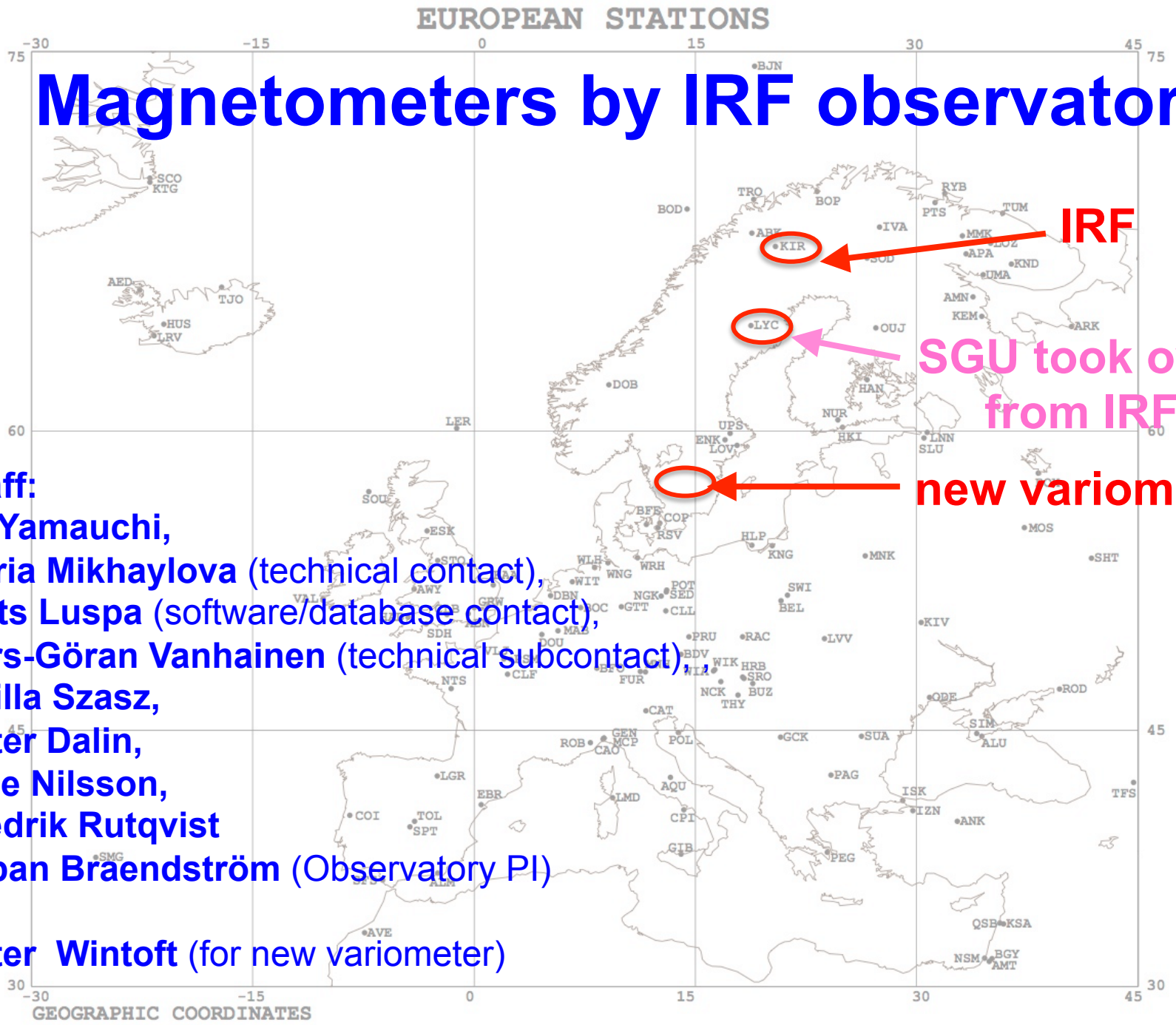
Magnetometers by IRF observatory



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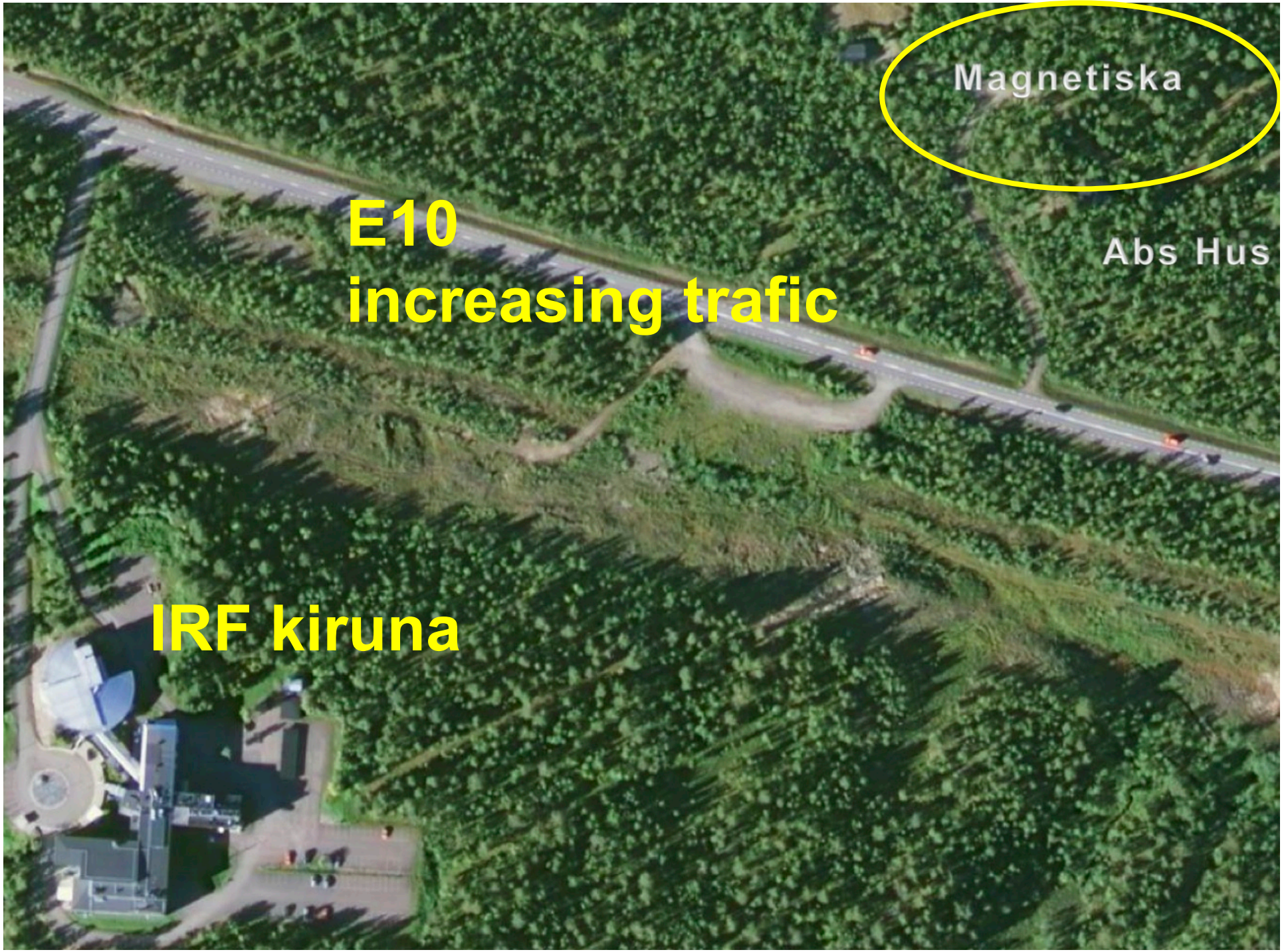
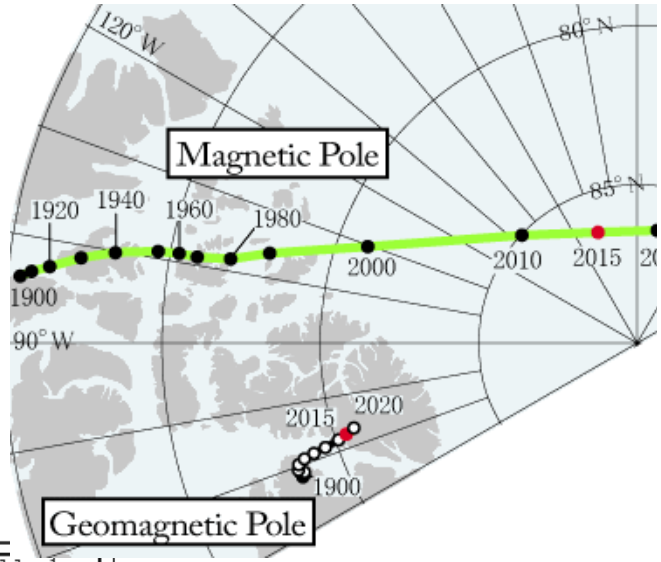
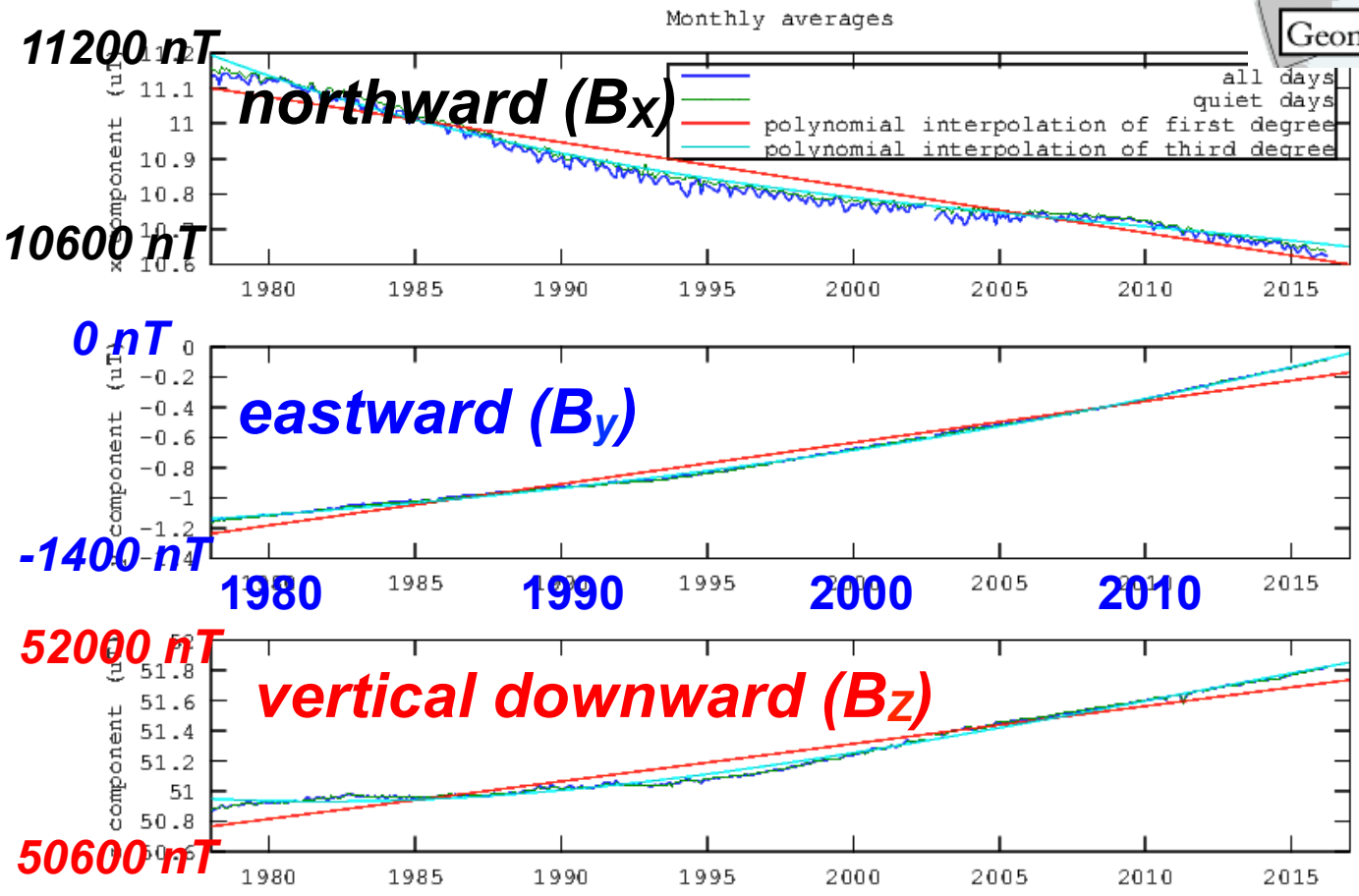
Lars-Göran Vanhainen (technical subcontact),,
Csilla Szasz,
Peter Dalin,
Peje Nilsson,
Fredrik Rutqvist
Urban Braendström (Observatory PI)

Peter Wintoft (for new variometer)


Magnetiska
Abs Hus
E10
increasing trafic
IRF kiruna

Compass declination:
5° → 0° in 20 years





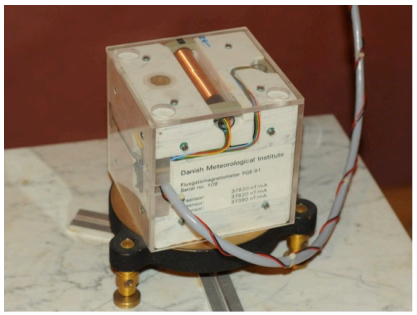
By ⇒ 0

Existing instruments

(1) Vector field (every 1 sec): Flux gate variometer (Kiruna)

Primary

Secondary (backup)



(2) Absolute measurement (weekly): DI flux magnetometer (Kiruna)

in operation

spair

(3) Total field (every 4 sec): Proton magnetometer = scalar value

in operation (old one)

spair (new one)

(4) Higher frequency than 1 Hz: Pulsation magnetometer

3 sensors (XYZ) in oparation

no spair

*** Newly installed near Hässleholm (2016)**

variometer (no spair)

Specialty of Kiruna:

(1) near the iron mining

(2) can combine with other measurements

- auroral image
- riometer
- ionosonde (new dynasode from 2017!)

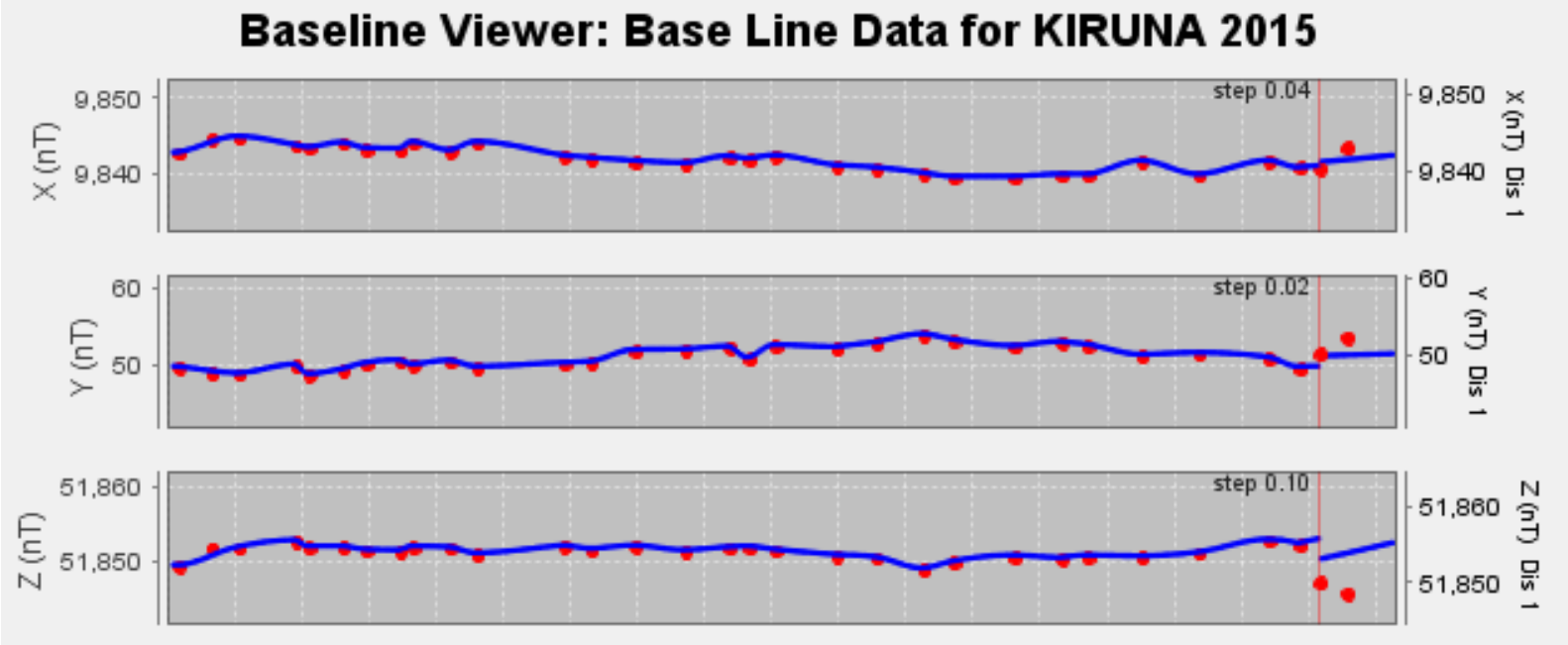
Recent developments (measurement)

(1) Aiming to INTERMAGNET quality

* quality control of absolute measurements with new staff (2012~)
* application to INTERMAGNET: 2016
* quality improvement of data processing: 2016~
* INTERMAGNET meeting (september 2017): **pending**

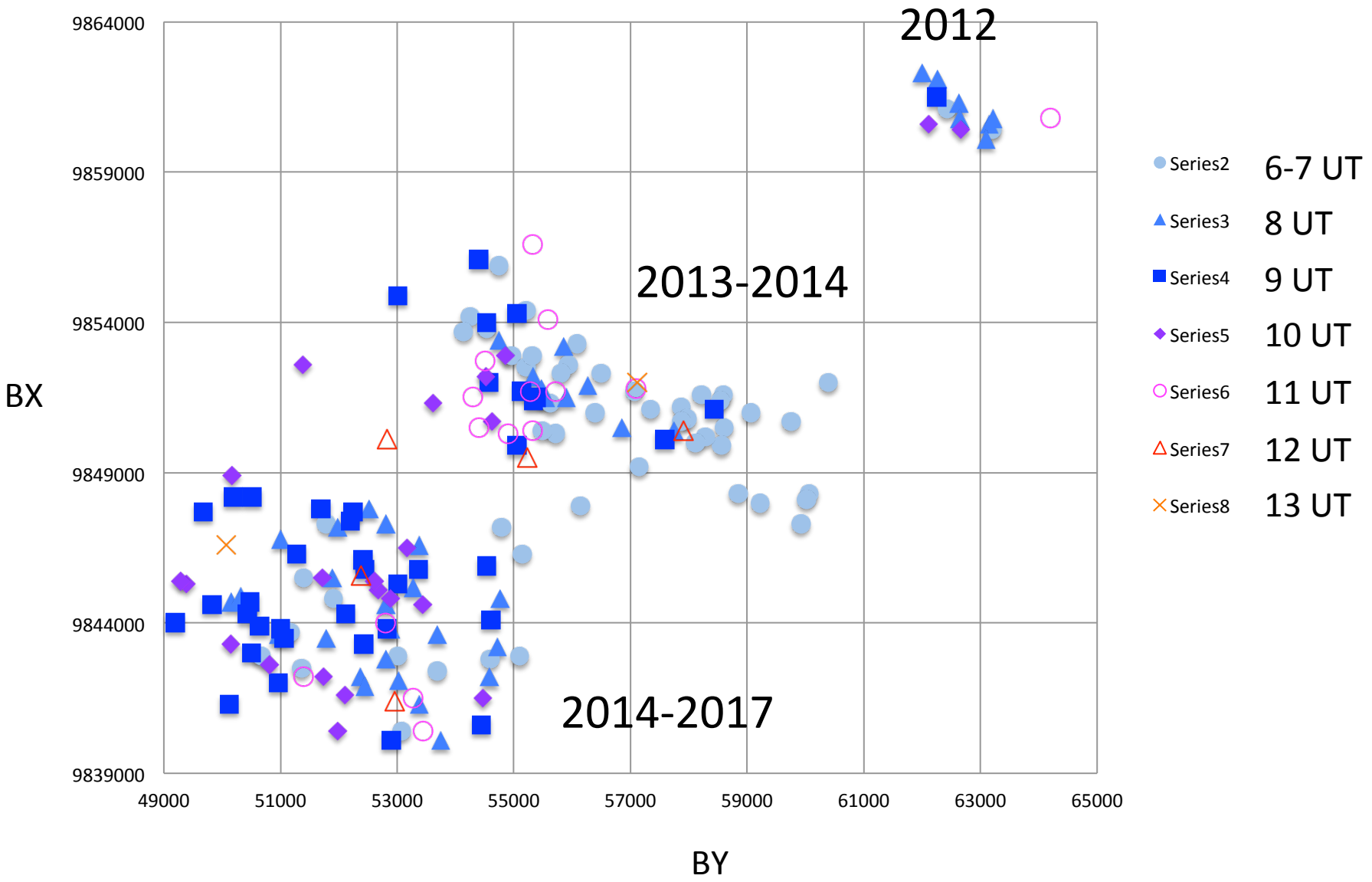
reason (because of **baseline, but variometer is ok**

Baseline fit in all components need a smoother fit (ΔX and ΔY in baseline jumps are not consistent with ΔZ), rather than what approximates to a linear interpolation between measured observations.



We are working on finding out reason

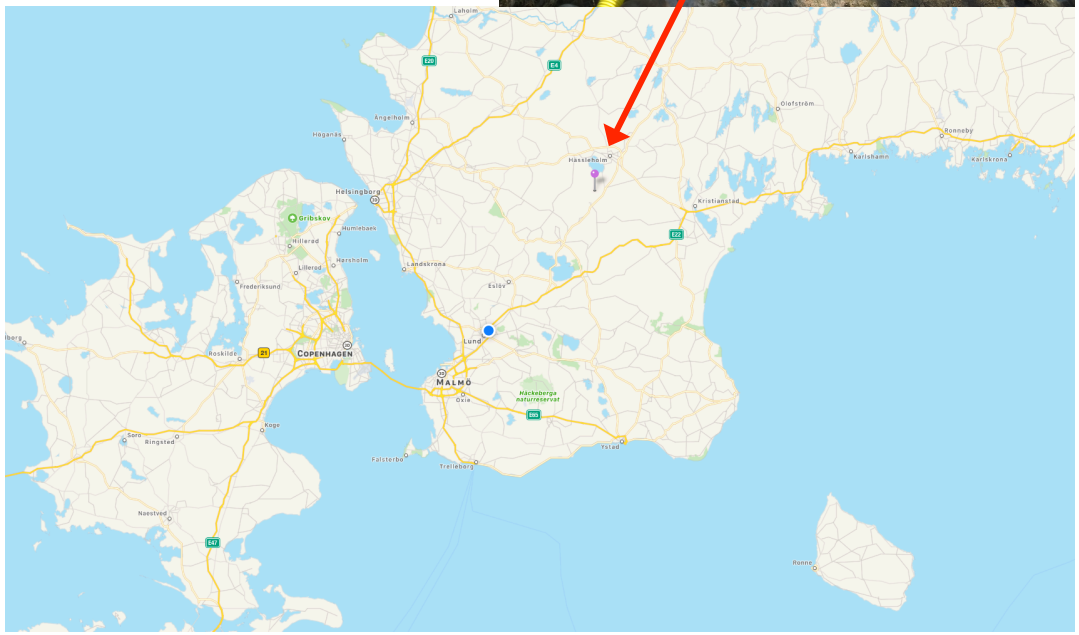
absolute measurement raw data (2012-2017) before applying G scale



Recent developments (measurement)

(2) New variometer close to Hässleholm

* test with DTU: 2013
* installment: November 2016
* problem with communication via 3G link



(3) Expanding variometer network

⇒ please contact **Hermann Opgenoorth**

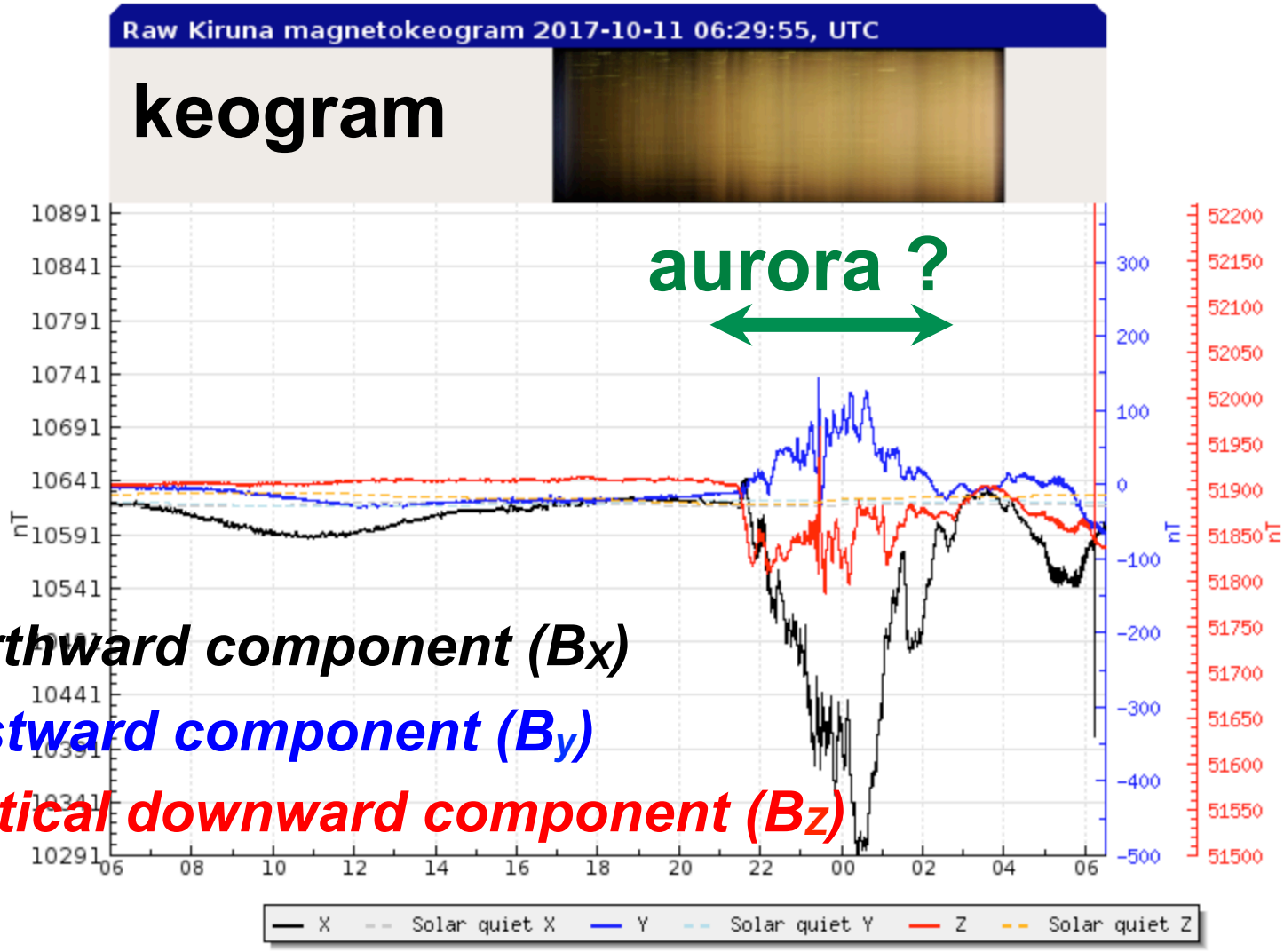
Recent developments (data presentation)

(1) Combining with auroral image

all-sky image ⇒ take meridian part ⇒ make keogram ⇒ combine

Overview
Topical
Vacancies
Popular Science
Research
Observatory
Data
Publications
Library
Education
SEARCH
Contact

IRF Kiruna
IRF Umeå
IRF Uppsala
IRF Lund

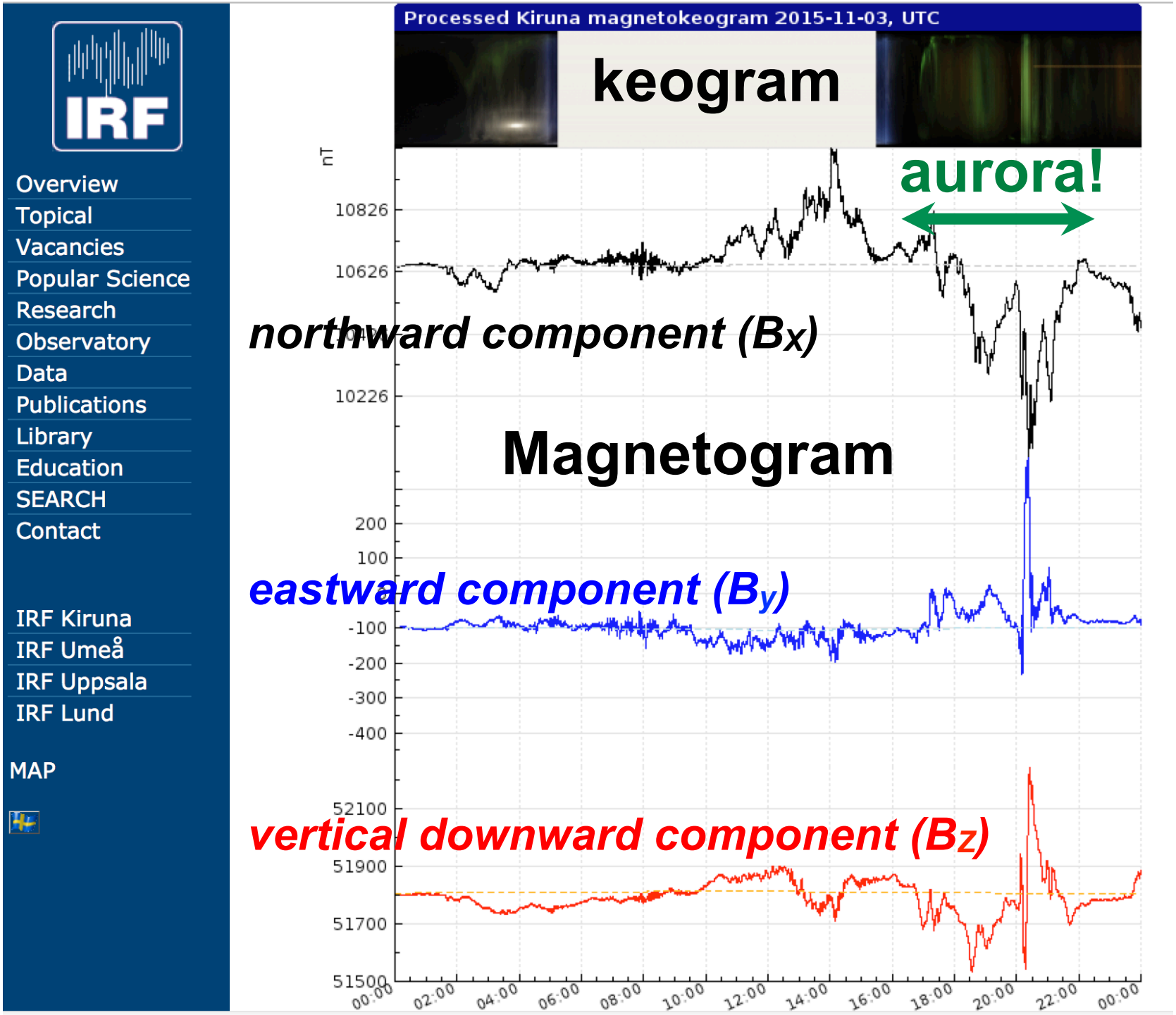


northward component (B_X)

eastward component (B_Y)

vertical downward component (B_Z)

Real-time: http://www.irf.se/mag/



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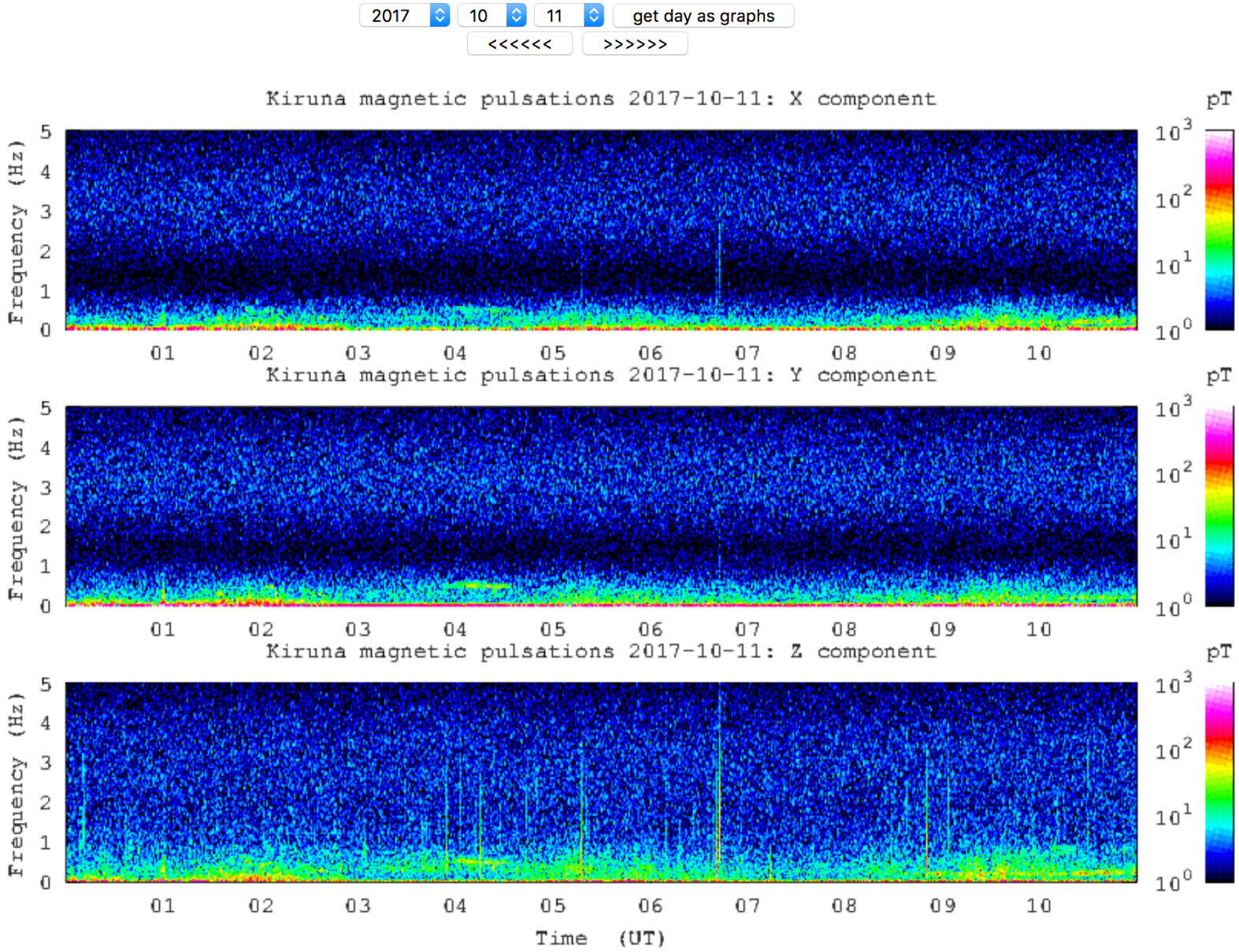
Pulsation magnetometer (real time)



Recent developments (data presentation)

(2) Direct comparison with magnetic disturbance and aurora

all-sky image ⇒ change RGB to HSL color code

⇒ automatic identification of "strong" aurora

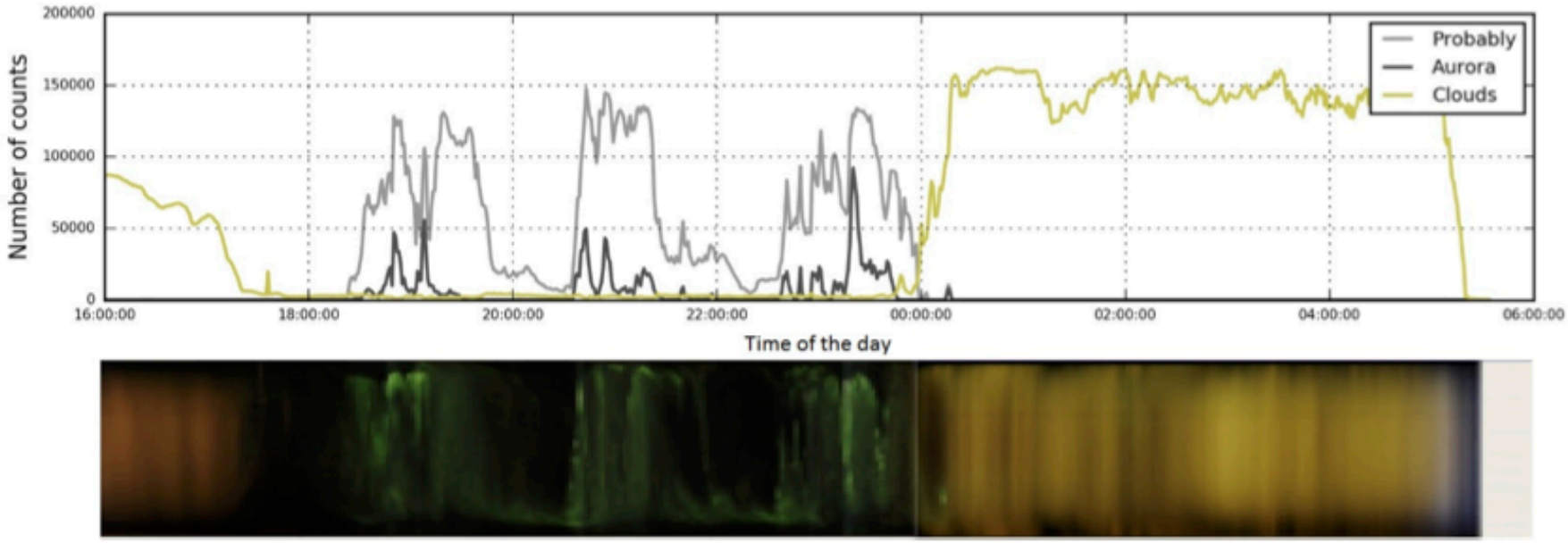


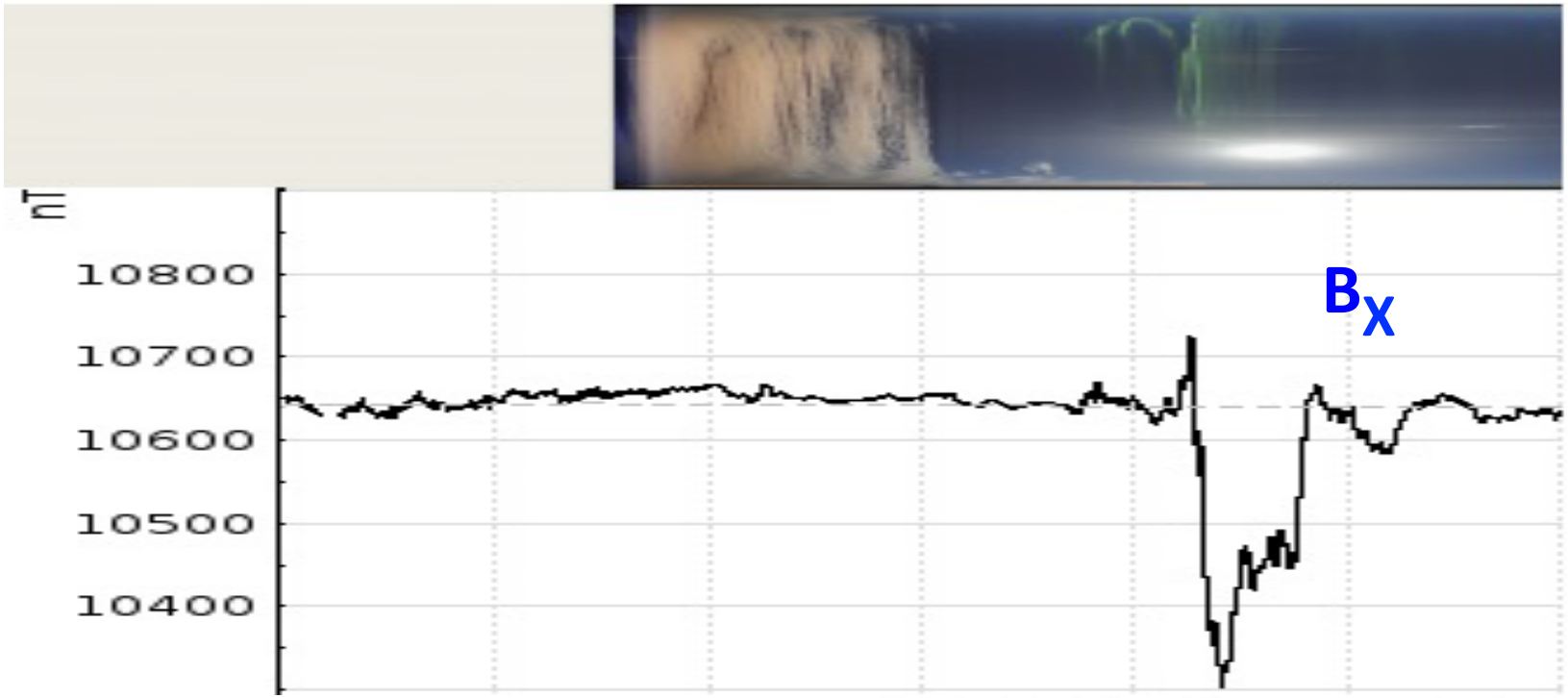
Figure 4.3: *The top plot is obtained by the filtering the photographs of the all-sky camera. The bottom part is a keogram, which is a pixel line from north to south. The result of the filtered photographs contains more information, without losing in accuracy.*

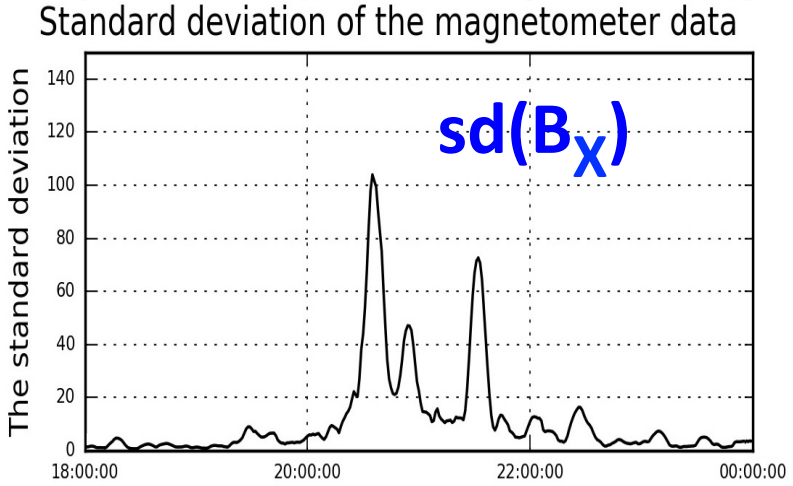
⇒ combine with magnetometer data

Application: (1) relation between aurora activity and dB/dt or sd(B)

(2) substorm warning (e.g., satellite collaboration, tourism)

example: sd(B) and aurora





SD: minute values of SD are obtained from 11 min window data

example: long-term change