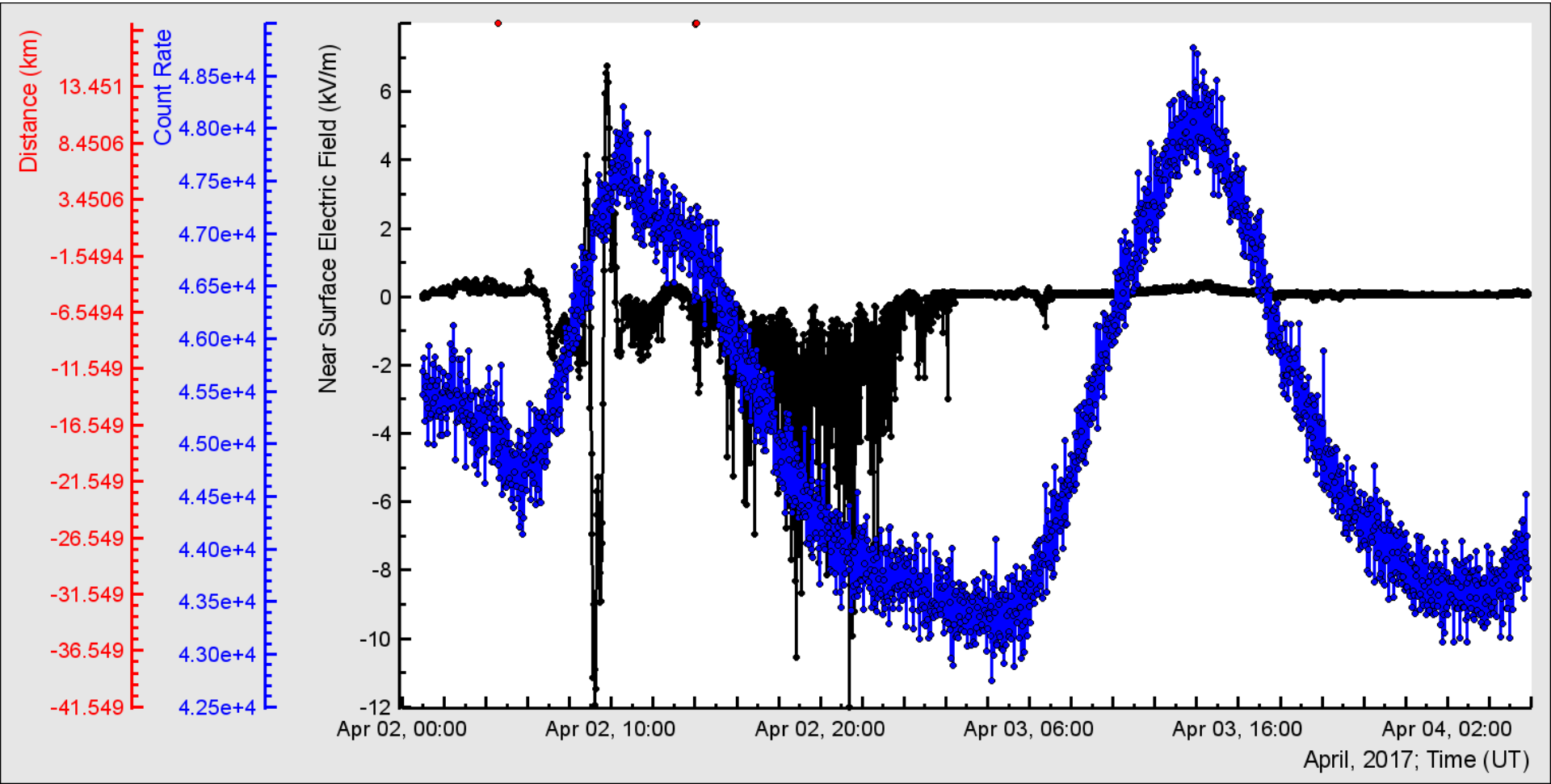
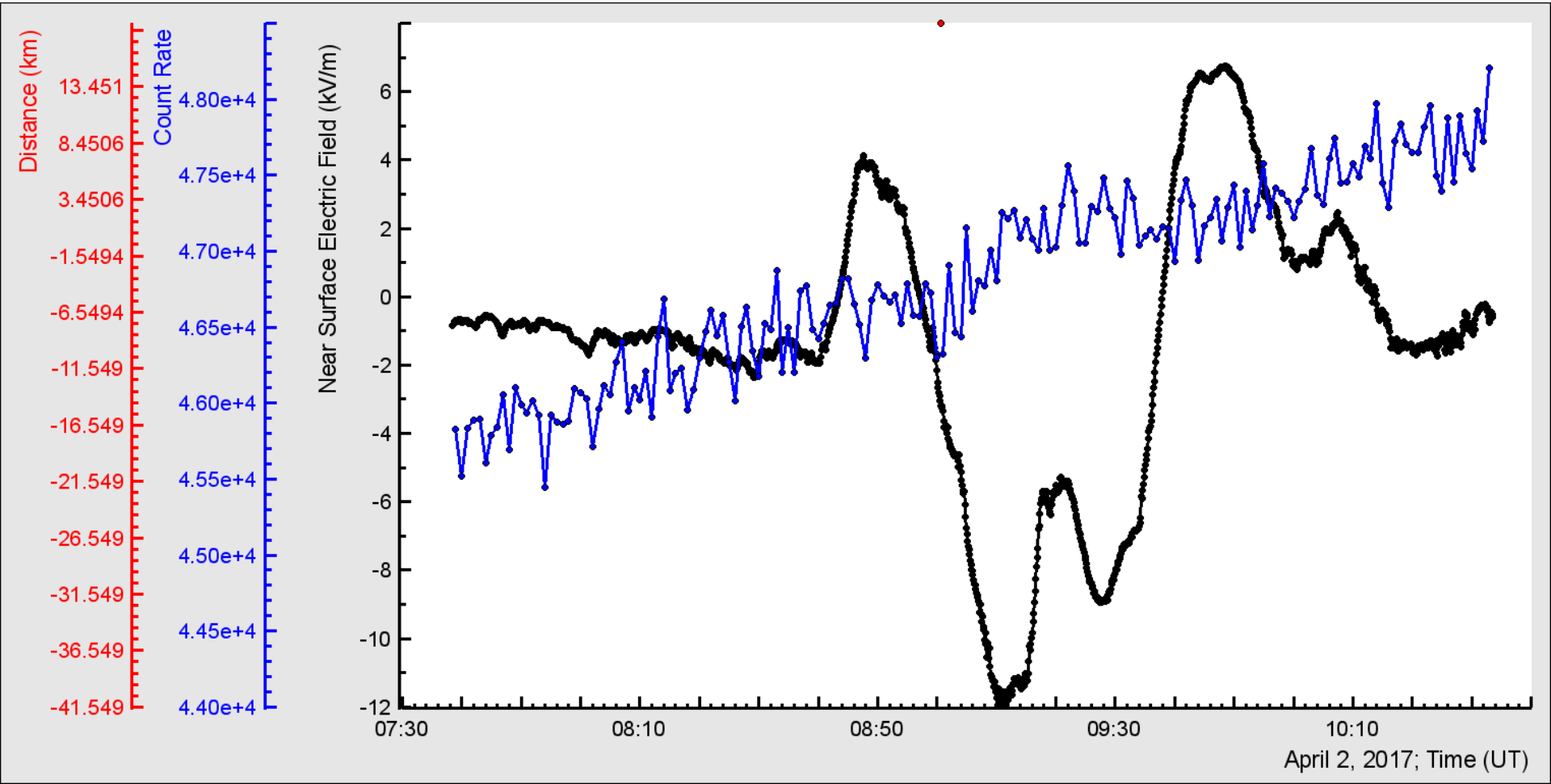
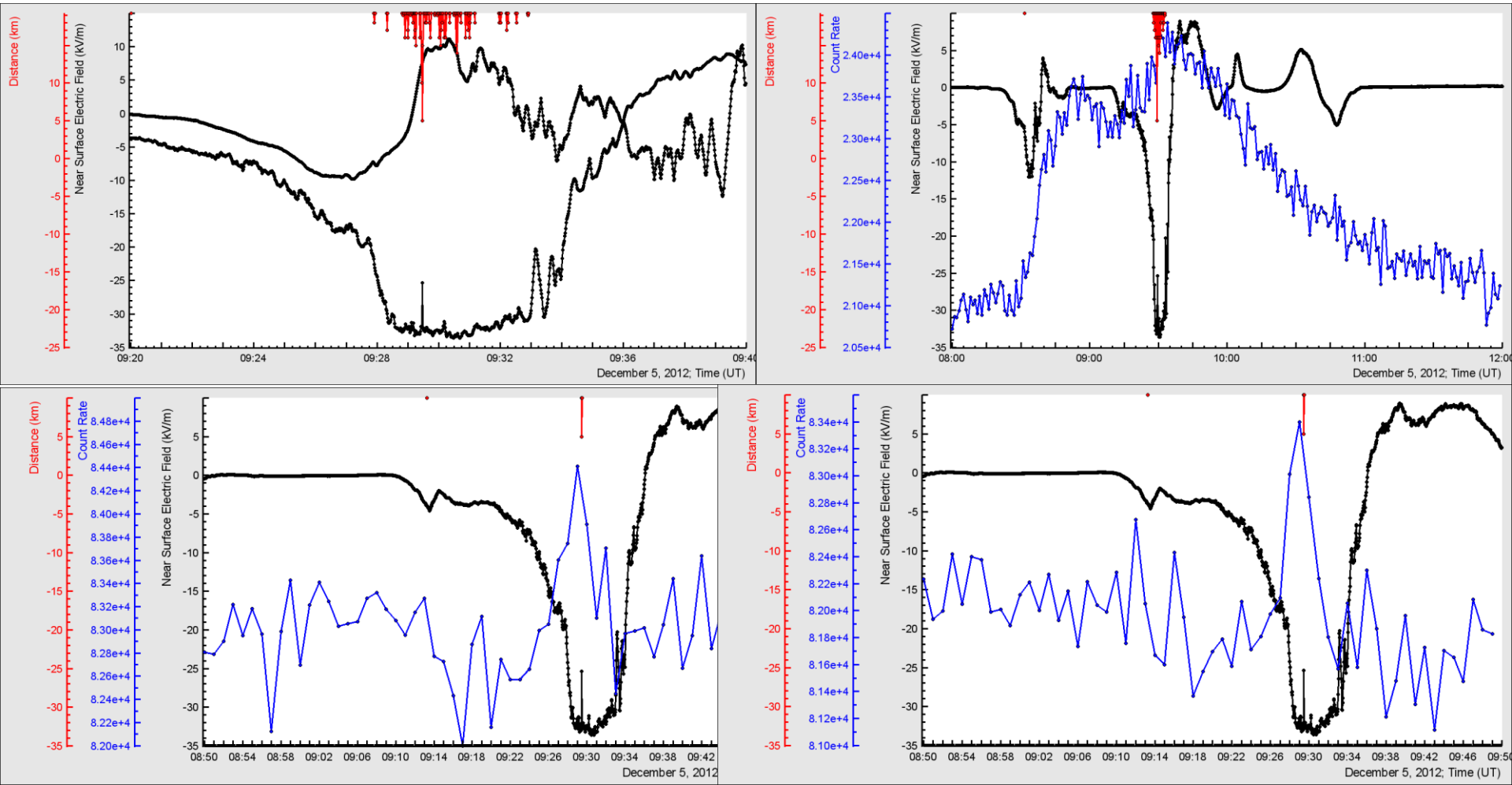
No lightning since October 2016: late Spring and now vegetation till april!



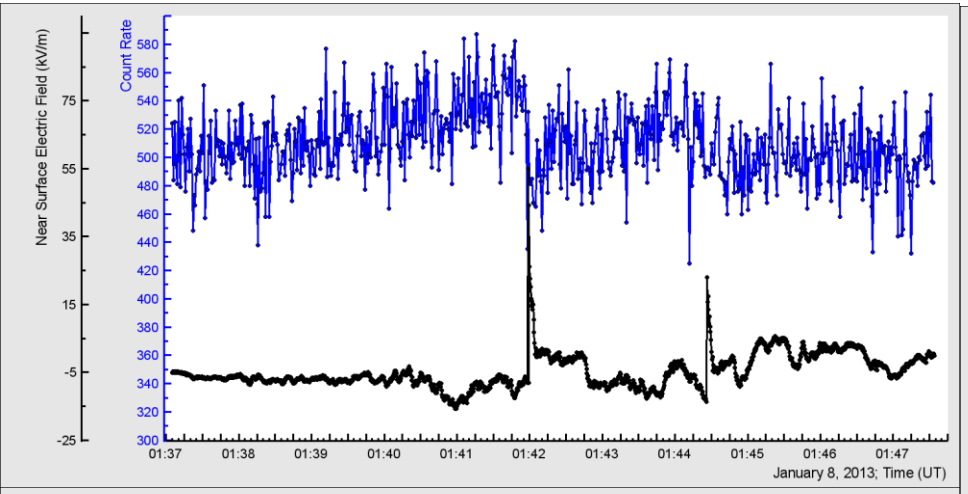
Disturbances of electric field on minute scale: lightningflash indicators should be on the millisecond scale!

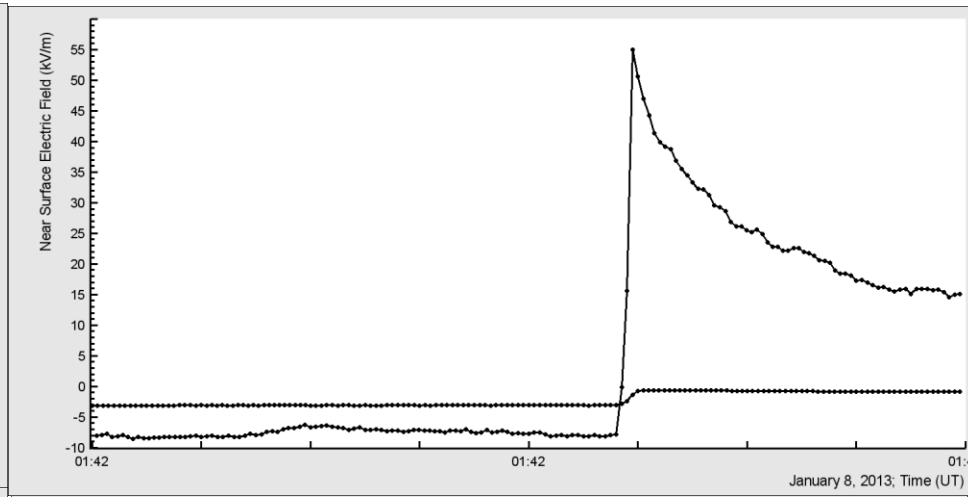


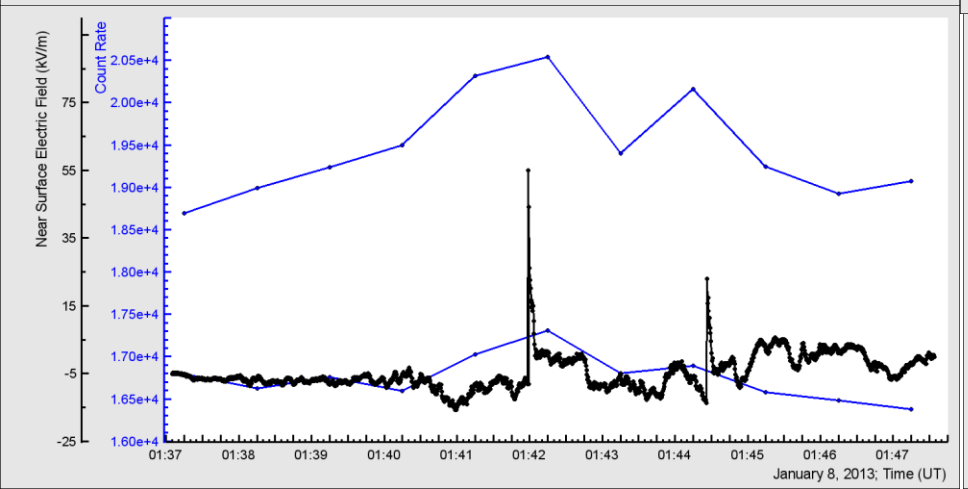
Winter thunderstorm and TGE in Nor-Amberd: Long TGE with Geiger counter; shorter TGEs with upper scintillators of NAMMM1 and 2

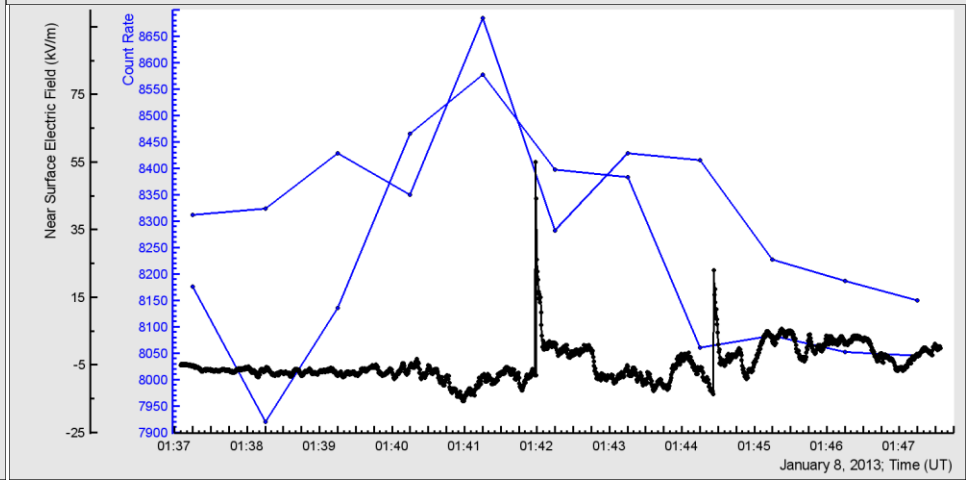


Winter Storm and TGE on Aragats: 3 cm thick scintillator of STAND1 MAKET counts terminated by lightning; electrostatic field on Aragats and Nor Amberd; 1-minute count rates of STAND1 (100 and 010) and STAN3 1000 and 1100)





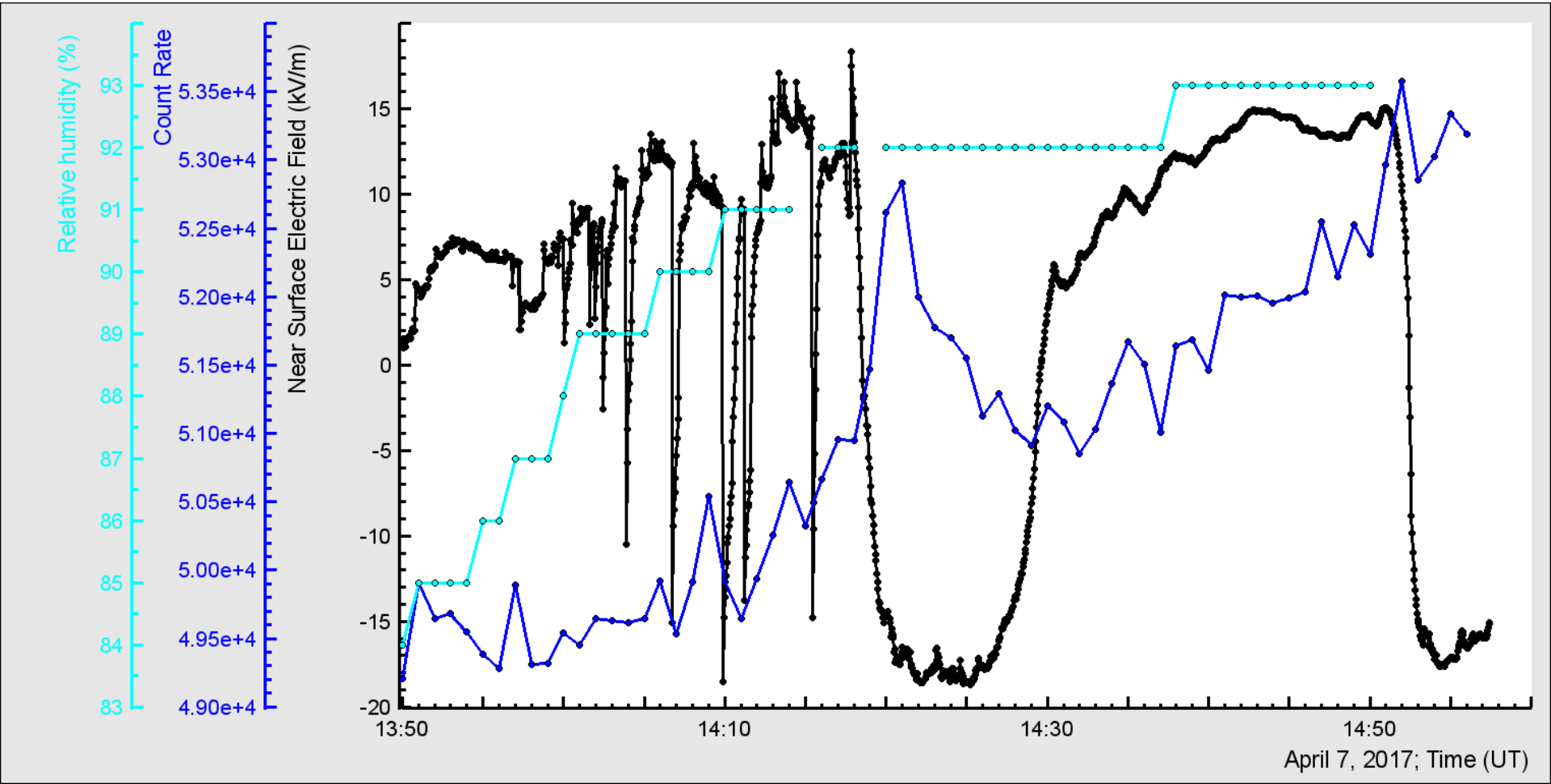




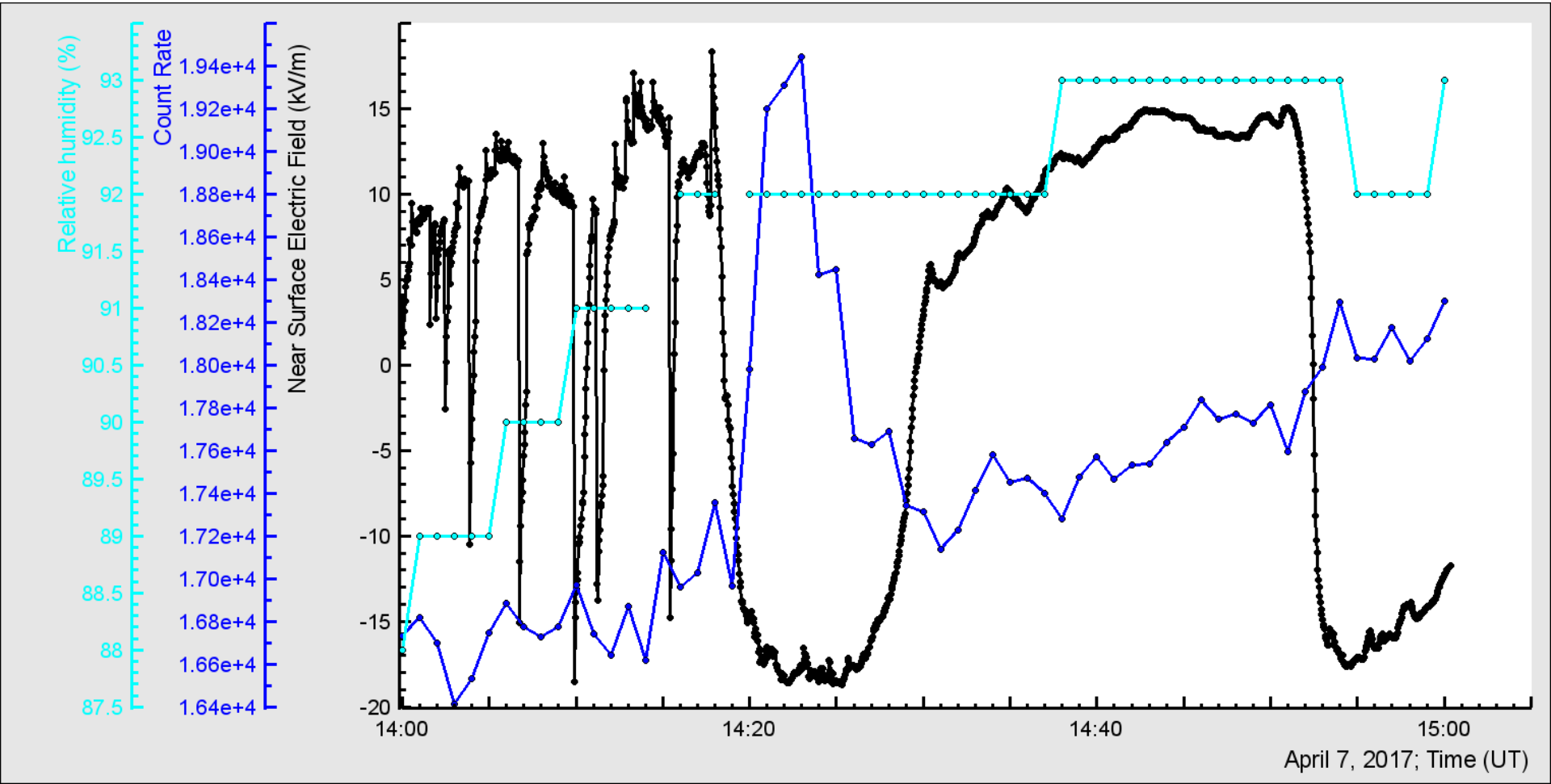
Applied issues of TGE/lightning science

- YSU-YerPhI joint center on monitoring of geophysical parameters;
- Armenian science satellite;
- Winter thunderstorms are indicators of early Spring? Look in 2013!
- Absence of lightning flashes is an indicator of late spring? 2017 is a proof of it!

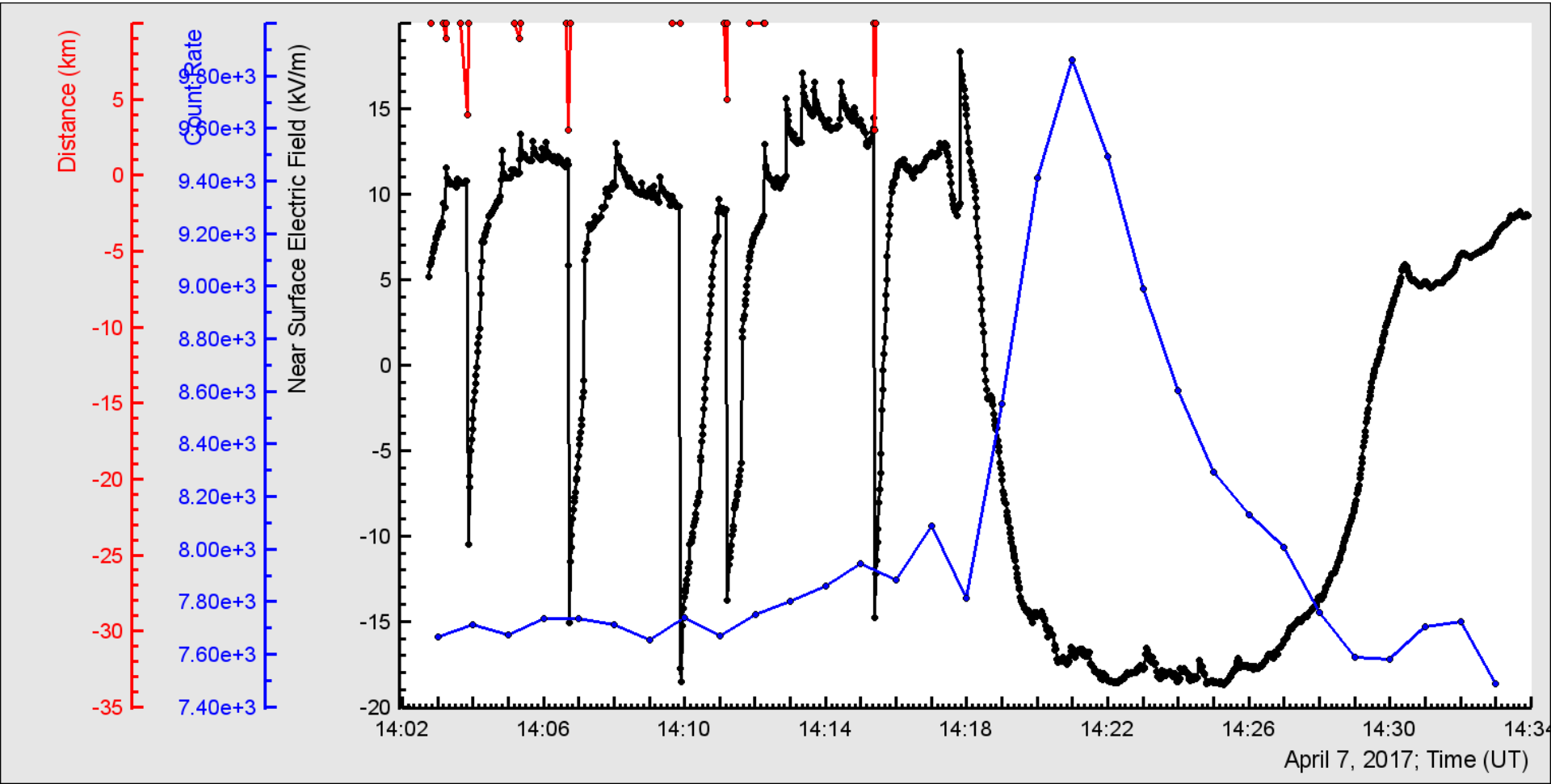
First Thunderstorm and small TGE
NaI N2



STAND1 (MAKET) 100

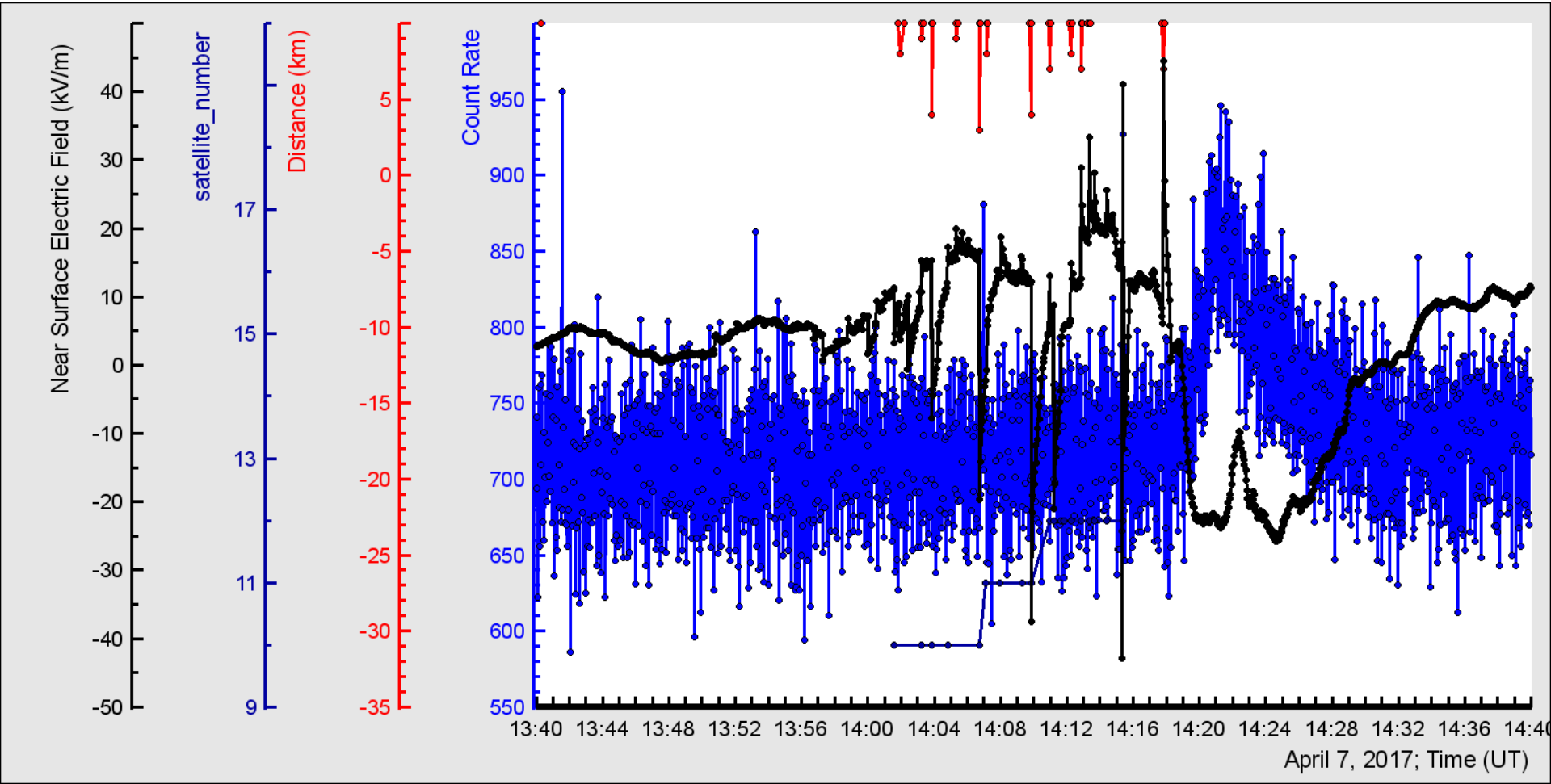


Efm-100 MAST; STAND3 1000 (one-minute time series) – TGE do not related to lightning flash – large negative electric field is required.

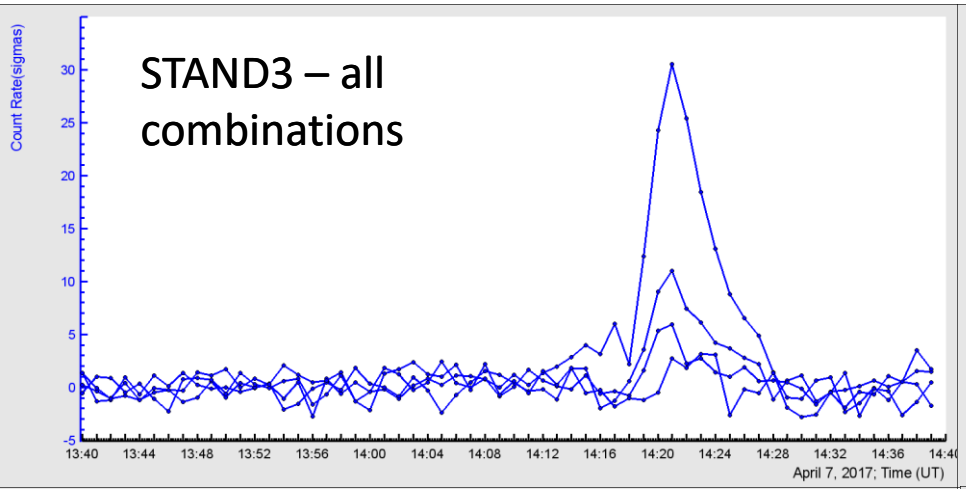


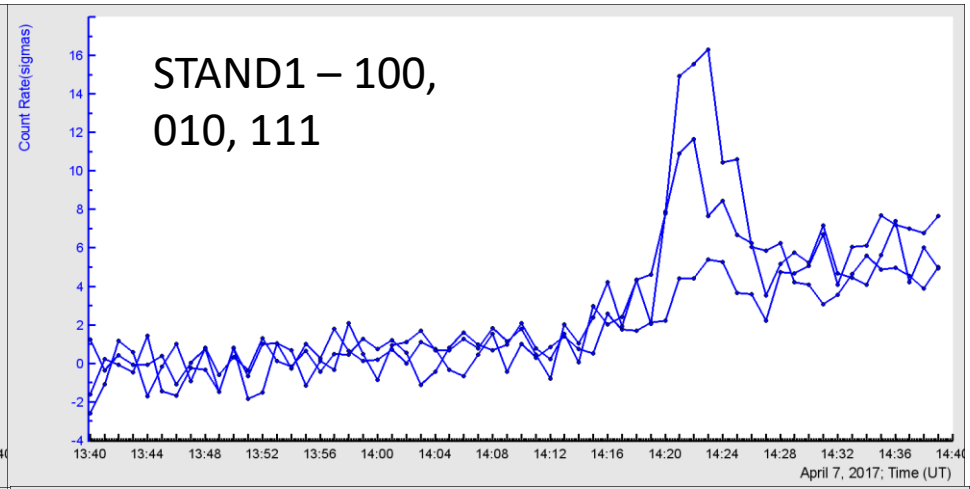

Aragats AllSkyCam 1
N. (0)
E. (90)
W. (270)
S. (180)
Aragats AllSkyCam 1
2017-04-07
15:00:00-00

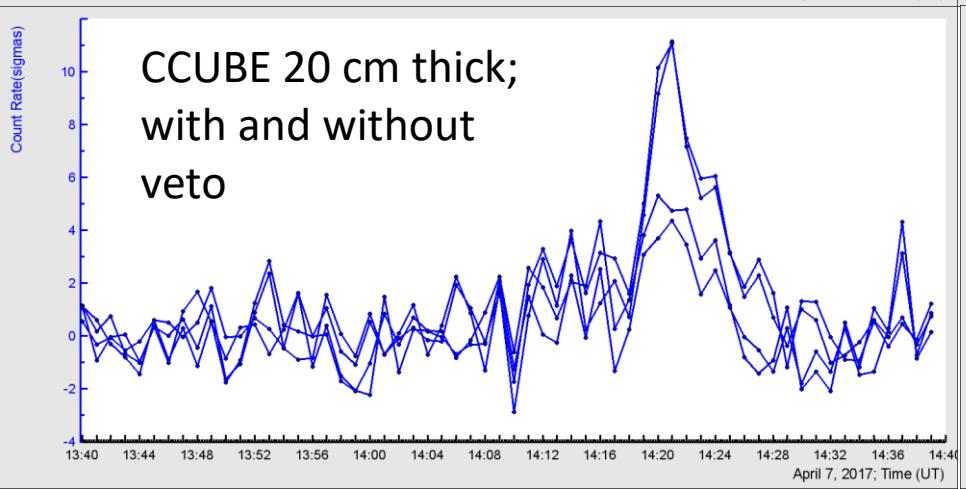
MAKET EFM-100 and 3 cm thick scintillator (1-second time series); TGE after series of positive and 1 negative lightning flash.

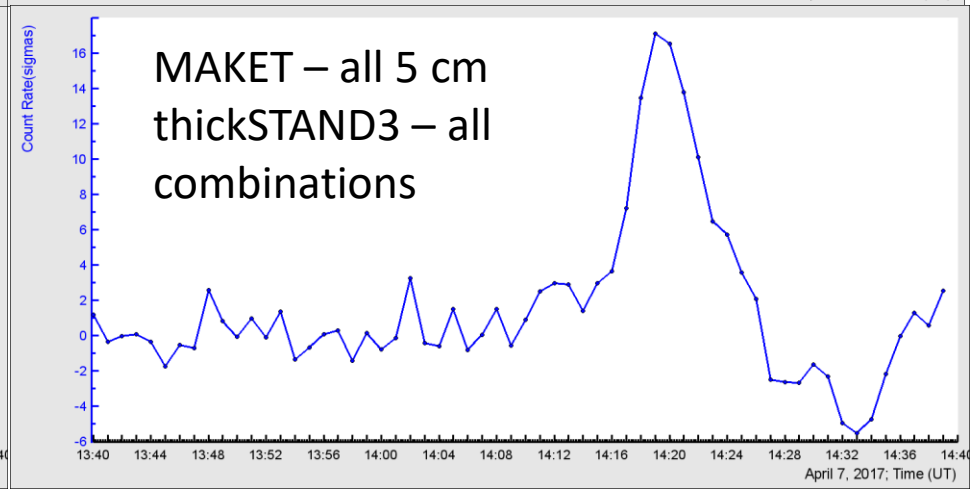


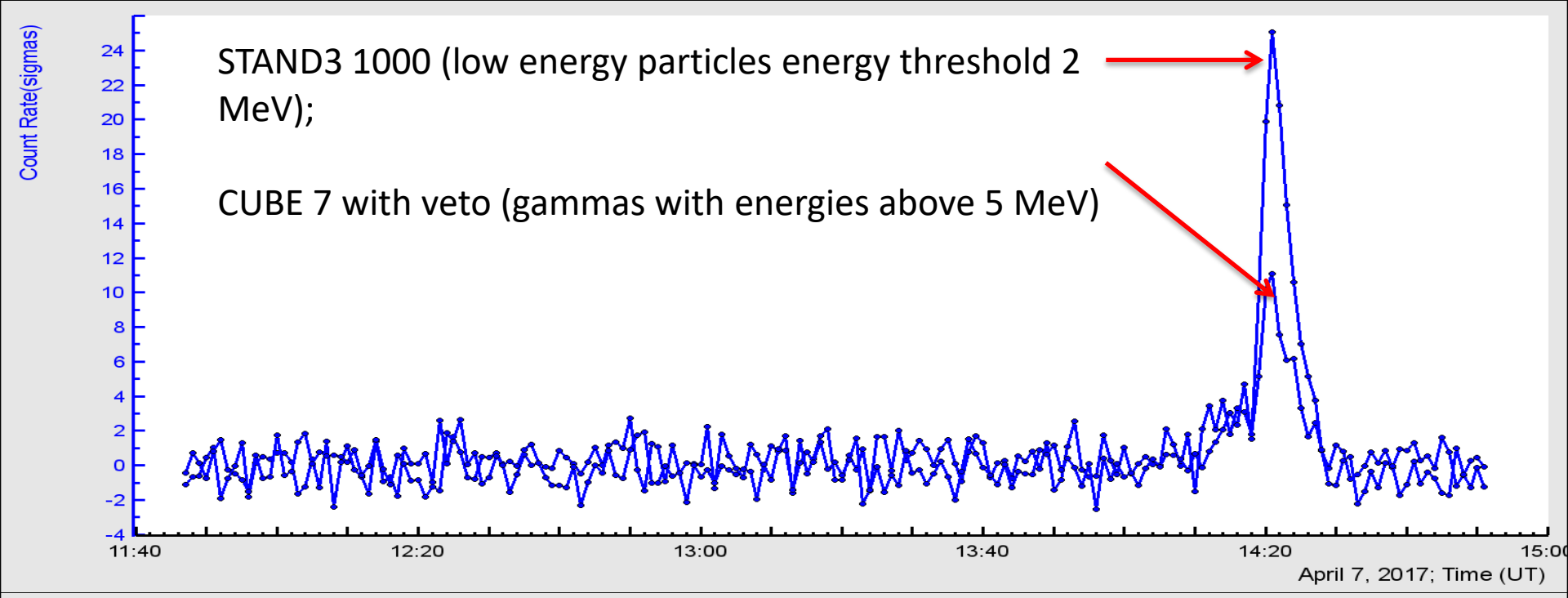
“Electron” TGE – first in 2017

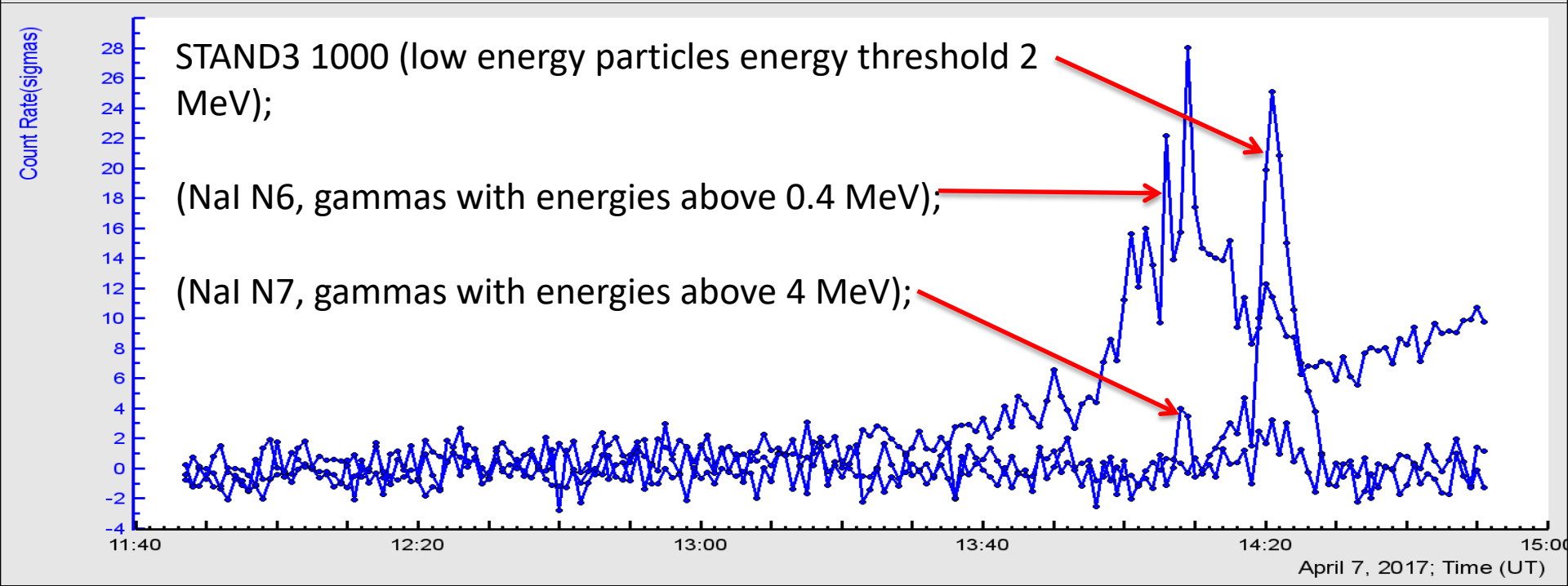




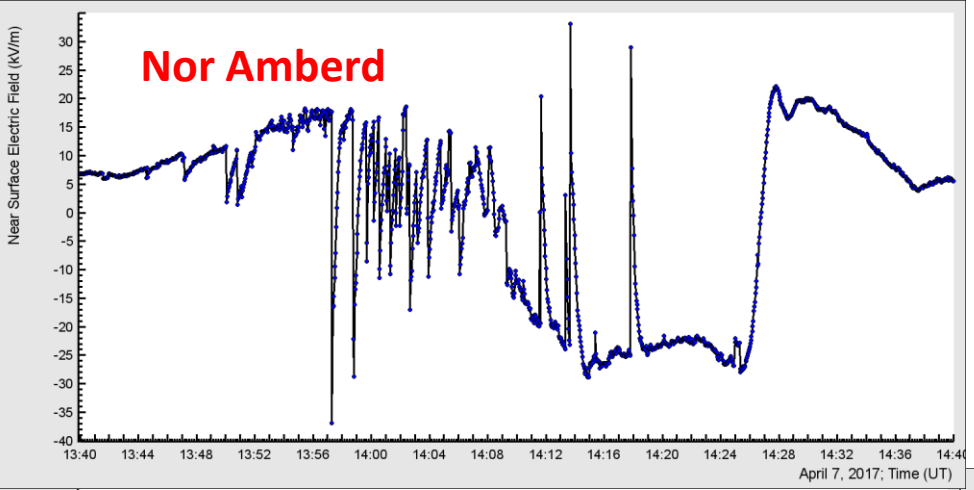


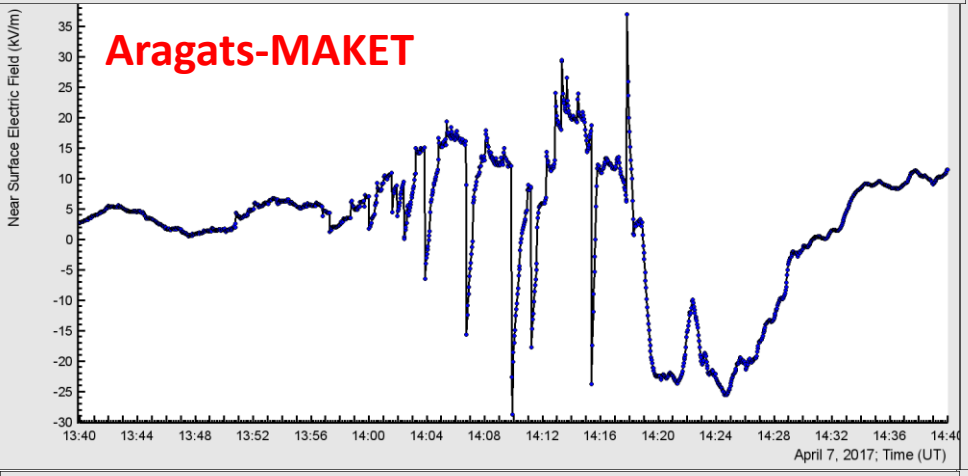


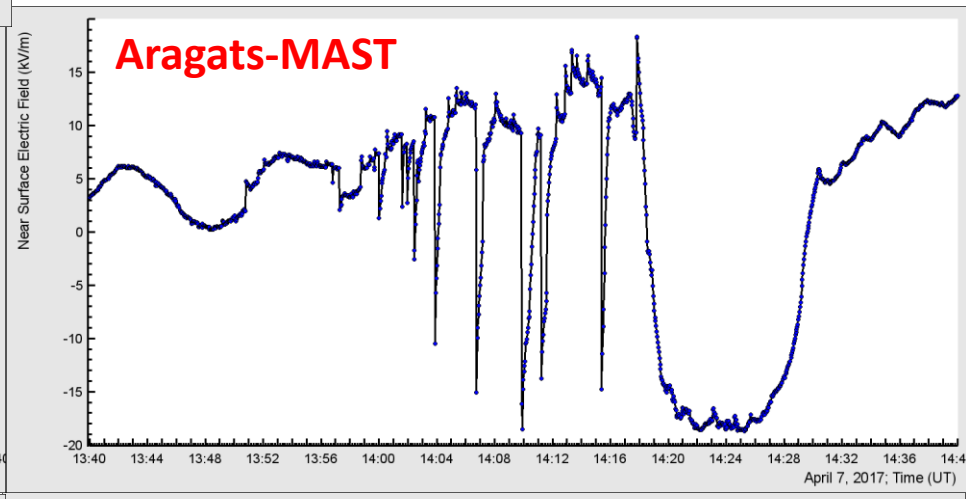

STAND3 1000 (low energy particles energy threshold 2 MeV);
CUBE 7 with veto (gammas with energies above 5 MeV)
Count Rate(sigmas)
24
22
20
18
16
14
12
10
8
6
4
2
0
-2
-4
11:40
12:20
13:00
13:40
14:20
15:00
April 7, 2017; Time (UT)

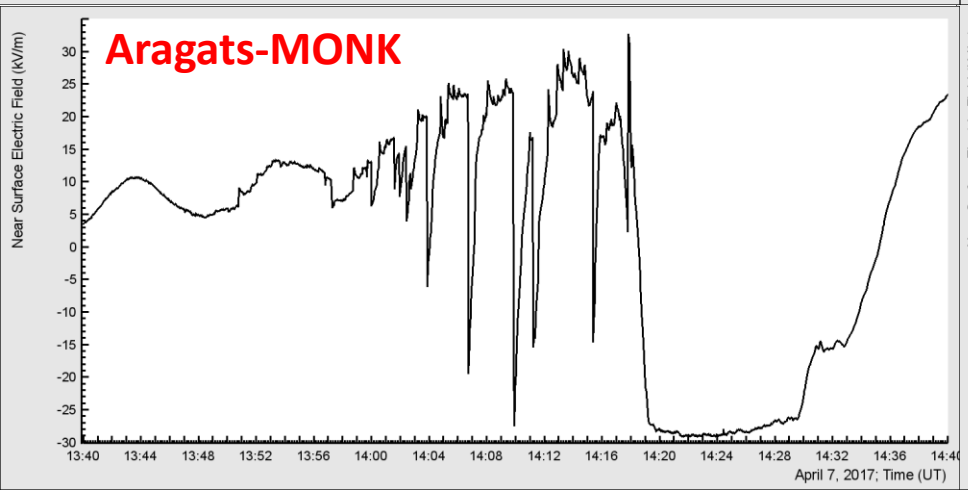

STAND3 1000 (low energy particles energy threshold 2 MeV);
(NaI N6, gammas with energies above 0.4 MeV);
(NaI N7, gammas with energies above 4 MeV);
Count Rate(sigmas)
28
26
24
22
20
18
16
14
12
10
8
6
4
2
0
-2
-4
11:40
12:20
13:00
13:40
14:20
15:00
April 7, 2017; Time (UT)

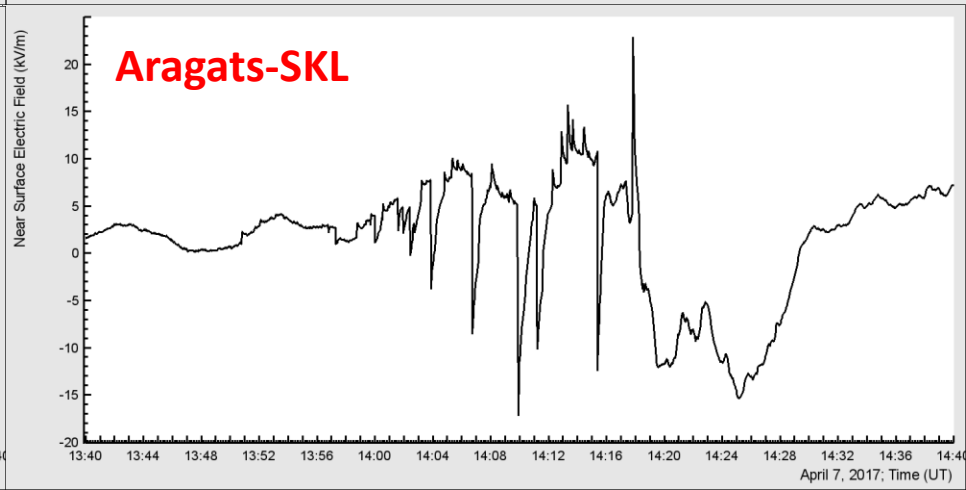
Electrostatic field disturbances

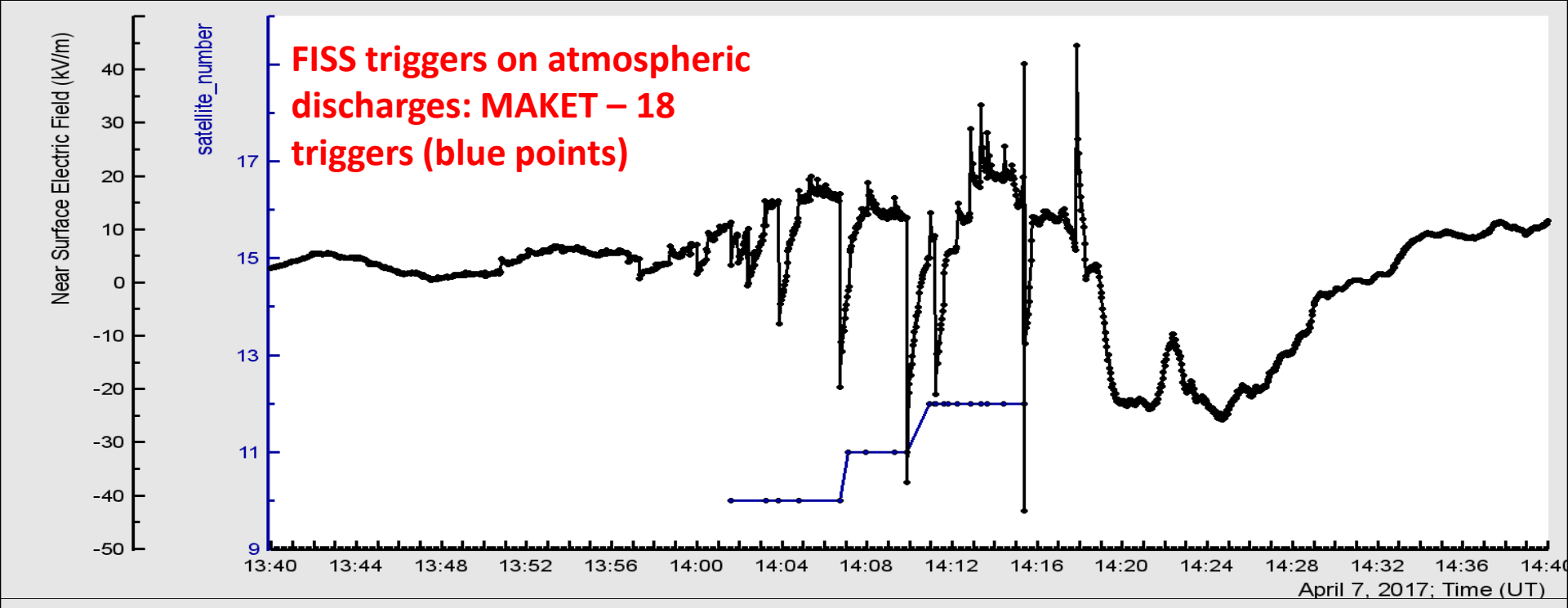


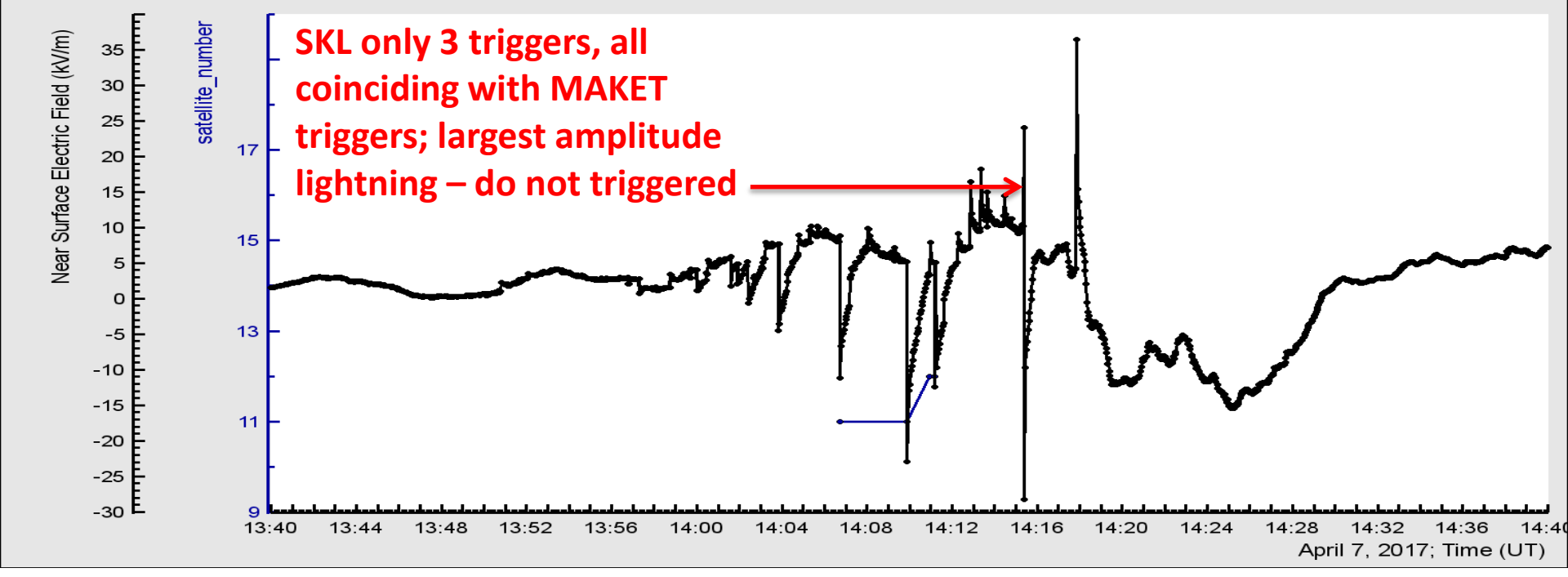




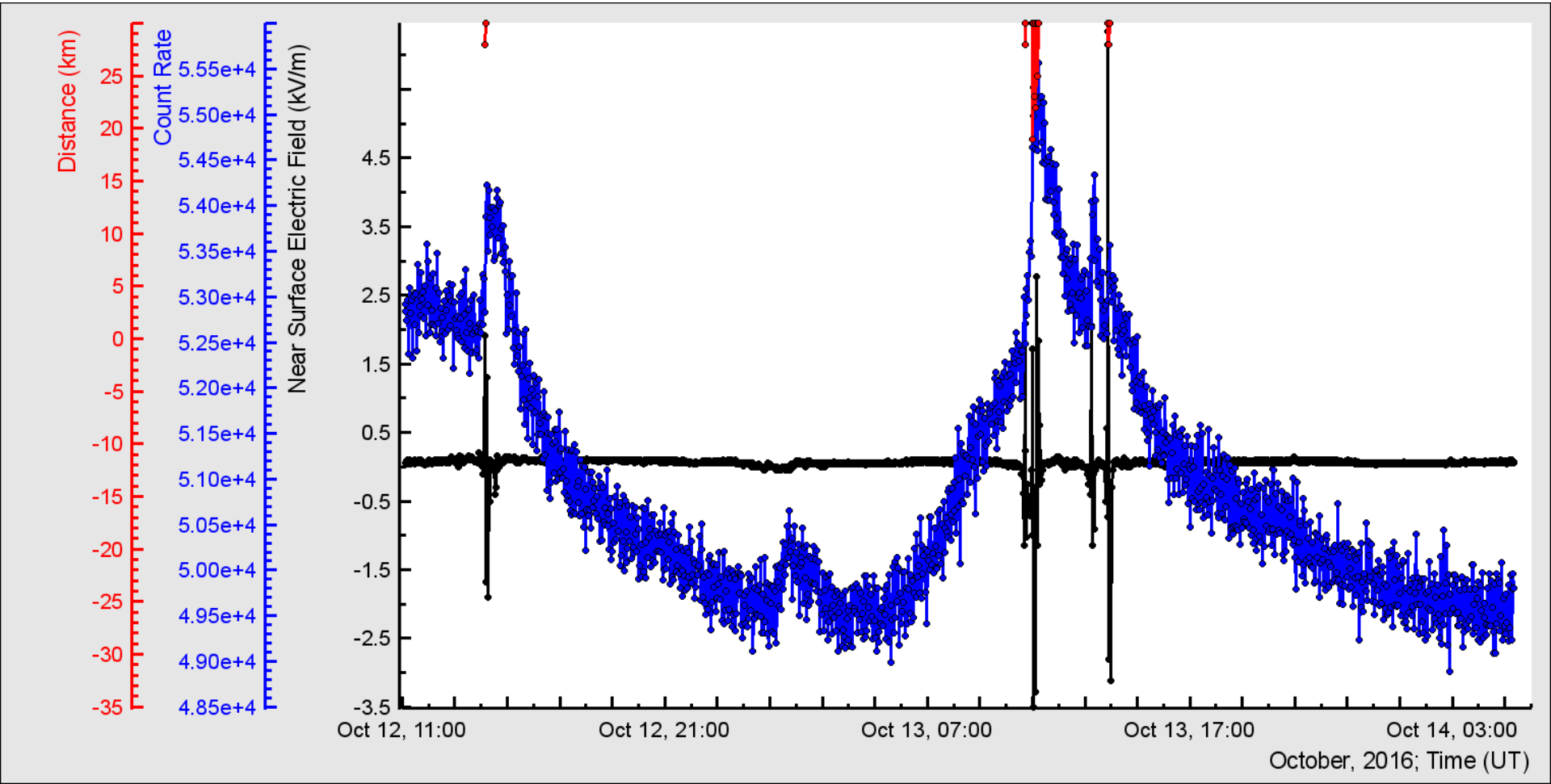





FISS triggers on atmospheric discharges: MAKET – 18 triggers (blue points)
Near Surface Electric Field (kV/m)
satellite_number
April 7, 2017; Time (UT)


SKL only 3 triggers, all coinciding with MAKET triggers; largest amplitude lightning – do not triggered
Near Surface Electric Field (kV/m)
satellite_number
April 7, 2017; Time (UT)

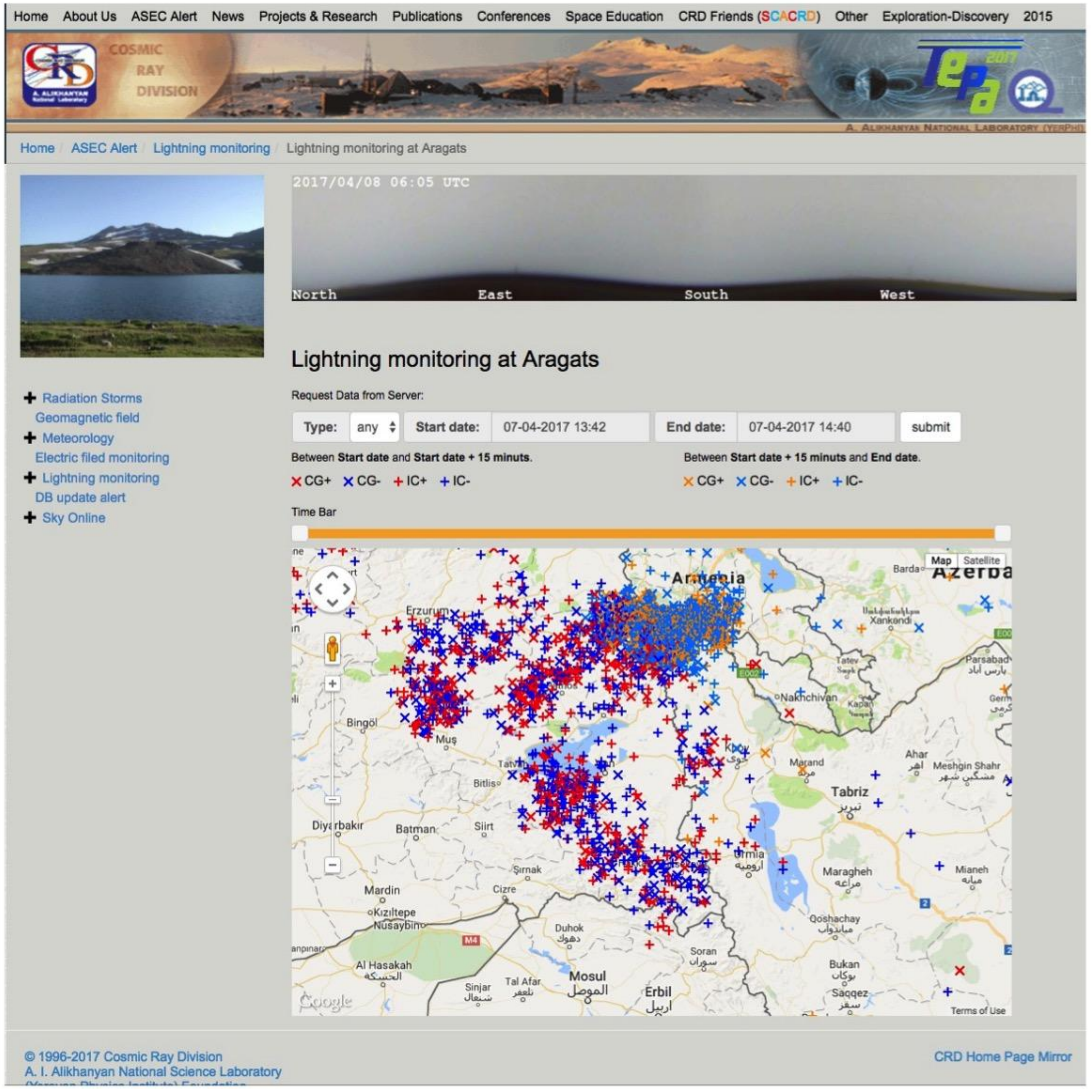
To understand small TGEs!



First 2017 thunderstorm on Aragats

- MAKET and SKL FISSS (Fast Integrated and Synchronized Sensors System) operated, although the trigger threshold is rather different; DUV (Hotel) – fails!
- TGE contains high-energy electrons – STAND! And STAND3 111 and 1111 coincidences demonstrate peaks;
- ASNT – do not operate properly!
- Pay attention on patterns of disturbances of the electrostatic field captured by 5 electric mills of Armenian geophysics network (Yerevan EFM do not operate!Dilijan and Sevan sites to be established this year!);
- It is necessary to operate Geriger tray in Nor Amberd!

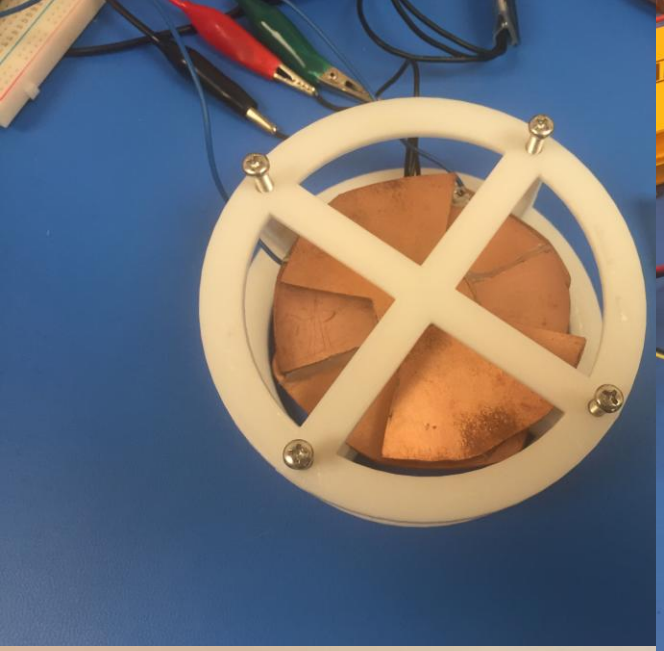
After half-of-year of salience first thunderstorm come to Aragats initiating large particle flux (TGE) and Spring flowers!

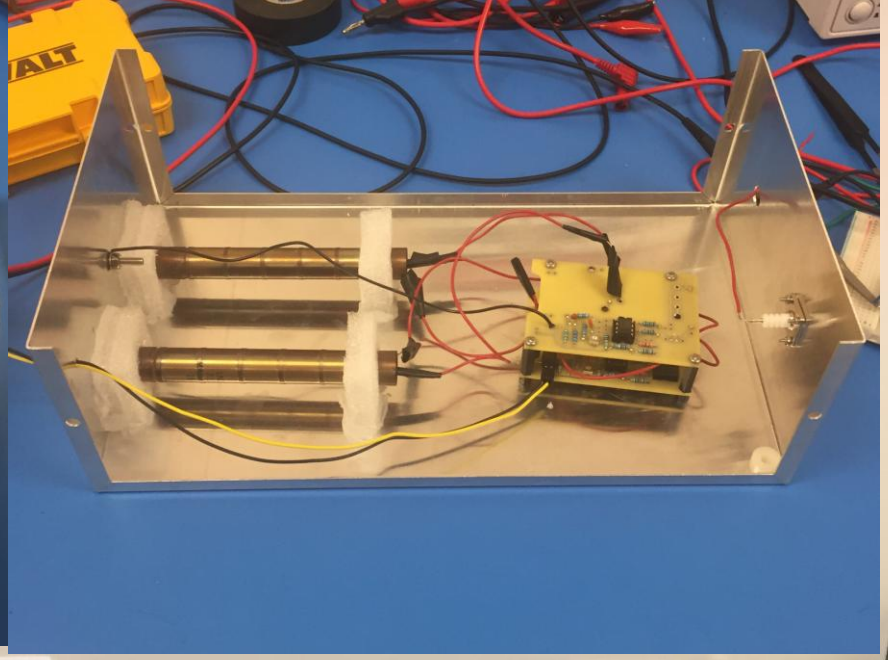



Oganes
eleme
249 Cf + 48
282
Cn

Genocide of Indians

Visit to New –Hampshire univ.; seminar & mattings & dinner






and the Commonwealth of Massachusetts have offered hope and refuge for immigrants seeking to begin new lives.
gift to the people of the Commonwealth and the City of Boston from the Armenian-American community of Massachusetts.
This sculpture is offered in honor of the one and one half million victims of the
Armenian Genocide of 1915-1923
May it stand in remembrance of all genocides that have followed, and
celebrate the diversity of the communities that have re-formed in the safety of these shores.

2017 CAMBRIDGE SCIENCE FESTIVAL

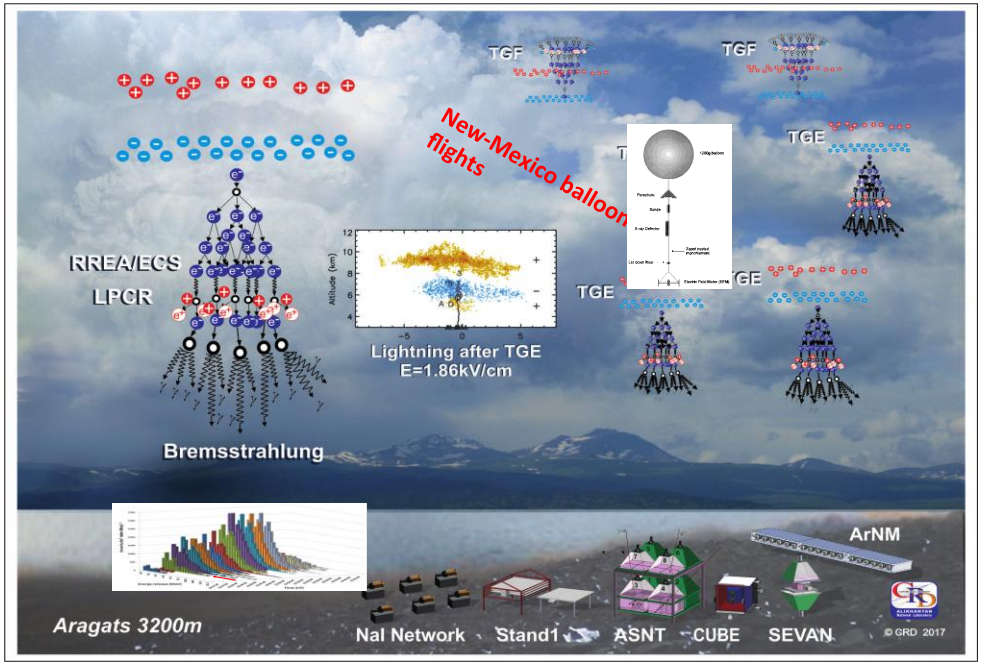
NORD ANGLIA EDUCATION
Be Ambitious

Massachusetts Institute of Technology

Biogen

CITY OF CAMBRIDGE

New Perspectives: Lightning, Climate Change & Other Exciting Scientific Challenges
April 17 @ 7:00 pm - 9:00 pm



New Perspectives: Thunder, Lightning and Climate Change
Come and learn about thundercloud electrification, huge natural accelerators operated just above our heads, global electrical circuits, terrestrial climate, atmosphere and its changes, weather in outer space, and sun flares and how they drive weather. This panel discussion will feature world-renowned cosmic ray scientist Ashot Chilingarian from Armenia along with local experts.

http://www.cambridgesciencefestival.org/


because the Earth is warmer, when a storm goes,
it's going to to drive more lightning flashes;
Lightning will strike far more frequently in a
world under climate change – but researchers
can still not
exactly where or when those
strikes will
The increa
ning flashes would lead to a
higher num
ldfires and threatening lives
and pr

What is lightning?

- Lightning carries large currents by forming a hot conductive channel, about as wide as your finger.

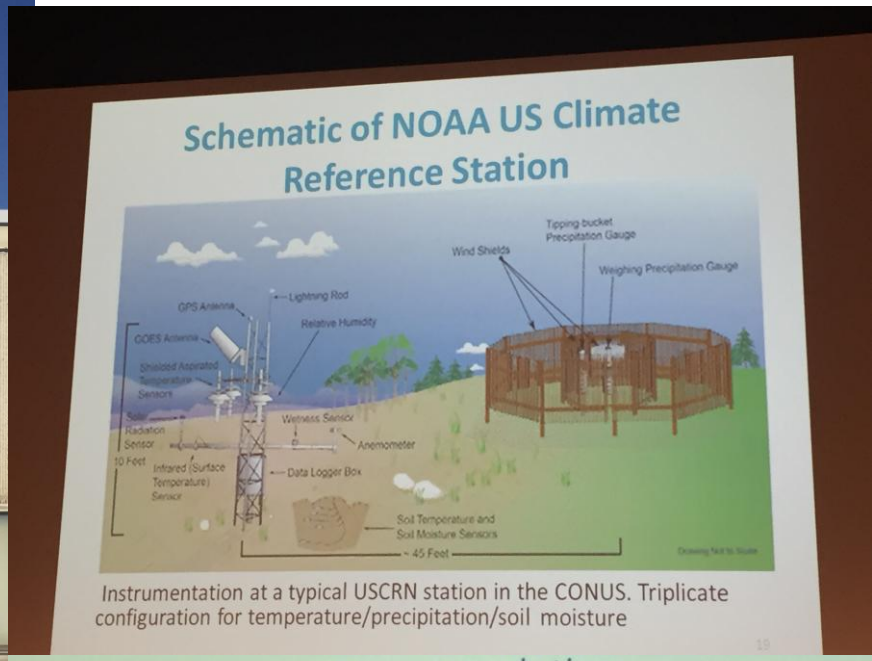
- The temperature of this channel can reach 50,000°F, 5 times hotter than the surface of the sun.

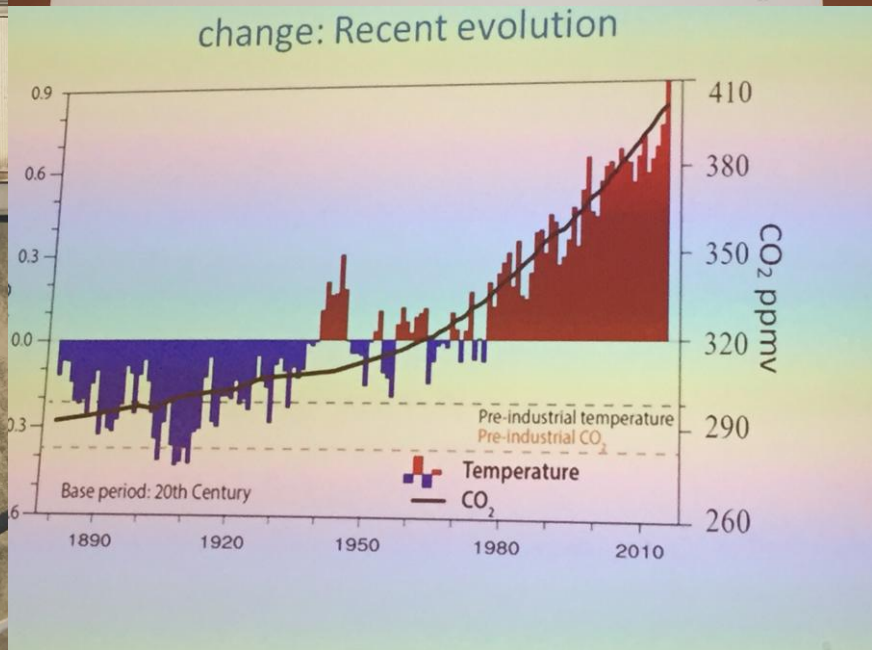
Photo courtesy Leah C


Cambridge Science Festival, Cambridge,


LIGHTNING

Climate Change





Boston Museum of Science

Creating models to communicate ideas

People create models to communicate ideas, teach concepts, or explain things.

Here you can create models to...

portray an object or idea using beaded metal chains;

convey time of day with light;

represent a place with sound.

How detailed should a model be?

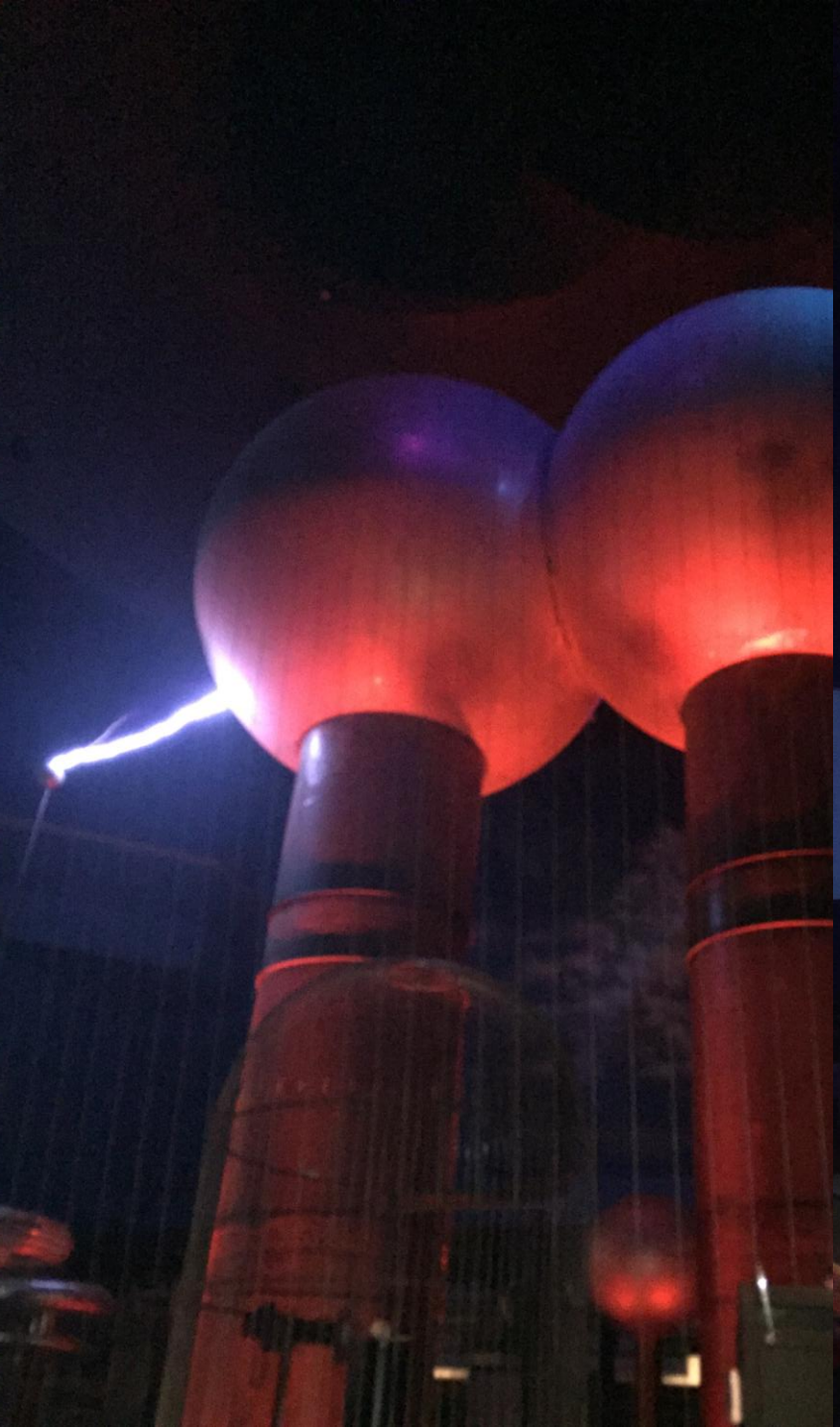
Models don't need to look exactly like the real thing. Some details can be left out. When creating models to communicate ideas, it's better for the model to be simple and informative than elaborate or confusing. As you create models here, consider each detail carefully and include only those essential to the task.

Models that Explain

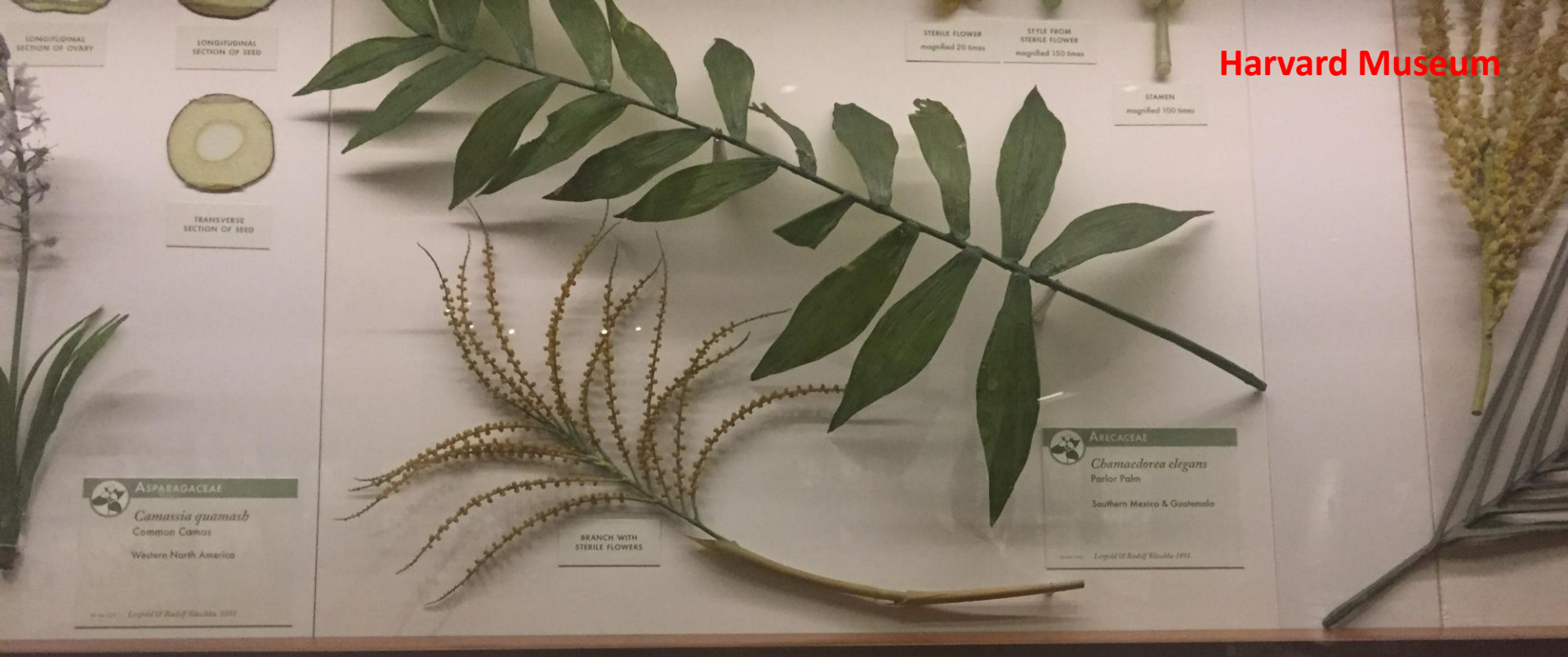
Scientific models grow and change as new discoveries bring about new understanding. Yesterday's model of the brain, the solar system or the atom is different from today's.

Mathematical models are unique. Some are physical, like geometric models of spatial relationships. Others are formulae and equations, like laws of motion, that are universal descriptions of the physical world.

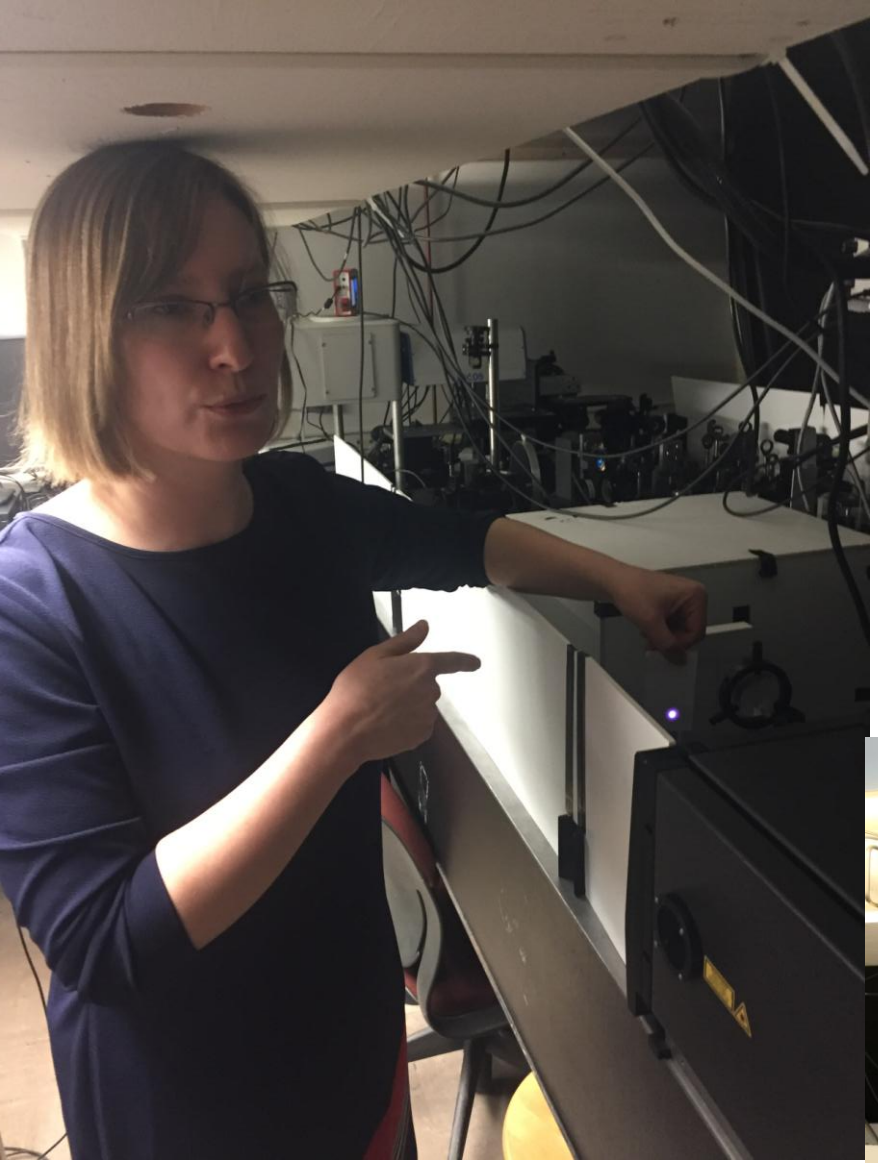
In the late twentieth century, a new type of scientific model arose – the computer simulation that allows scientists to make "what if" experiments about complex systems, independent of the physical world.

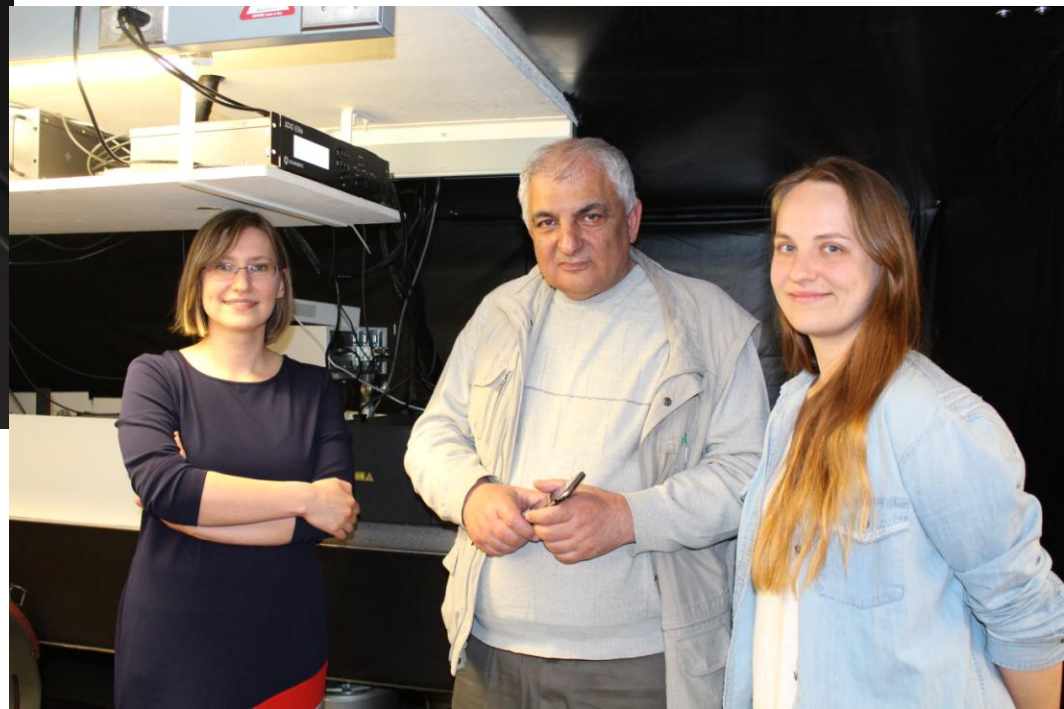


Harvard Museum




WORCESTER POLYTECHNIC INSTITUTE
LEHR UND KUNST
1865
WPI
HARRINGTON






MASSACHUSETTS STATE HOUSE


FREEDOM
ANDREW CHOATE PARSONS SHAW
IN MASSACHUSETTS
1788 JOHN HANCOCK
OF THE BILL OF RIGHTS TO
POSING THE ADDITION
E FEDERAL CONSTITUTION
1779 JOHN ADAMS SAMUEL ADAMS AND JAMES BOWDOIN
DRAFTING THE MASSACHUSETTS CONSTITUTION OF 1780

Lancaster port and fishing

Nowel April 23


Remembering our Martyrs-1915
s. Vartanantz Sunday and Armenian Schools
Turkey is Guilty of Genocide
ARMENIAN GENOCIDE
1915 - 2015
#Neverforget1915
ANGELA SALON
DRICA FASHION
BRAZIL
EXECUTIVE BUILDING
LOWELL

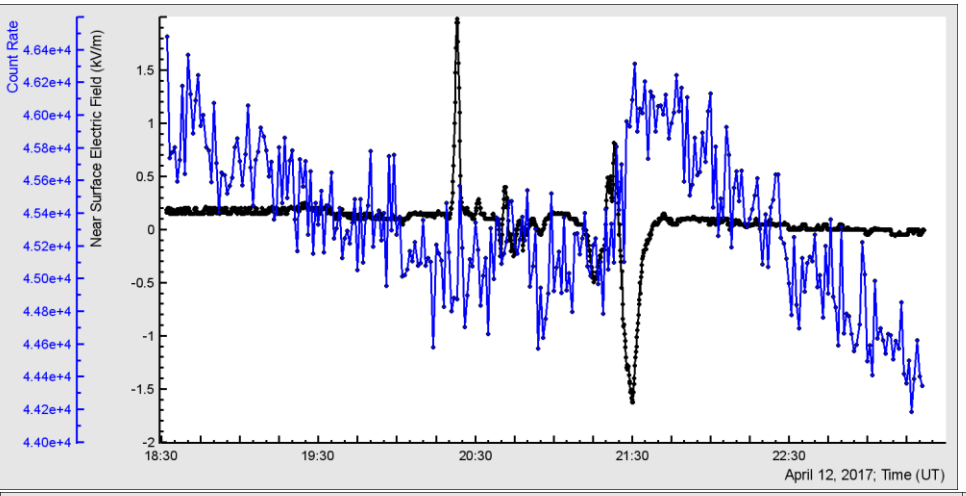

Remembering our Martyrs-1915
Vartanantz Sunday and Armenian Schools
ANGELA SALON
DRICA FASHION
BRAZIL
Merrimack St.
Turkey Is Guilty of Genocide
ARMENIAN GENOCIDE
1915 - 2015

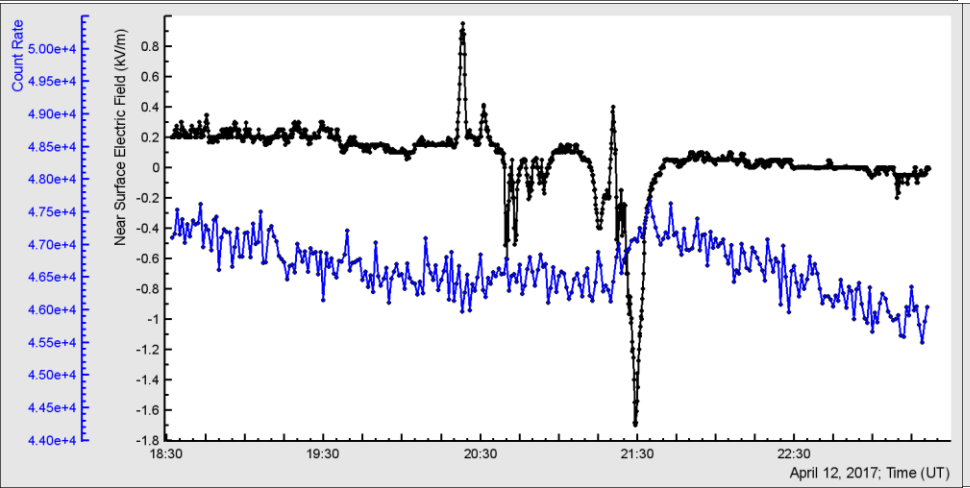

TURKEY
COMMITTED
GENOCIDE

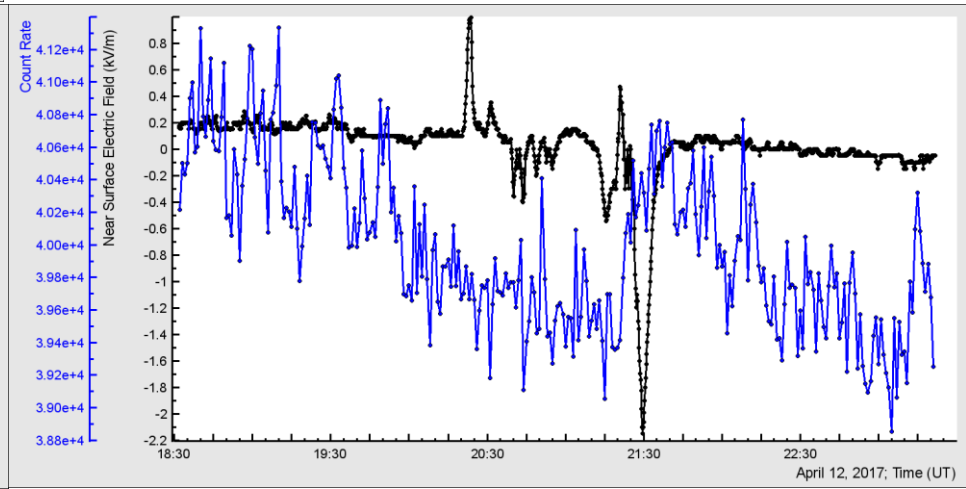
MIT HAYSTACK Observatory

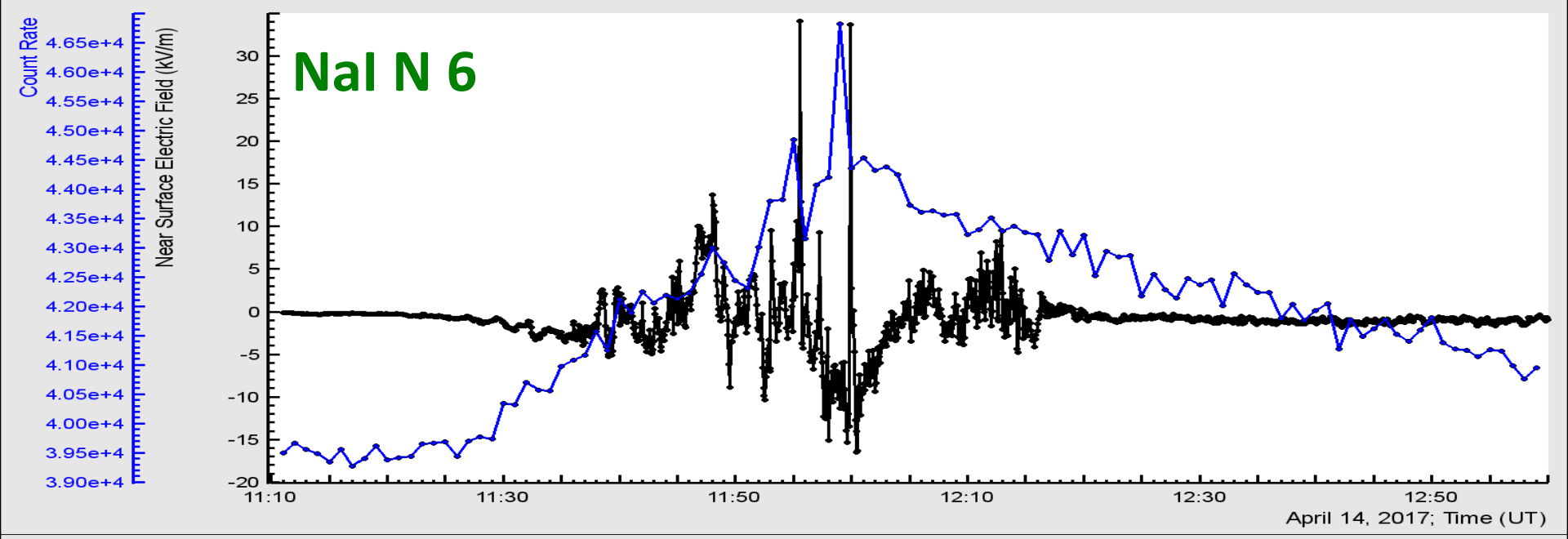

DIRECT
FUSION
FUSION
"DUPONT-AIGNAN PREMIER MINISTRE".
Ralliement FN-Debout la France : "Je reste moi-même" a précisé N. Dupont-Aignan en conférence de presse.
DÉCLARATI

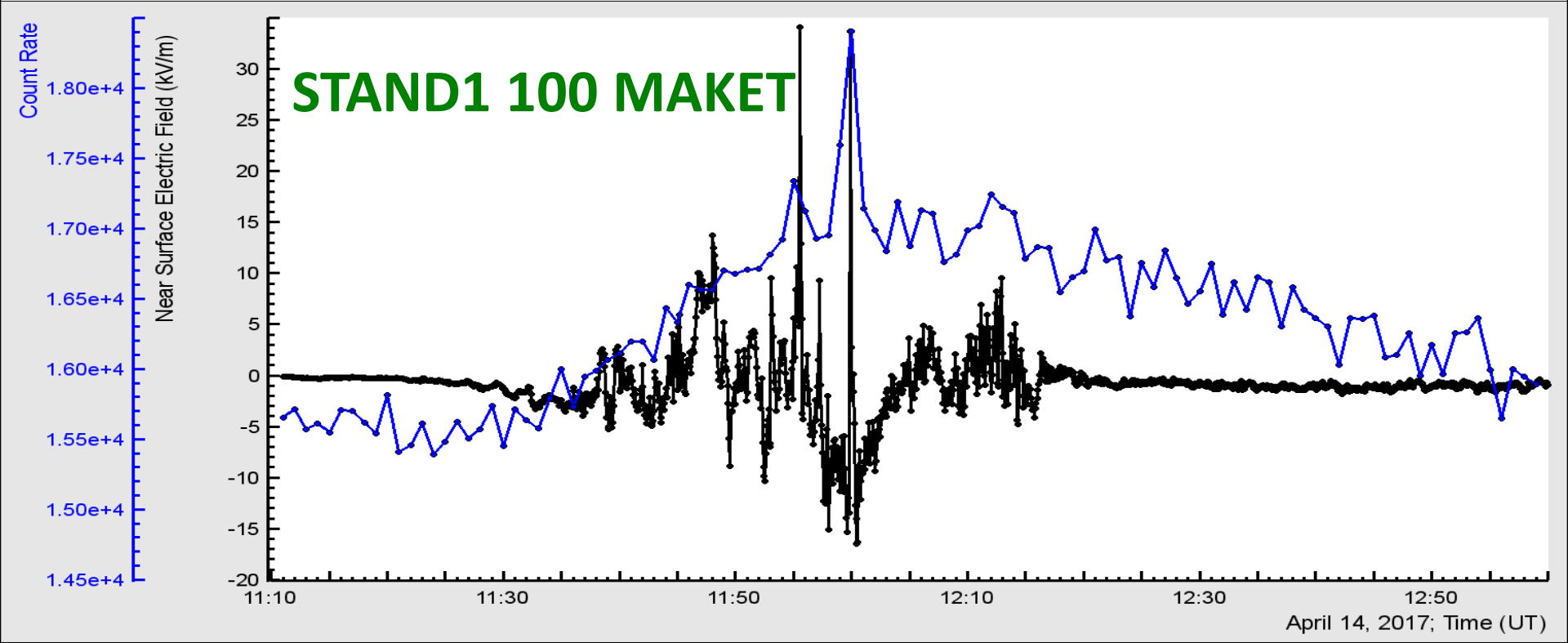
Small TGE and very close measurements of EFM-100



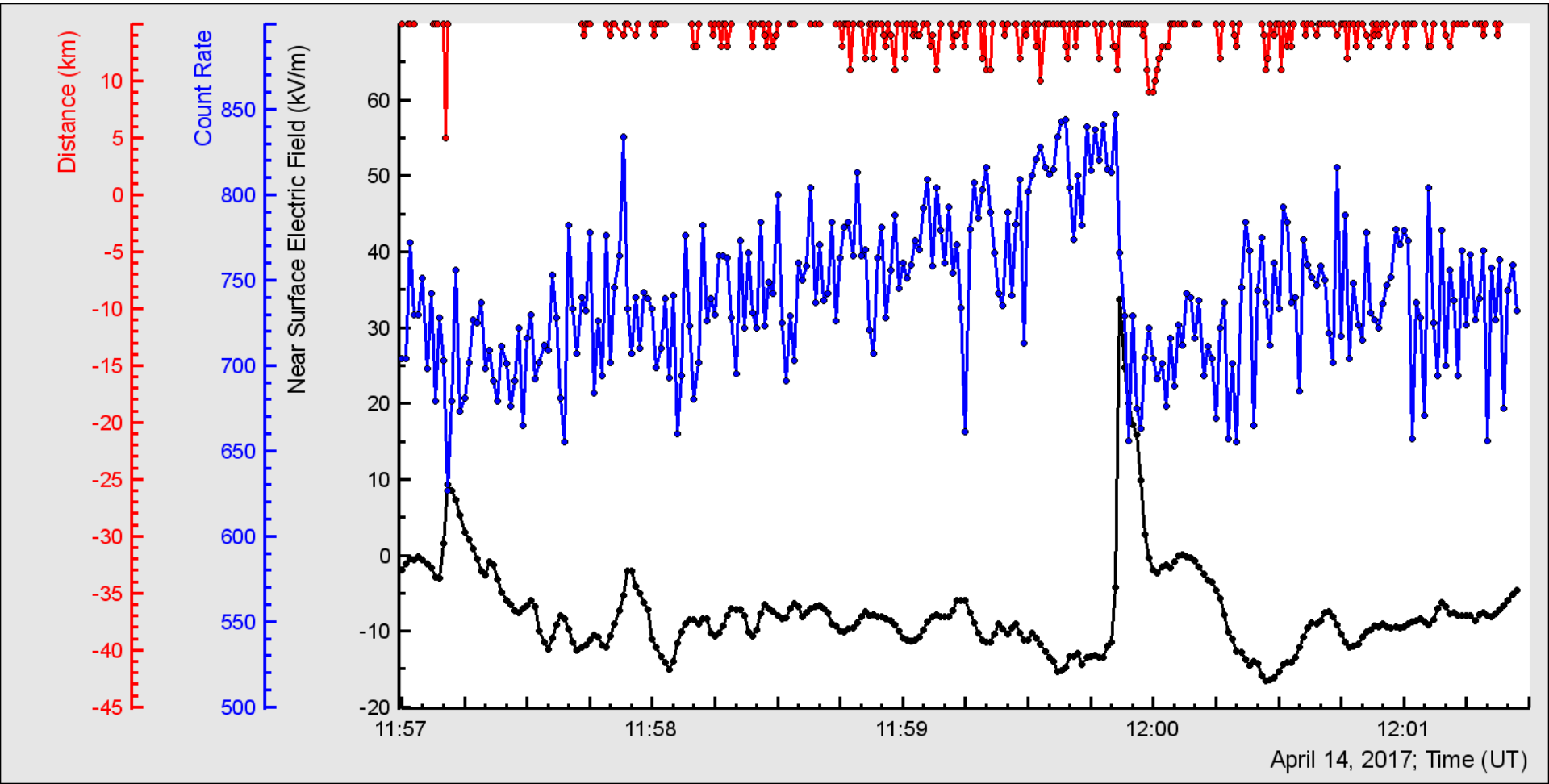




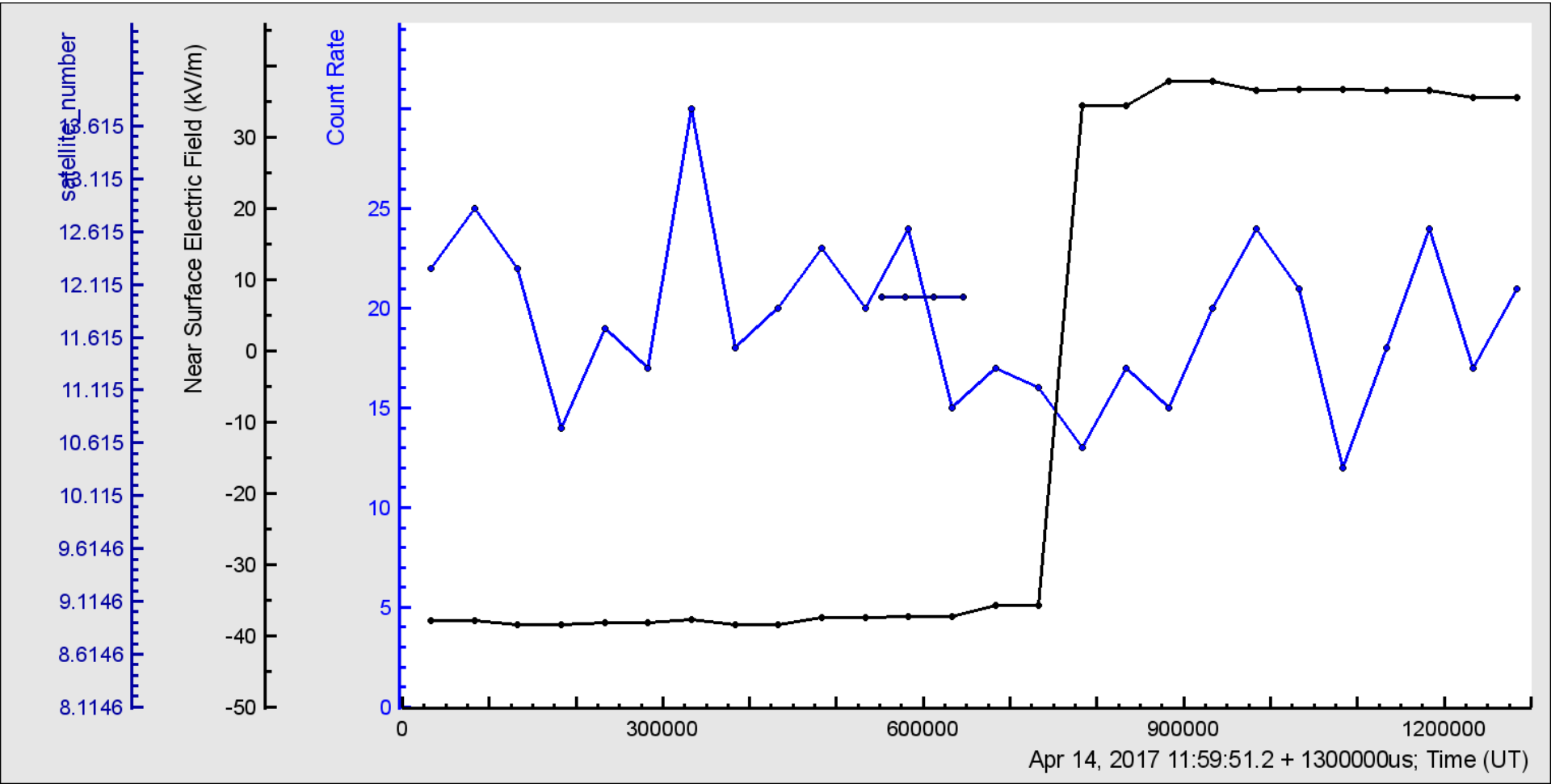

NaI N 6
Count Rate
Near Surface Electric Field (kV/m)
4.65e+4
4.60e+4
4.55e+4
4.50e+4
4.45e+4
4.40e+4
4.35e+4
4.30e+4
4.25e+4
4.20e+4
4.15e+4
4.10e+4
4.05e+4
4.00e+4
3.95e+4
3.90e+4
30
25
20
15
10
5
0
-5
-10
-15
-20
11:10
11:30
11:50
12:10
12:30
12:50
April 14, 2017; Time (UT)


STAND1 100 MAKET
Count Rate
Near Surface Electric Field (kV/m)
1.80e+4
1.75e+4
1.70e+4
1.65e+4
1.60e+4
1.55e+4
1.50e+4
1.45e+4
30
25
20
15
10
5
0
-5
-10
-15
-20
11:10
11:30
11:50
12:10
12:30
12:50
April 14, 2017; Time (UT)

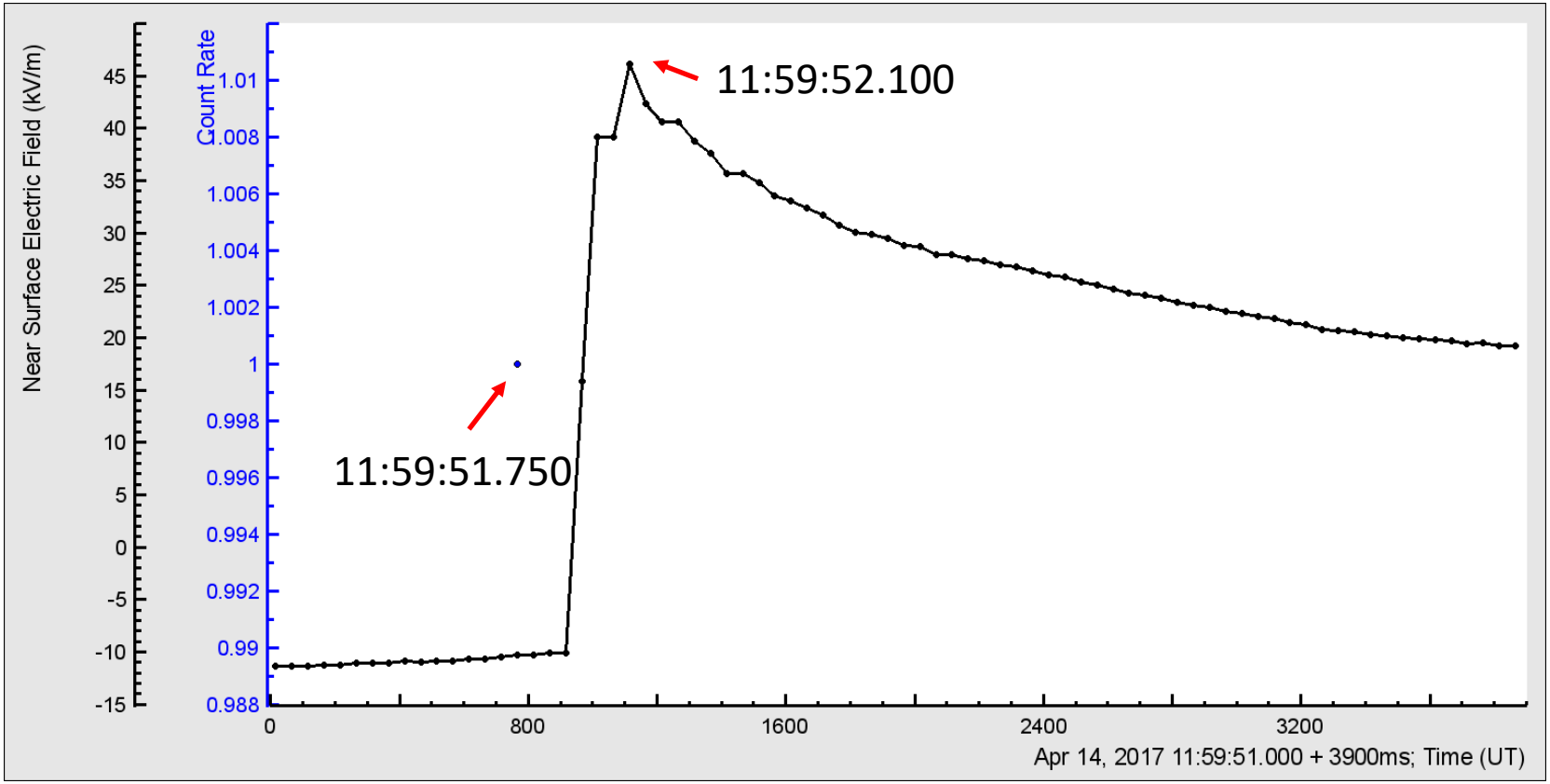
First TGE of 2017 terminated by a lightning flash (SKL STAND1 3 cm thick scintillator).



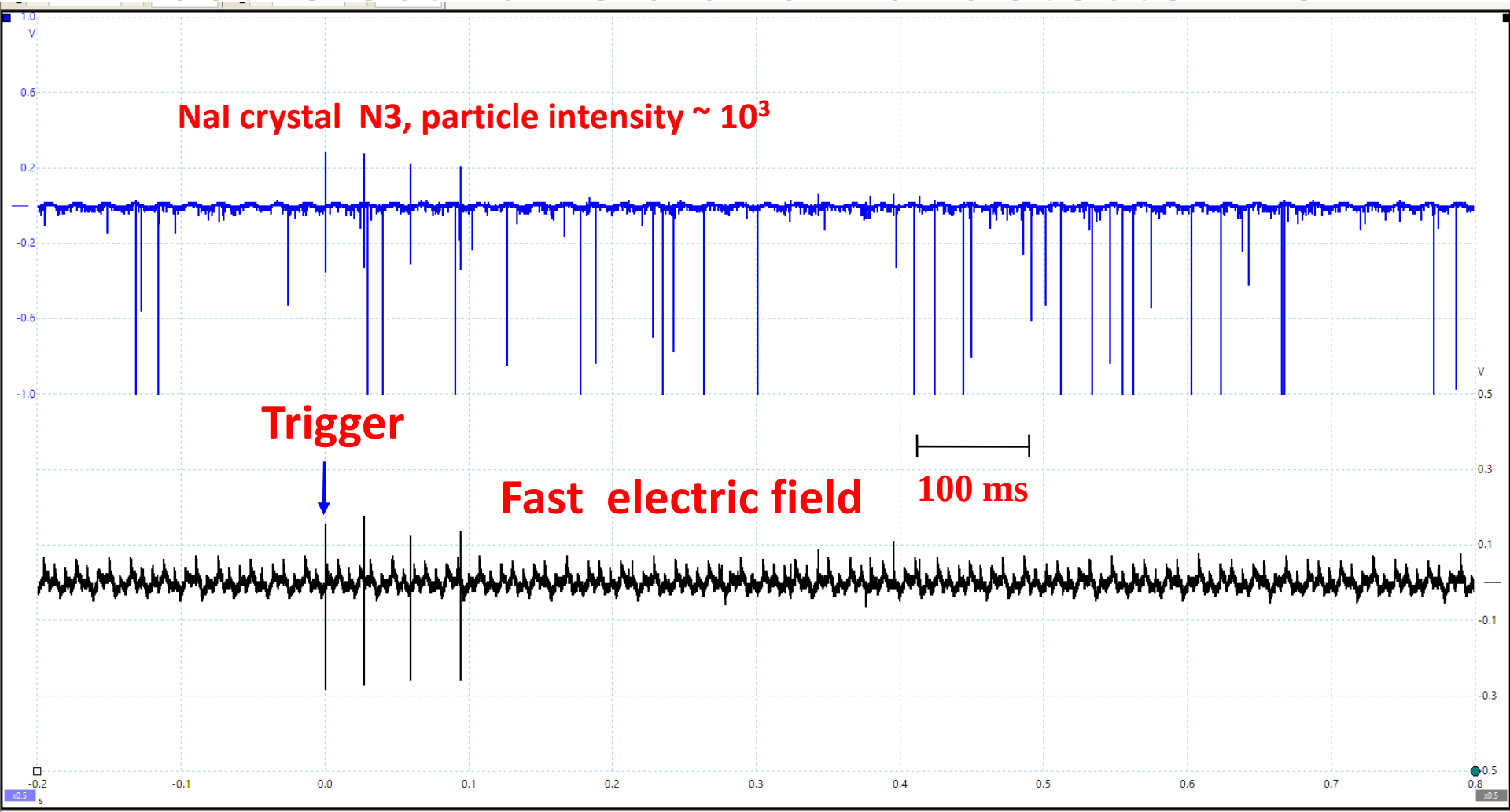
Electric field from GAMMA EFM-100: 50 ms surge from 59:51.35 (-35 kV/m) until 59:51.985 (35 kV/m); Four MAKET FISSS triggers were detected in 100 ms; the first one coincides with SKL FISSS trigger at 59:51:85. Particle flux observed – GAMMA STAND1 3 cm thick scintillator: decline during rearrangement of electric field after lightning.



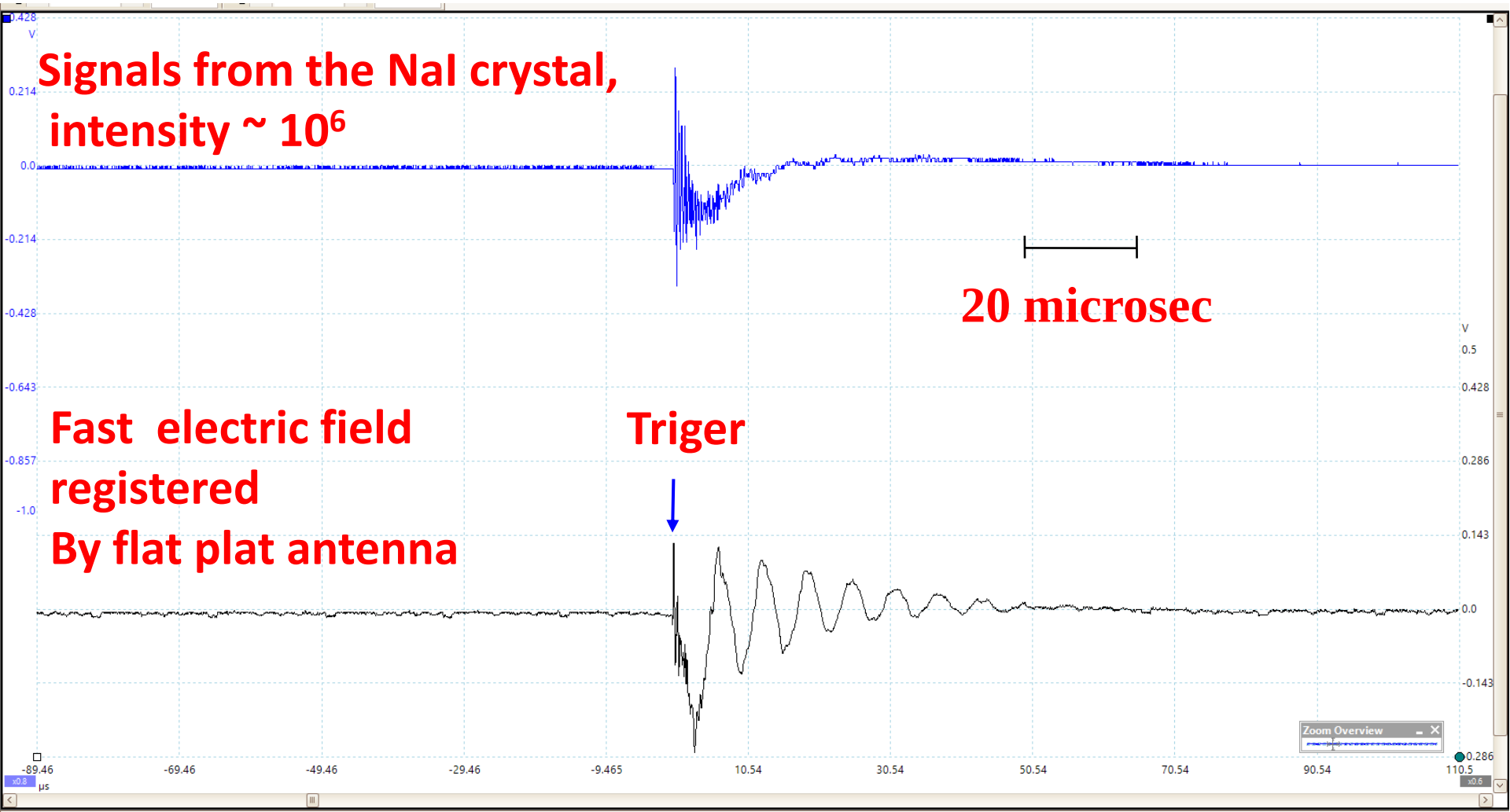
SKL FISSS trigger and SKL EFM-100 electric field



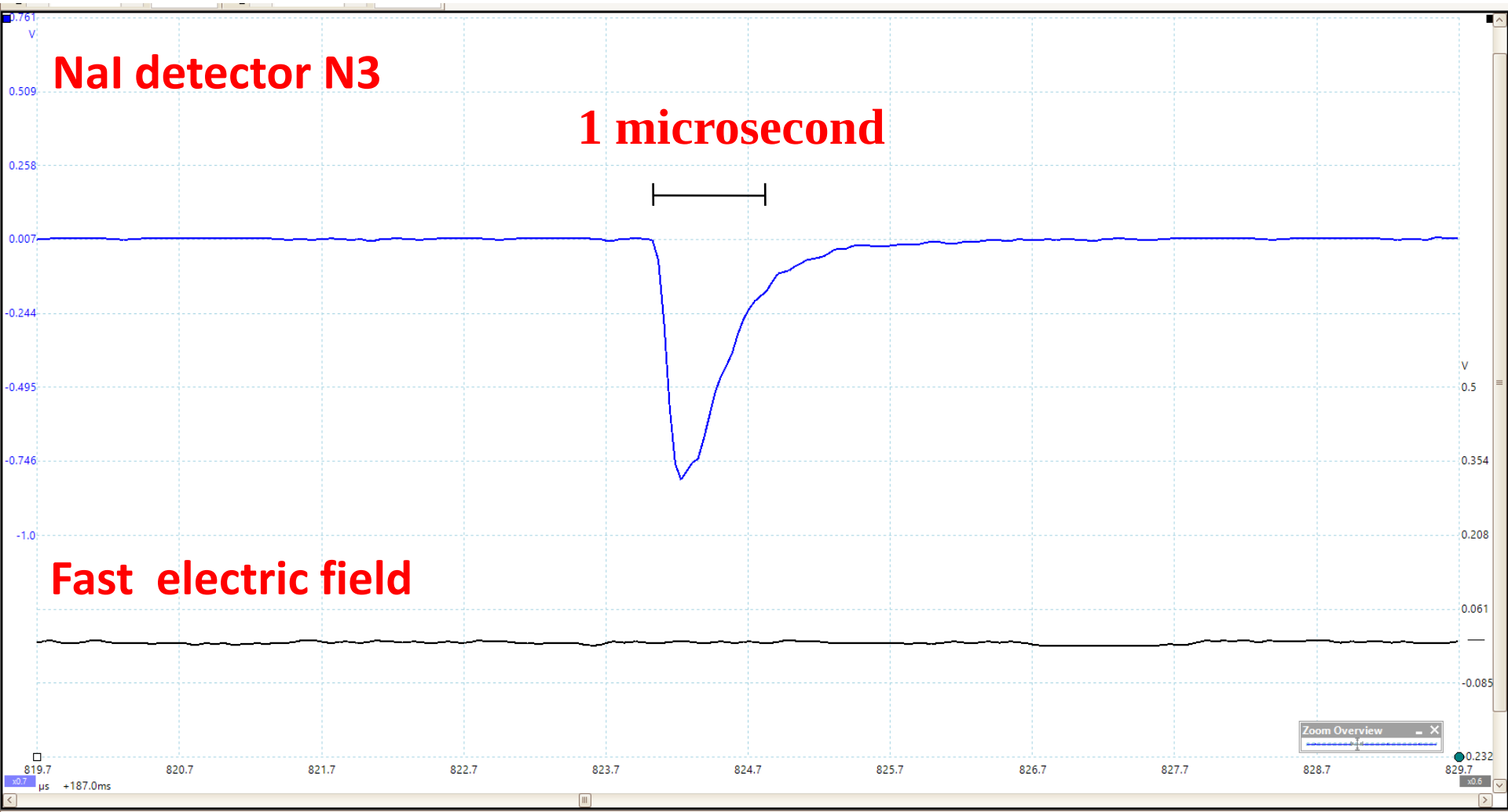
40 ns time series captured by digital oscilloscope located in the SKL experimental hall on Aragats. April 14, 2017 11:59:52 Fast electric field and NaI detector N3



“Particle” burst detected by NaI crystal

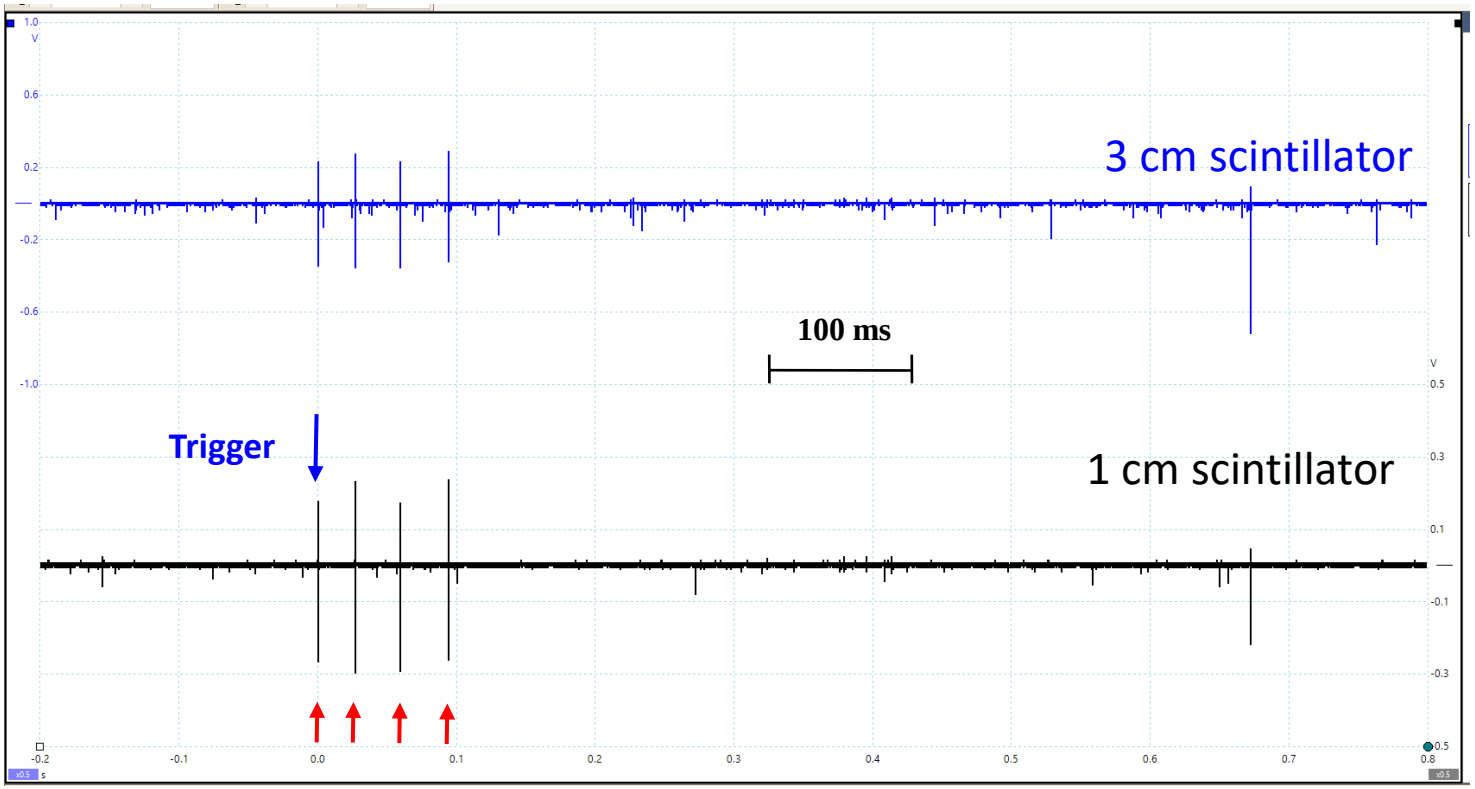


Typical shape of the signal from particle detected by the NaI detector



Picoscope N3 MAKET April 14, 2017 11:59:52

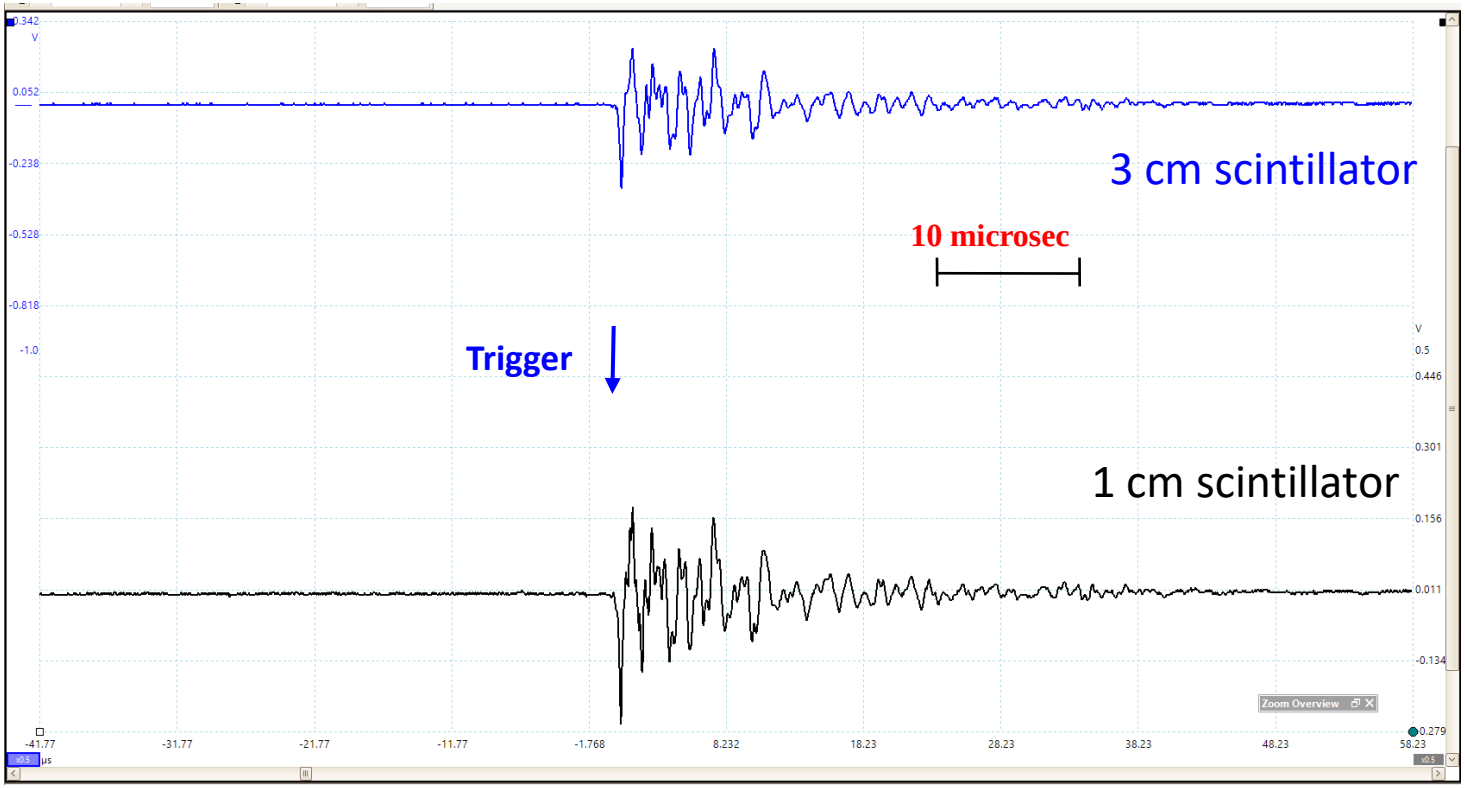
Ch A - One sec 3 cm; Ch B – One sec 1 cm



Four pulses with similar shape. Zoom of first pulse is shown in next slide

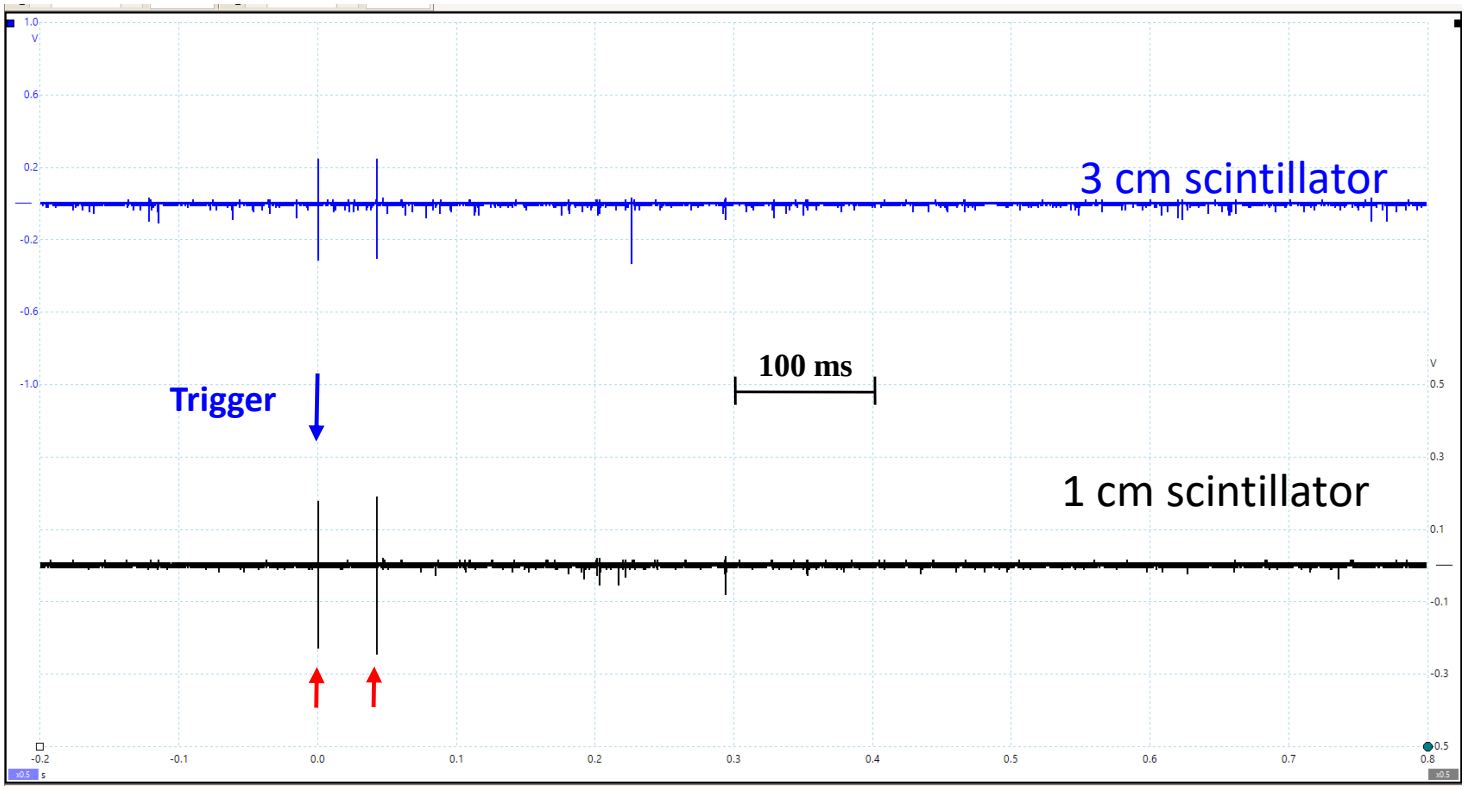
Picoscope N3 MAKET April 14, 2017 11:59:52

Ch A - One sec 3 cm; Ch B – One sec 1 cm



Picoscope N3 MAKET April 14, 2017 11:55:30

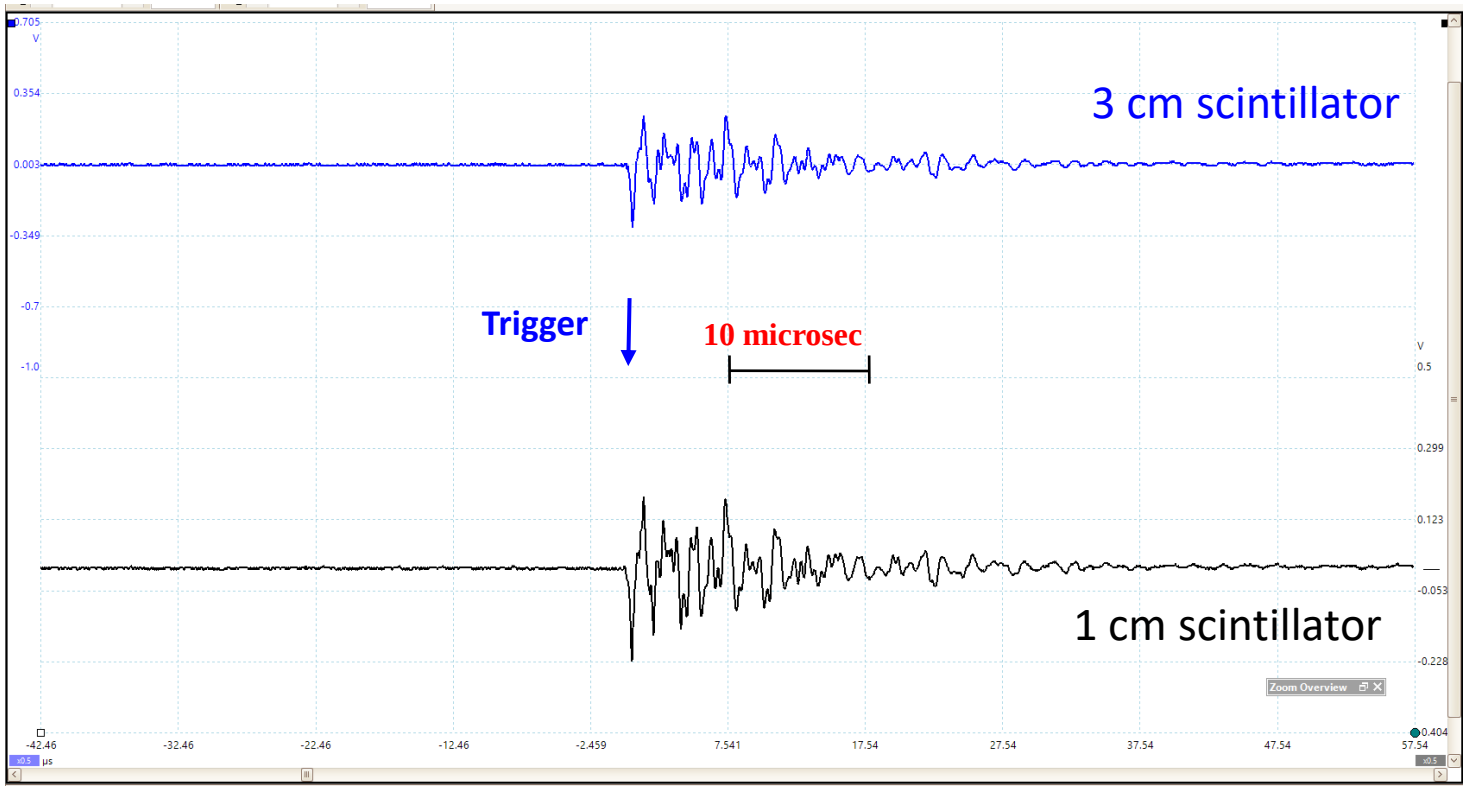
Ch A - One sec 3 cm; Ch B – One sec 1 cm

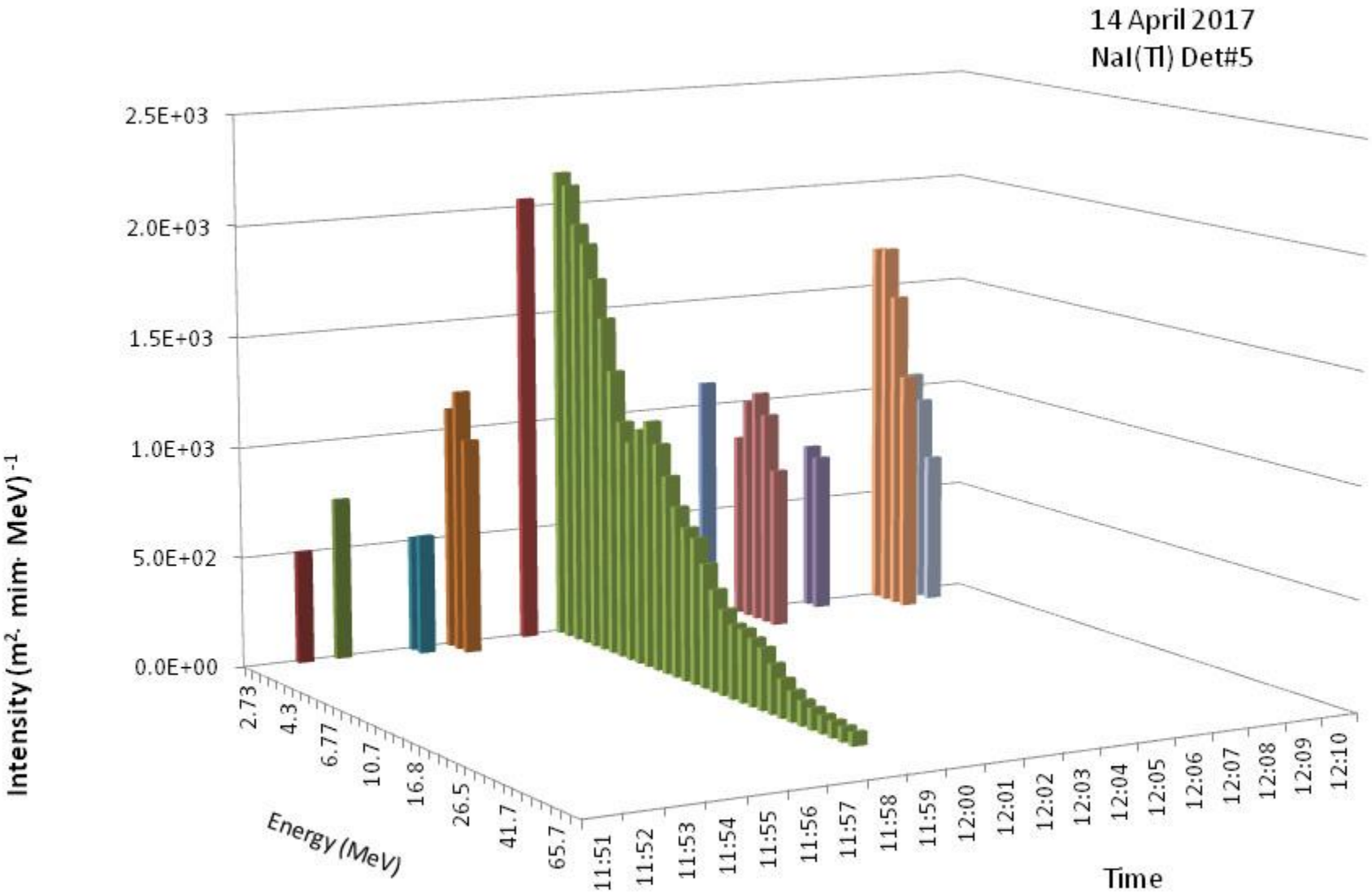


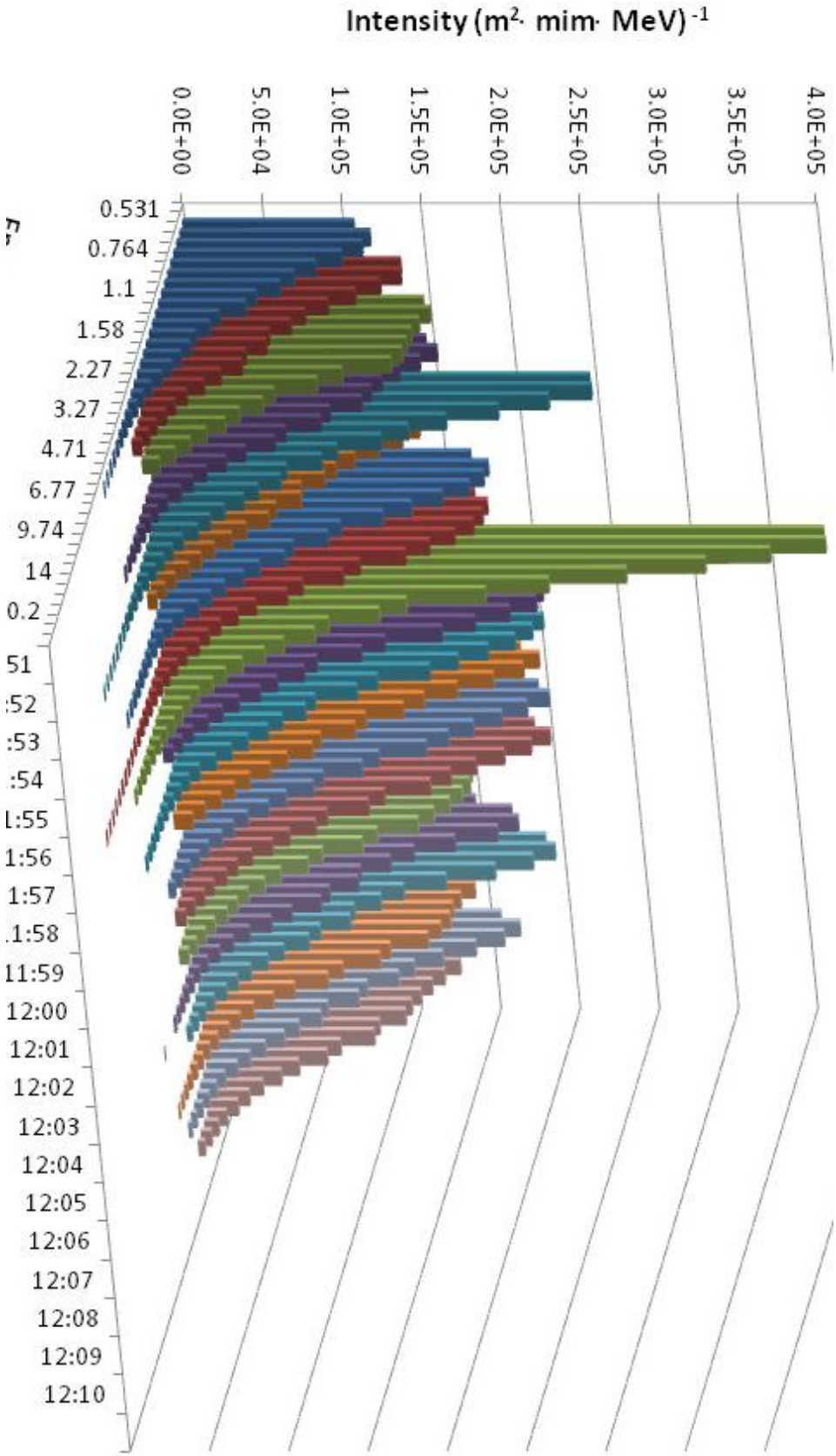
Two pulses with similar shape. Zoom of first pulse is shown in next slide

Picoscope N3 MAKET April 14, 2017 11:55:30

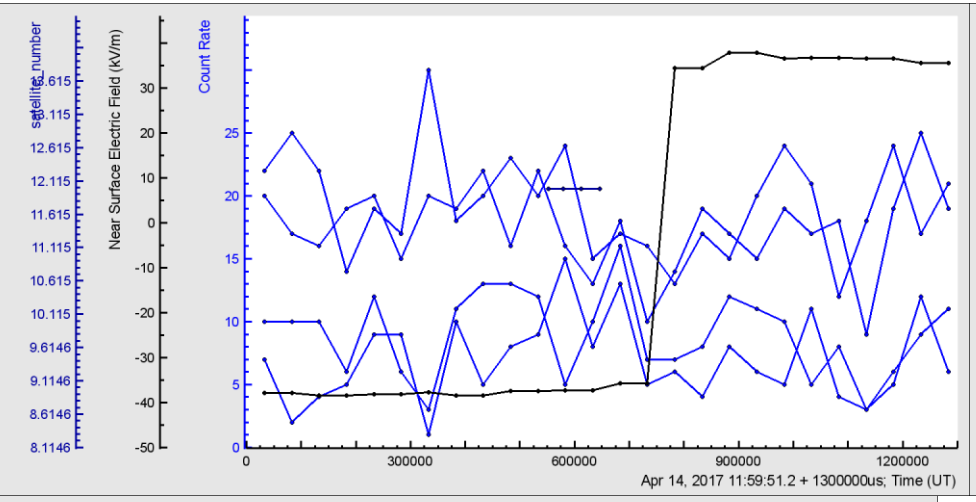
Ch A - One sec 3 cm; Ch B – One sec 1 cm

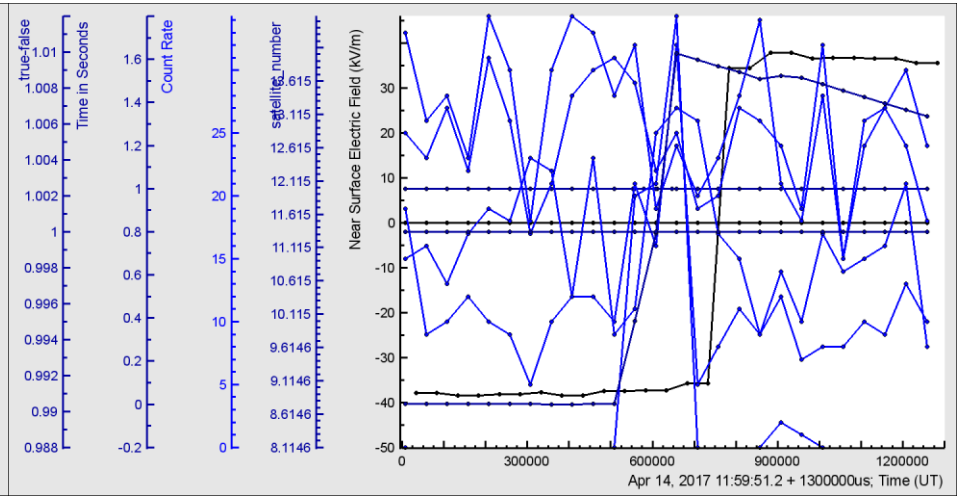


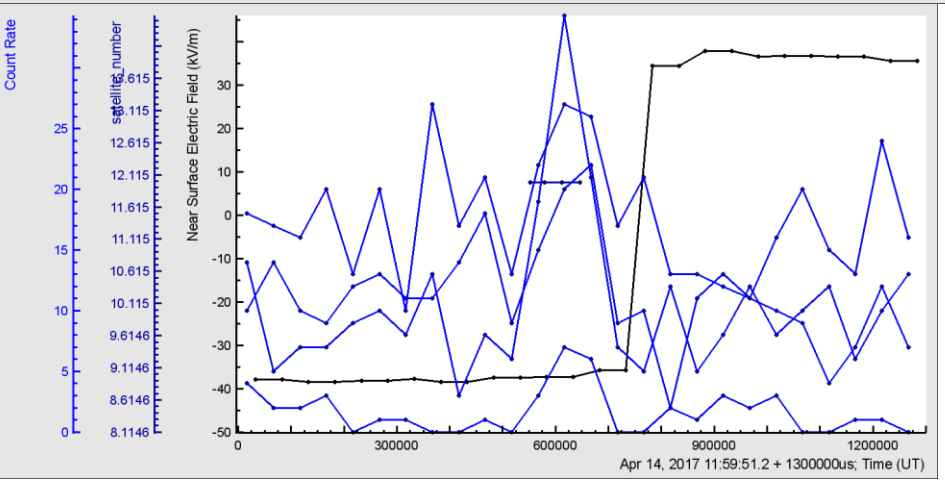

14 April 2017
NaI(Tl) Det#5
2.5E+03
2.0E+03
1.5E+03
1.0E+03
5.0E+02
0.0E+00
Intensity (m2· mim· MeV)-1
2.73
4.3
6.77
10.7
16.8
26.5
41.7
65.7
Energy (MeV)
11:51
11:52
11:53
11:54
11:55
11:56
11:57
11:58
11:59
12:00
12:01
12:02
12:03
12:04
12:05
12:06
12:07
12:08
12:09
12:10
Time


Intensity (m2· mim· MeV) -1
4.0E+05
3.5E+05
3.0E+05
2.5E+05
2.0E+05
1.5E+05
1.0E+05
5.0E+04
0.0E+00
0.531
0.764
1.1
1.58
2.27
3.27
4.71
6.77
9.74
14
0.2
51
:52
:53
:54
1:55
1:56
1:57
.1:58
11:59
12:00
12:01
12:02
12:03
12:04
12:05
12:06
12:07
12:08
12:09
12:10

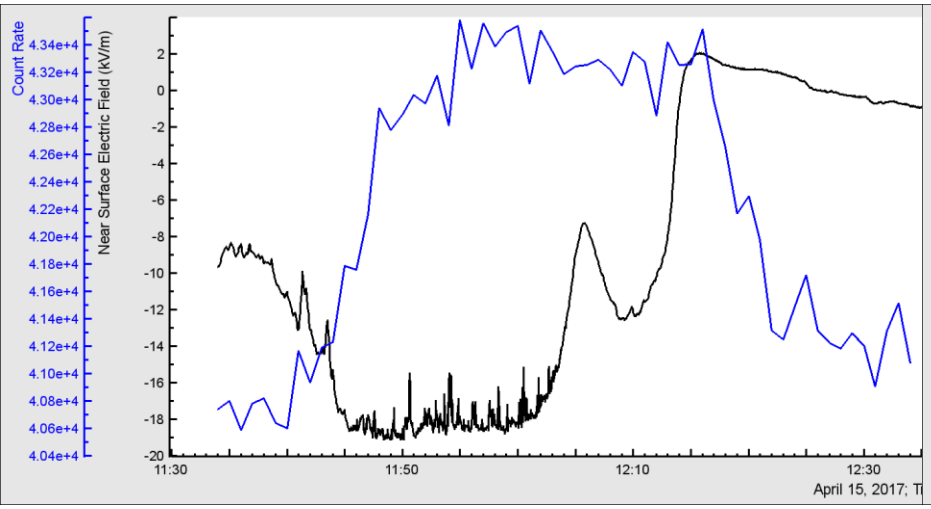
Lightning stroke at 11:59:51.82

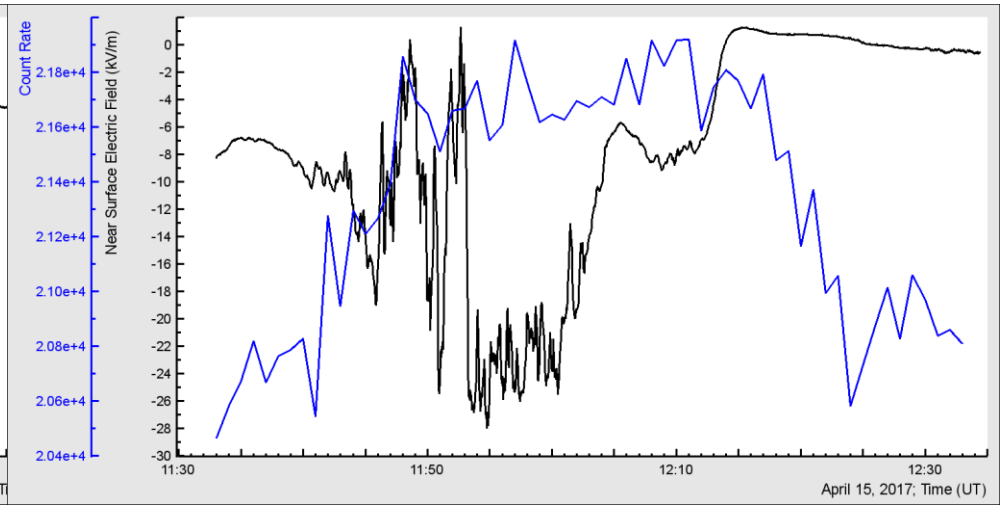


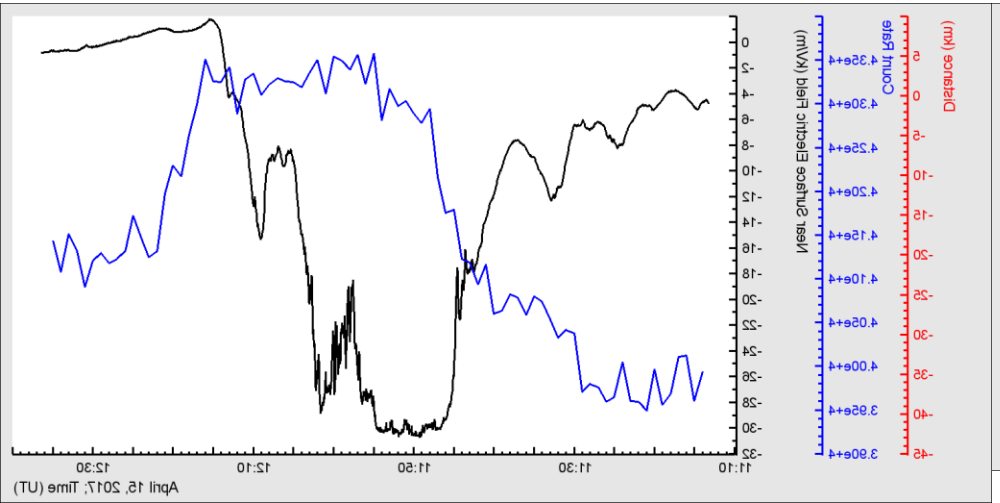


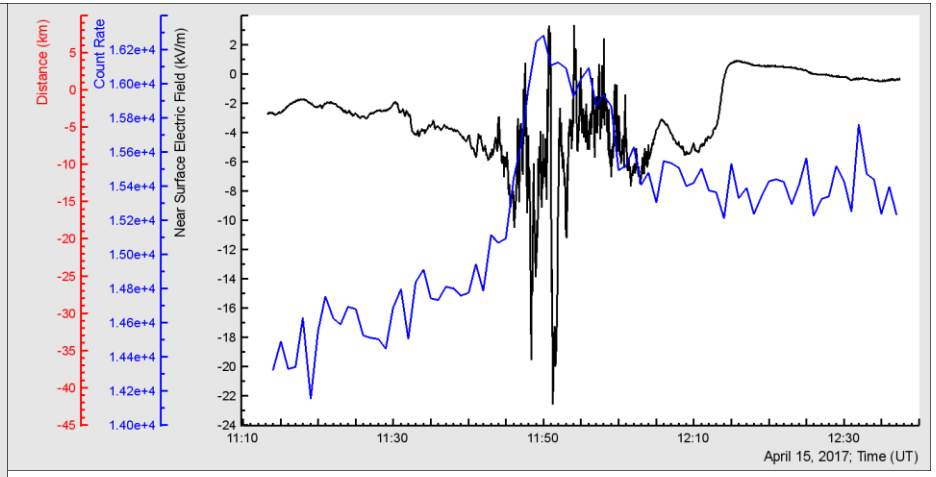


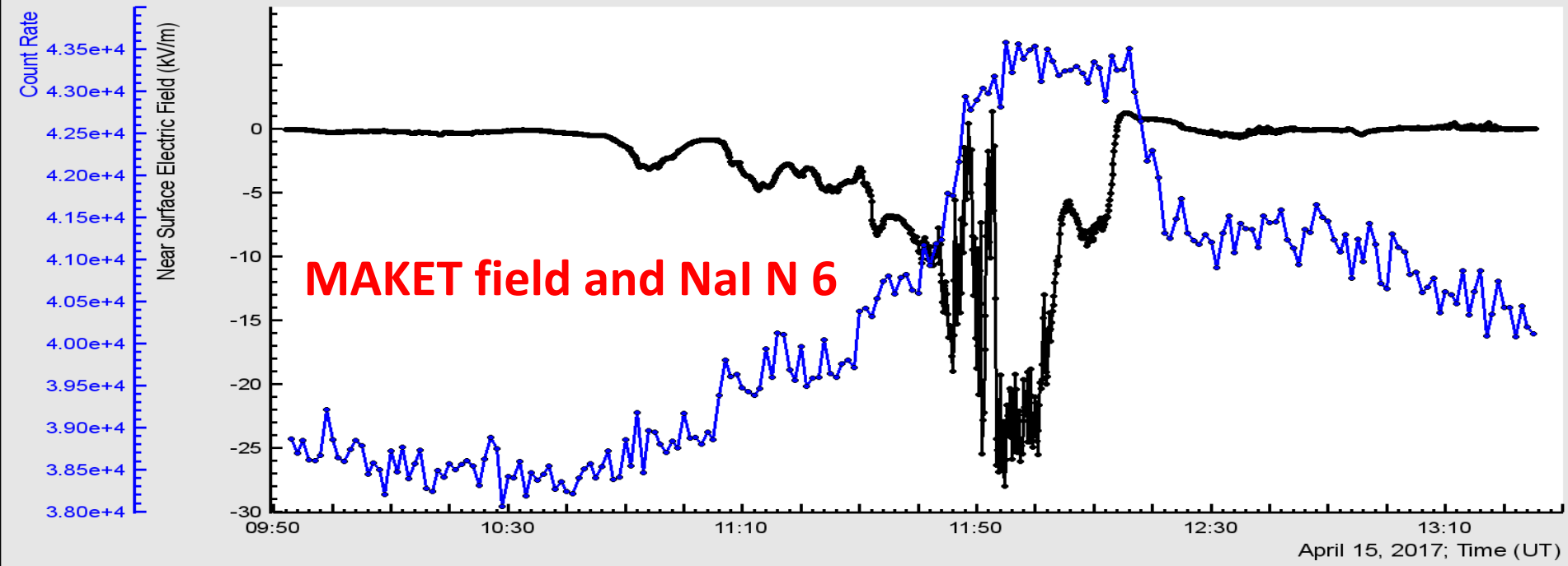
15 April Long lasting TGE

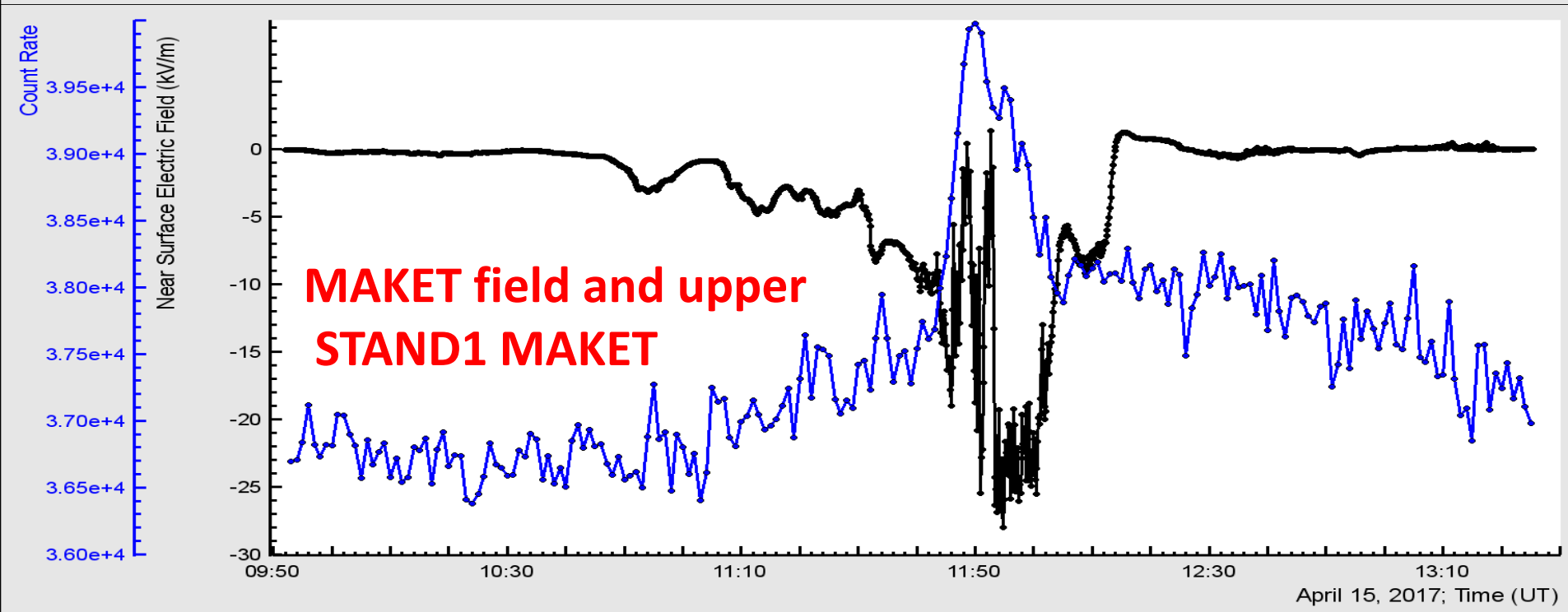




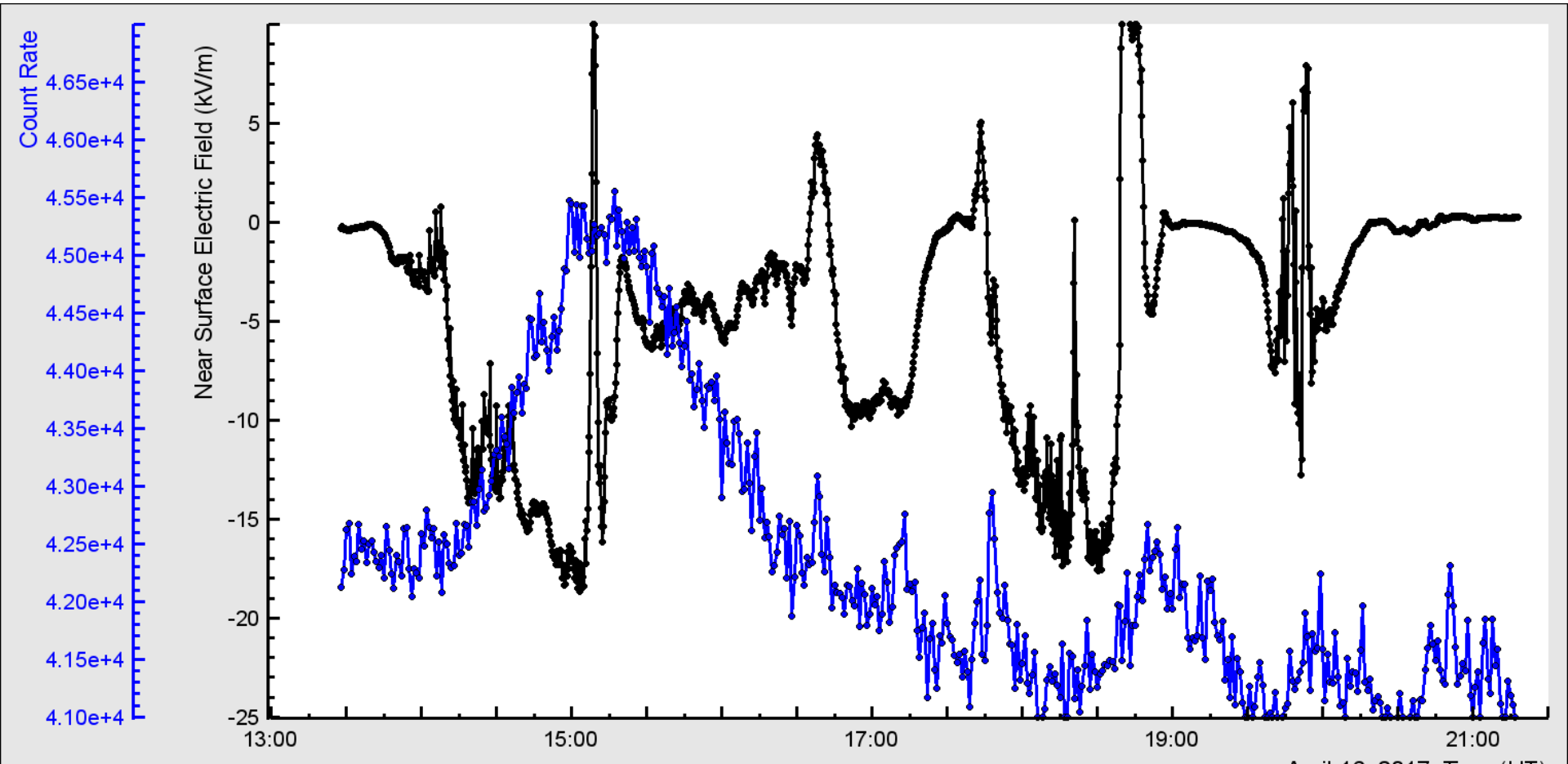




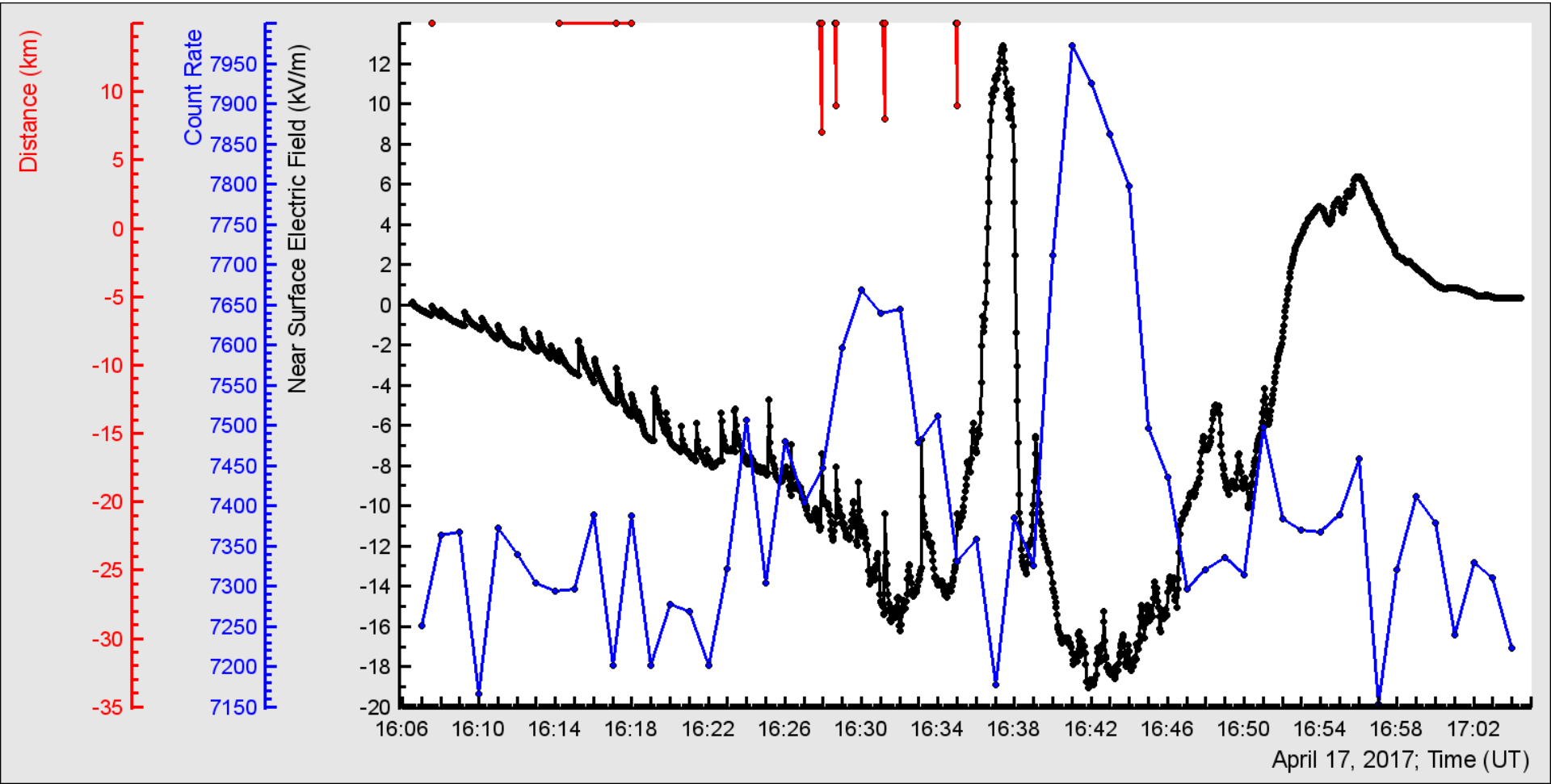

MAKET field and NaI N 6
Count Rate
4.35e+4
4.30e+4
4.25e+4
4.20e+4
4.15e+4
4.10e+4
4.05e+4
4.00e+4
3.95e+4
3.90e+4
3.85e+4
3.80e+4
Near Surface Electric Field (kV/m)
0
-5
-10
-15
-20
-25
-30
09:50
10:30
11:10
11:50
12:30
13:10
April 15, 2017; Time (UT)

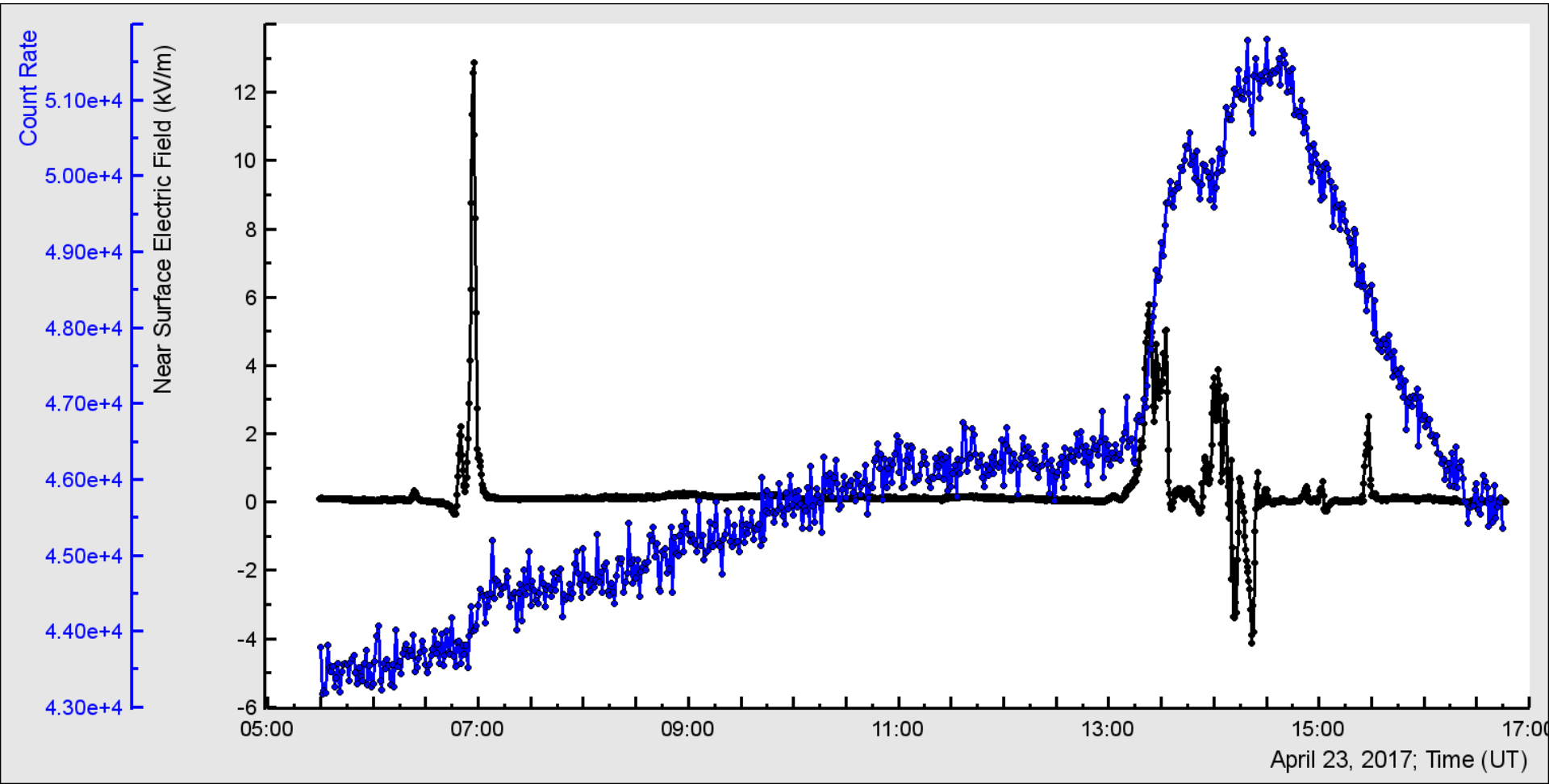

MAKET field and upper
STAND1 MAKET
Count Rate
3.95e+4
3.90e+4
3.85e+4
3.80e+4
3.75e+4
3.70e+4
3.65e+4
3.60e+4
Near Surface Electric Field (kV/m)
0
-5
-10
-15
-20
-25
-30
09:50
10:30
11:10
11:50
12:30
13:10
April 15, 2017; Time (UT)

MAKET EFM and N 6 NaI



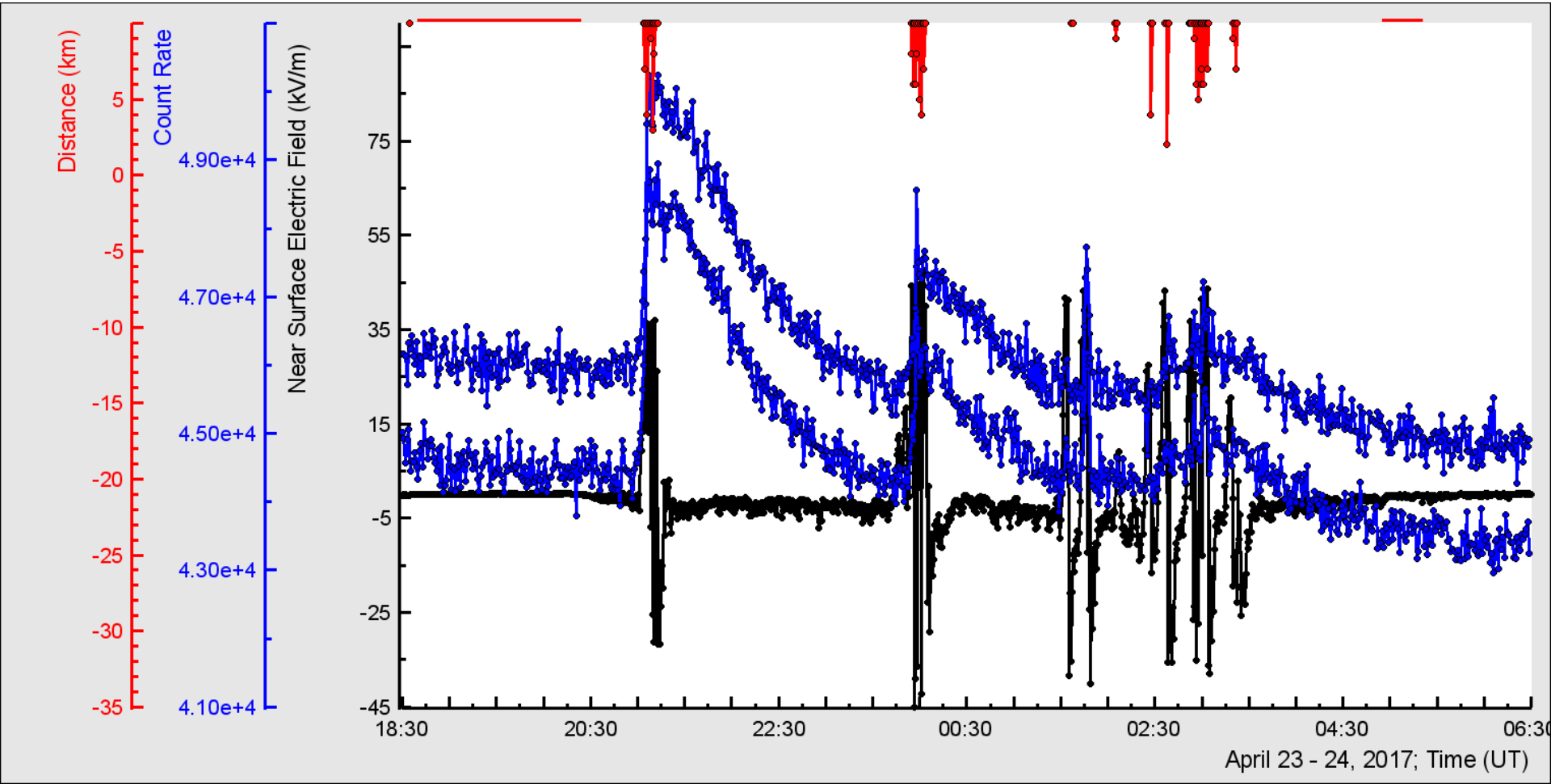
MAKET EFM and STAND3 1000 combination (threshold 2-3 MEV).



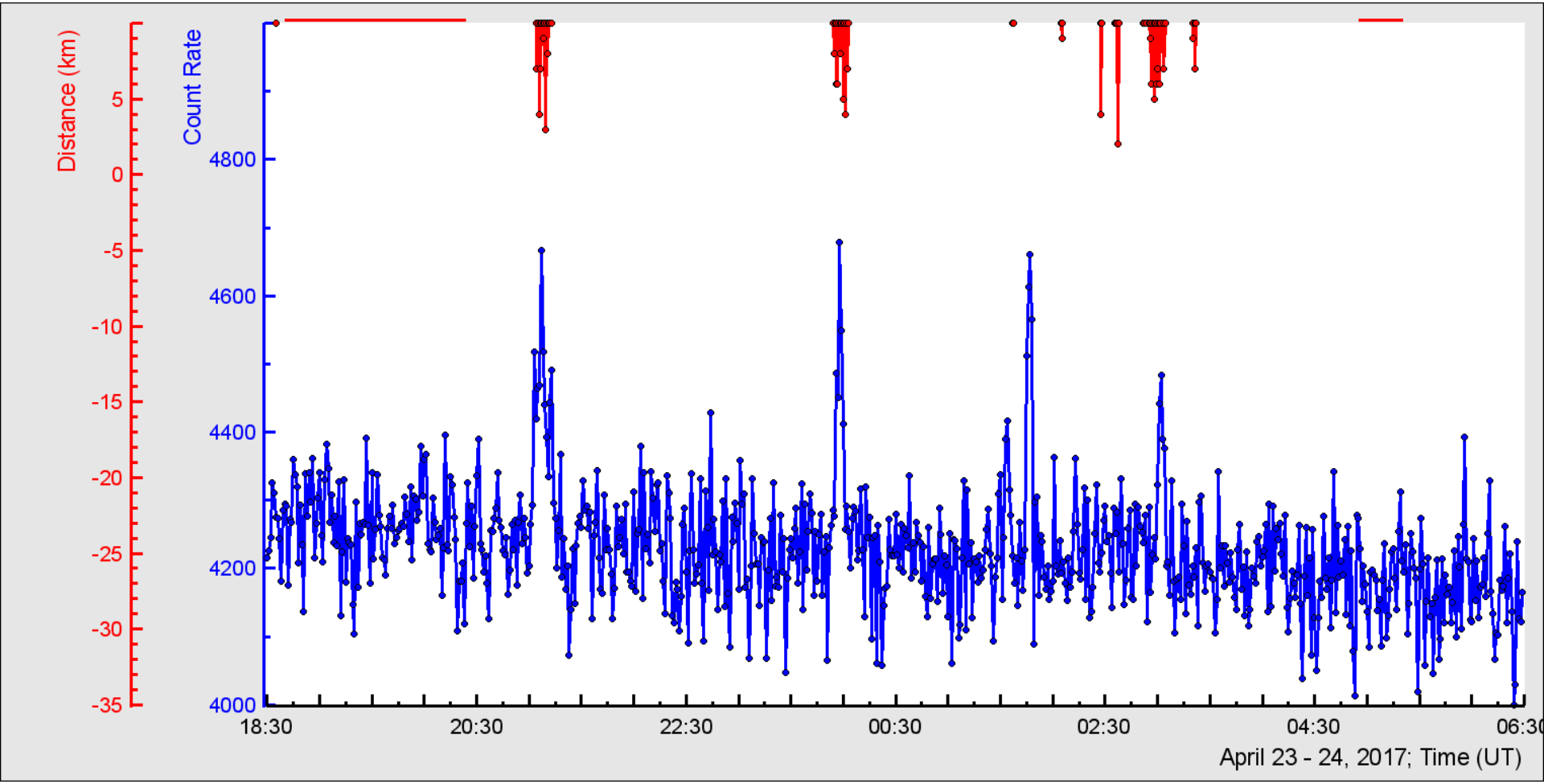

Count Rate
5.10e+4
5.00e+4
4.90e+4
4.80e+4
4.70e+4
4.60e+4
4.50e+4
4.40e+4
4.30e+4
Near Surface Electric Field (kV/m)
12
10
8
6
4
2
0
-2
-4
-6
05:00
07:00
09:00
11:00
13:00
15:00
17:00
April 23, 2017; Time (UT)


Aragats AllSkyCam 1
N. (0)
E. (90)
W. (270)
S. (180)
Aragats AllSkyCam 1
2017-04-23
06:52:00-00

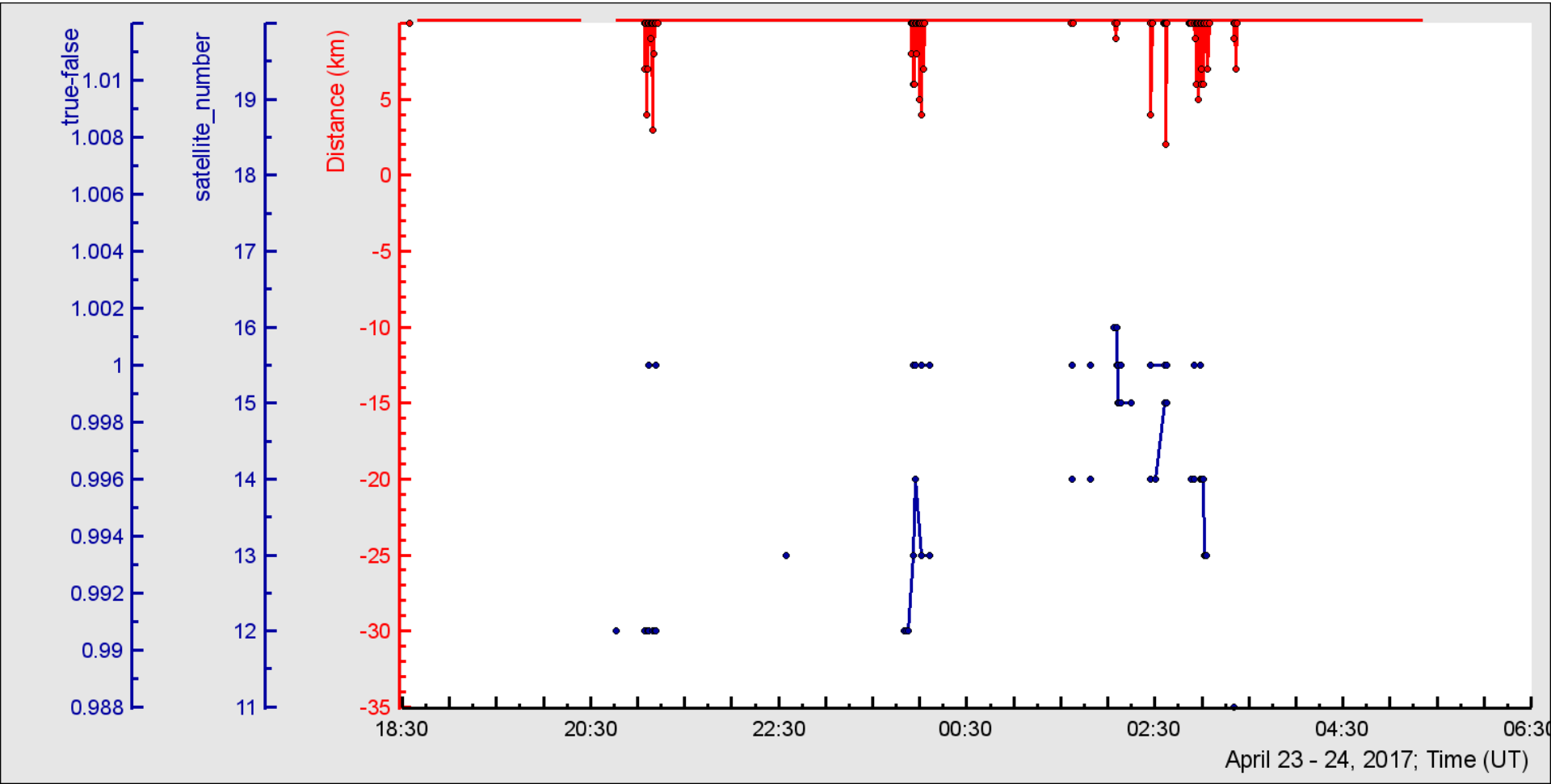
Strong snowstorm on Aragats lasting ~7 hours with numerous nearby lightning flashes and several TGEs (NaI crystals N 1 and 2 with threshold 0.4 MeV)



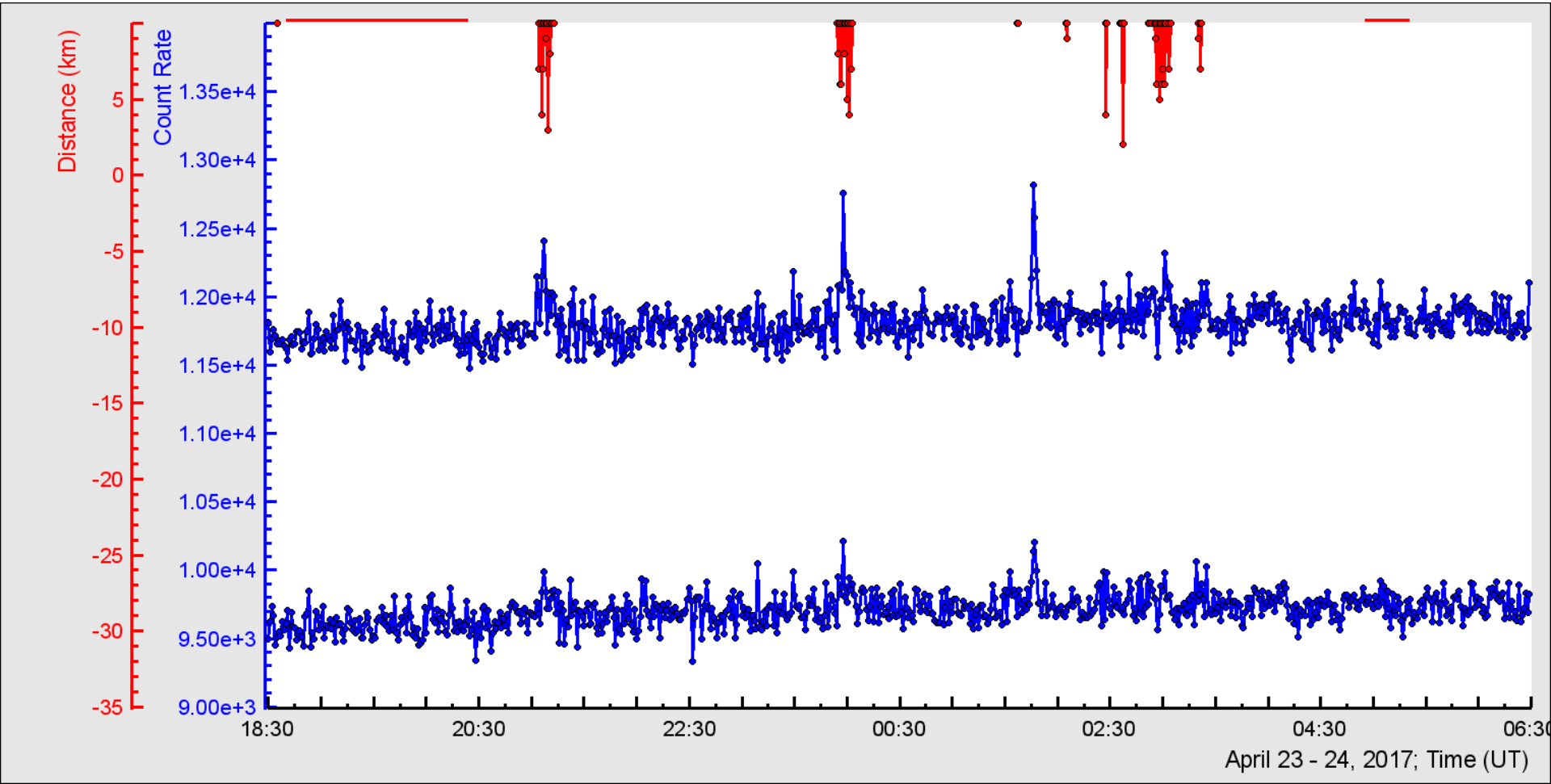
NaI crystal N 5, energy threshold 0.4 MeV



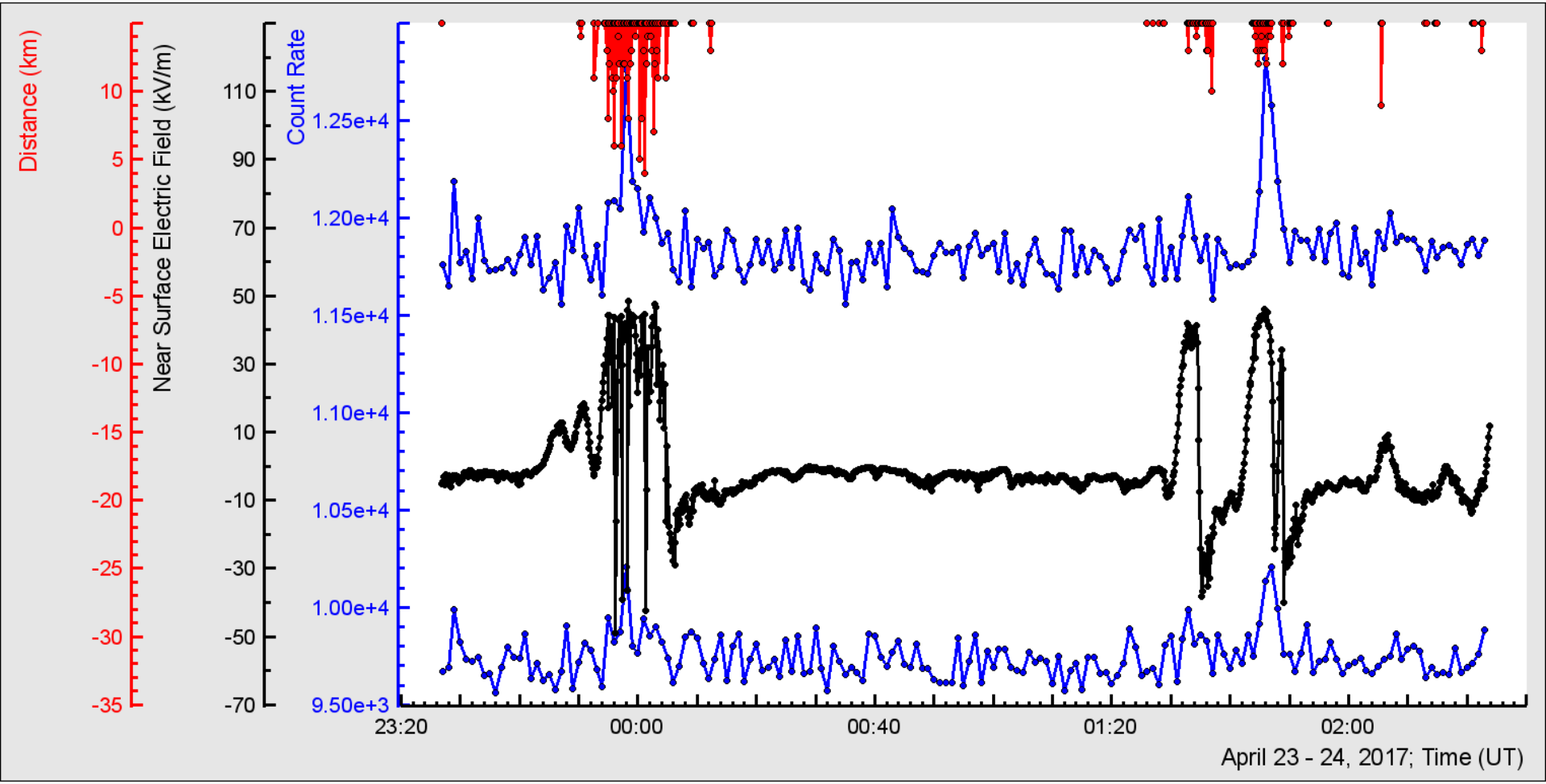
Near 10 mutual triggers from MAKET (number of satellites ranging from 12 to 15) and SKL(validity = 1) whip antennas



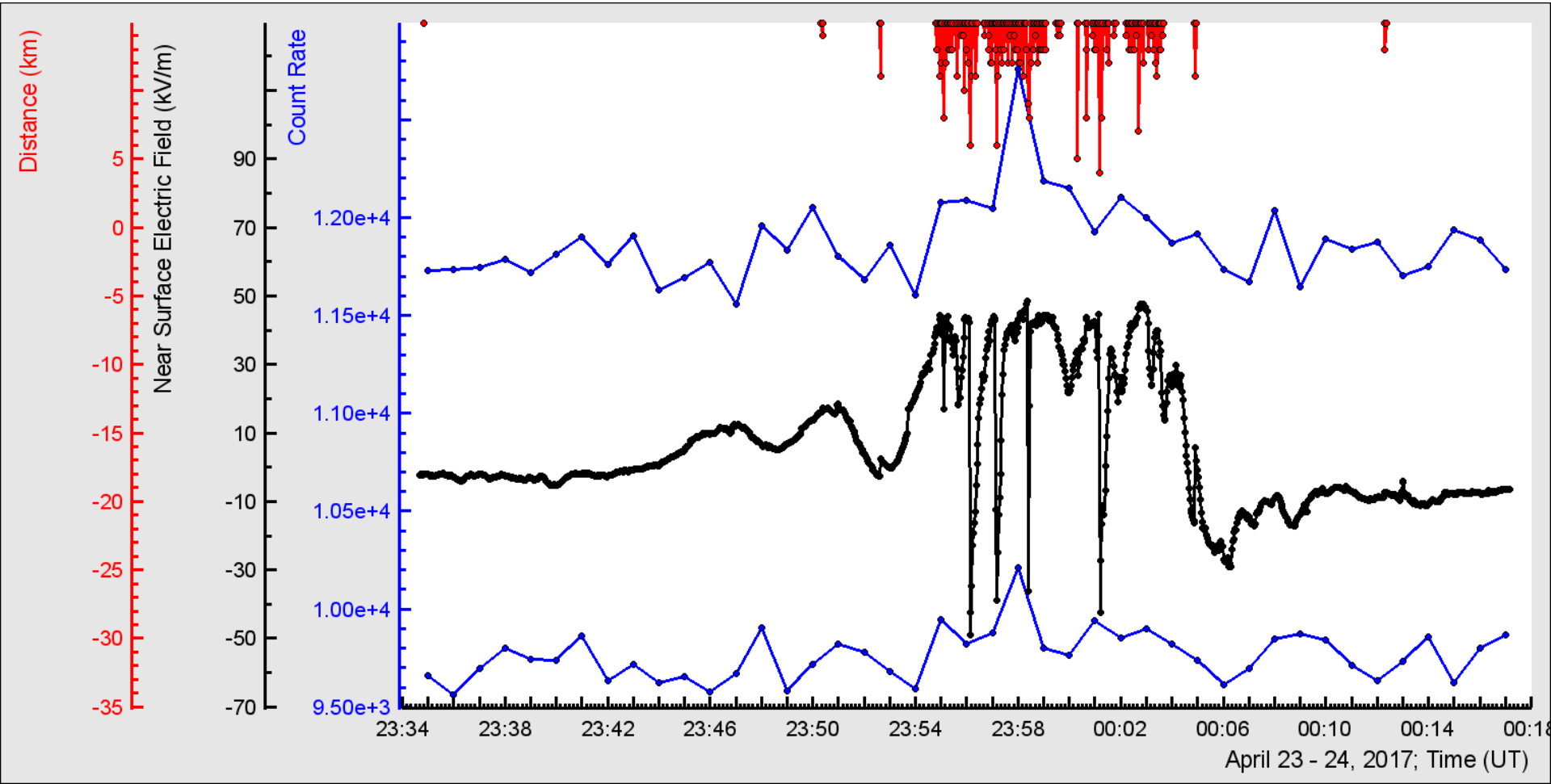
Cube detector: inside 20 cm thick scintillators (energy threshold 3-4 MeV)



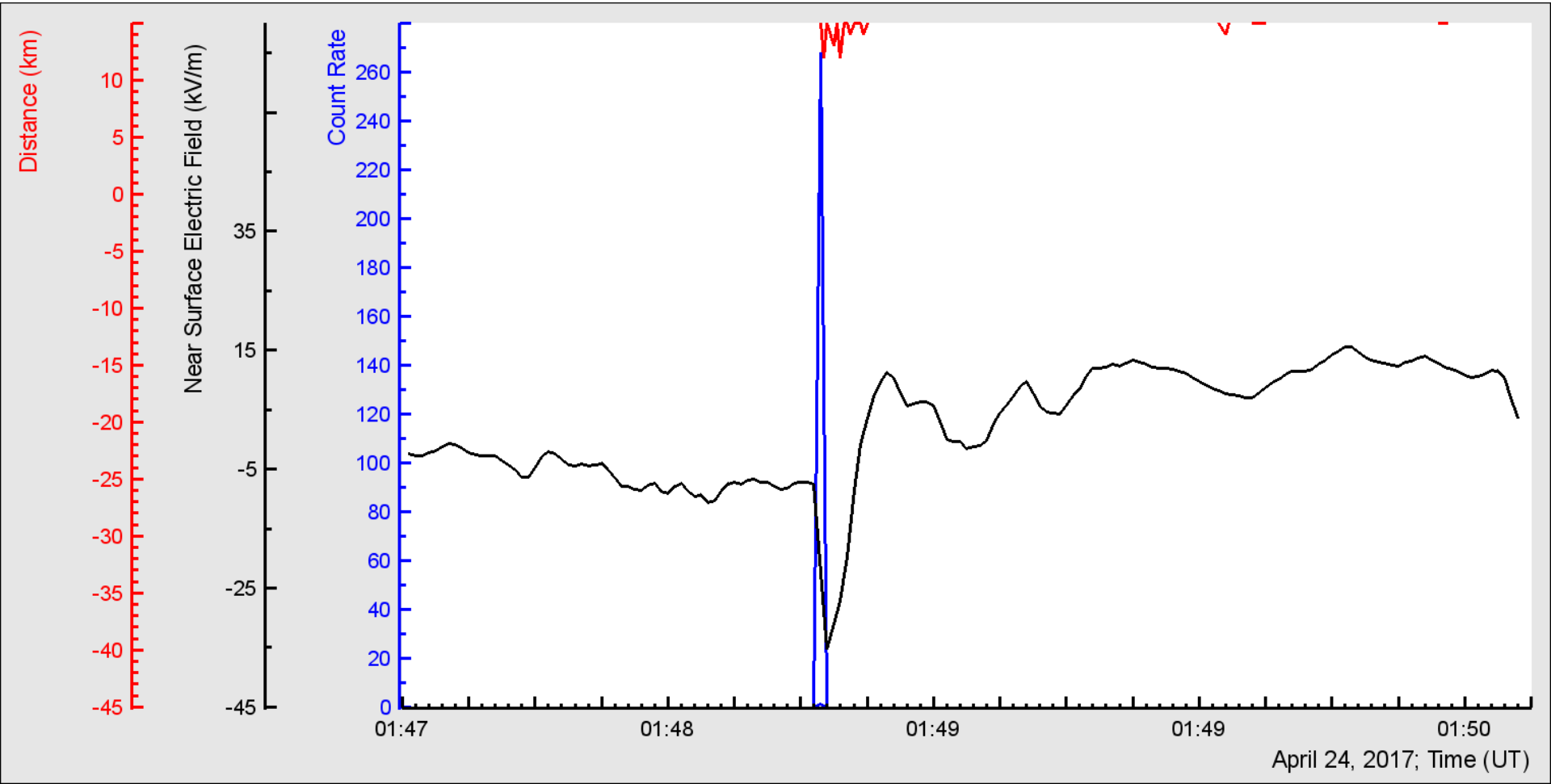
Zoom of previous slide with electric field disturbances measured by GAMMA electric mill



Zoom of previous slide with electric field disturbances measured by GAMMA electric mill



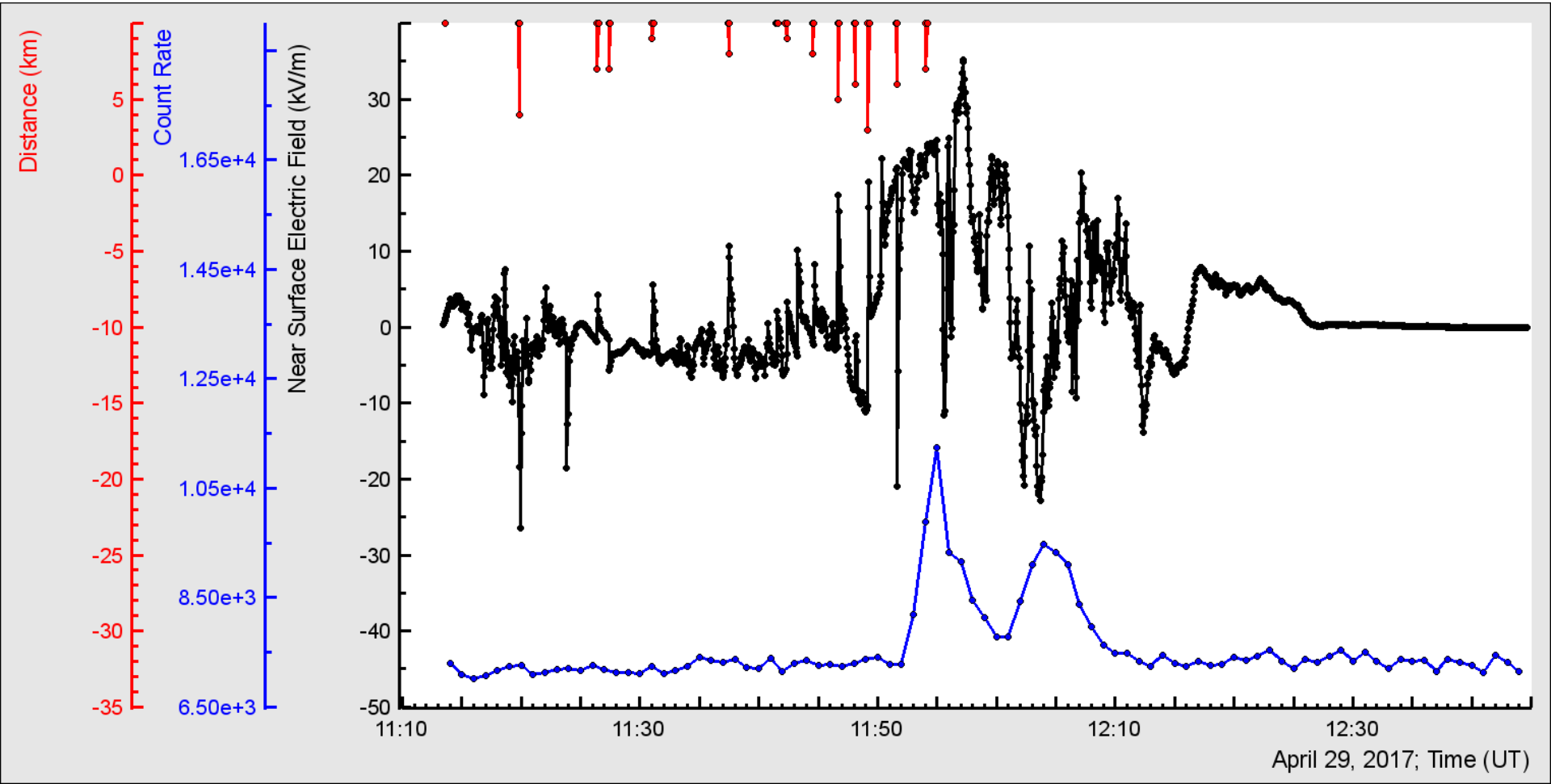
UV sensor (blue) registering lightning flash



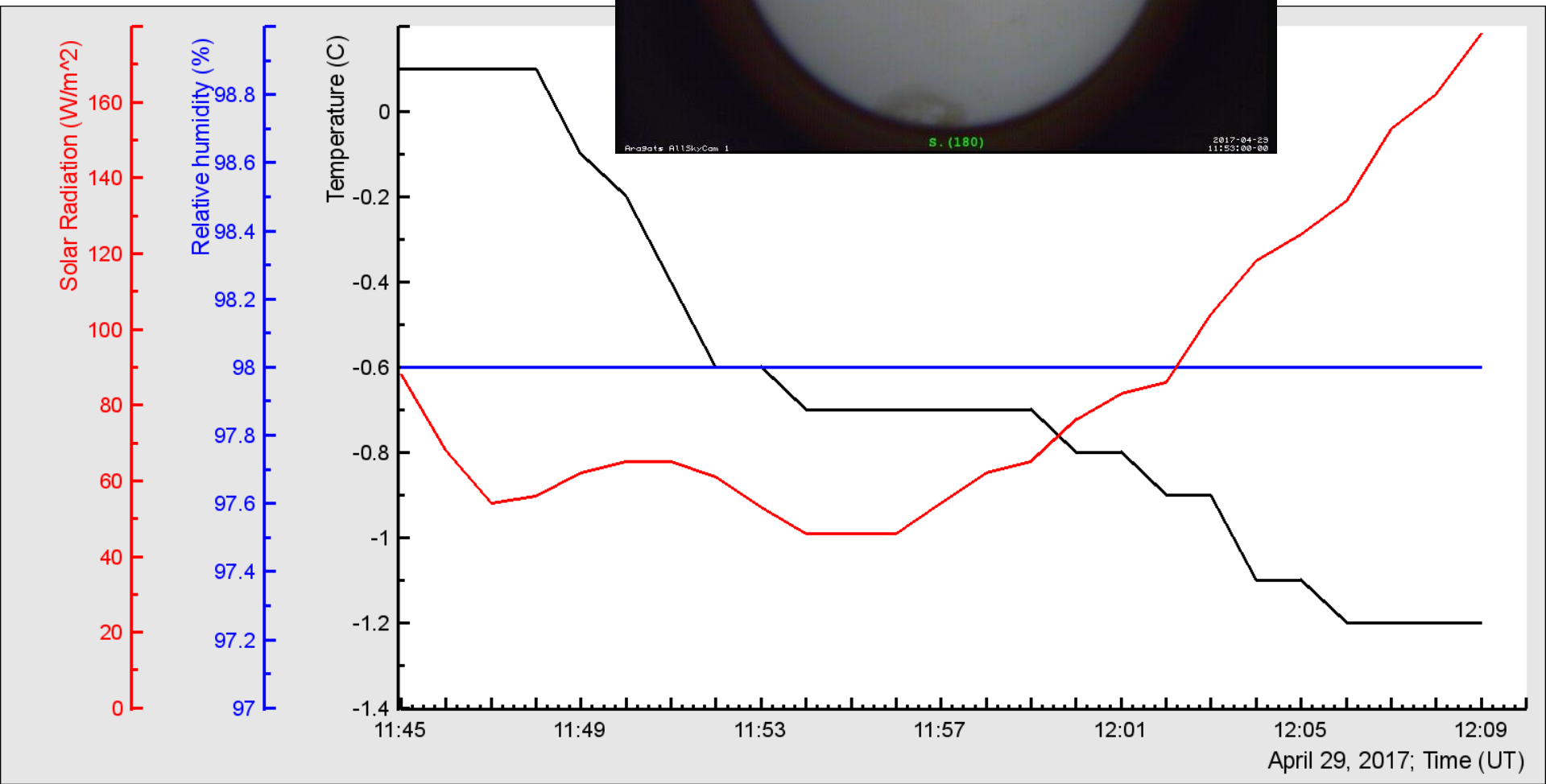
29 April TGE

- 13:30 (local) groupels, lightnings, fog;
- 15:30 the snowstorm.

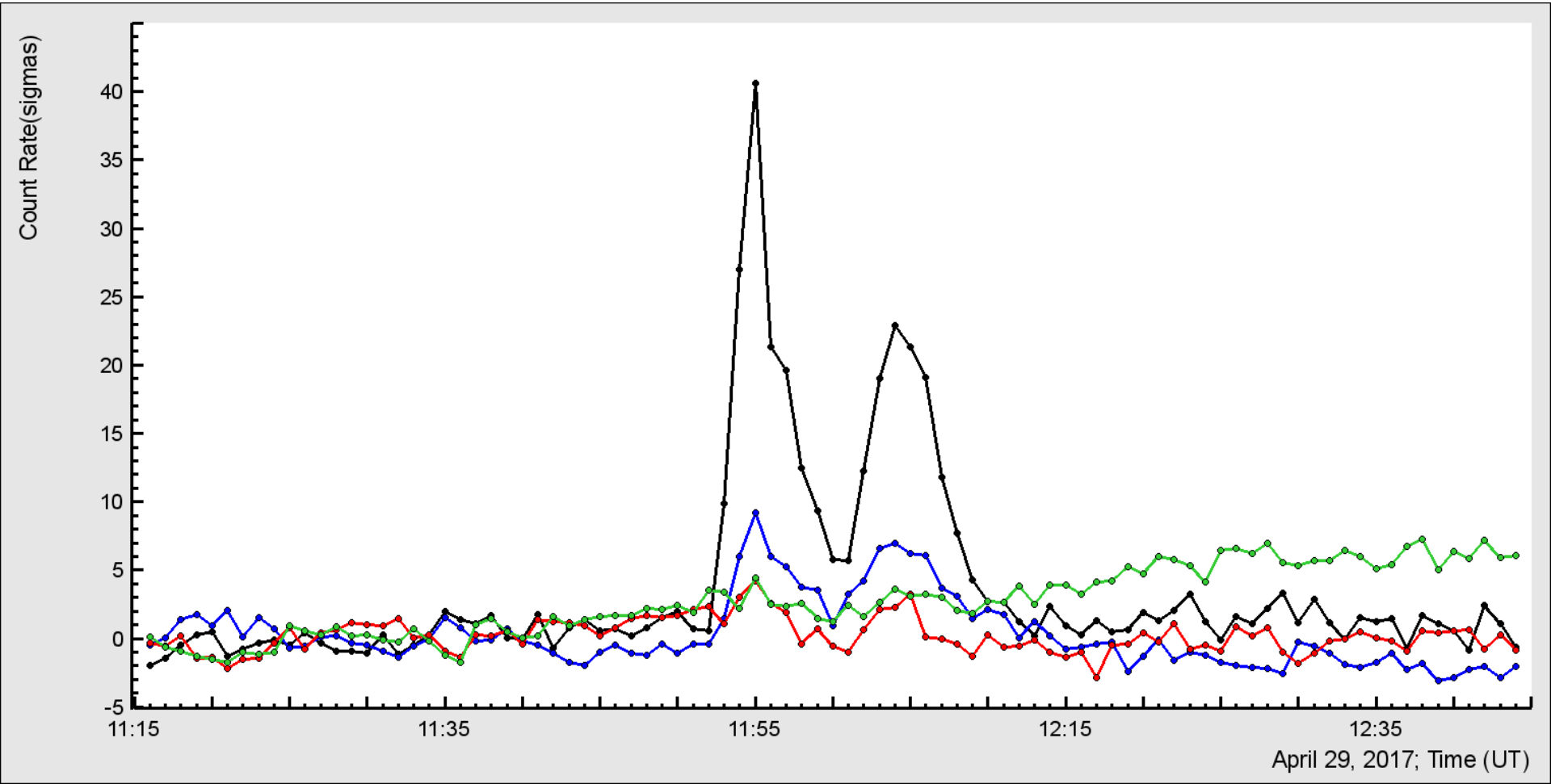
MAKET EFM and 1000 of STAND3



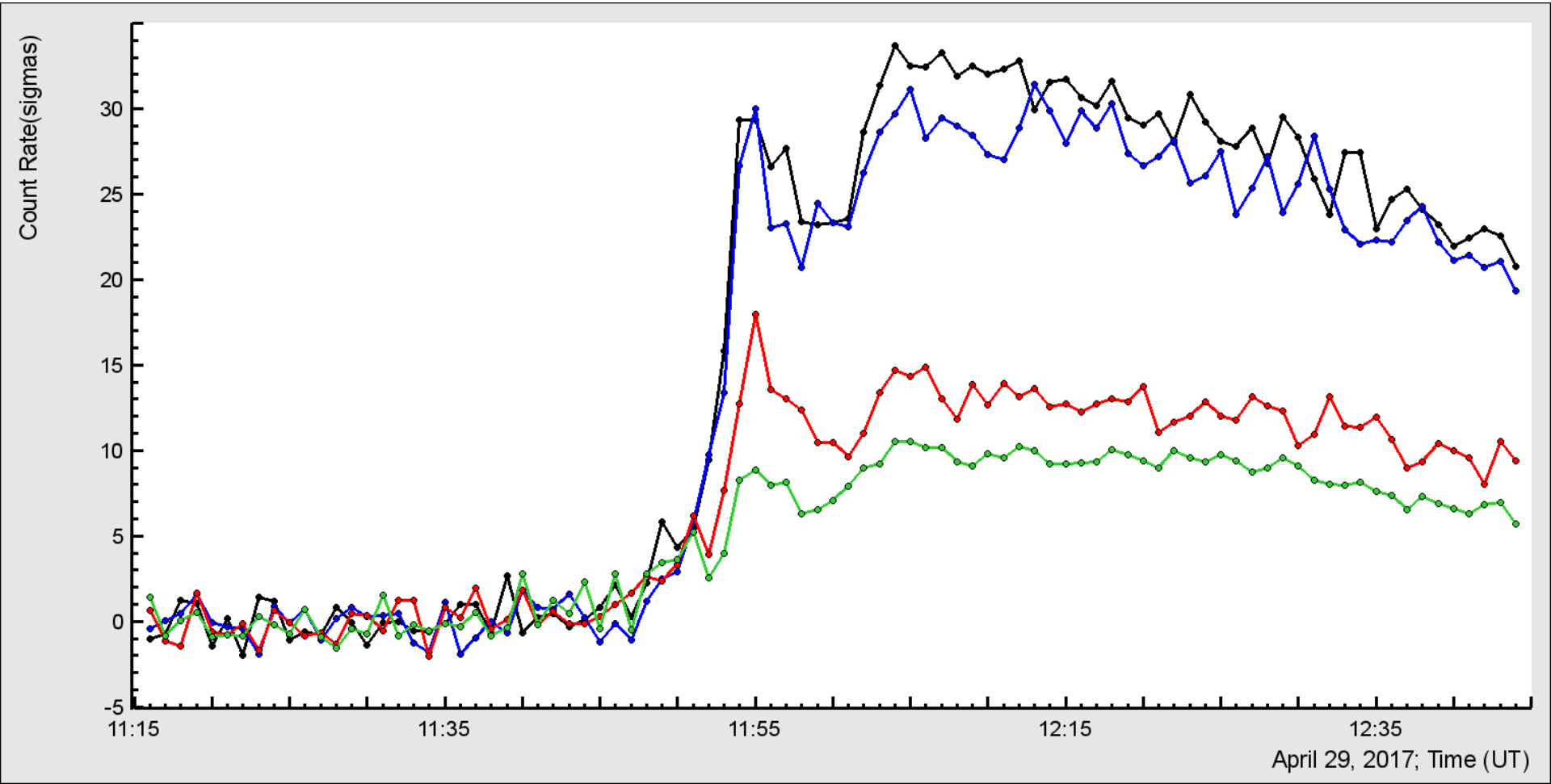

Aragats AllSkyCam 1
N. (0)
E. (90)
W. (270)
S. (180)
Aragats AllSkyCam 1
2017-04-29
11:53:00-00


Solar Radiation (W/m^2)
0
20
40
60
80
100
120
140
160
Relative humidity (%)
97
97.2
97.4
97.6
97.8
98
98.2
98.4
98.6
98.8
Temperature (C)
-1.4
-1.2
-1
-0.8
-0.6
-0.4
-0.2
0
11:45
11:49
11:53
11:57
12:01
12:05
12:09
April 29, 2017; Time (UT)

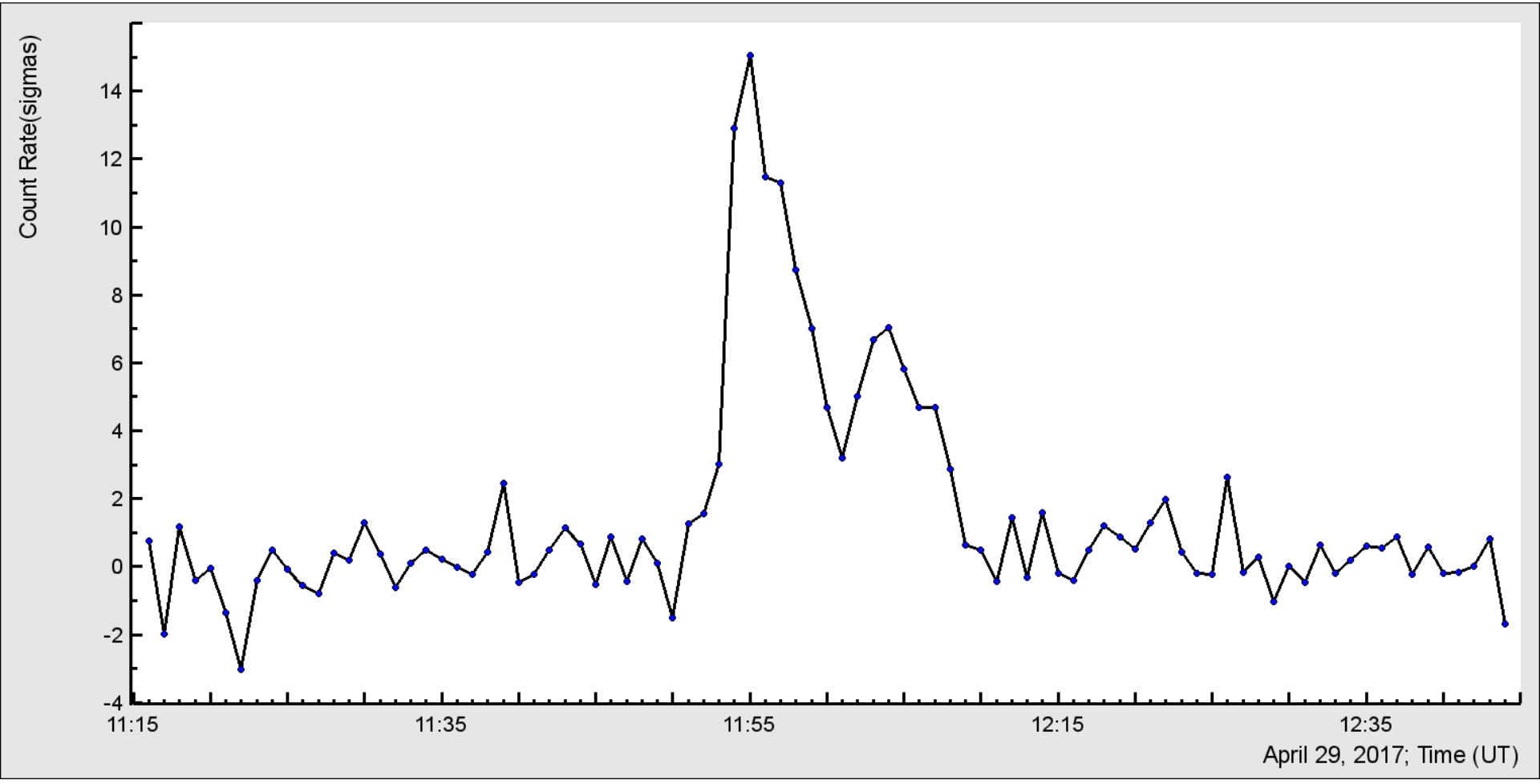
STAND3 combinations



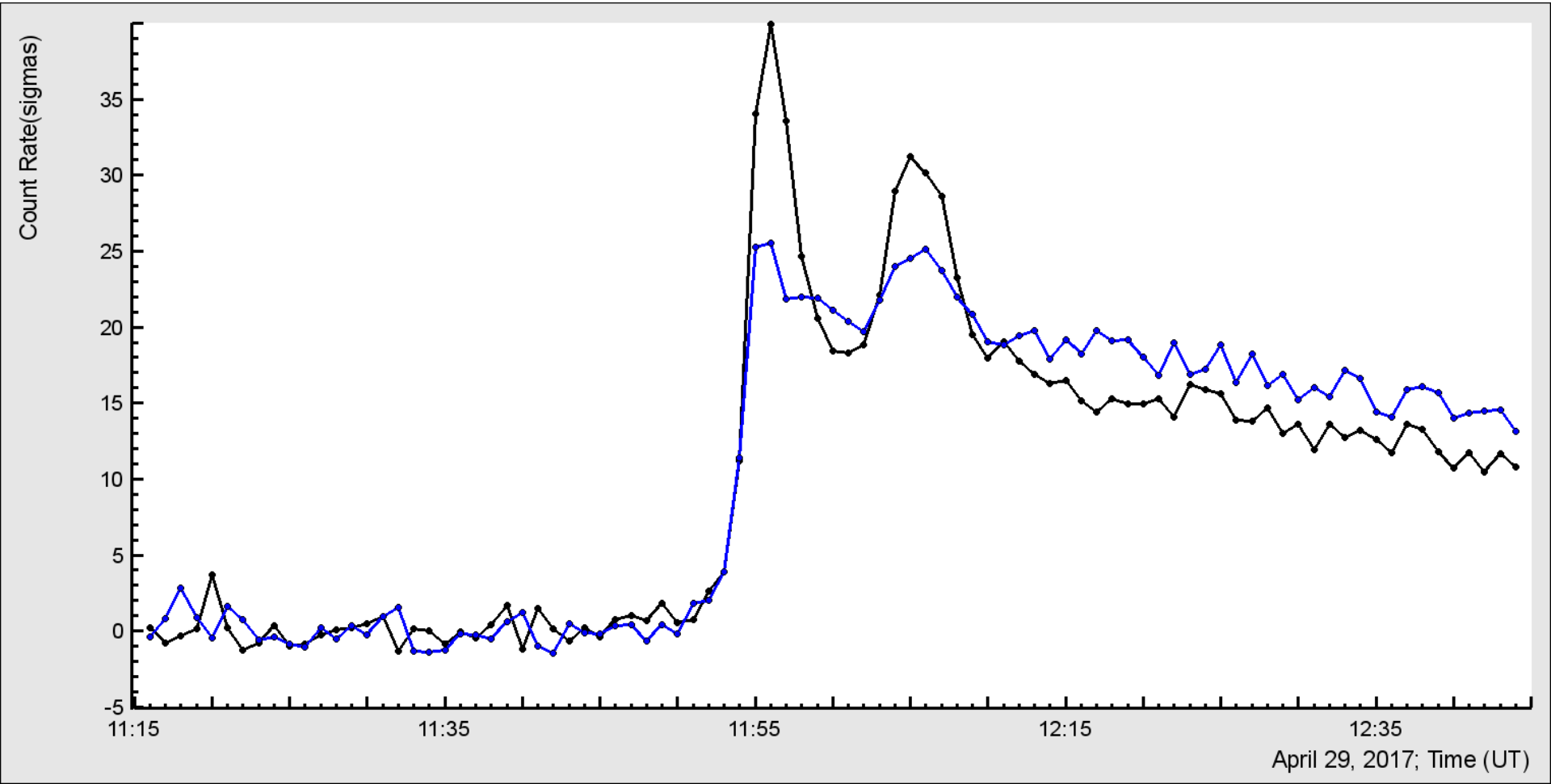
NAI N 1,2,3,6


Count Rate(sigmas)
30
25
20
15
10
5
0
-5
11:15
11:35
11:55
12:15
12:35
April 29, 2017; Time (UT)

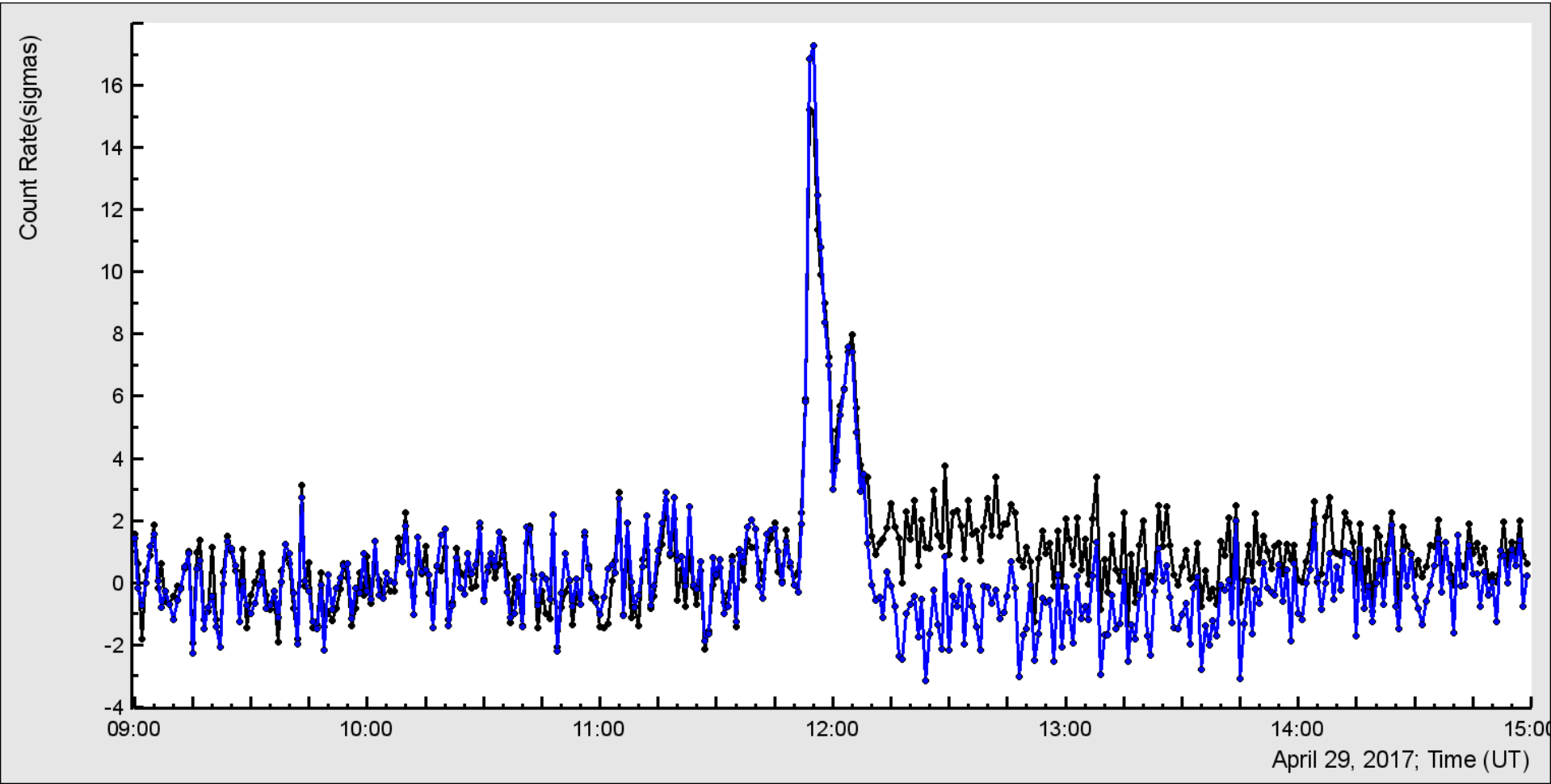
NaI N 5


Count Rate(sigmas)
14
12
10
8
6
4
2
0
-2
-4
11:15
11:35
11:55
12:15
12:35
April 29, 2017; Time (UT)

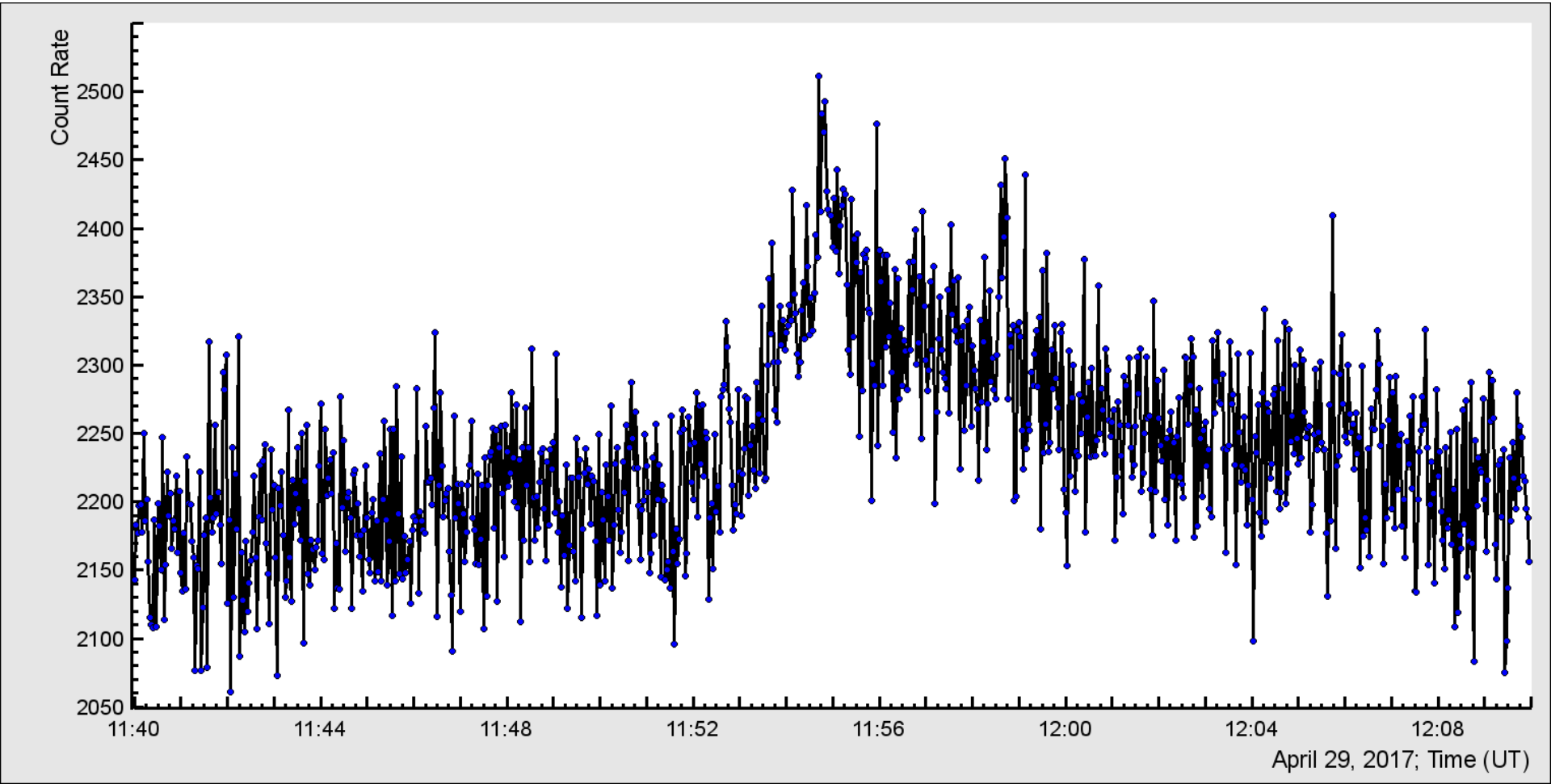
STAND1 100 and 010



CUBE 7 with and without veto



ASNT 60 cm thick



MAKET 3 cm thick