

# Cosmic Rays and Earthquakes ???

Piotr Homola

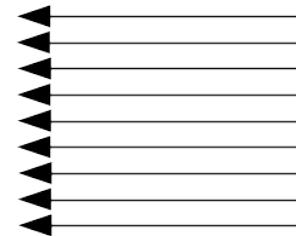
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CREDO Anniversary Symposium, Kraków, 30.08.2017

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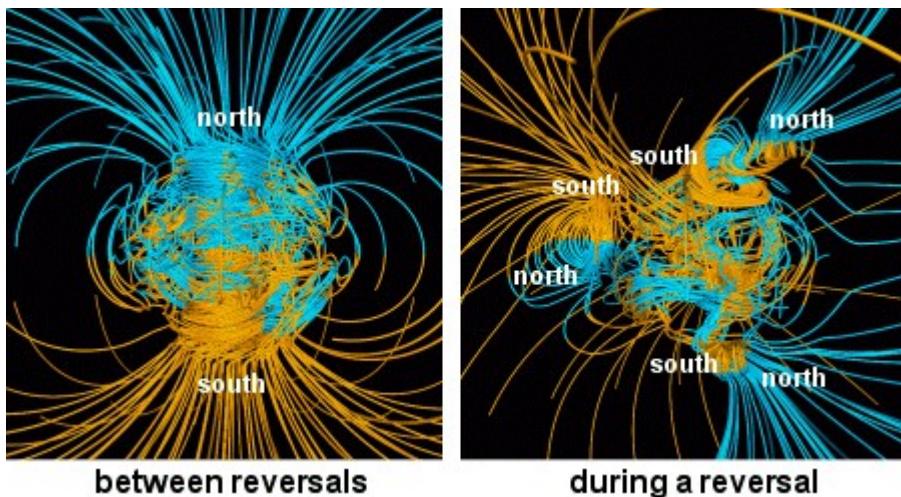
# CREDO

THE QUEST FOR UNEXPECTED

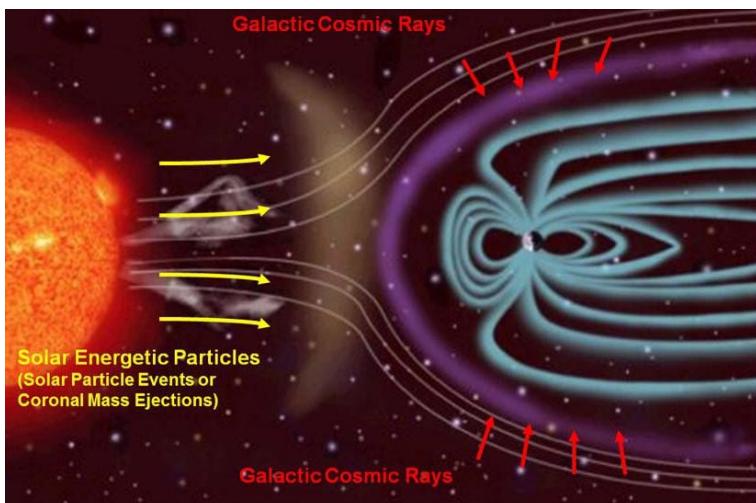


## Scientific diversity: GEO

Wikipedia: „Geomagnetic reversal”



Wikipedia: „Health threat from cosmic rays”



**Earth outer core: Liquid** (molten iron)

→ geomagnetism

↓  
Impulse (tidal forces)

→ hydrodynamics: waves

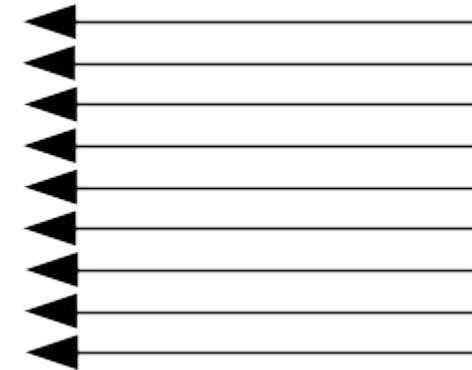
→ Mechanical wave upwards (slow, hours?)  
→ Electromagnetic wave („instant”, ms)

↓  
Local geomagnetic field vector changes  
AND seismic effect might occur!

↓  
Variation of the CR rate!

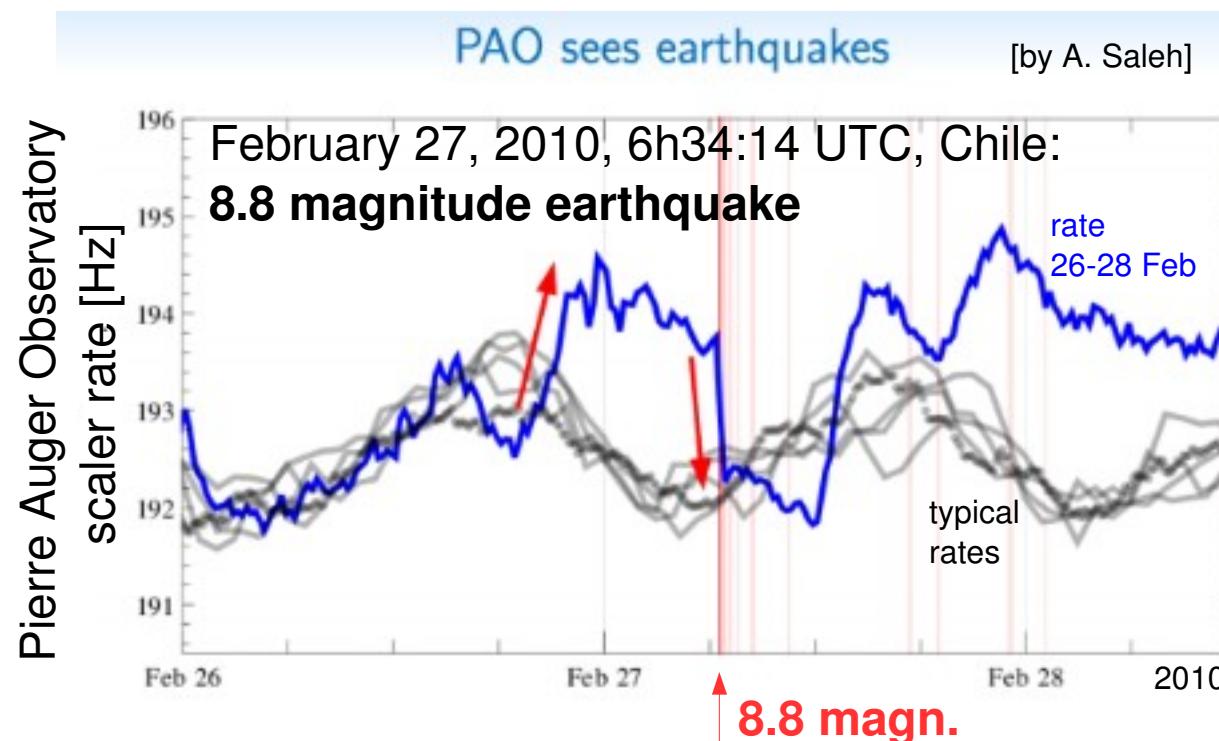
↓  
**Earthquake precursors?**

# CREDO



THE QUEST FOR UNEXPECTED

## Scientific diversity: GEO



- Increase of CR before the earthquake
- Strong drop during the earthquake

→ CREDO-earthquakes task [already existing]

# Literature



Pergamon

*Phys. Chem. Earth (A)*, Vol. 25, No. 3, pp. 321–324, 2000

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## Variations of the Cosmic Ray Fluxes as a Possible Earthquake Precursor

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Received 28 May 1999; accepted 31 August 1999

ISSN 0016-7032, *Geomagnetism and Aeronomy*, 2000, Vol. 55, No. 2, pp. 219–222. © Plata de los Publishing, Ltd., 2000.  
Original Russian Text © N. V. Romanova, V. A. Pilipenko, M. V. Stepanova, 2000, published in *Geomagnitika i Aeronomiya*, 2000, Vol. 55, No. 2, pp. 231–234.

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## On the Magnetic Precursor of the Chilean Earthquake of February 27, 2010

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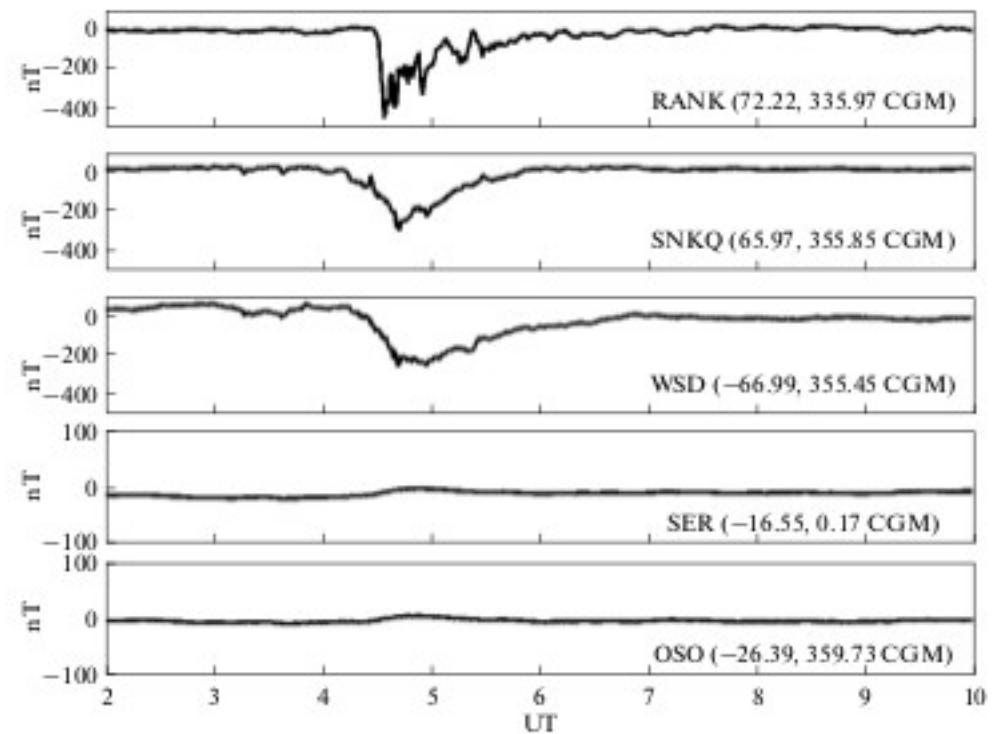
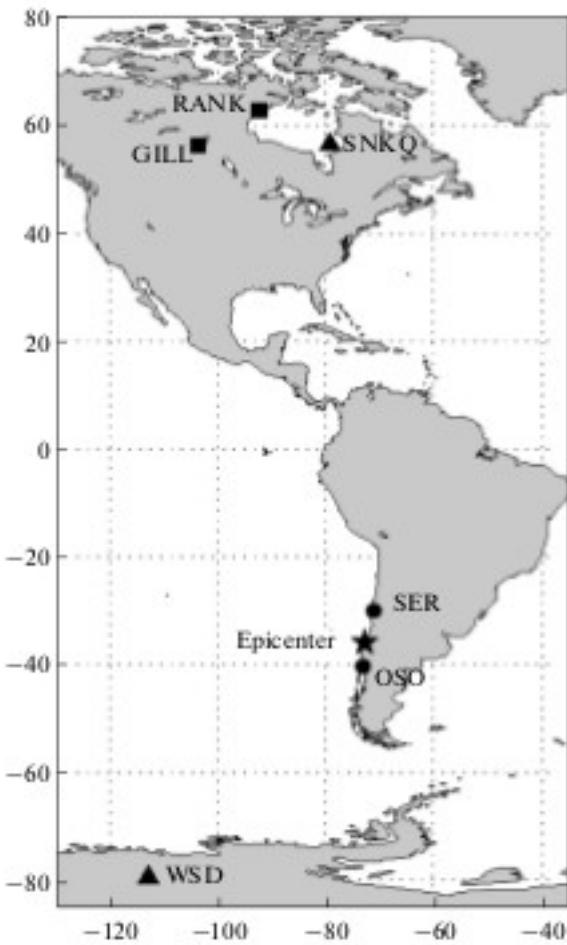
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# Literature: the Chilean Earthquake, 2010

N. V. Romanova et al., 2014



no geographical coincidence → reason: sun storm (PH: ?)

# Literature: the Baikal Earthquake Precursor?

S. M. Korotaev et al., 2011

ISSN 1028-334X, Doklady Earth Sciences, 2011, Vol. 438, Part 2, pp. 842–845. © Pleiades Publishing, Ltd., 2011.  
Original Russian Text © S.M. Korotaev, V.S. Shneer, S.P. Gaidash, N.M. Budnev, R.R. Mirgazov, A.A. Khalezov, A.I. Panfilov, 2011, published in Doklady Akademii Nauk, 2011,  
Vol. 438, No. 5, pp. 683–686.

## GEOPHYSICS

### The Effect and Forerunners of the Earthquake of August 28, 2008, in the Vertical Component of the Electric Field in Lake Baikal

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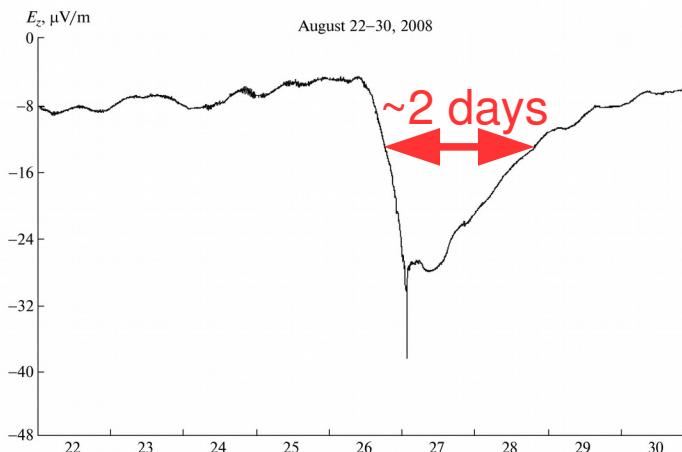
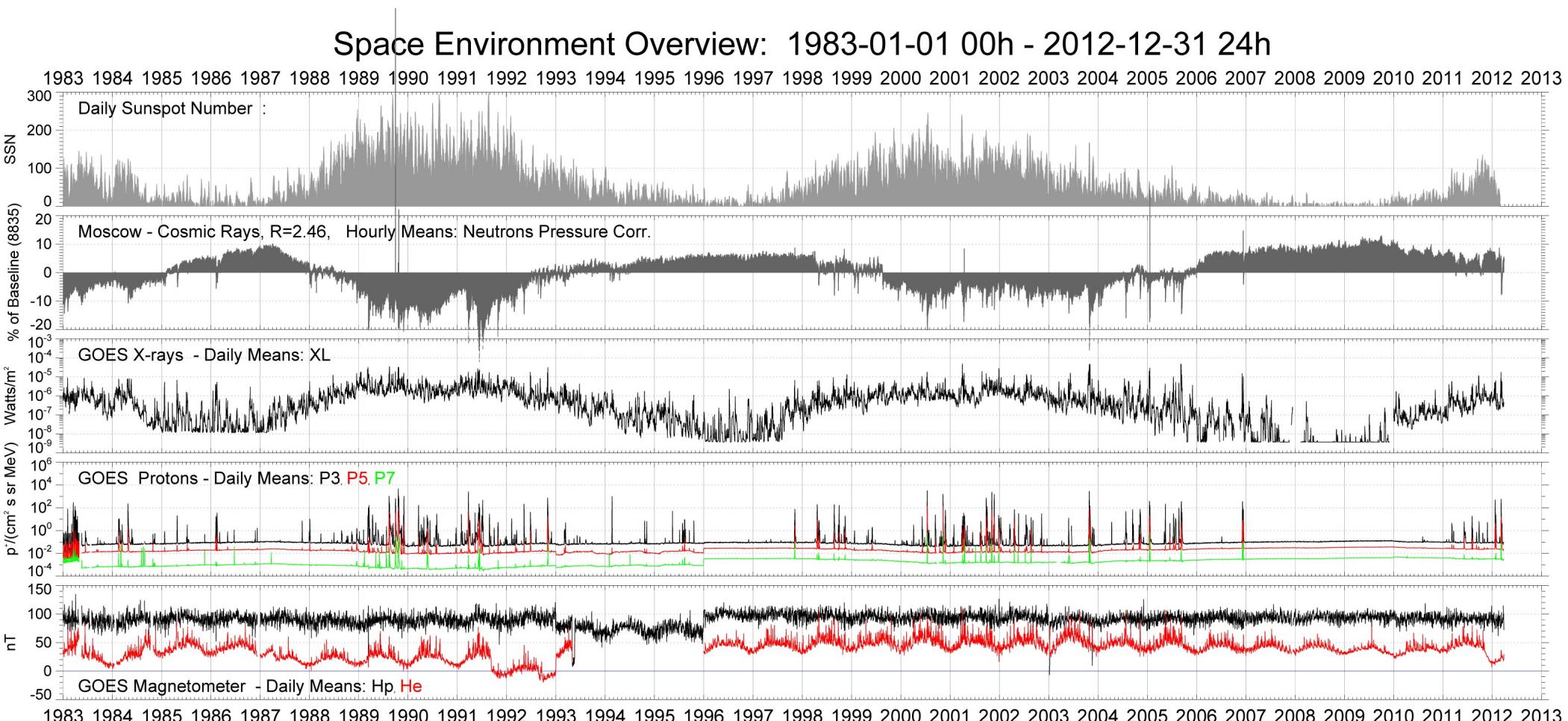


Fig. 1. Vertical electric field over a basis of 1250 m (one-minute average data). The earthquake (August 27, 2008) moment corresponds to the minimum peak of the curve.

Earthquake precursor, lasting ~day, in vertical electric field (Baikal lake)???

# CREDO: best tool to verify → multichannel

Wikipedia: „cosmic rays”



→ CREDO: goes global with cosmic-ray monitoring, add seismic channel!

# Summary



Low energy cosmic rays related with seismology?

The lowest chance for a prediction of disasters is a must-check!

With CREDO the check naturally easier than with individual detectors

Multichannel approach:

- cosmic rays
- weather data (pressure, temperature)
- geomagnetism transient changes
- sun storm information