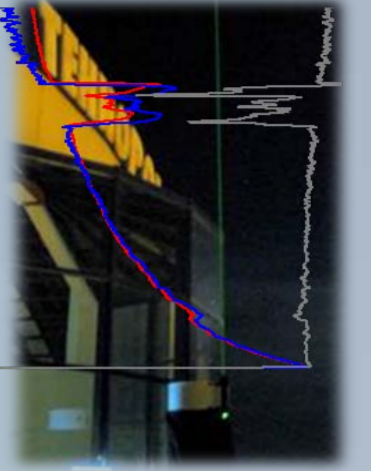


State of the art of the LIDAR systems development for the Romanian Lidar national NETWORK ROLINET

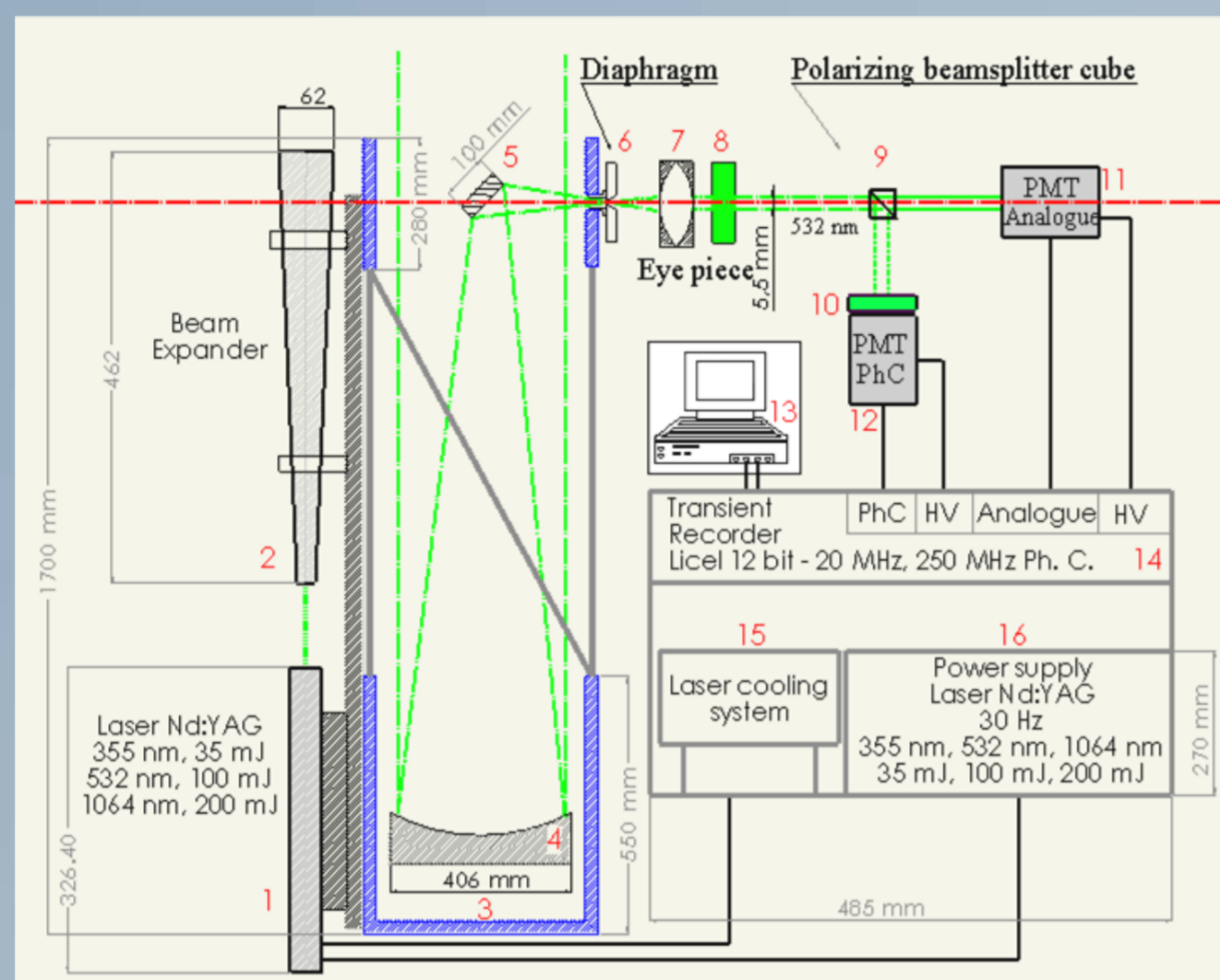
Ioan Balin¹, Mihai Cazacu¹, Ovidiu Tudose¹, Claudiu Mahalu¹, Silviu Gurlui², Dan Costin³, Valentin Ristici⁴, Ioan Vetres⁵, Doina Nicolae⁶

(1) ESYRO (EnviroScopY SRL), Tehnopolis – Science & Technology Park, Iasi, RO; (2) “Al. I. Cuza” University of Iasi, Faculty of Physics, Iasi, RO; (3) “Babeş-Bolyai” University, Faculty of Environmental Sciences and Engineering, Cluj-Napoca, RO; (4) National Meteorological Administration, Bucharest, RO; (5) “Politehnica” University of Timisoara, Faculty of Mechanical Engineering, RO; (6) National Institute of Research & Development for Optoelectronics, INOE, Bucharest, RO.

Abstract: In order to realize a national LIDAR network in Romania which may be included later one at European and mondial atmospheric observations networks (i.e GAW, EARLINET) a research development project namely ROLINET (Romanian Lidar NETWORK) is ongoing in a public-private partnership frame. Thus a new mini LIDAR system was developed and it will be technically presented in this paper. This up-gradable configuration of ^mESYLIDAR is dedicated for monitoring of relevant atmospheric parameters as aerosols and clouds in whole troposphere (100 m to 12-15 Km ASL) with high temporal (minutes) and spatial resolutions (meters) and is based on a powerful Nd:YAG 30 Hz pulsed laser (35 mJ at 355 nm, 100 mJ at 532 nm, 200 mJ at 1064 nm), a 40 cm Newtonian telescope and on a new opto-mechanics detection module built in an eye geometry consideration with 2 standard detection channels (elastic one at 532 nm and a Raman channel at 607 nm). In this paper will be presented the state of the art of this national LIDAR network, first profiles, tests and the last characteristics/performances of the ^mESYLIDAR system.



The NEW ^mESYLIDAR system basic configuration



1. Laser Nd:YAG
2. Beam Expander
3. Newtonian telescope
4. Primary mirror of telescope
5. Secondary mirror of telescope
6. Iris diaphragm
7. Eyepiece
8. Interferential filters
9. Polarizing beam splitter cube
10. Neutral density filter
11. Analogue Photomultiplier
12. Photon counting
13. Computer
14. Acquisition part, analogue/ digital conversion and datas transmissions
15. Cooling system for laser
16. Laser power supply

^mESYLIDAR Keywords

Low cost, easy up-gradable, versatile and modular; High spatial (m) and temporal (min) resolution

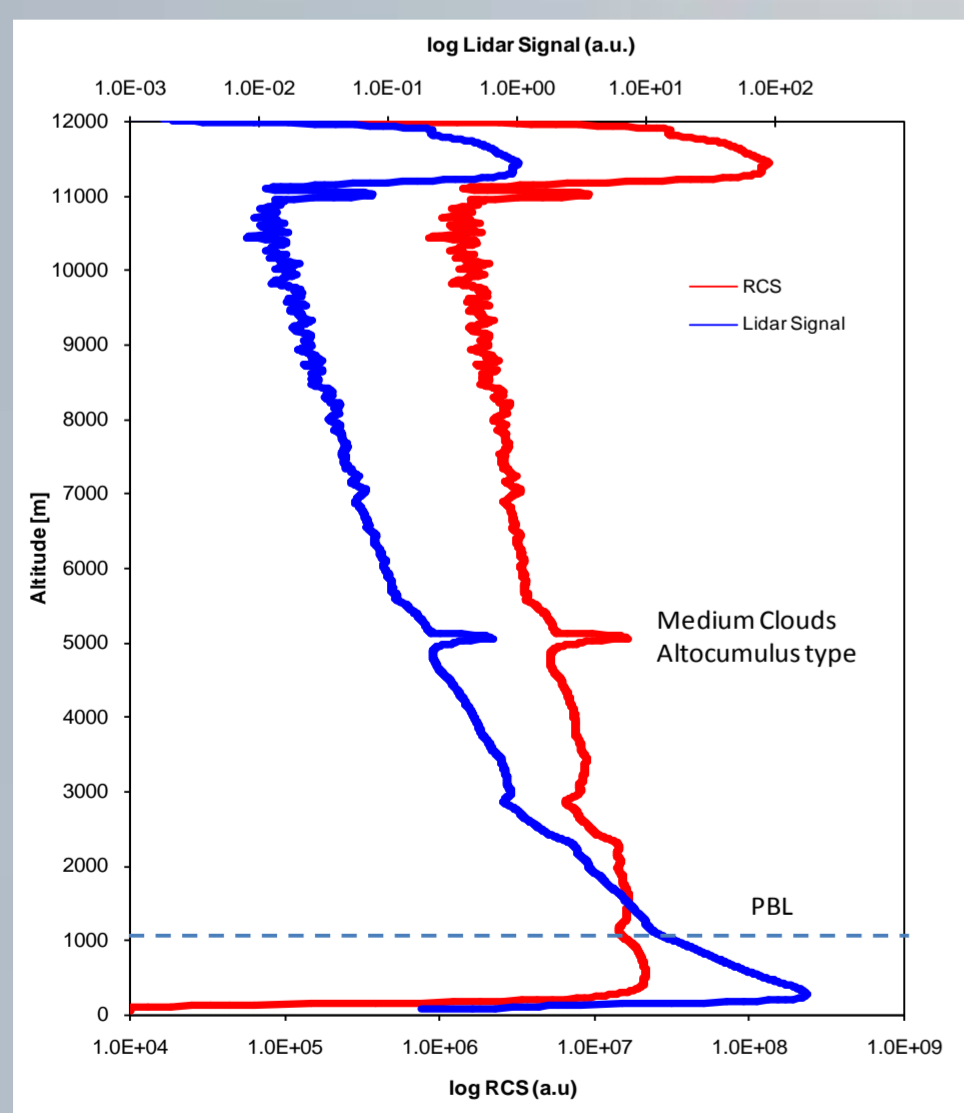
Specifications of emission part (^m ESYLIDAR)		Specifications of detection part (^m ESYLIDAR)	
Laser	Nd:YAG	Telescope	Light Bridge
Energy	35 mJ, 100 mJ, 200 mJ	Type	Newtonian
Wavelength	355 nm, 532 nm, 1064 nm	Diameter of primary mirror	406 mm
Beam diameter	0.6 mm	Focal length	1829 mm
Pulse width	6 – 9 ns	Focal ratio	f/4.5
Divergence	0.75 mrad	Power	70X
Repetition rate	30 Hz	The Detection	
Beam Expander		Iris diaphragm	12 mm
Expansion power	5X	Interferential filters	532 nm
Input aperture diameter	15 mm	Bandwidth	1 nm
Exit aperture diameter	48 mm	Photomultipliers	Analogue, Photon Counting



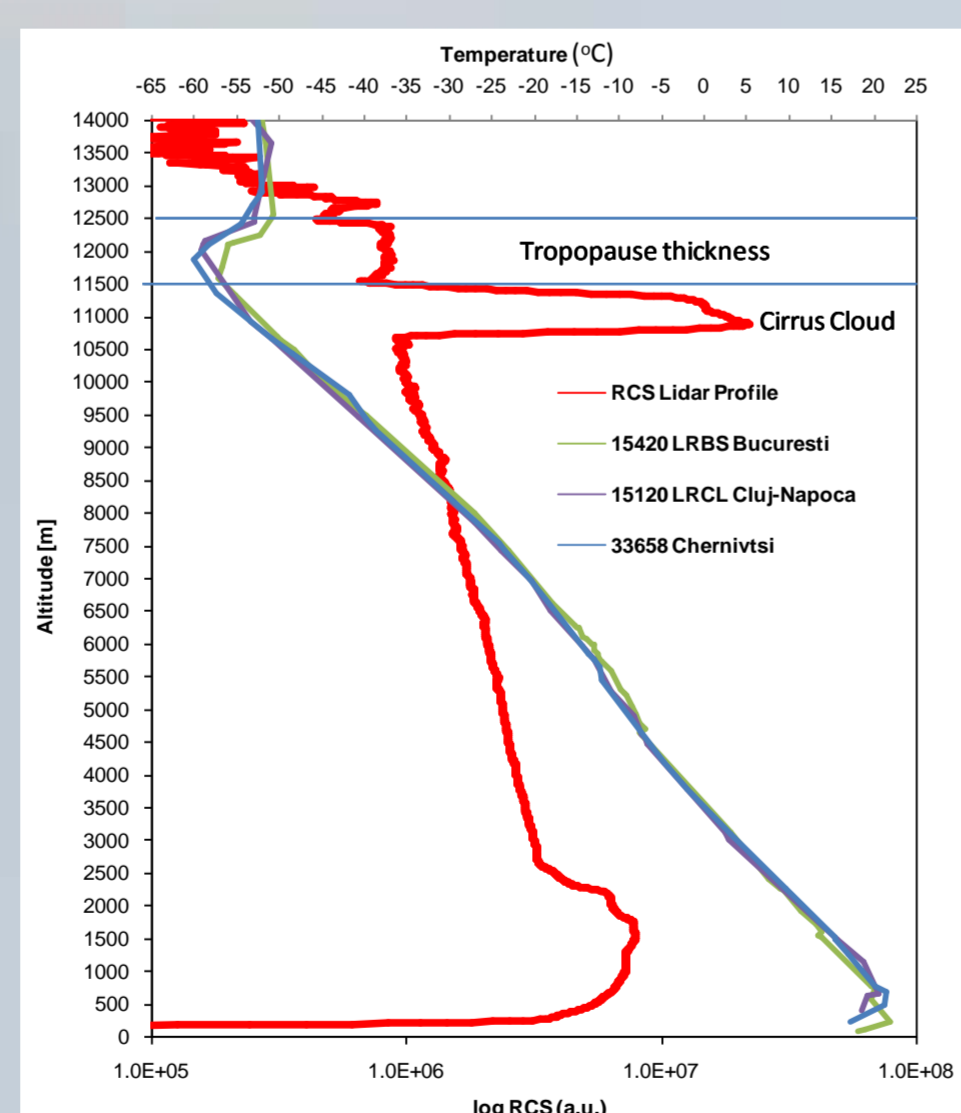
Lidar Stations - ROLINET

- Iasi – UAIC: “Alexandru Ioan Cuza” University
- Cluj – UBB: “Babeş-Bolyai” University
- Timisoara – UPT: “Politehnica” University
- Bucuresti Baneasa – ANM: National Meteorological Administration
- Bucuresti Magurele – INOE: National Institute of Research&Development for Optoelectronics

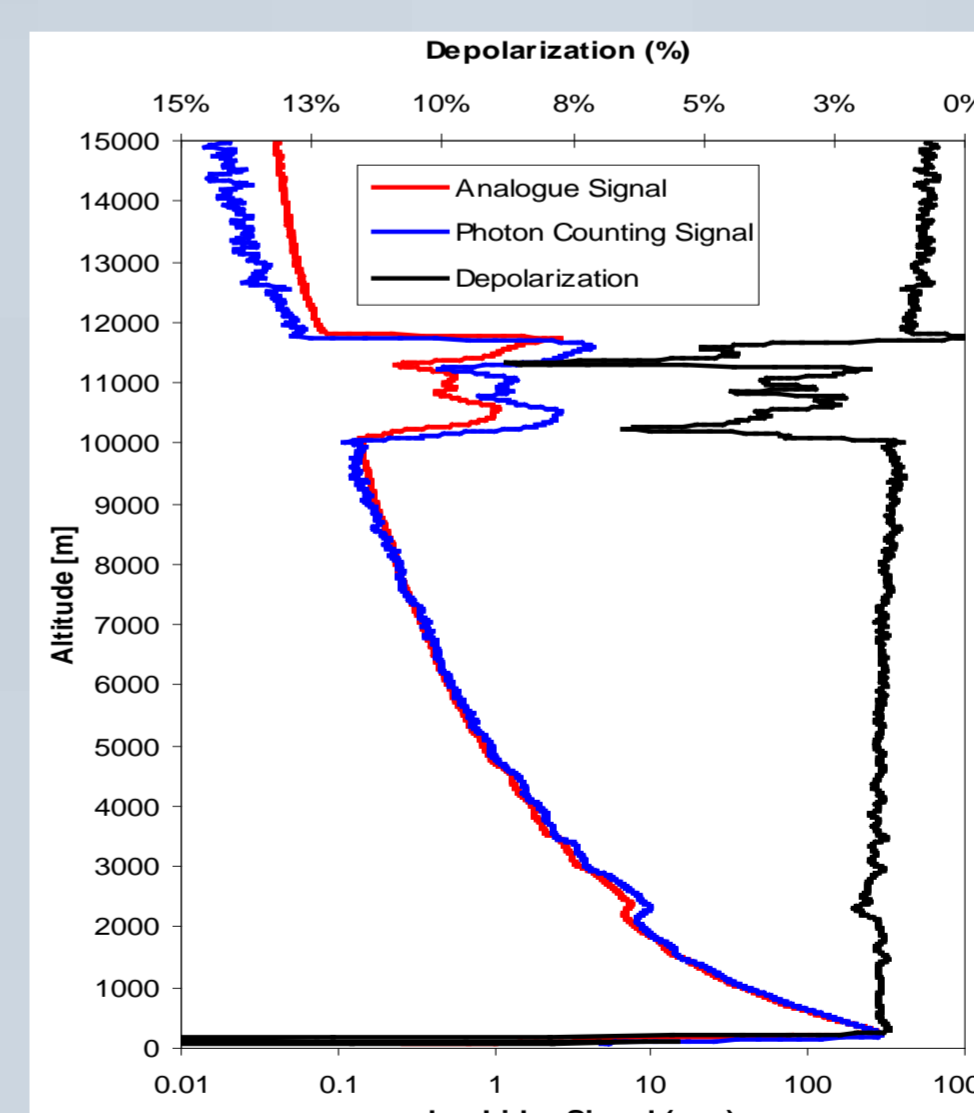
^mESYLIDAR - First tests – Preliminary results from different measurements campaigns



11th of June 2009 - Lidar day profiles and RCS profile at 532 nm – h 06:50 UTC
7,5 m spatial resolution,
4 min integration time
Location: Iasi - ESYRO Station (Tehnopolis)



2nd of July 2009 - RCS night profile at 532 nm
h 20:18 UTC, 7,5 m spatial resolution, 5 min
integration time & temperature profiles at h00:00
– 03.07.2009 from 3 near sounding stations.
Location: Iasi – ESYRO Station (Tehnopolis)



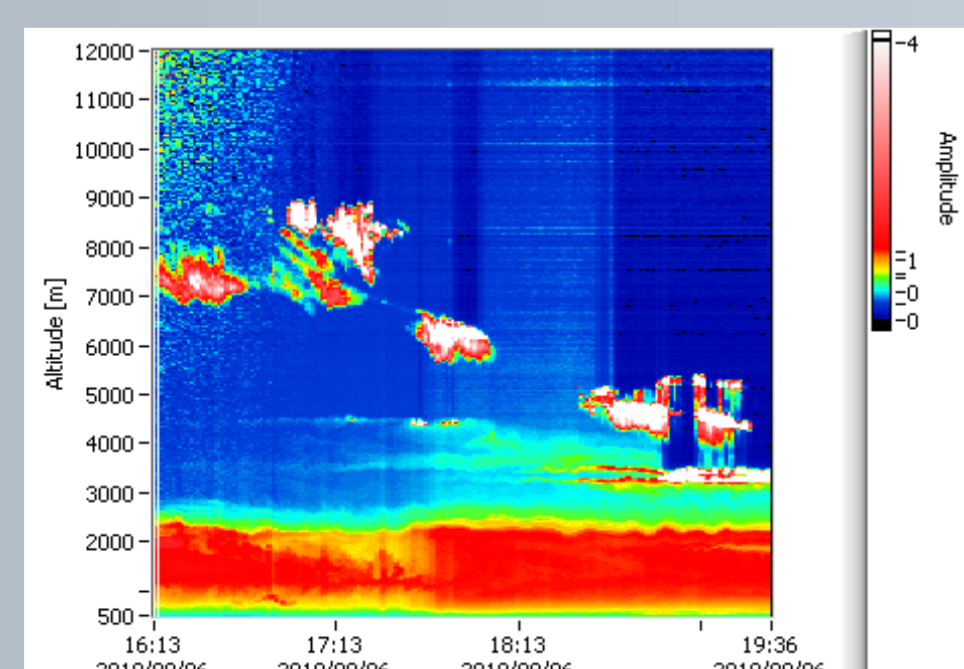
Depolarization study - 11th of June 2009
Lidar night profiles at 532 nm – 00.35h UTC
7,5 m spatial resolution
1 min integration time
Location: Iasi – ESYRO Station (Tehnopolis)

ESYLIDAR APPLICATIONS

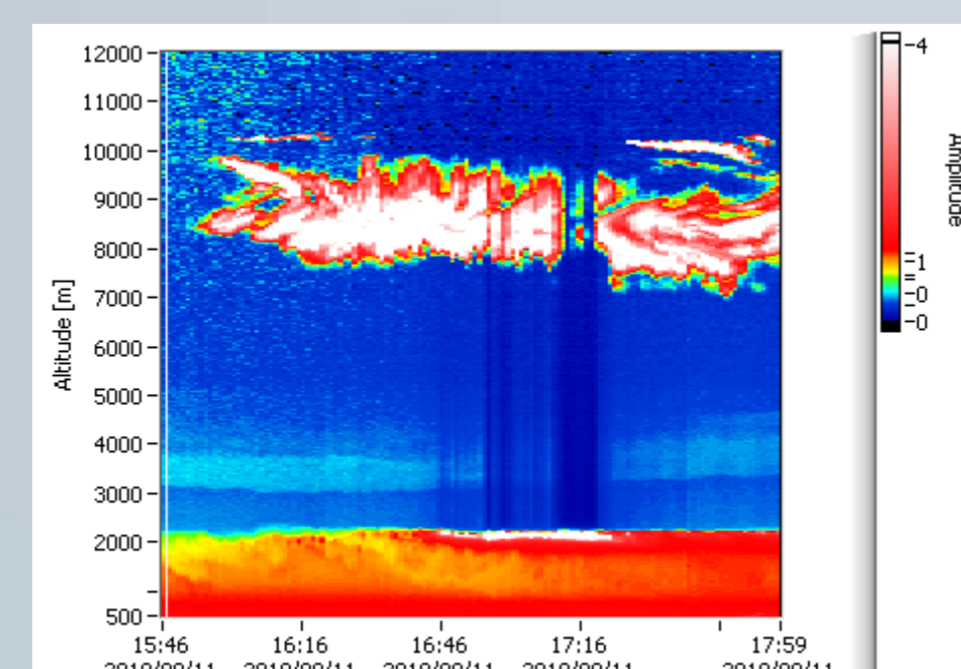
- 3D monitoring (clouds, aerosols, dust, volcanic ash,...);
- Planetary Boundary Layer (height, dynamics, structure, ...);
- Aerosols characterization (optical coefficients, size...);
- Depolarization study (aerosols shape);
- Anti-hail and fight against fire and droughts complementary tool.
- Meteorological forecasting (i.e. using PBL altitude and cloud ceiling)

References:

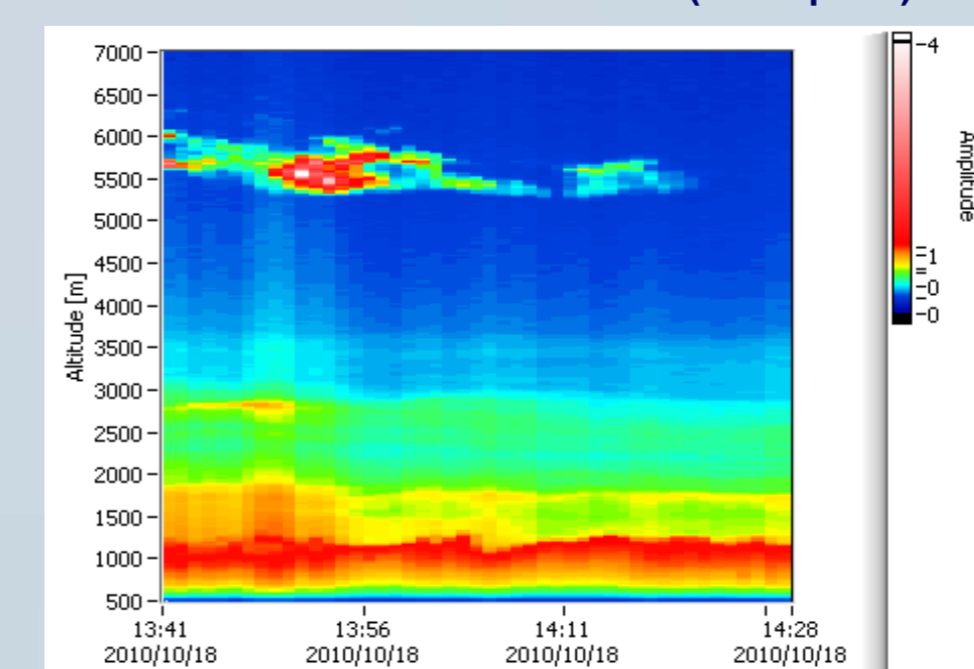
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3. S. Stefan, D. Nicolae, M. Caian, *Secretele aerosolului atmosferic în lumina laserilor*, 2008
4. M.M. Cazacu, A. Timofte, P. Mark, O. Tudose, S. Gurlui, D.O. Dorohoi, I. Balin – *New ^mESYLIDAR system testing measurements: first results considering meteorological context in North East region of Romania*, The General Assembly of the European Geosciences Union, EGU 2010, 2 – 9 Mai 2010, Viena, Austria;



The example of RCS time series from 06.09.2010, at 355 nm – elastic UV channel,
Spatial resolution: 7.5 m, Temporal resolution: 1 min
Location: at 2km from Rovinari Power Plant



The example of RCS time series from 11.09.2010, at 532 nm – elastic VIS channel,
Spatial resolution: 7.5 m, Temporal resolution: 1 min
Location: at 2km from Rovinari Power Plant



The example of RCS time series from 18.10.2010, at 532 nm – elastic VIS channel,
Spatial resolution: 30 m, Temporal resolution: 1 min
Location: “Babeş-Bolyai” University of Cluj-Napoca

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