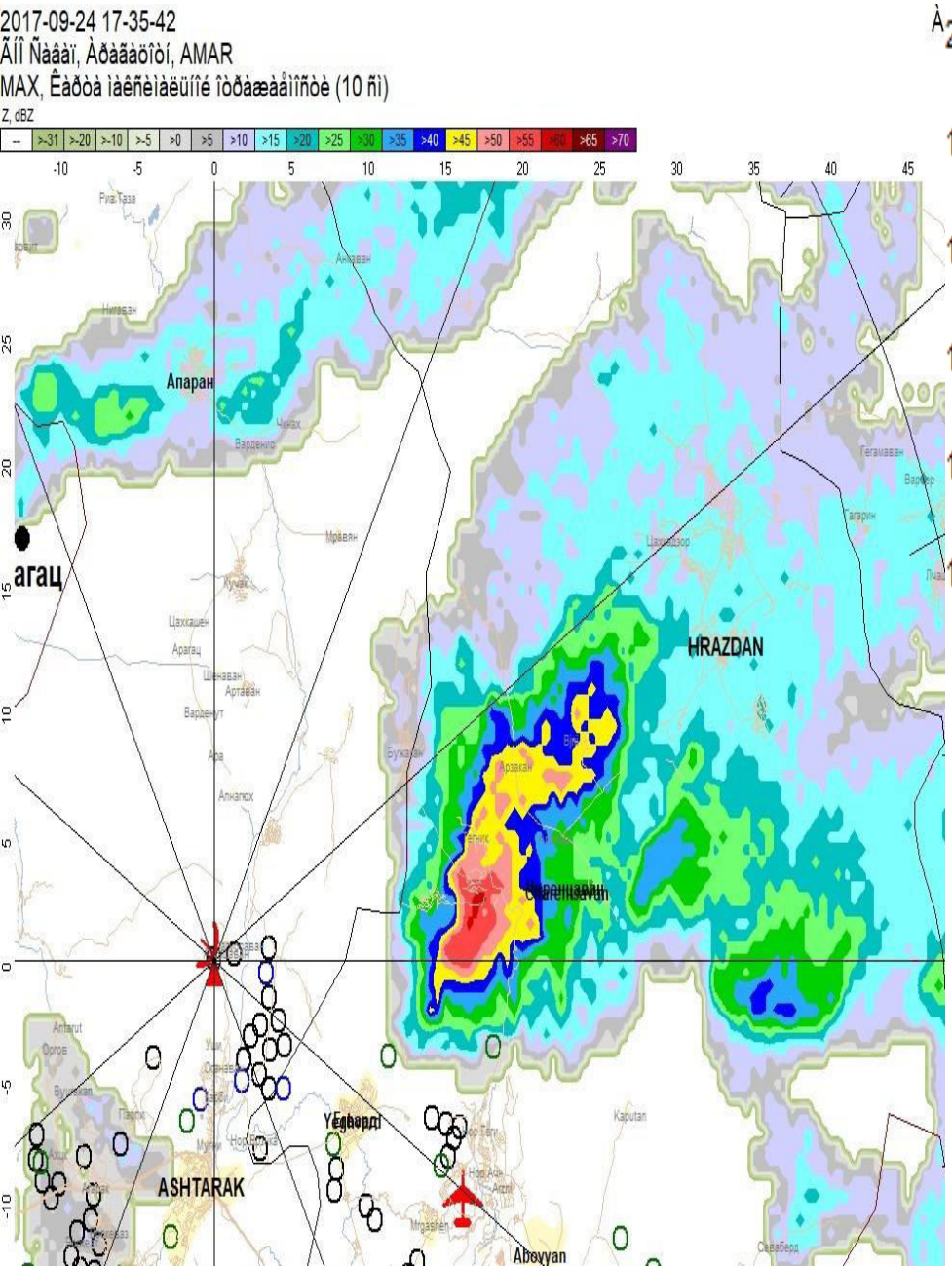
EARTHQUAKE
LIGHTNING
WHAT IS WHAT
SUREN HOVAKIMYAN
MES OF RA
TEPA-2019

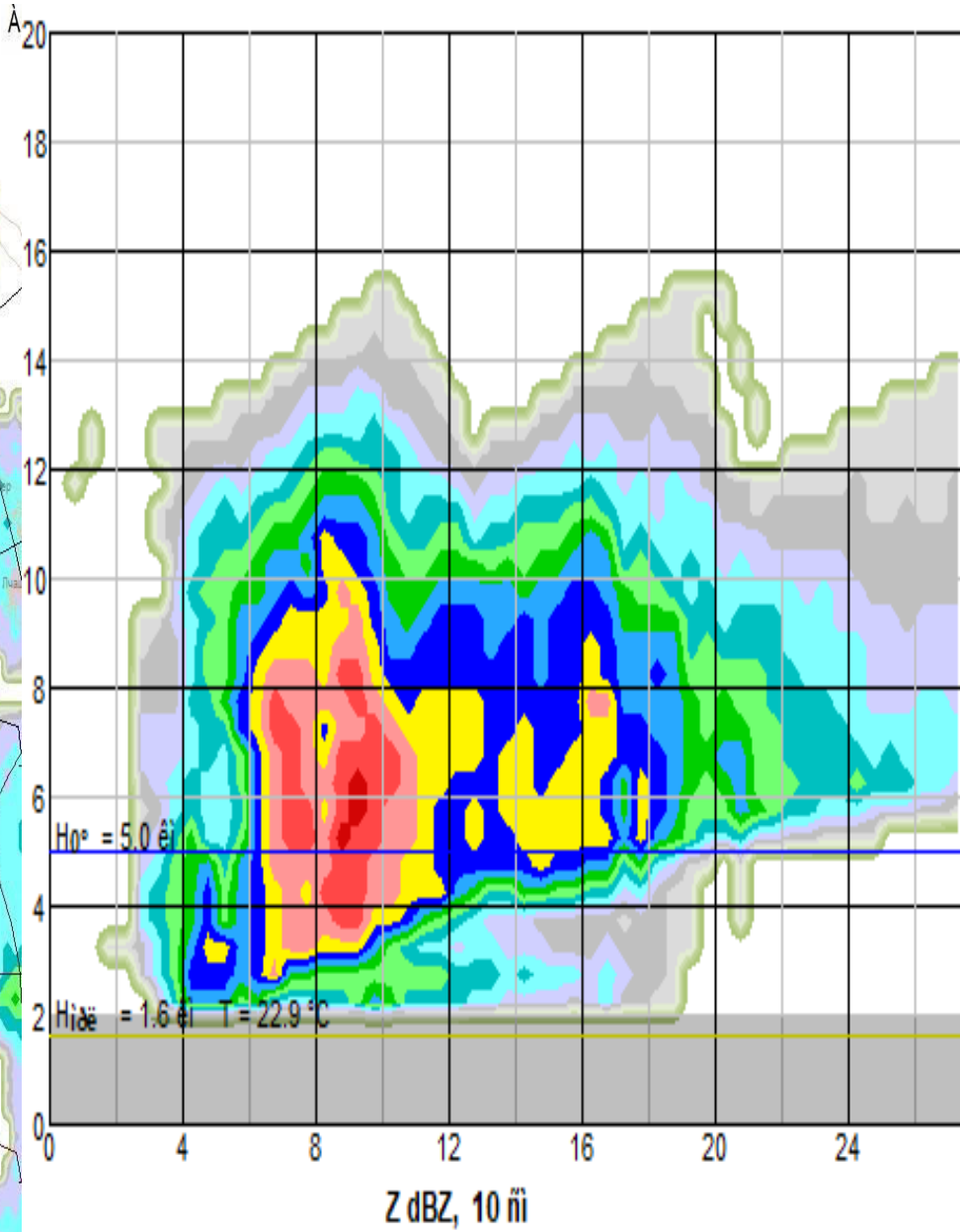
THUNDERCLOUD AS A EARTHQUAKE OBSERVATION INSTRUMENT

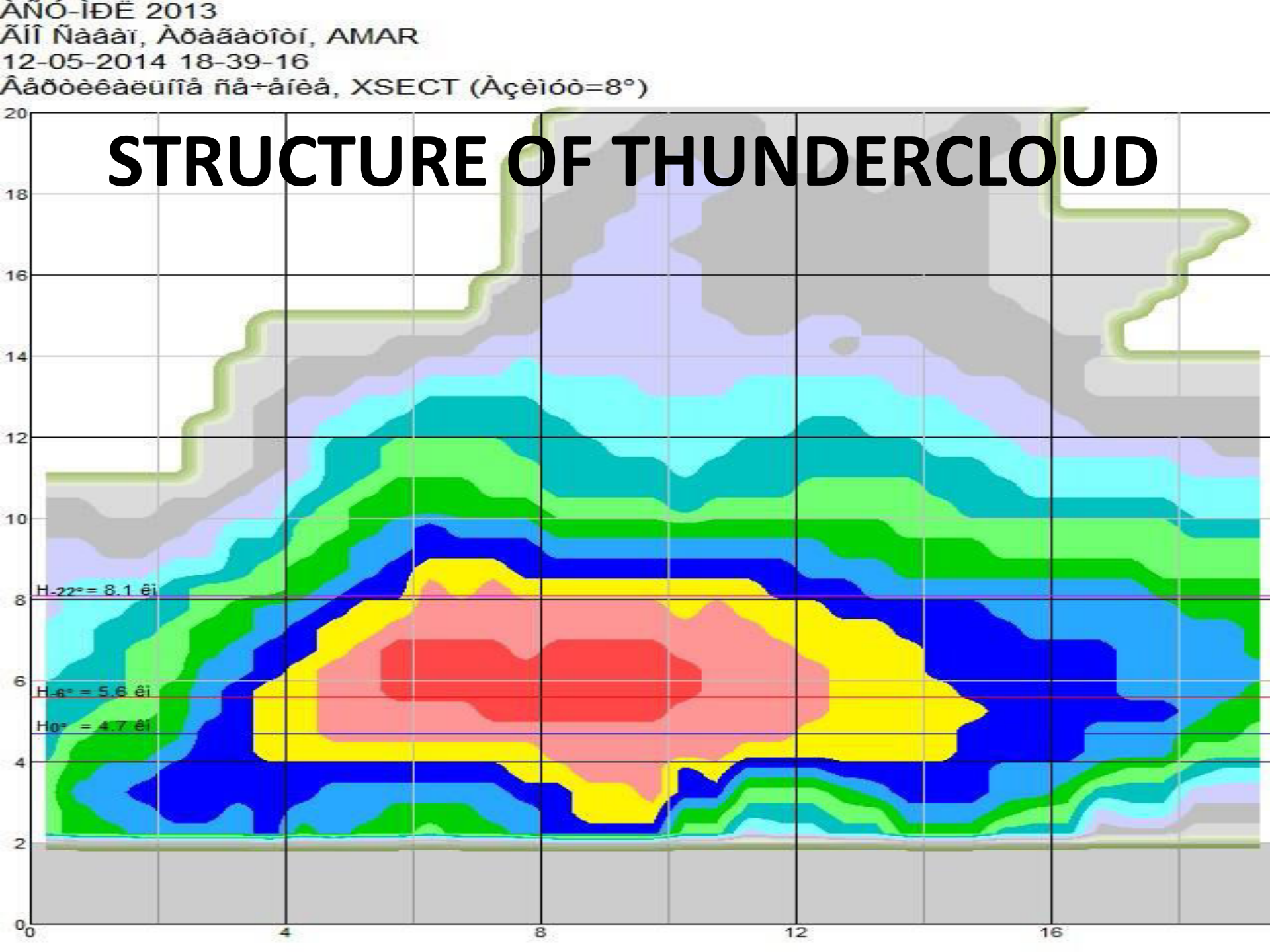
MRL-5 METEORADAR
Reflectivity, Cloud,
Integrated Water Amount.

LIGHTNING DETECTOR
3-D location and time,
Flash rate, flash size

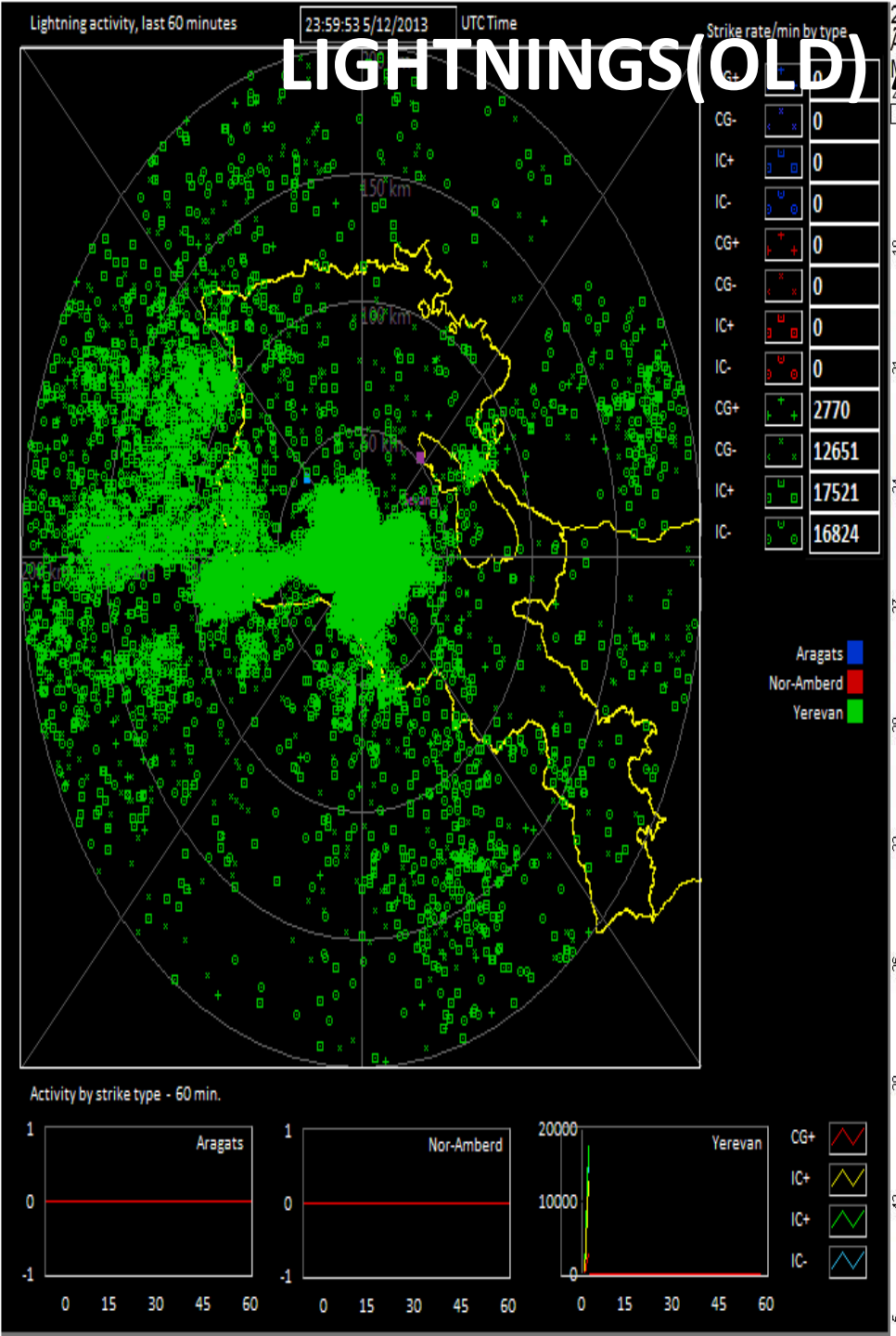
HORIZONTAL AND VERTICAL CUTS OF THE THUNDERCLOUDS

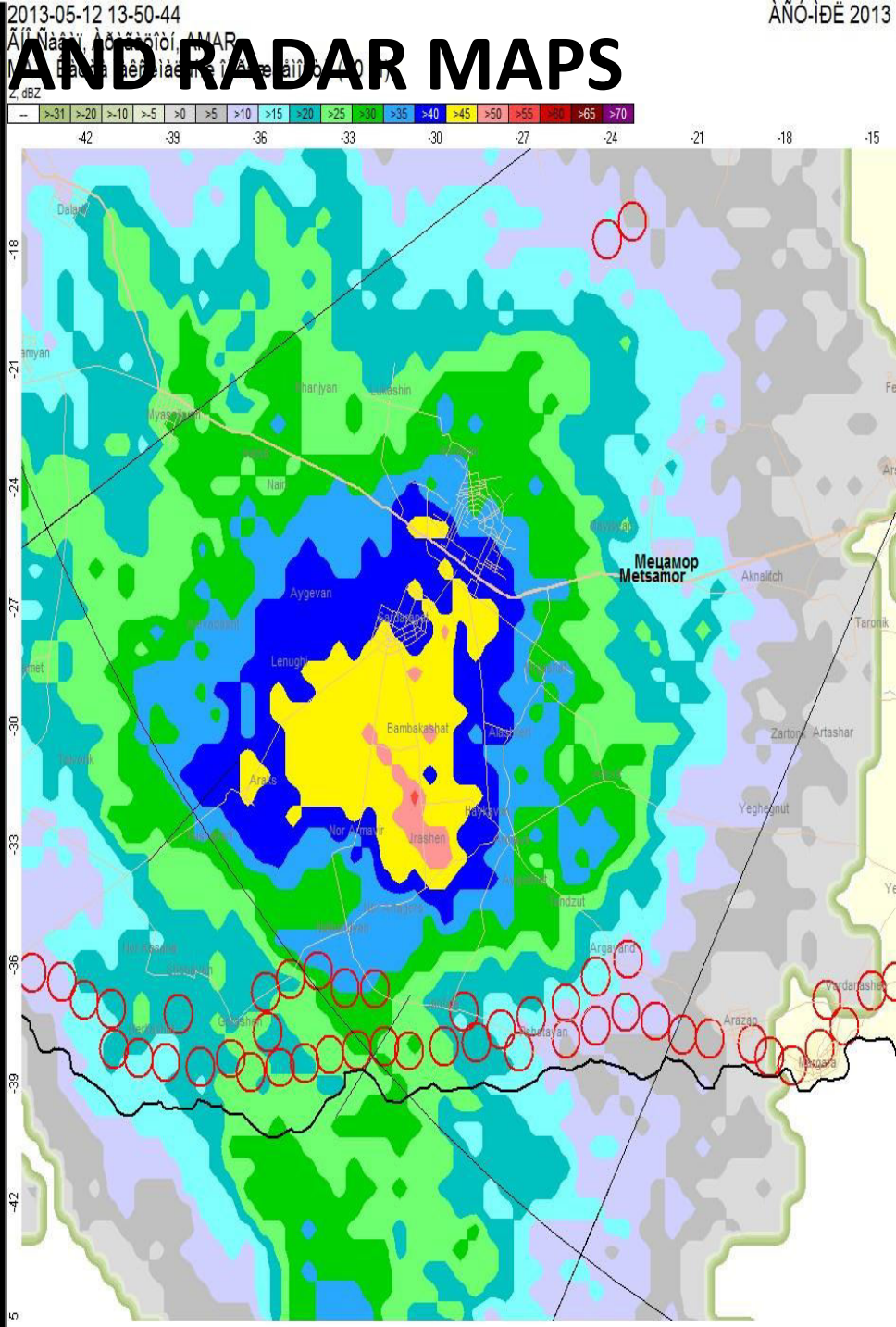




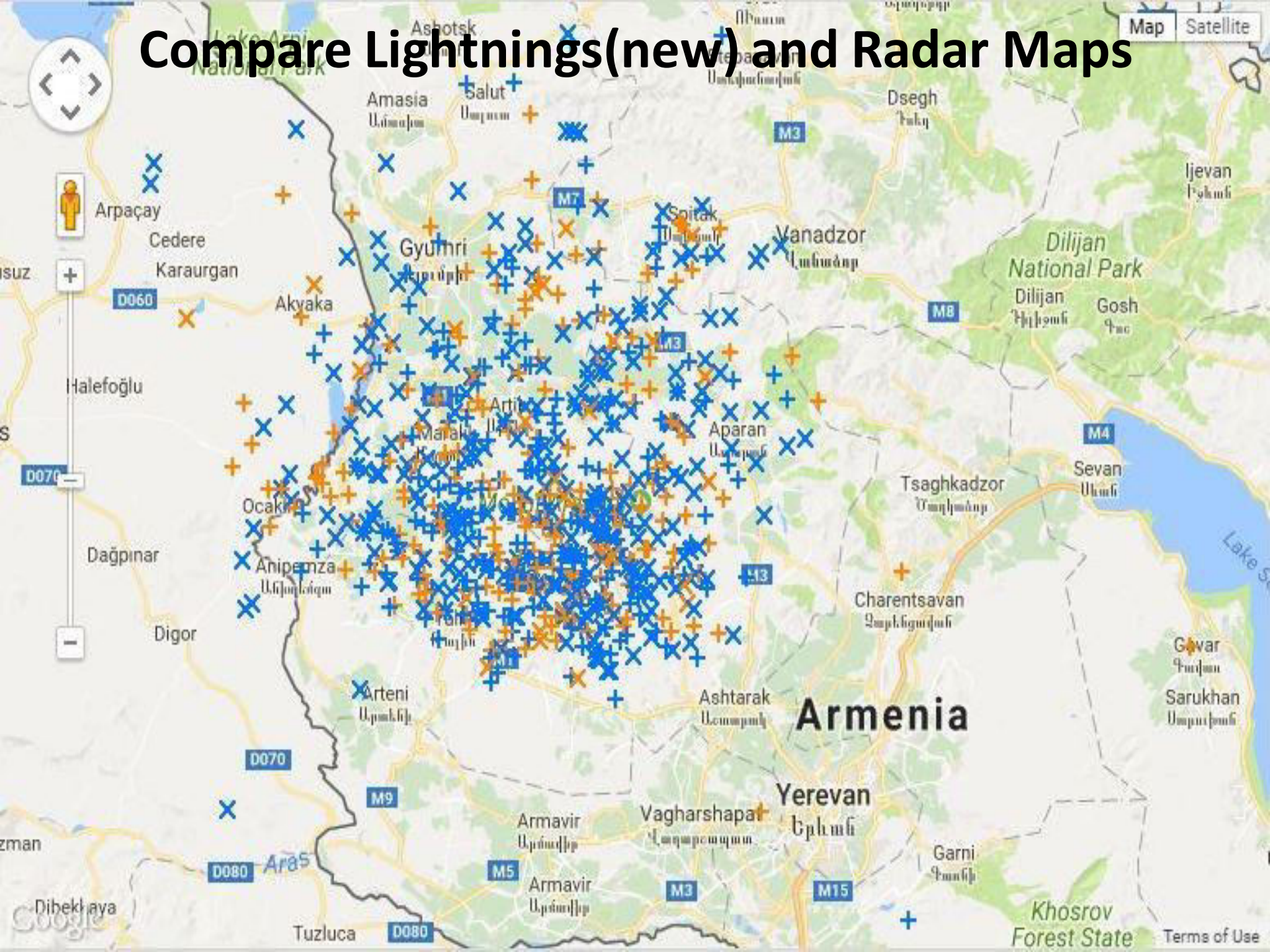

ÀÑÓ-ÌÐÉ 2013
ÃÍÎ Ñàâàï, Àðàãàöîòí, AMAR
12-05-2014 18-39-16
Âåðòèêàëüíîå ñå÷åíèå, XSECT (Àçèìóò=8°)
STRUCTURE OF THUNDERCLOUD
H-22° = 8.1 êì
H-6° = 5.6 êì
Ho° = 4.7 êì
0
2
4
6
8
10
12
14
16
18
20
0
4
8
12
16

LIGHTNINGS(OLD) AND RADAR MAPS

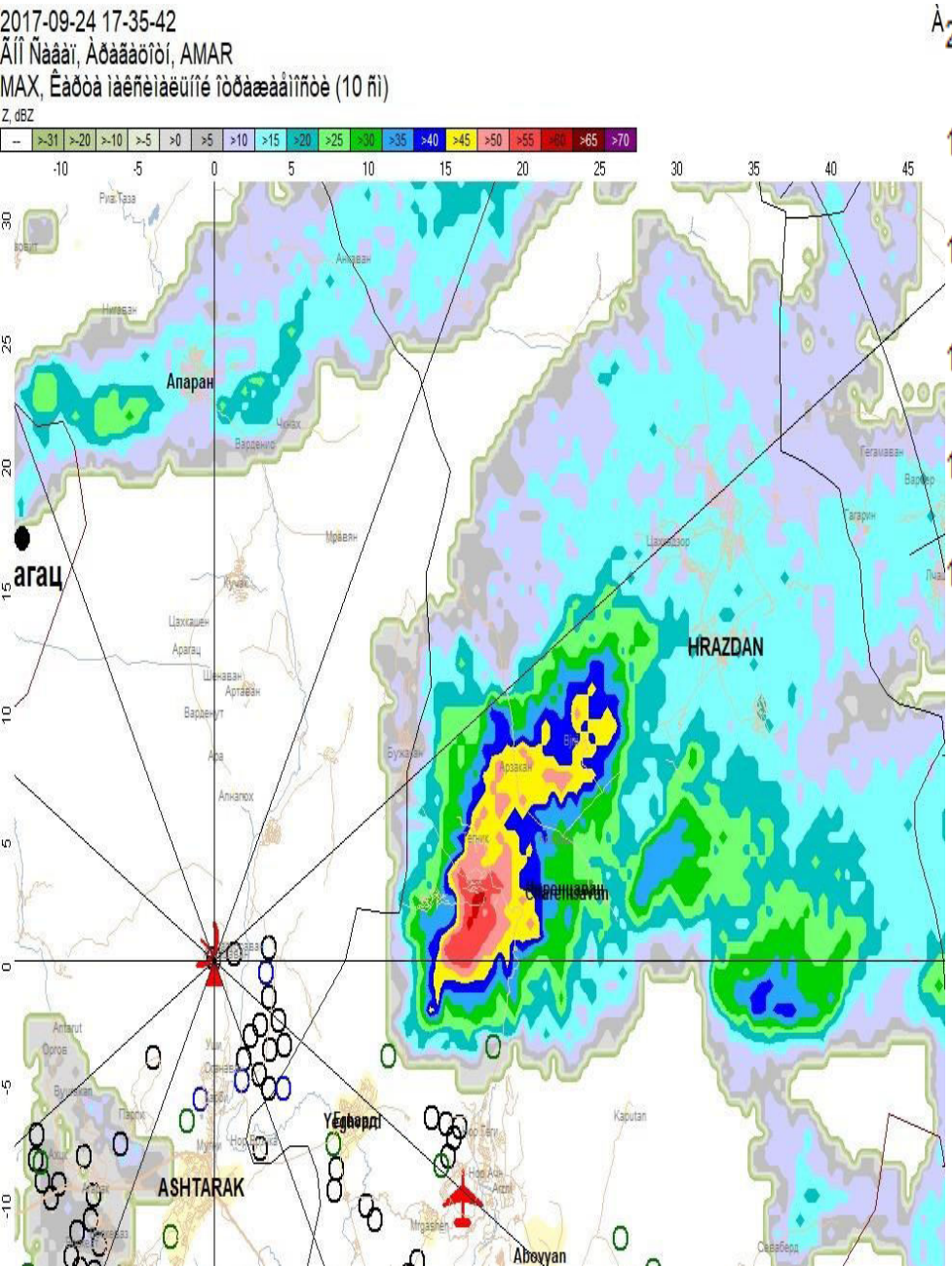


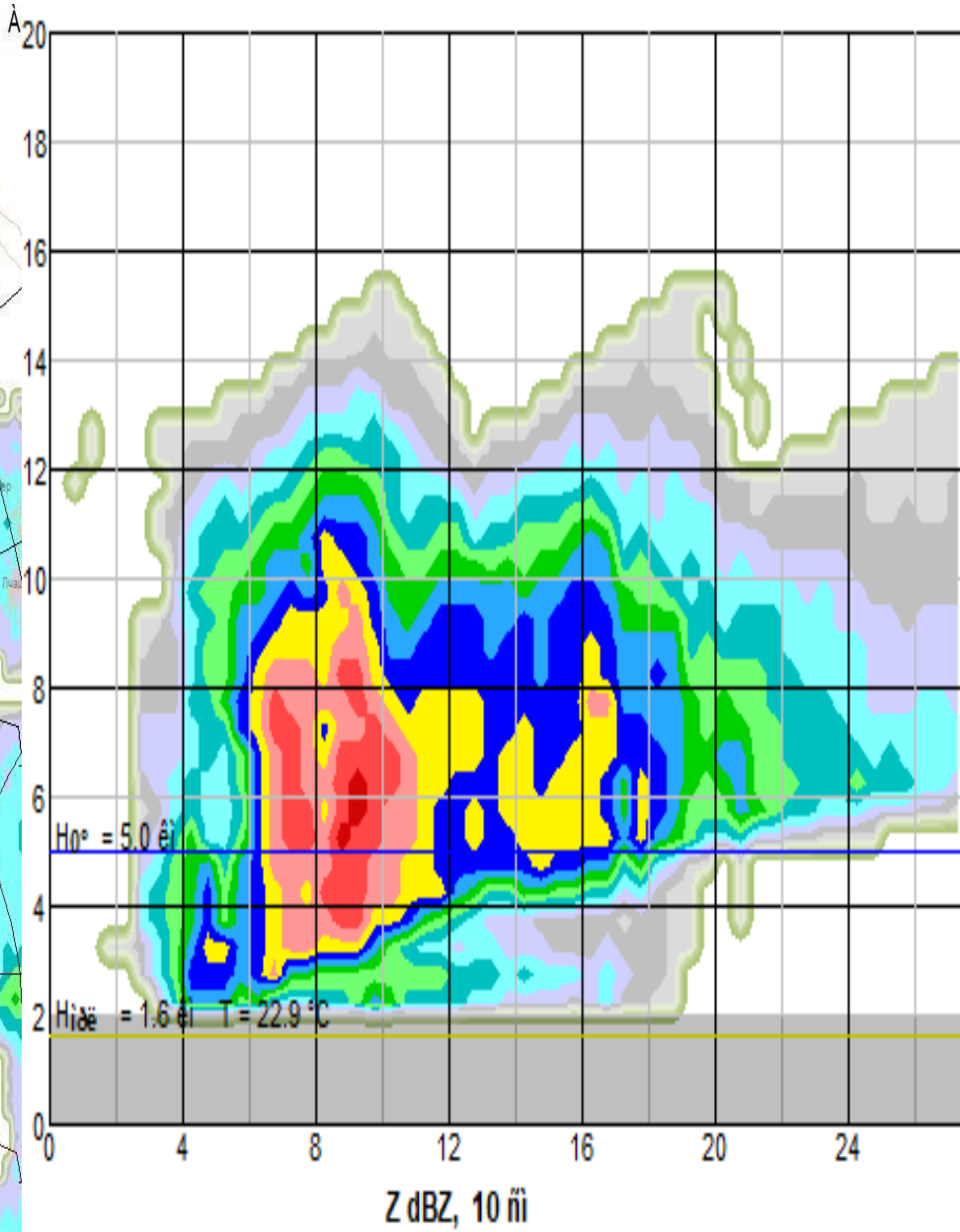


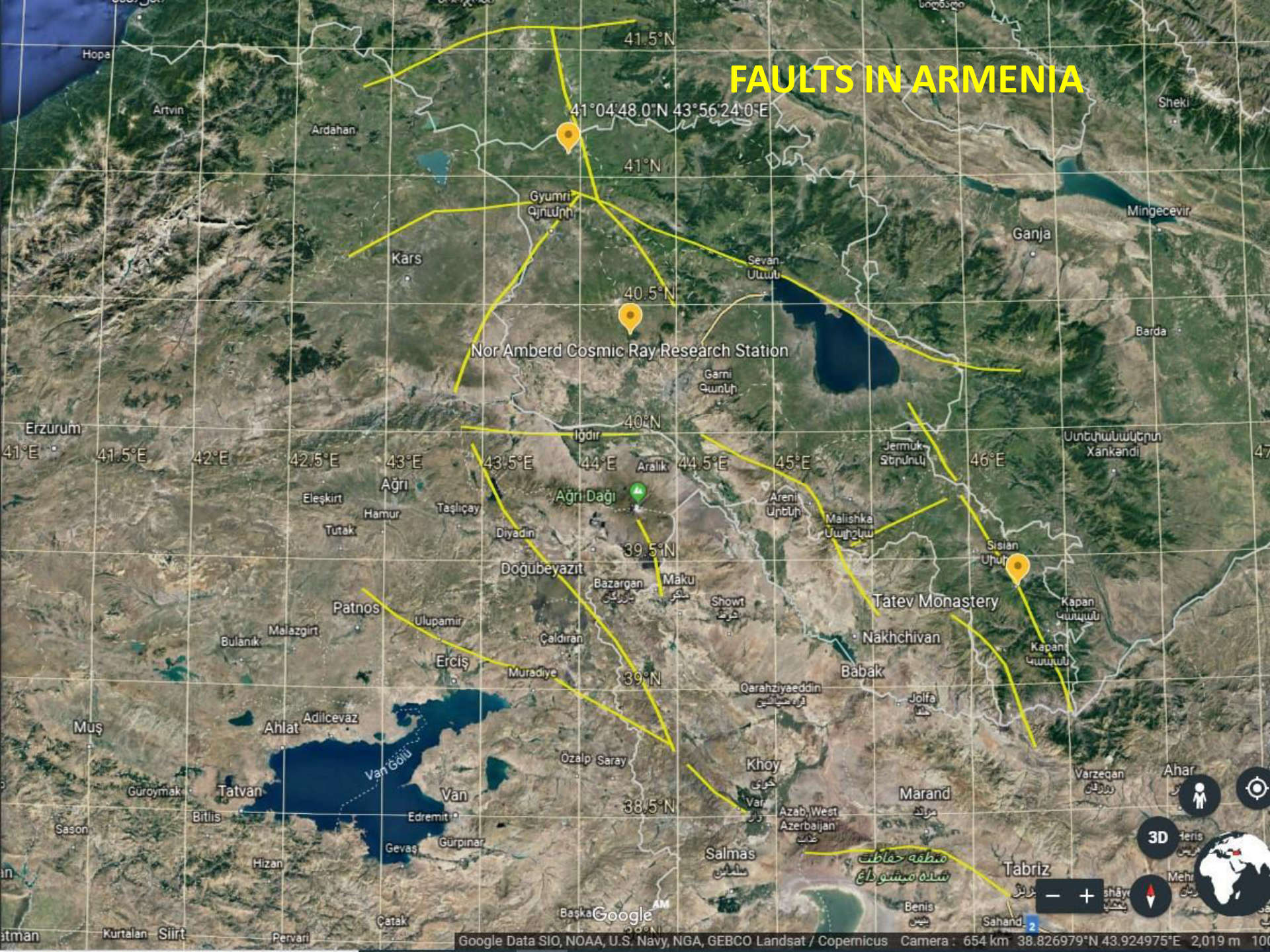
Compare Lightnings(new) and Radar Maps



HORIZONTAL AND VERTICAL CUTS OF THE THUNDERCLOUDS

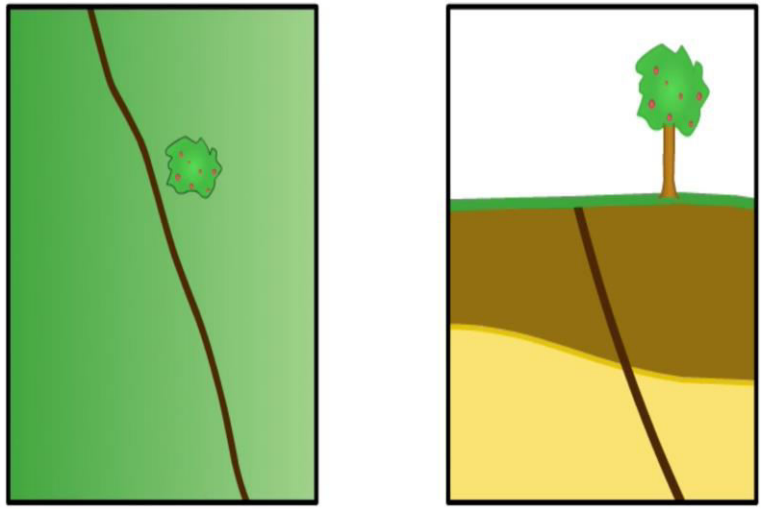





FAULTS IN ARMENIA
41°04'48.0"N 43°56'24.0"E
Nor Amberd Cosmic Ray Research Station
Gyumri
Kars
Sevan
Ganja
Mingecevir
Barda
Erzurum
Ağrı
Ağrı Dağı
Doğubeyazit
Patnos
Tatev Monastery
Nakhchivan
Babak
Erciş
Muş
Ahlat
Van
Tatvan
Khoy
Marand
Salmas
Tabriz
Google Data SIO, NOAA, U.S. Navy, NGA, GEBCO Landsat / Copernicus Camera : 654 km 38.826979°N 43.924975°E 2,019 m

USGS Foreshocks, Mainshocks & Aftershocks

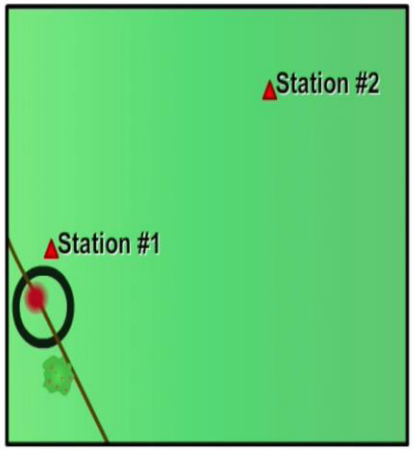
Foreshock Mainshock Aftershock



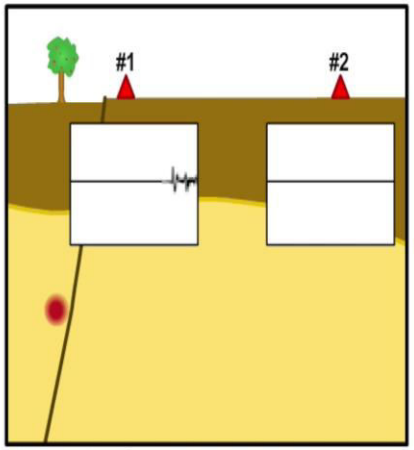
Map View

Cross-Section View

USGS Attenuation

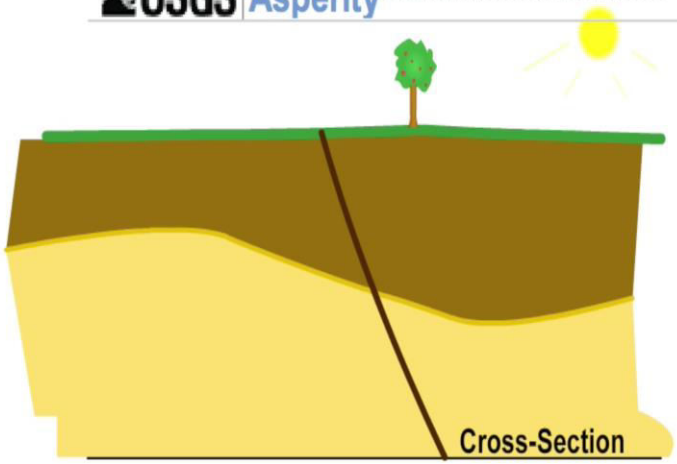


Map View



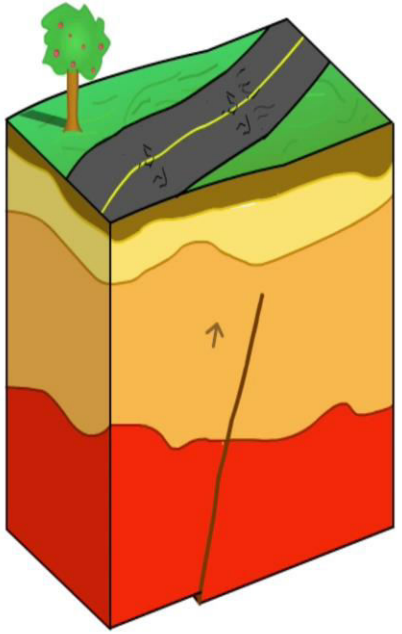
Cross-Section

USGS Asperity

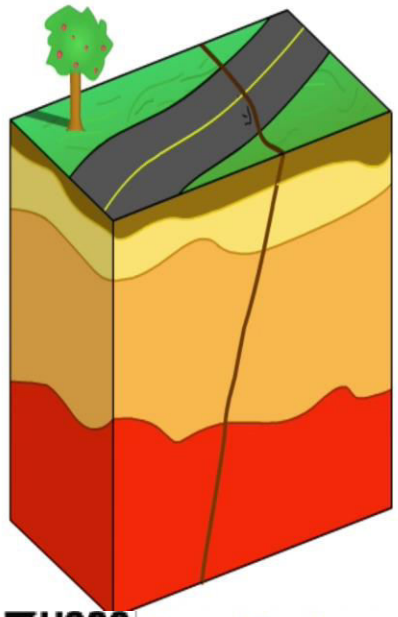


Cross-Section

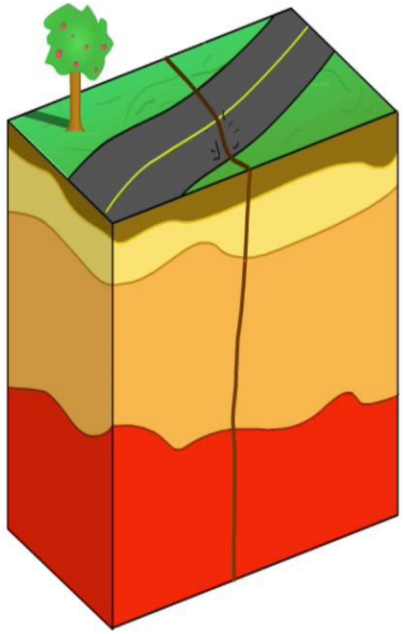
USGS Blind Thrust Fault



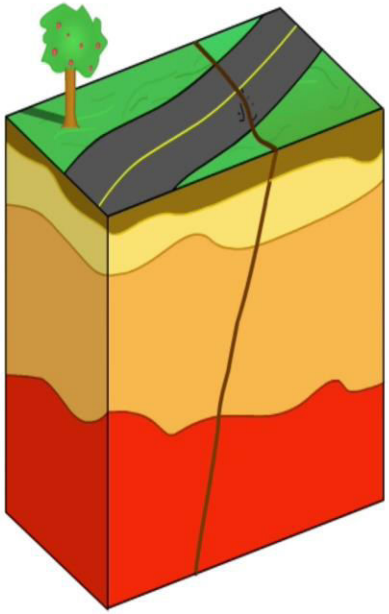
USGS Thrust Fault



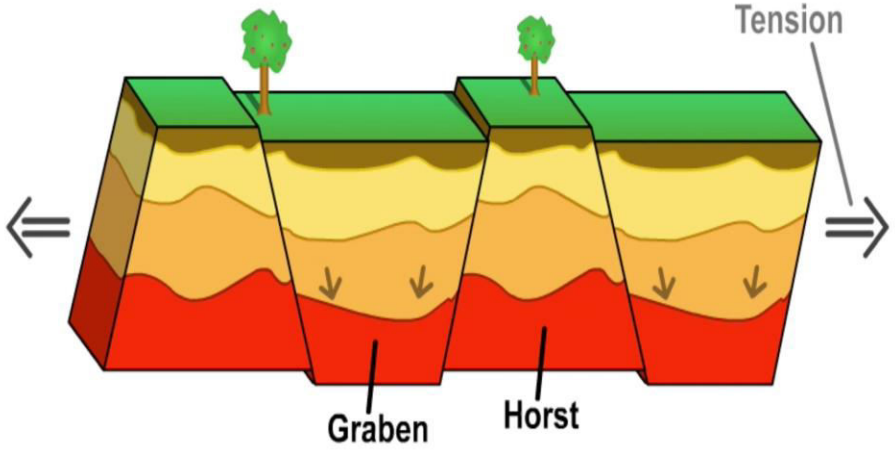
USGS Strike-Slip Fault



USGS Normal Fault



USGS Horst & Graben



CG
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CG
© Fabrizio

CC
© Matthew Clark

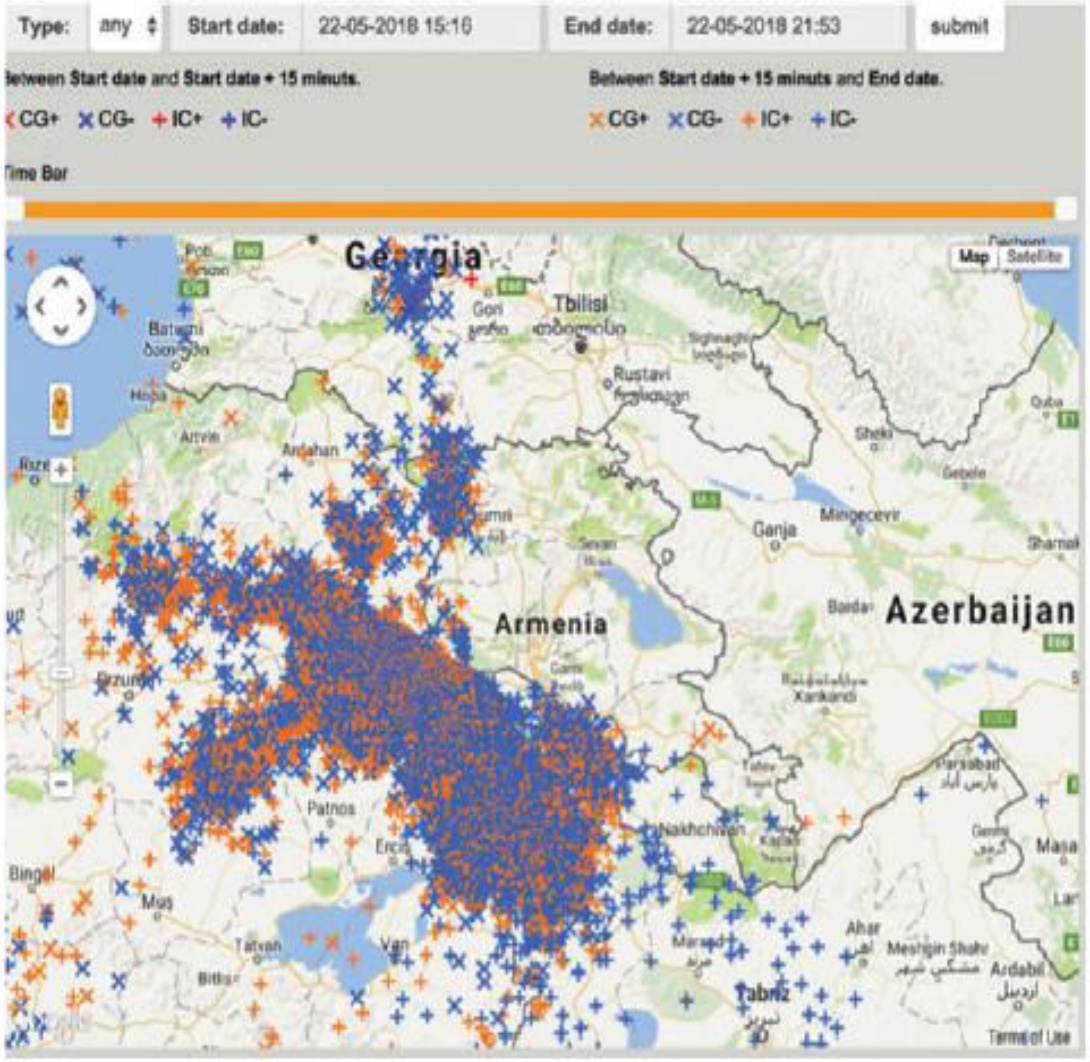

FIG. 3. The Google Map with lightning flashes shows the thunderstorm of May 22, 2018, approaching Armenia.

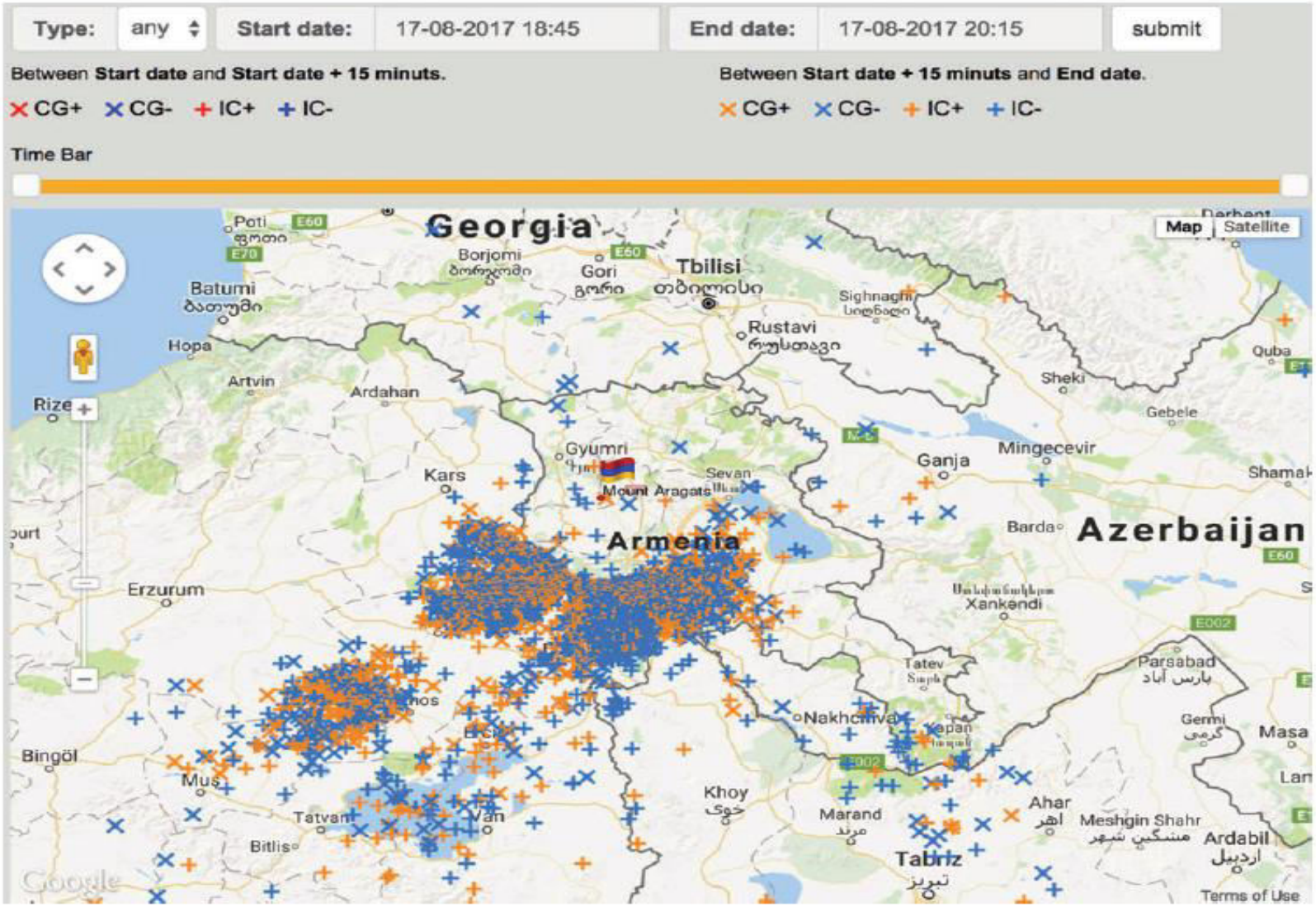

FIG. 1. Pattern of the storm in Armenia mapped by lightning flashes showing the approaching storm front; the Aragats station position on the map is flagged.

THANK YOU