki &
Polechońska,
2017

Methodology of survey

1. The definitive value of relative secular variation ($\Delta T_{n,t}$) in a secular point (n) in the year (t) is an average value of reduction results

$$\Delta T_{n,t} = \frac{1}{60} \sum_1^{60} \left| \vec{T}_{obs,n,(\tau+\Delta\tau)} \right| - \left| \vec{T}_{Belsk,\tau} \right|$$

τ - time of measurement in GMT (Greenwich Mean Time)

$\Delta\tau$ - time correction related to the difference in longitude between measurement point and the Belsk Observatory

2. **Linear approximation** of definitive values of relative secular variations

$$W_n(t) = b_n \cdot t + a_n$$

3. **Graphical illustration of slope coefficient**

$$b_n = \partial(\Delta T_{n,t})$$

Changes in time of the relative geomagnetic field values $\Delta T_{n,t}$ in individual secular points of the Zgorzelec-Wizajny profile

ΔT_n

mean values of $\Delta T_{n,t}$ in the period 1966-2016 for individual secular points

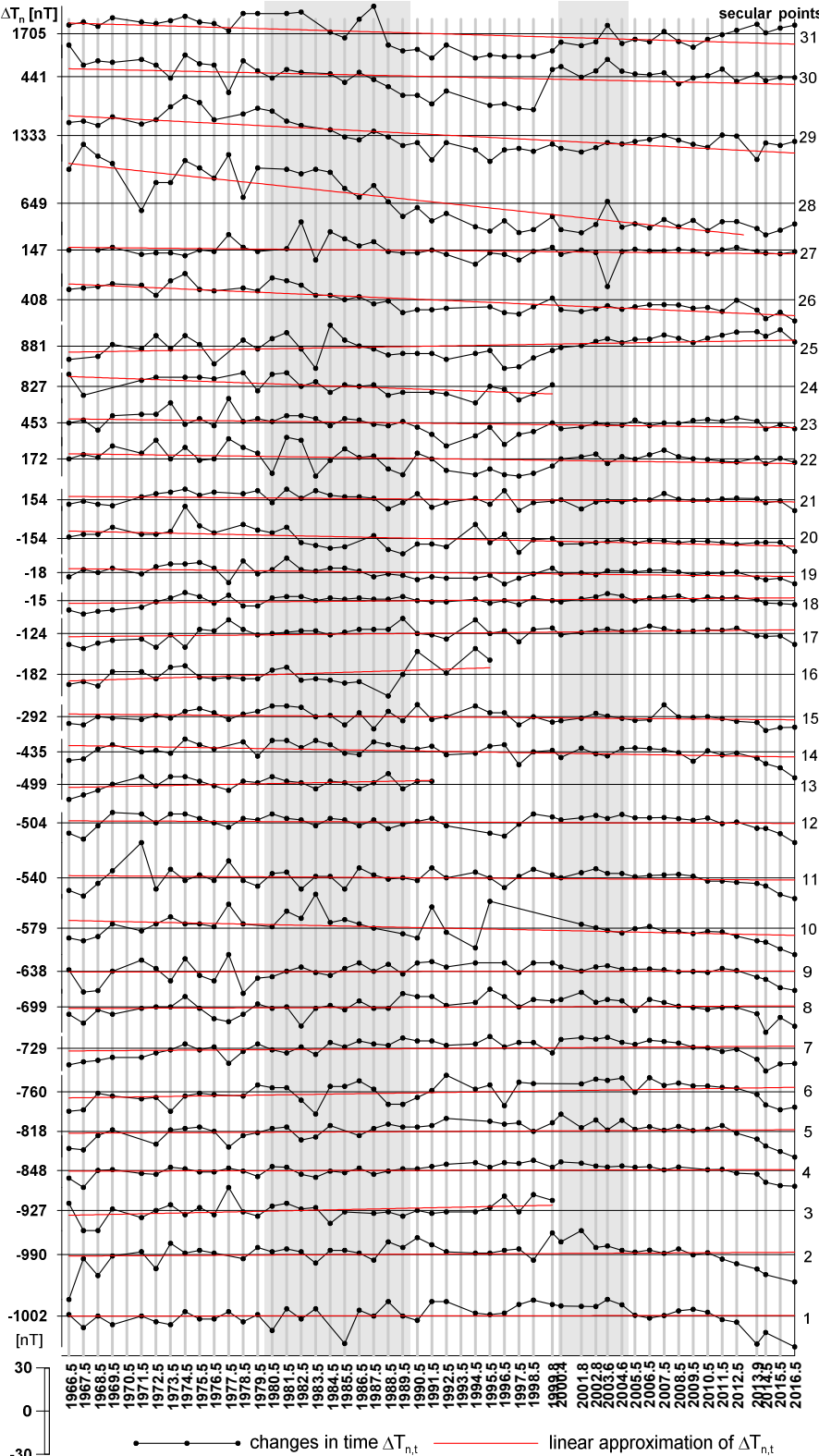
grey background

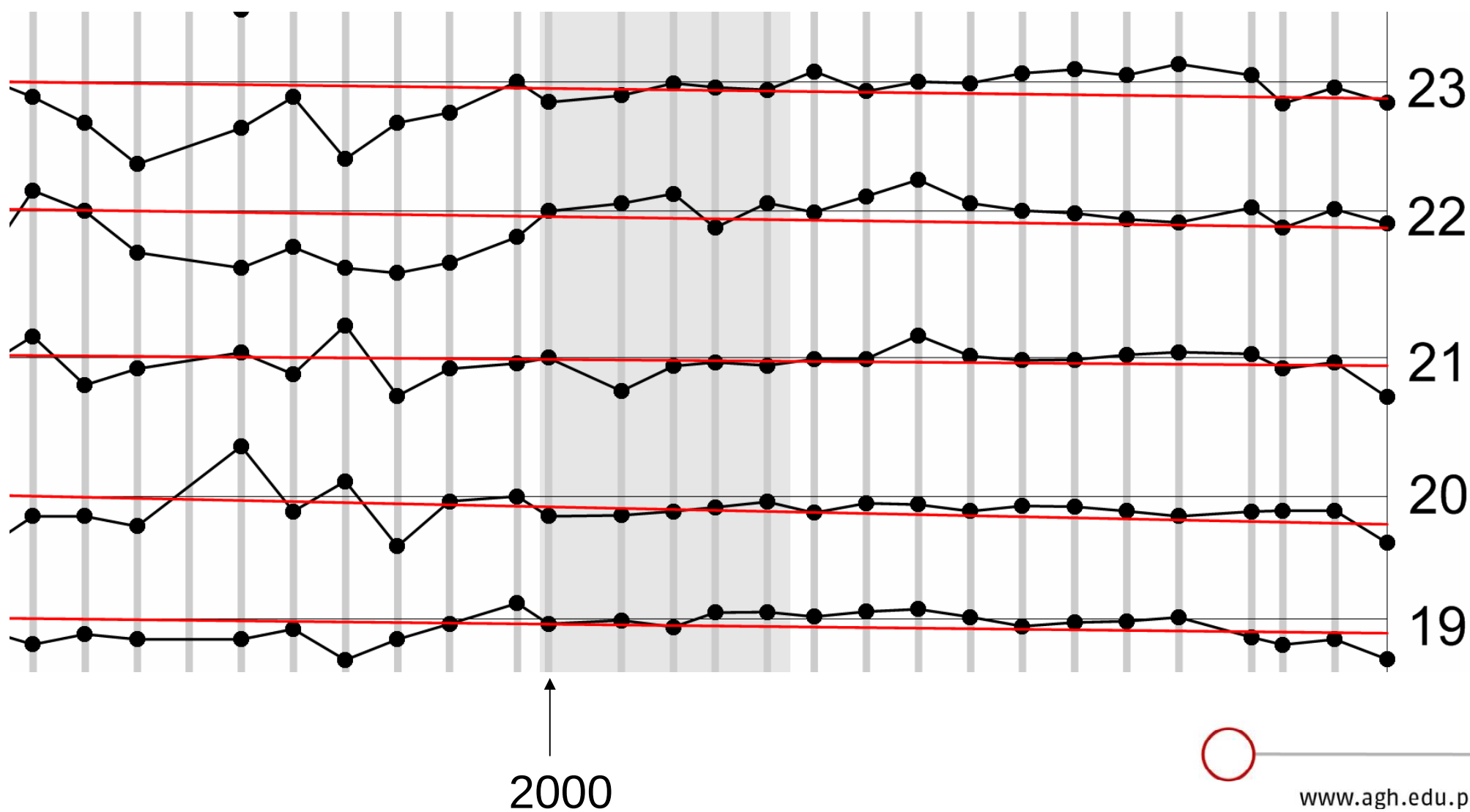
periods of time (1980-1990 and 2000-2005), when systematic changes of total magnetic intensity in Central Europe have been observed (Welker, 2007)

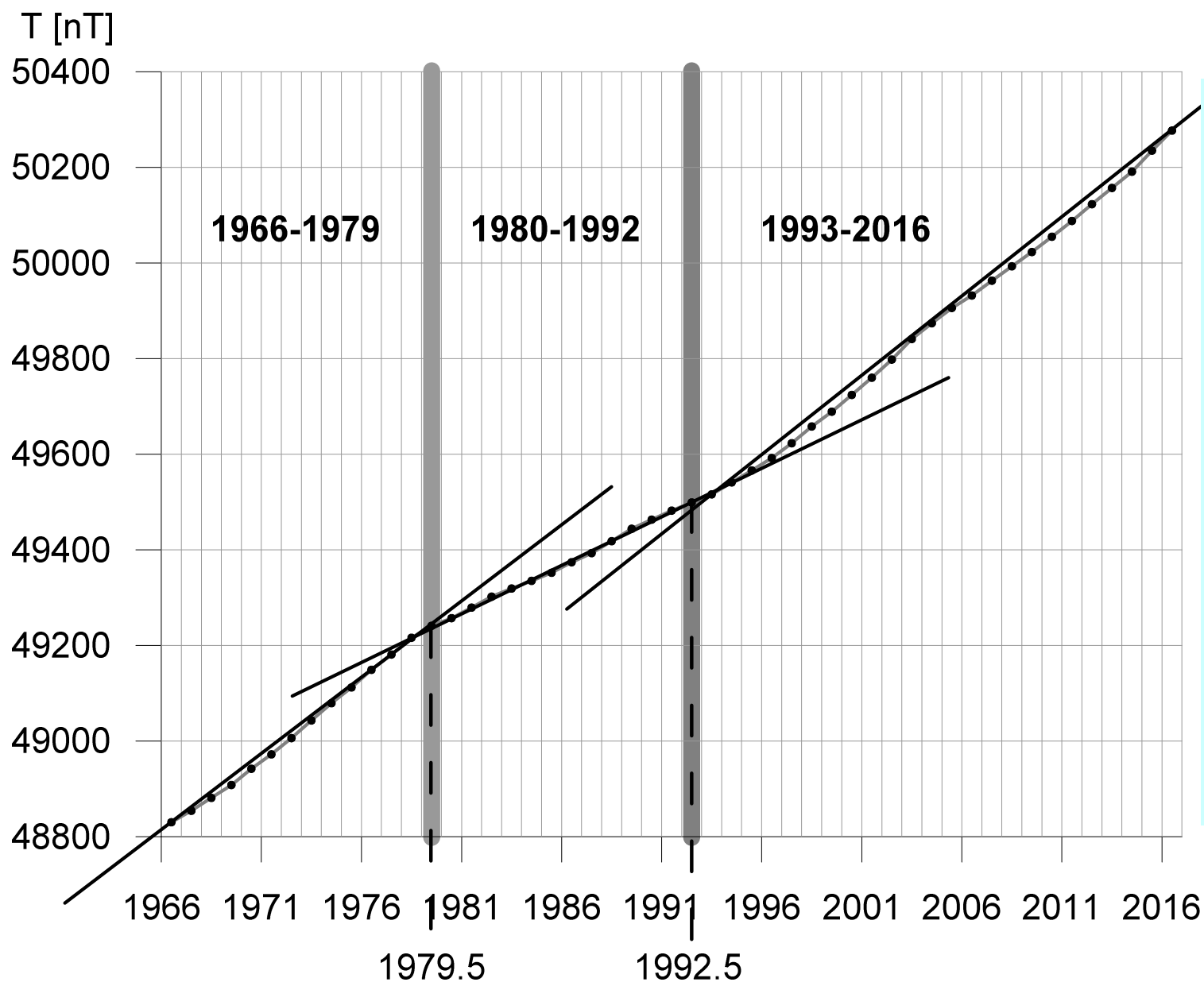
linear approximation of $\Delta T_{n,t}$

$$W_n(t) = b_n \cdot t + a_n$$

$$b_n = \delta(\Delta T_n) \quad [nT / rok]$$





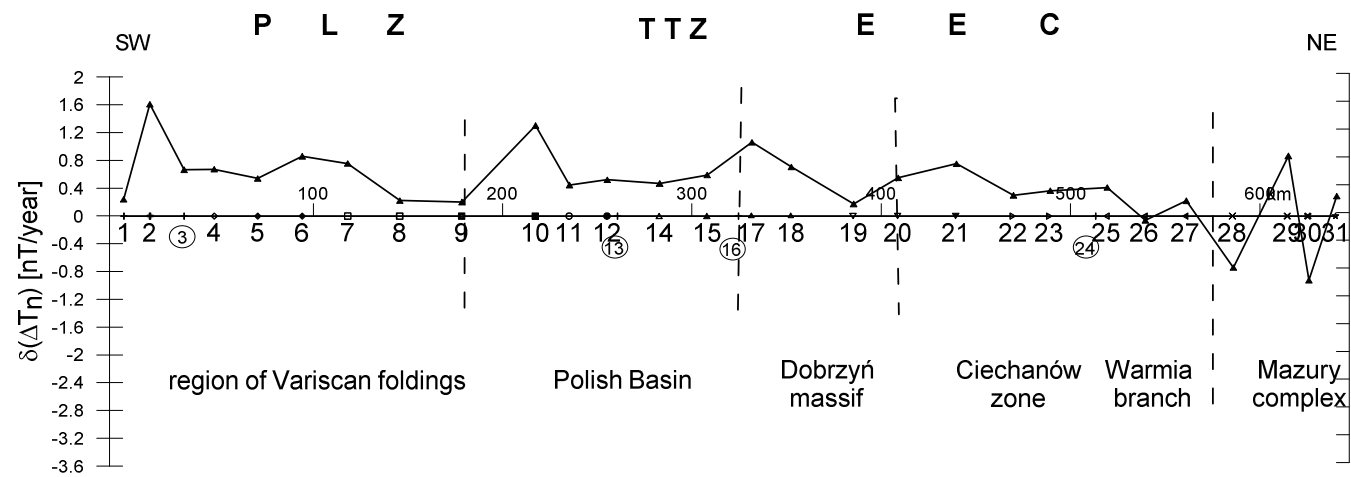


Selection of time-periods with different rate of total magnetic intensity changes on the basis of data collected in the Central Geophysical Observatory in Belsk since 1966 (by courtesy of Jan Reda, IGF PAN).

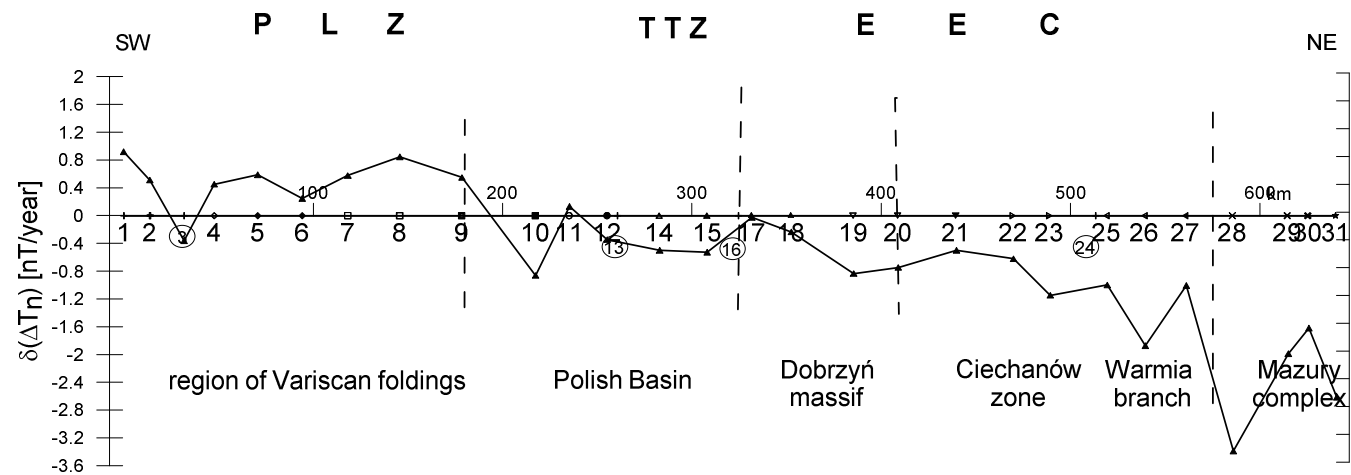
••• annual means of total magnetic intensity in the years 1966-2016

— total magnetic intensity approximated by the means of straight lines

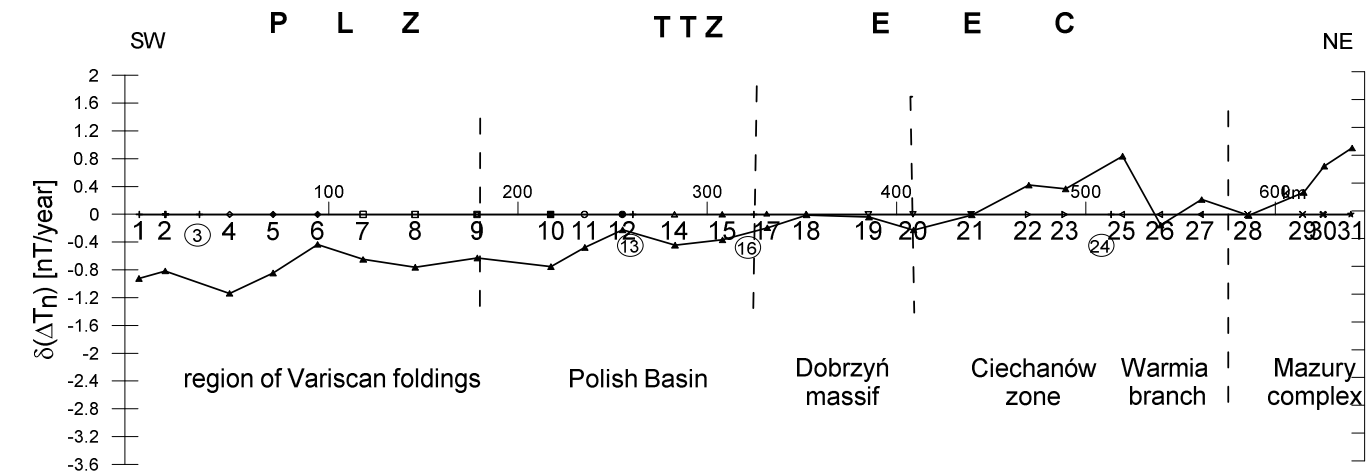
1979.5, 1992.5 - the years, in which the changes of total magnetic intensity rate are visible



1966-1979



1980-1992



1994-2016



AGH
SW

P

L

Z

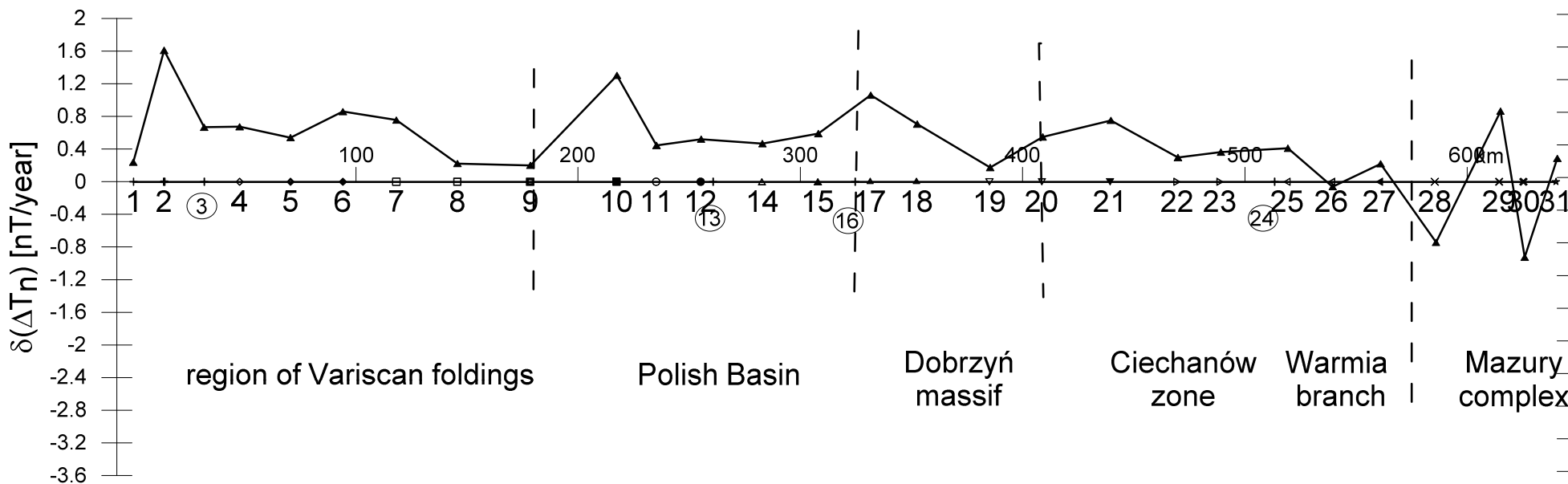
TTZ

E

E

C

NE



1966-1979



AGH
SW

P

L

Z

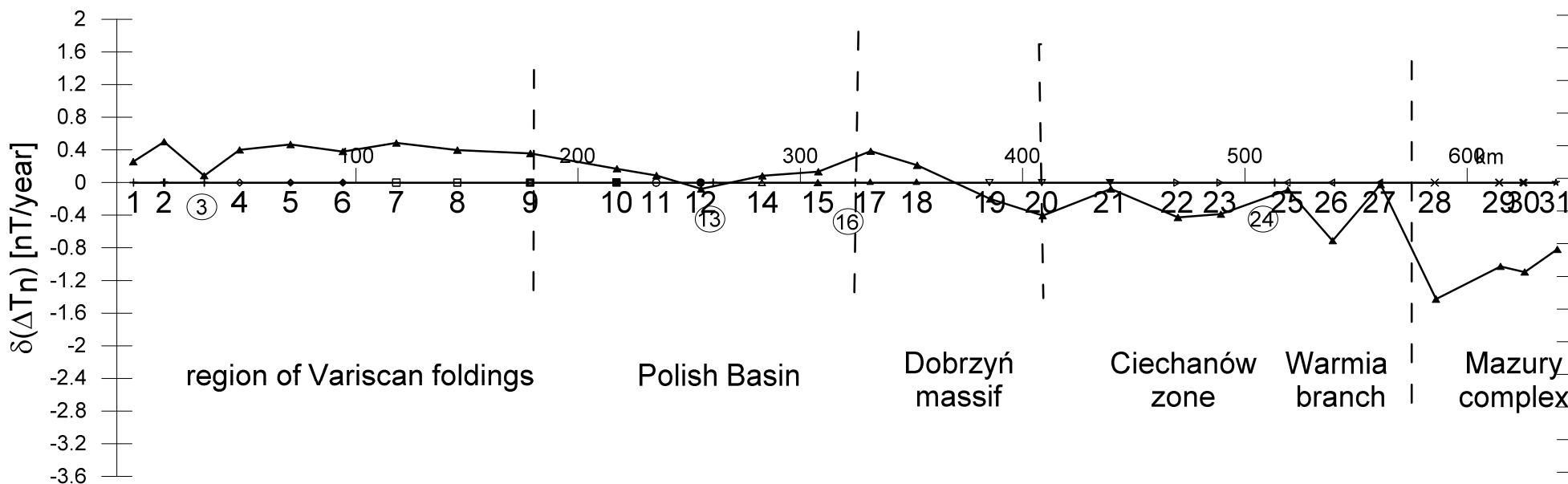
TTZ

E

E

C

NE



1966-1995



AGH
SW

P

L

Z

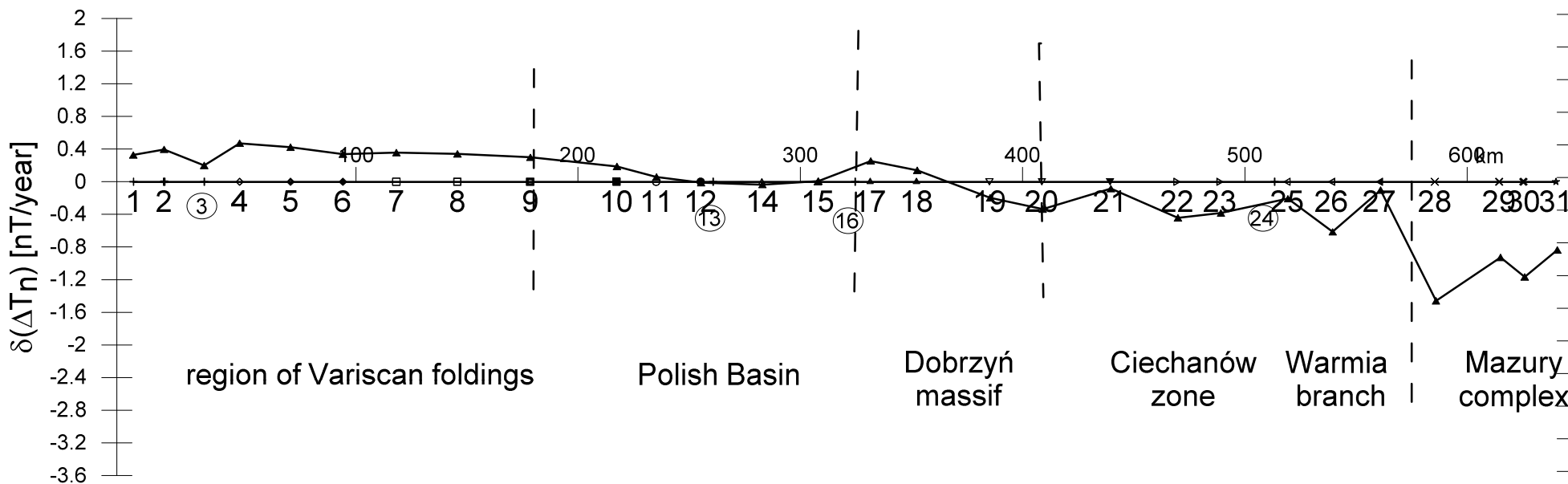
TTZ

E

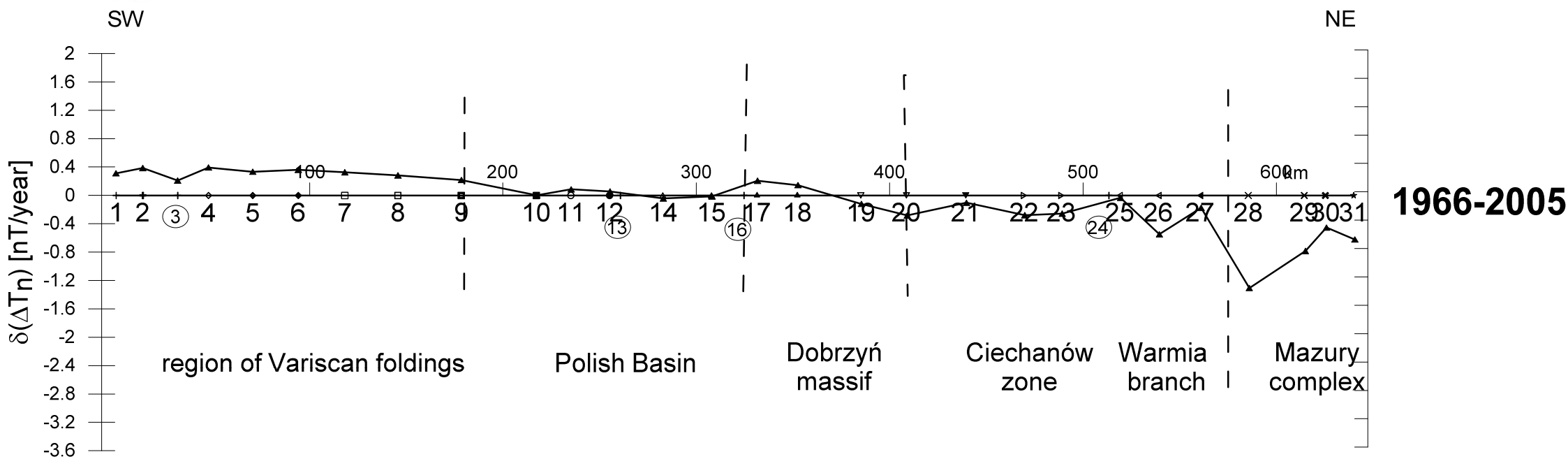
E

C

NE



1966-2000





AGH
SW

P

L

Z

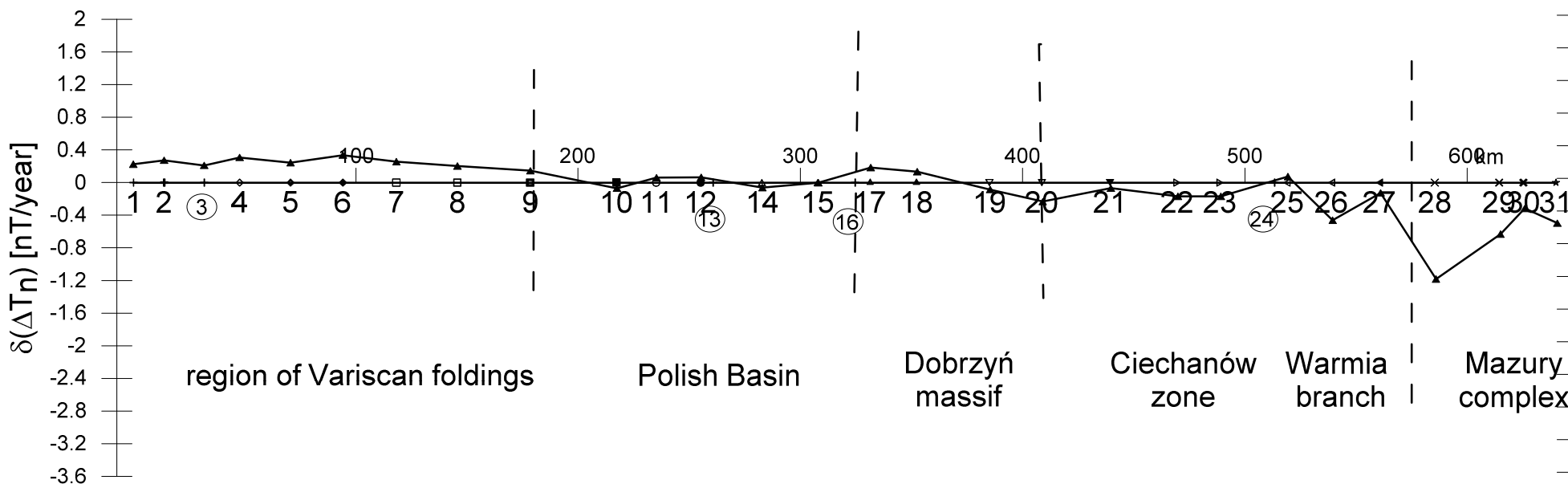
TTZ

E

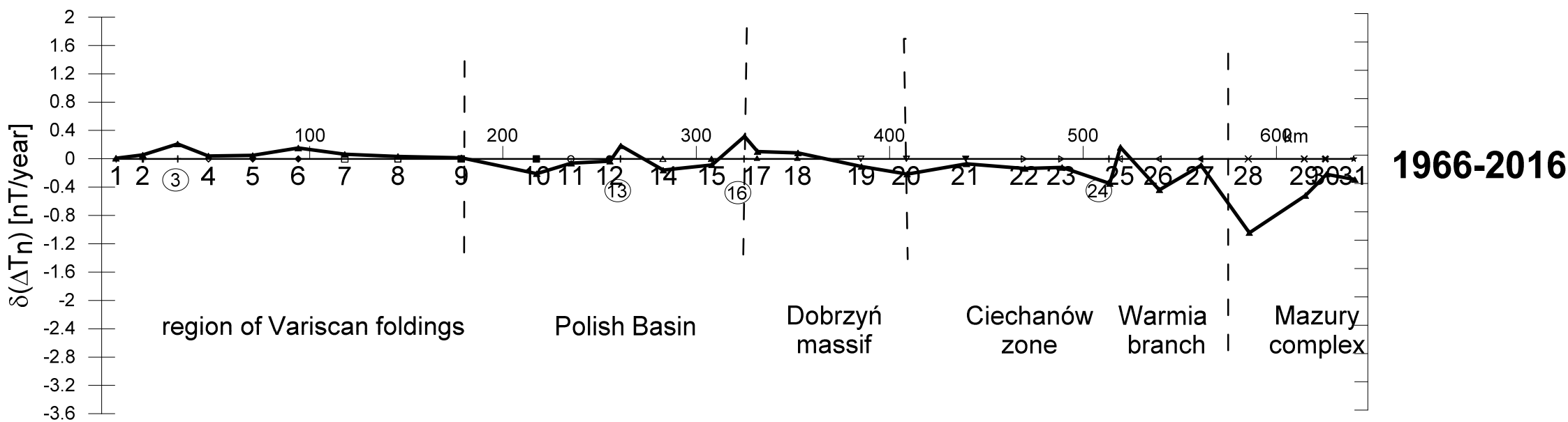
E

C

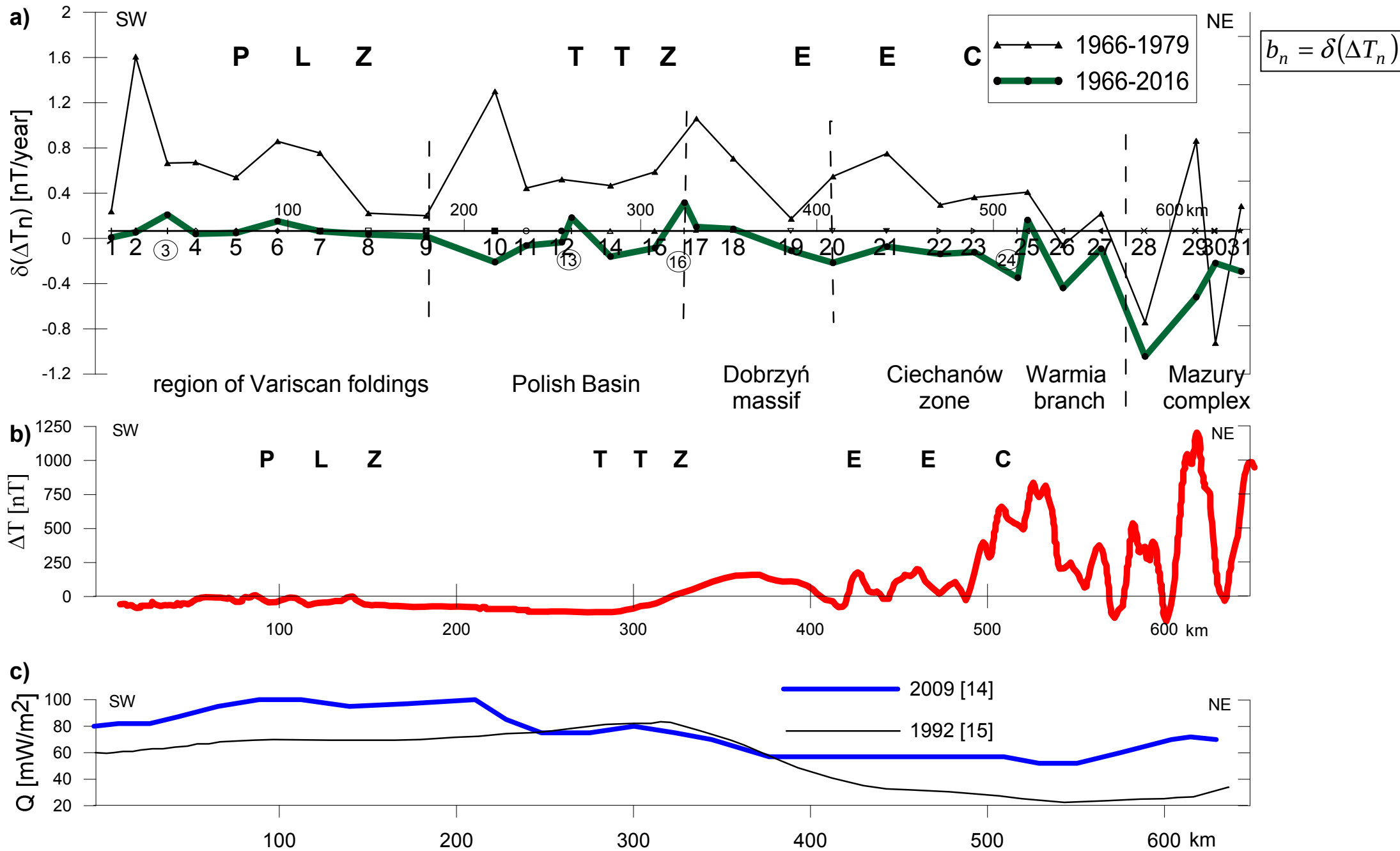
NE



1966-2010



Relative secular variations along the Zgorzelec-Wiżajny profile



Summary



1. The character and dynamics of the relative secular variations correspond to the **geological division** of the study area.
2. The **EEC area** is characterized by a **slower rate** of the Earth's magnetic field changes. The relative secular variations in this region during the last 50 years of study amount to c. -1.0 nT/year.
3. In the area of the Palaeozoic Platform, the higher rate of the geomagnetic field changes is observed.
4. Long-term studies show that **since 2000** the relative secular variations of the Earth's magnetic field along the Zgorzelec-Wiżajny profile were **low**. They may correspond to the **regular secular variations** observed in **Central Europe** in this time.
5. The systematic recording, since 1966, of the TMI of the geomagnetic field along the Zgorzelec-Wiżajny profile **is unique** and should be continued.
6. The observations may be a **supplementation to** magnetic observations conducted by the Institute of Geodesy and Cartography in Warsaw over the territory of Poland.

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Thank you for attention.

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