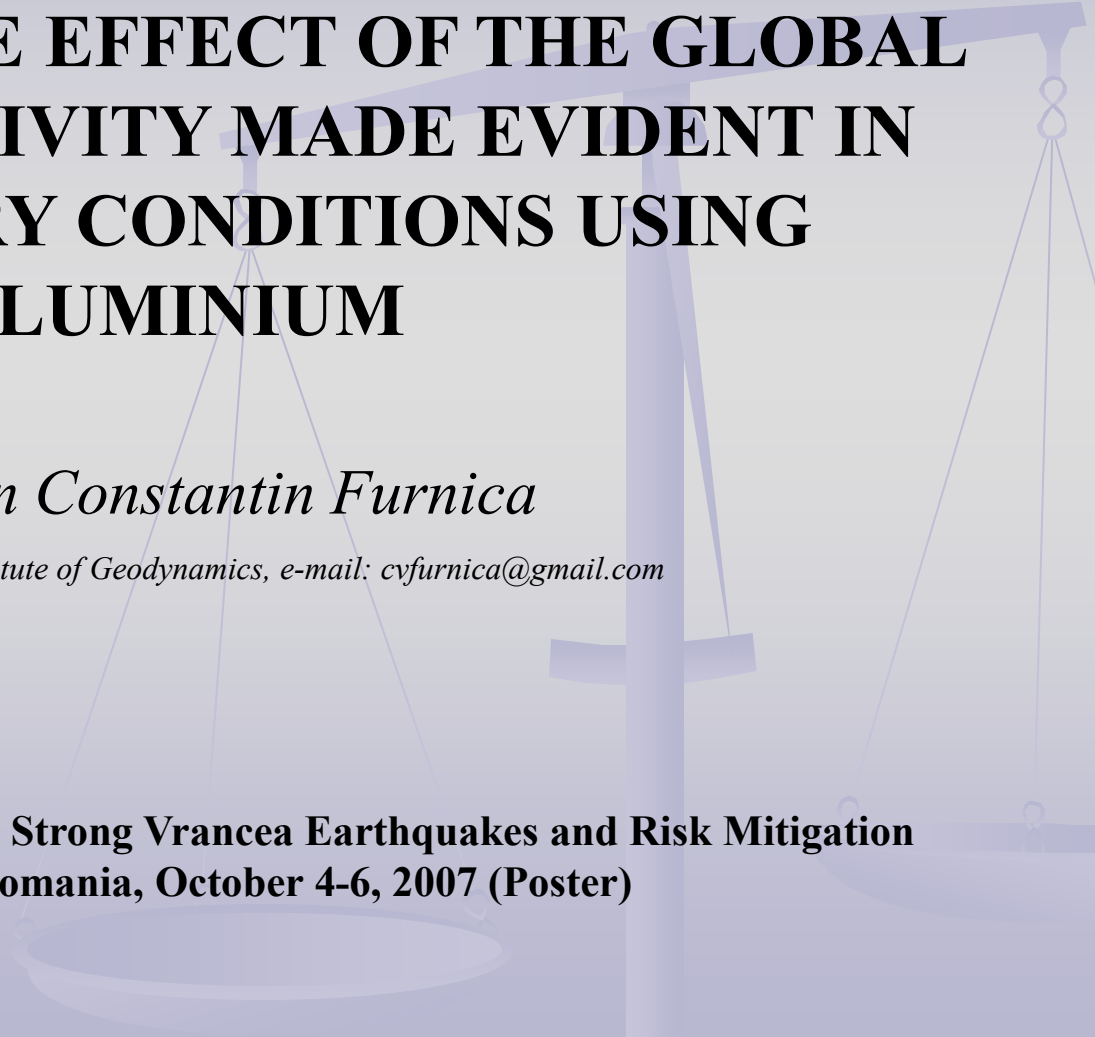




THE ELECTRODE EFFECT OF THE GLOBAL TECTONIC ACTIVITY MADE EVIDENT IN LABORATORY CONDITIONS USING ALUMINIUM

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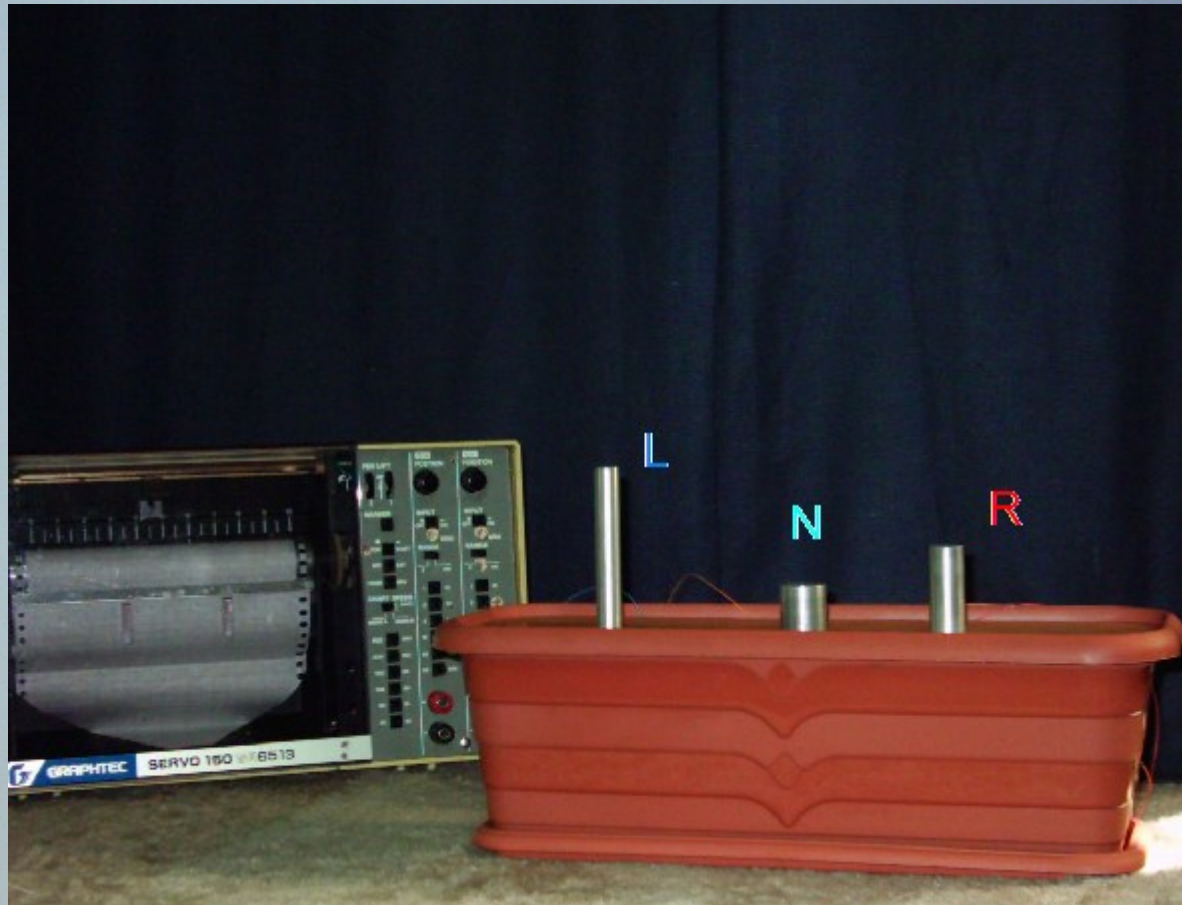
Researches performed around the world, concerning *the precursory electric seismic signals* lead to the conclusion that measurements of electric, magnetic or electromagnetic fields, or observations on their mode of interaction with the matter, allow the identification of specific anomalous effects correlative with earthquakes' occurrence.

Evidences pointed out such signals related to the more or less significant seismic events and their preparing zones, or *even to the tectonic movements of seasonal and tidal kinds, landslides or earth falls in mining works.*

In the laboratory, one proved that also non-piezoelectric rock materials can, under pressure, generate the stress electromagnetic field (Varotsos et al., 2001).

Supposing that this *radiant energy, of thermal nature*, maintains processes which tend to thermodynamic equilibrium into the surroundings, we could make evident the entropy flux of the stress source *measuring the electric potential difference of a resistive dipole* (the anode and the cathode of a galvanic cell situated in stationary conditions), considered an open thermodynamic system for a long time of working.

Under the influence of the incident electromagnetic field of thermal nature, a part of the energy received by the electrodes constitutes as exciting energy for the electrons of metallic structure, increasing the Helmholtz free energy. The difference of electric potential between the electrodes, made from the same metal and having identical masses and control surfaces with the solution of electrolyte, was obtained by influencing the dissipation of free electrons selecting the corresponding sections of aluminium cylinders. We consider that the statistical moving of free charges (electron gas) can be influenced by the proportion between the diameter and the generatrix of a straight cylinder.



The transducer system "SLD_Al": L (Left), N (Null) and R (Right) represent the cylinders of aluminium which, together with sodium-chloride solution, form the electrodes of a double galvanic cell.

Being considered the third most spread element in the environment geology, aluminium is present in the majority of mineral classes, participating in the specific process of the lithosphere, especially for the continental crust type. Observing Kirchhoff's law – "each substance absorbs the radiations it can emit in the same conditions of pressure and temperature" (Onicescu et al., 1971) – the electric potential differences of a double pile could be in connection with high energy phenomena, having in view that the radiation emitted by minerals containing aluminium, captive in tectonic processes of different scales, is absorbed differently by three cylinders, also made of aluminium:

$$\Delta V_L = V_L - V_N \quad (\text{L signal}) \quad (1)$$

$$\Delta V_R = V_N - V_R \quad (\text{R signal})$$

where: ΔV_L - electric potential difference of the left cell [mV]

ΔV_R - electric potential difference of the right cell [mV]

V_N - electric potential of the common electrode N

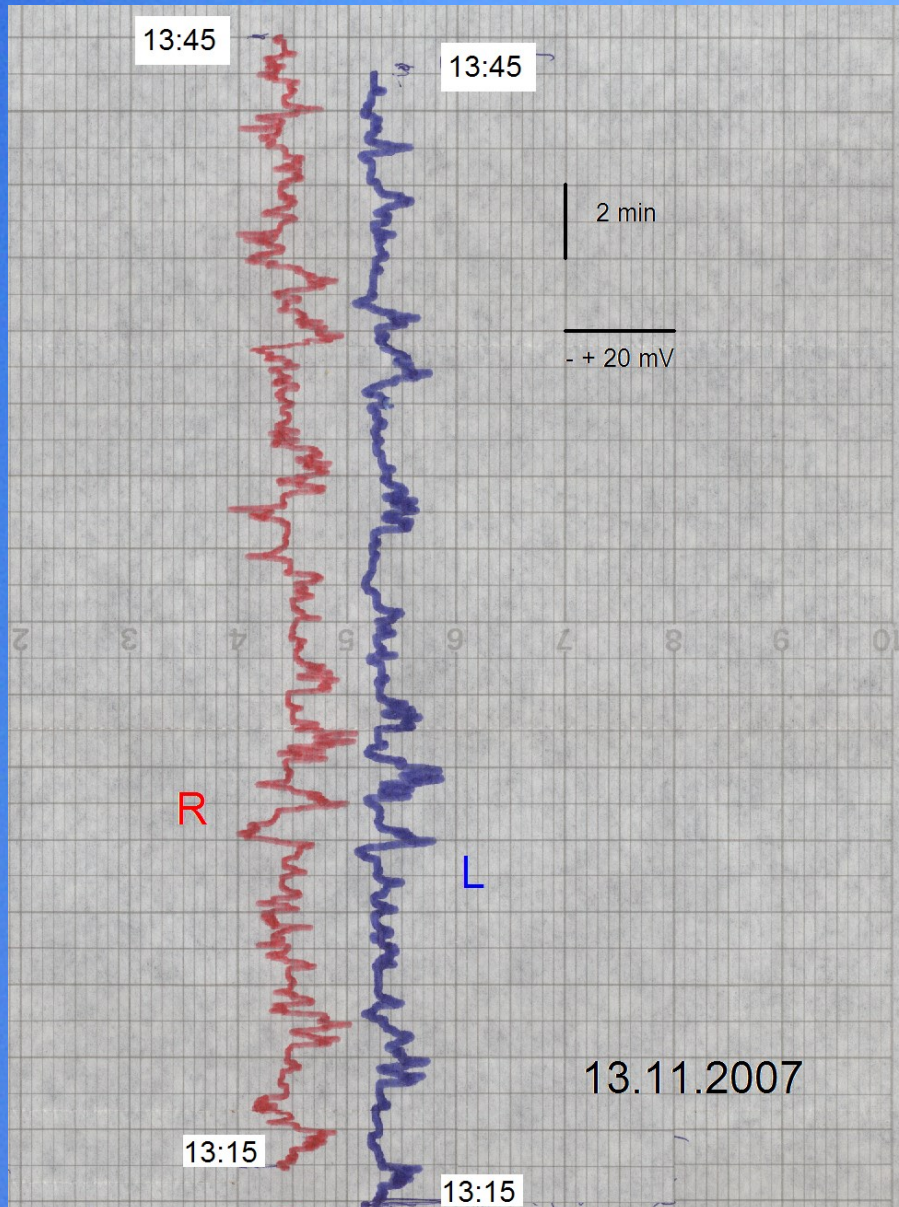
We point out some of the most important observations:

- both signals L and R were affected by "background values" of the potential differences, approximately constant during the 30 minutes of recording, but variable for a long time scale. The two traces can be placed in the range of negative values, of positive values, superposed, or intersected. Oscillations of the two signals recorded simultaneously can be in phase, with similar amplitudes

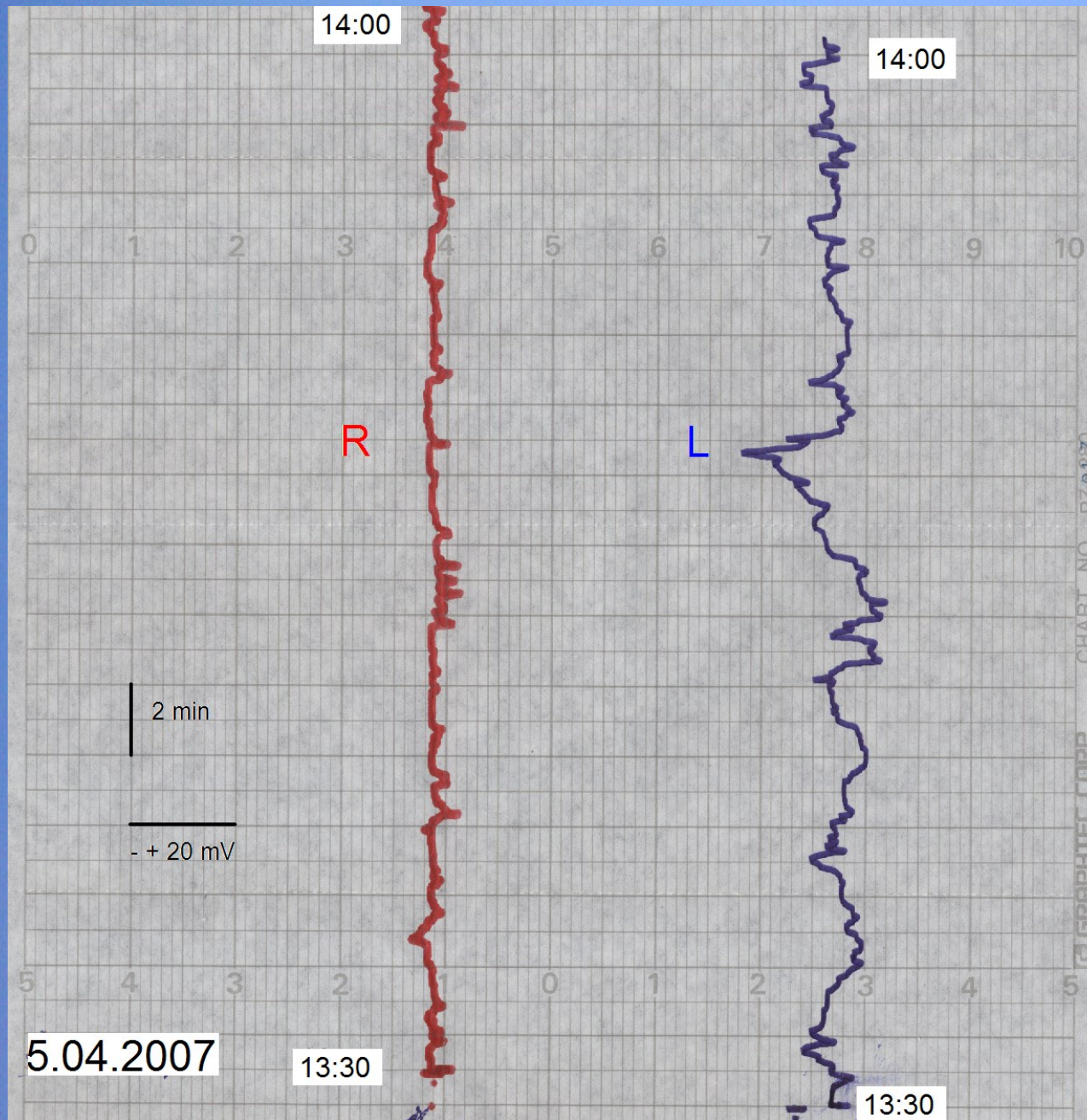
- because the daily means of the "background values" could be caused by electric fields of planetary importance, the plots corresponding to the six months of recording represent two derived signals, named "principal signal L" and "principal signal R";

- the maximum amplitude of any oscillation within the daily record of 30 minutes plotted on a time scale of six months provided another kind of signal, which could be associated with electromagnetic fields of thermal nature, having smaller sources, subordinated to the principal type and named further on "secondary signal L" and "secondary signal R";

-- corresponding to a paper speed of 300 mm/h and to a scale of ± 100 mV, there were often identified periods between 6 and 180 seconds, rarely between 210 and 300 seconds and exceptionally of 350, 1050 or 1600 seconds, the domain values for amplitudes being 2 - 60 mV;

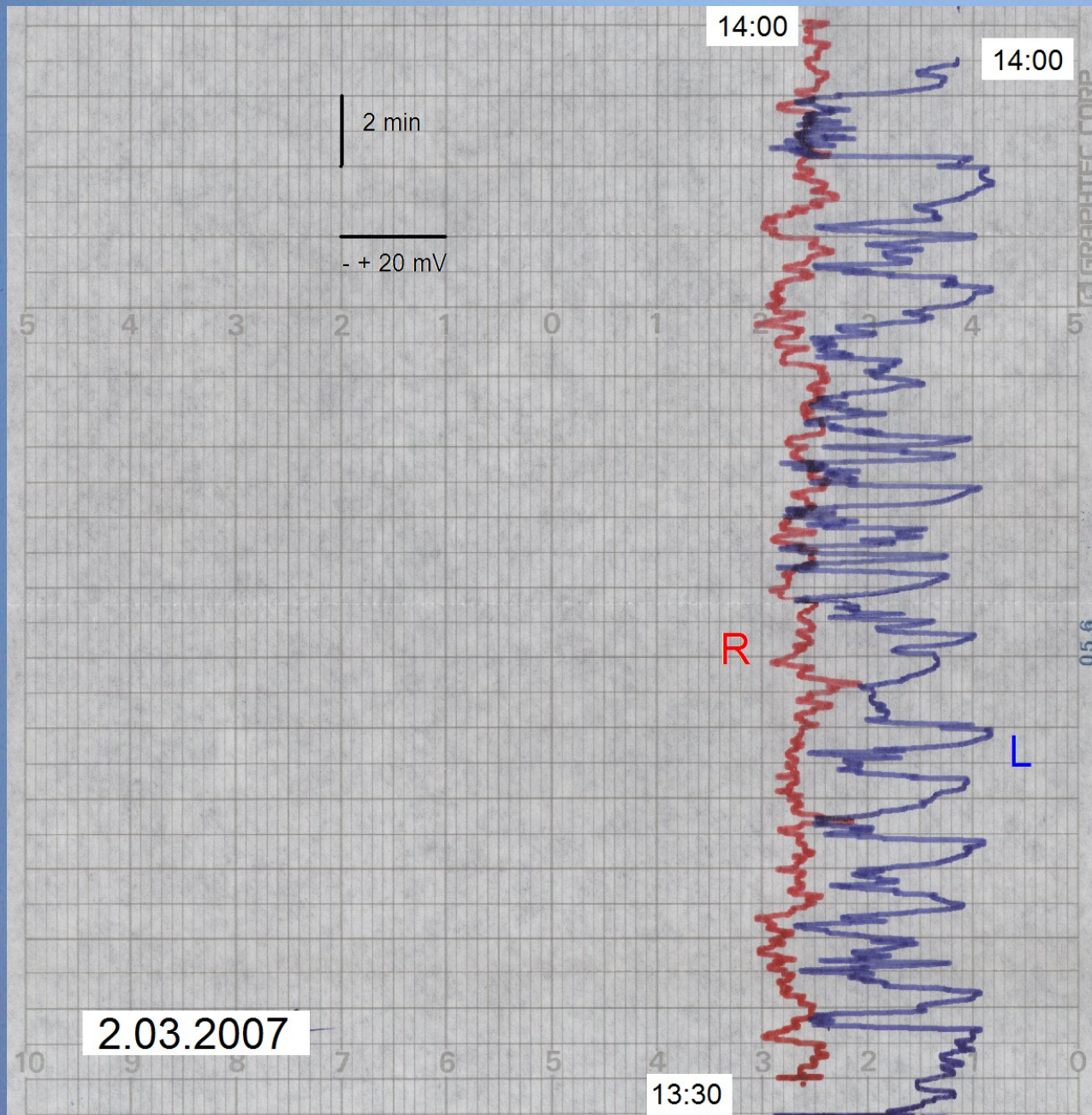


The components R and L of "aluminium signal" having oscillations in the ultra low frequency range (ULF, < 20 Hz) are in phase on both channels

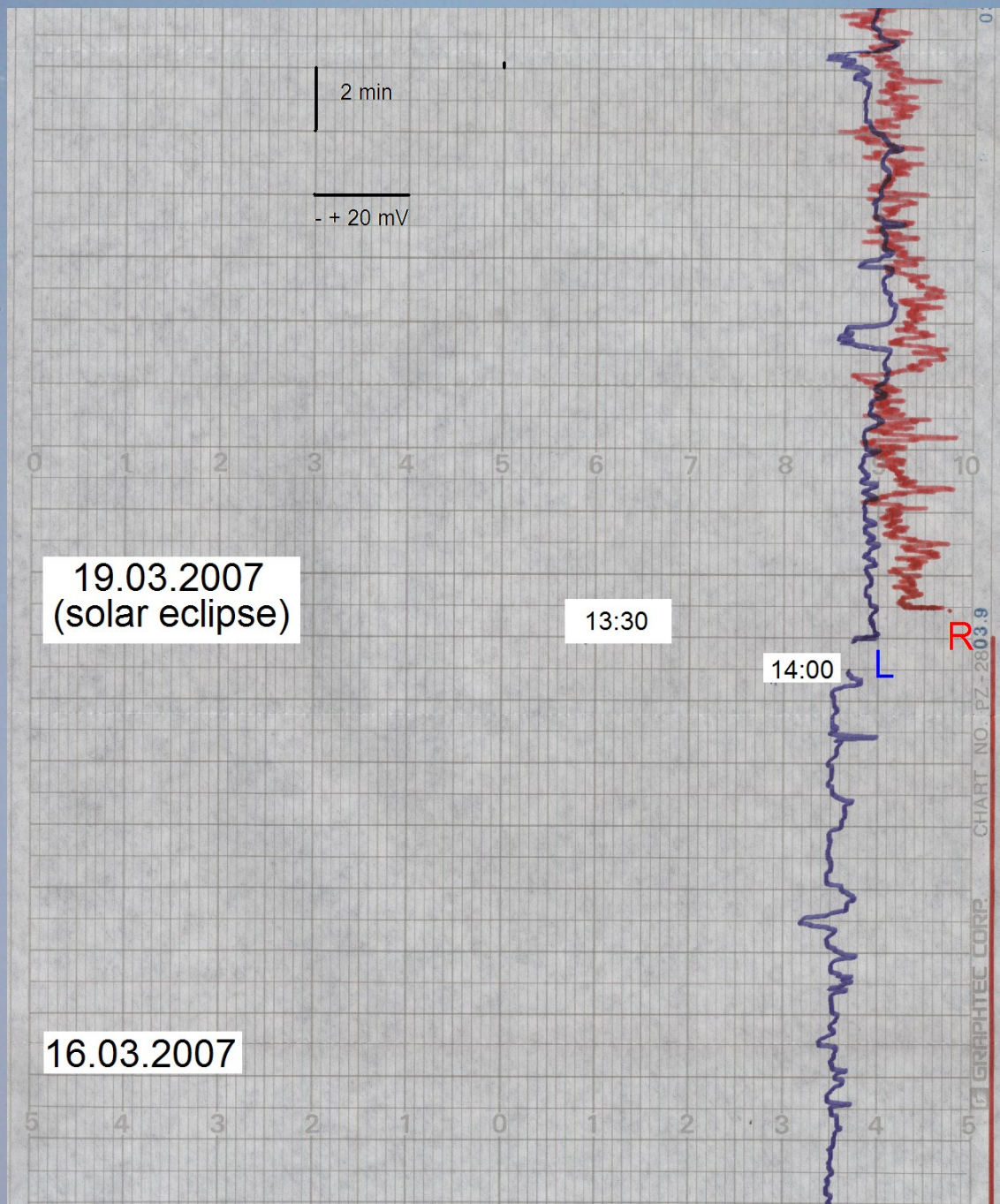


The variations of electric potential difference. ΔV_L and ΔV_R have amplitudes and periods entirely different

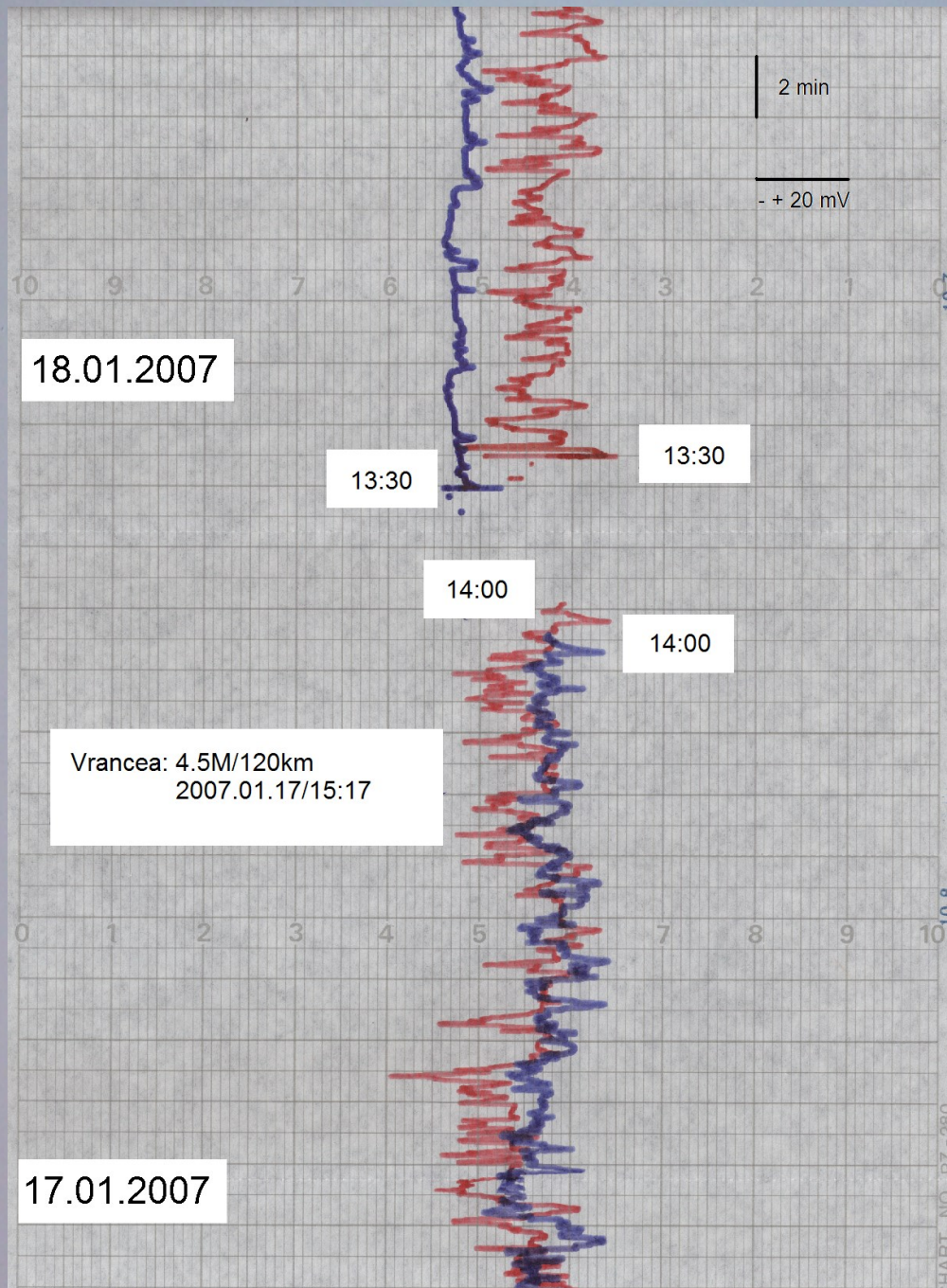
- *near the moments of lunar and solar eclipses, in March, 2007, both principal and secondary components support maximum variations in amplitudes, the phenomenon having an important geodynamic value concerning the cosmic influences ;*
- *many times, overlaps and intersections of the L and R signals have accompanied the seismic events which occurred in Vrancea or worldwide but, because we also registered them without those triggering causes, they might represent the influence of other similar processes, unknown at this level of experiment;*
- *the principal signals L and R plotted together on the full time scale of six months, suggest a strong influence of electric/electromagnetic fields (generated by the highest tectonic stress associated to the phases of lunar and solar eclipses) over the electrodes of the transducer system. On 1 April 2007, on the time domain when the electric anomaly, in evident correlation with the lunar and solar eclipses, ceases, the 8.1M earthquake (Solomon Islands) took place, suggesting possible causes of electric/electromagnetic nature in the releasing process;*
- *the secondary signals L and R differ from one another, but together contain periods of about 60 days, which are not superposed to the anomaly of the principal signals produced by the Earth electric activity in the eclipses time domain. The secondary signal L tends to correlate with the seismic events $M > 8$, especially in the time intervals with minimum values, and with the worldwide earthquakes having $M = 6.5, 6.7, 6.8$ and 7.5 or those with $M \geq 4.0$ occurred in Vrancea, in a period of 60 days, between 15 January 2007 and 15 March 2007 .*



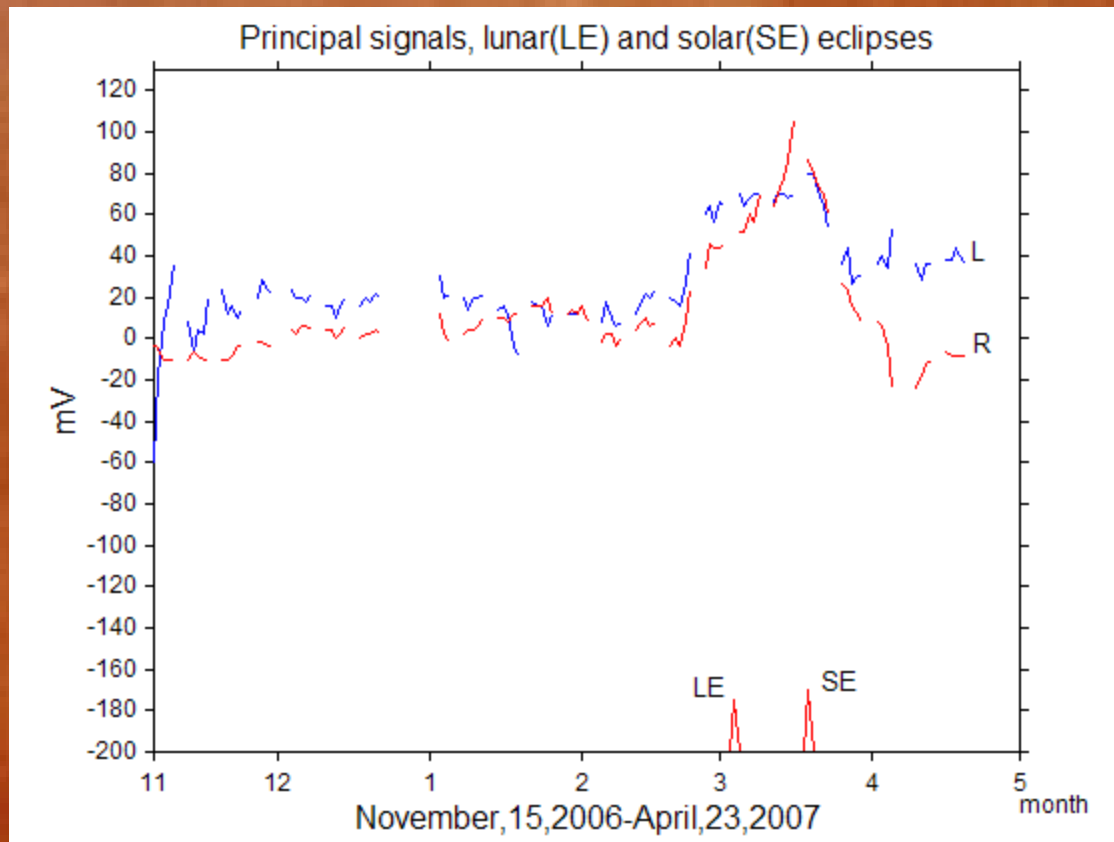
The signal shape, two days before the total lunar eclipse (3-4 March 2007)



*High amplitudes for the
"background" of signals L and R,
three days before the partial solar
eclipse (19 March 2007)*

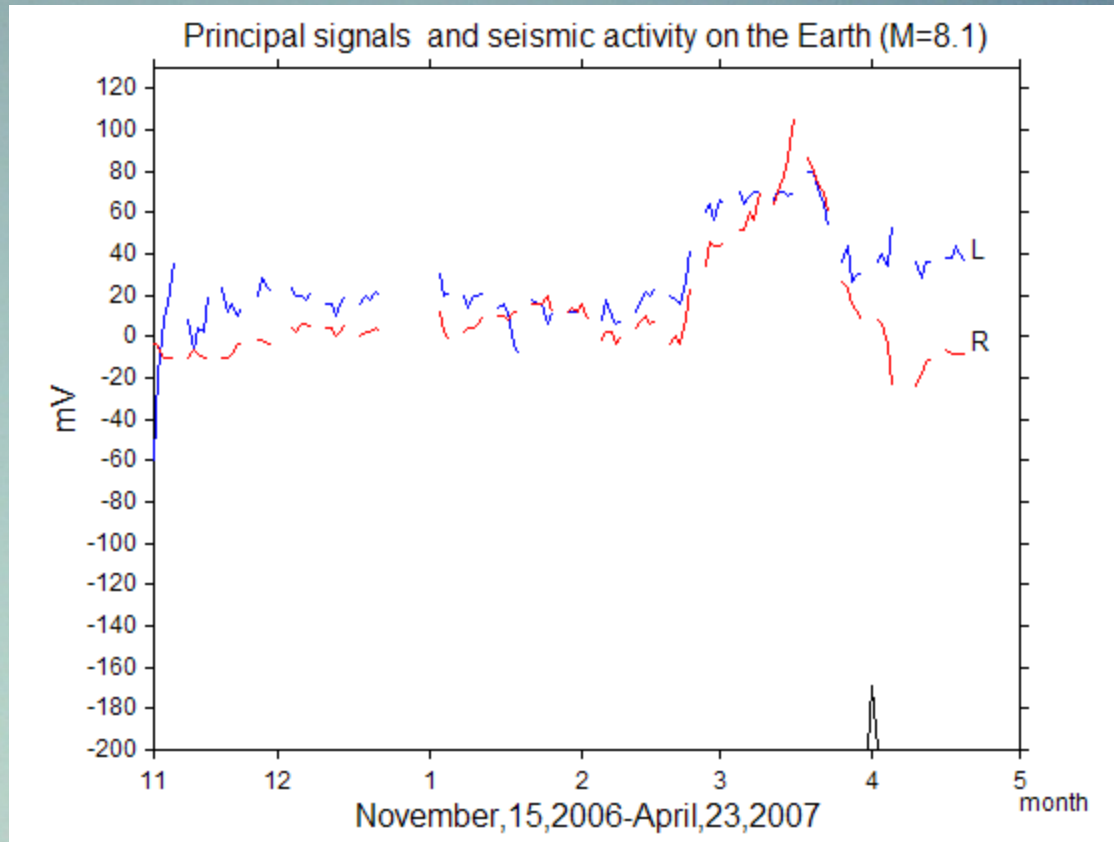


*Superposition of the signals L and R,
before the earthquake of 4.5M/130 km,
Vrancea 17.01.2007/15:17
(legal Romanian time)*

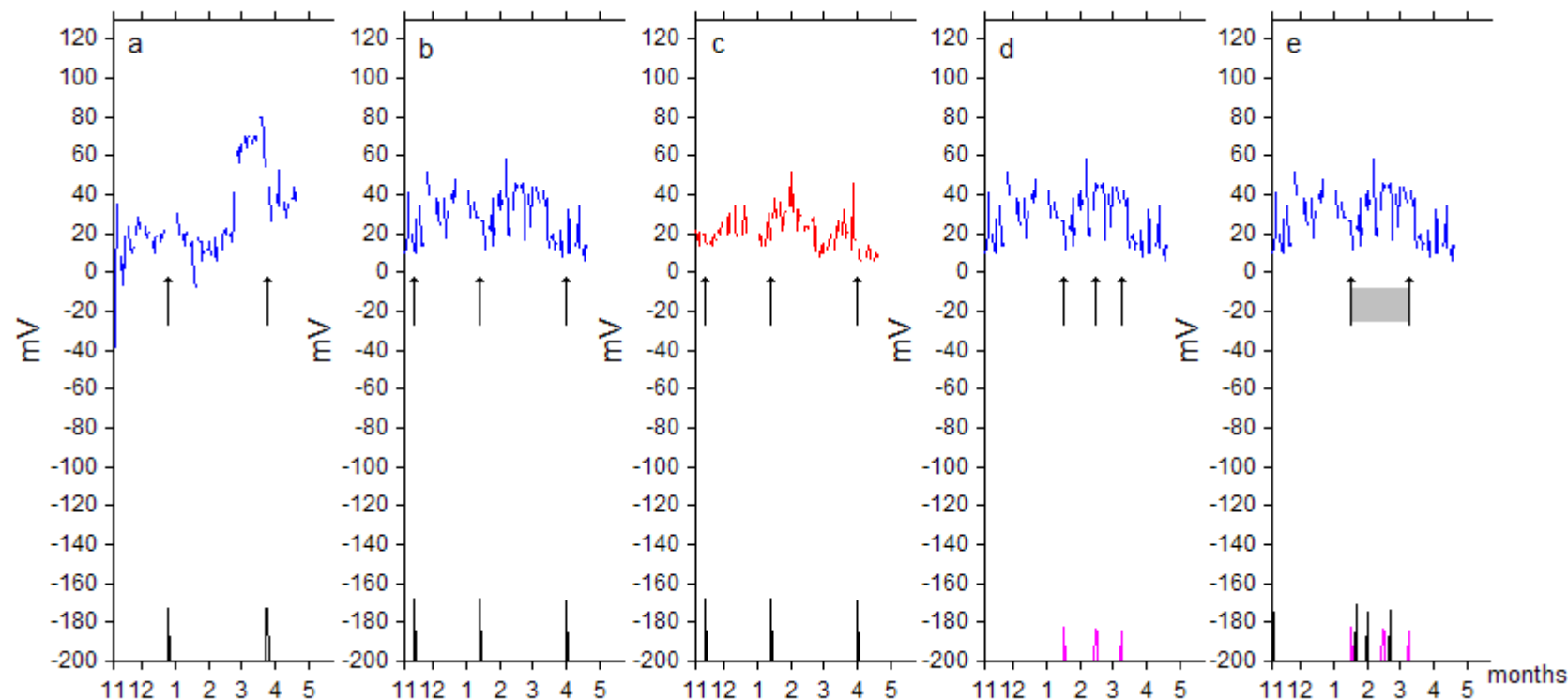


The "principal signals" L and R obtained by representing the mean values of daily recorded "background" on the total interval of about six months.

LE, SE – lunar and solar eclipses' moments.



The earthquake of 8.1M/10km, Solomon Islands, 1.04.2007/22:40 (legal Romanian time) followed the electric anomaly in the principal composite signal L, R which accompanied the lunar and solar eclipses.



Possible correlations of principal and secondary signals with earthquakes occurred between 6.11.2006 and 23.04.2007:

- a) the principal signal L and the worldwide seismic activity of $7.1M$;*
- b) the secondary signal L and the worldwide seismic activity of $M \geq 8.1$;*
- c) the secondary signal R and the worldwide seismic activity of $M \geq 8.1$;*
- d) the secondary signal L and the seismic activity of Vrancea, for $M \geq 4.0$;*
- e) the secondary signal L, Vrancea seismic activity of $M \geq 4.0$ and the worldwide seismic activity for the 17 January – 9 March 2007 interval with magnitudes $M = 6.5, 6.7, 6.8$ and 7.5*

Conclusions

- In the laboratory, the transducer system "SLD Al", designed for the detection of precursory seismic electric signals, using aluminium, confirms "the electrode effect of the global tectonic activity". Thus, the electric anomaly present in the principal signals L and R, containing on its time domain the phases of lunar and solar eclipses from the spring of 2007, could be considered an electric precursor for the 8.1M earthquake of 1.04.2007. Also, the secondary signal L is correlated with seismic events of $M \geq 4.0$ from Vrancea, during an oscillation with a 60- day period.
- In the presence of residual currents from the industrial activity, electromagnetic fields which arise, more intense than those of natural origin, maintain electric potentials on the resistive geologic structures, especially nearby the urban agglomerations, or become important on the return current path towards the transformer stations. Also, the high energy transmission lines are another cause for the residual electromagnetic fields. Taking into account that aluminium is the material the most used in these anthropic processes and the most spread in the Earth crust, we must pay attention to possibility of degradation of the natural electric field in the geological structures and of the environment quality. We suppose that many periods from the secondary signal, present in the L and R components, could reflect these artificially excited waves.

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