

Technical Programme

20 Annual European Meeting on Atmospheric Studies by Optical Methods

Apatity

Russia

14-18 September 1993

**NATO
ADVANCED
RESEARCH
WORKSHOP**



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Location of the Conference:

**REST-HOUSE HOTEL "TIRVAS" IN KIROVSK SURROUNDINGS
TELEPHONES: 5-24-81, 5-23-43**



WELCOME

NATO ADVANCED RESEARCH WORKSHOP - 20 ANNUAL EUROPEAN MEETING ON ATMOSPHERIC STUDIES BY OPTICAL METHOD IS ORGANIZED AND SPONSORED BY NATO SCIENTIFIC AND ENVIRONMENTAL AFFAIRS DIVISION AND POLAR GEOPHYSICAL INSTITUTE OF KOLA SCIENCE CENTRE OF RUSSIAN ACADEMY OF SCIENCE.

THE AIM OF THE CONFERENCE IS TO PROVIDE A POSSIBILITY FOR EXCHANGE OF IDEAS, SCIENTIFIC RESULTS AND INSTRUMENTAL INFORMATION. IT IS THE FIRST TIME THAT ONE WHEN NATO ADVANCE RESEARCH WORKSHOP IS LOCATED IN RUSSIA AND ITSELF IS A PIONEERING TASK.

Scientific Committee:

Kiell Henriksen

Sergey Chernouss

Victor Davydov

Yasha Feldstein

Klauss Grossman

Åke Steen

Nikolai Shefoy

CONFERENCE AT A GLANCE

Monday Sep 13	Tuesday Sep 14	Wednesday Sep 15	Thursday Sep 16	Friday Sep 17	Saturday Sep 18	Sunday Sep 19
08.00 Arrival	08.00 Breakfast	08.00 Breakfast	08.00 Breakfast	08.00 Breakfast	08.00 Breakfast	08.00 Breakfast
10.00 Registration at "Tirvas"	10.00 Opening Session (PGI)	09.00 Scientific session	09.00 Excursion to Kola Nuclear Power Plant	09.00 Scientific session	09.30 Excursion to Kirovsk orthodox church	08.30 Bus excursion to country side
10.30 Scientific session (PGI)	10.30 Coffee	10.30 Coffee	10.30 Sightseeing tour	10.30 Coffee	Coffee	Visit to Murmansk
	11.00 Scientific session	11.00 Scientific session		11.00 Scientific session	11.00 Scientific session	Departure
	12.30 Lunch	12.30 Lunch	14.00 Lunch	12.30 Lunch	13.00 Final session	
13.30 Lunch	14.00 Scientific session	14.00 Scientific session	16.00 Excursion to open pit in Khibiny	14.00 Scientific session	14.00 Lunch	
15.00 Scientific session	15.30 Coffee	15.30 Coffee		15.30 Coffee	Free time in town	
16.30 Coffee	16.00 Scientific session	16.00 Scientific session	16.00 Sightseeing tour	16.00 Scientific session, posters, exhibition		
17.00 Scientific session	18.30 Concert	18.30 Concert		20.00 Conference dinner	20.00 Supper	
20.00 Ice- breaking party	20.00 Supper	20.00 Supper	20.00 Supper			

Tuesday
September 14

Opening session (Polar Geophysical Institute)

Chairman: S. Chernouss

- | | | |
|-------------|--------------|------------------------|
| 10.00-10.10 | Henriksen K. | General View |
| 10.10-10.20 | Pivovarov V. | Opening Address |
| 10.20-10.30 | Chernouss S. | Practical Information. |

Session 1 (Polar Geophysical Institute)

Auroral Dynamics, Irregularities and Pulsations and their Relations to the Magnetospheric Disturbances.

Chairman: A. Grafe

- 10.30-10.55 Sandholt P.E., Farrugia C.J., Burlaga L.F., Holtet J.A., Moen J., Lybakk B., Jacobsen B., Opsvik D., Egeland A., Lepping R., Lazarus A.J., Hansen T., Brekke A., Friis-Christensen E. (invited)
Cusp/cleft auroral activity in relation to solar wind dynamic pressure, IMF Bz and By.
- 10.55-11.10 Volkomirskaya L., Feldstein Ya., Elphinstone R., Starkov G.V., Pajupaa A., Leontjev S., Vorobjev V., Zverev V.
Geomagnetic pulsations and auroral dynamics in the course of a magnetospheric substorm.
- 11.10-11.30 Berkey F.T., Kelly C.N., Ono T. (invited)
Dynamics of the dayside aurora using south pole all-sky camera data.
- 11.30-11.45 Despirak I.V., Lubchich A.A., Yahnin A.G., Craven J.D., Aulamo O., Potemra T.
Region of soft precipitation in dayside high latitudes (cusp) and its relation to aurora during steady magnetospheric convection.
- 11.45-12.00 Pellinen R., Heikkila W., Huuskonen A., Kauristie K., Pudovkin M.I., Pulkkinen T.
The trigger phase of magnetospheric substorms.

Lunch

Session 1 (continuation) (Tirvas, Hall 1)

- 14.30-14.50 Kosch M.J. (invited)
Rapid temporal and spatial variations in auroral optical emissions.
- 14.50-15.05 Yagodkina O.I., Vorobjev V.G., Sandholt P.I., Egeland A., Brekke A., Hansen T.L.
Daytime geomagnetic pulsations associated with ionospheric travelling vortices.
- 15.05-15.20 Bosinger T., Kaila K., Rasinkangas R., Pollary P., Trakhtengerts V., Demekhov A.
An EISCAT study of pulsating energetic electron precipitation in association with auroral luminosity and magnetic field pulsations.
- 15.20-15.35 Manninen J., Turunen T., Kultima J.
Correlating optical emissions, quasi-periodic VLF emissions and magnetic Pc3 pulsations.

Coffee

- 16.05-16.25 Lyatsky W.B., Kozlovsky A.E., Rezhnev B.V. (*invited*)
Discrete aurora arc, problems and ways of solution.
- 16.25-16.40 Kosch M.J., Nielsen E., Scourfield M.W.J., Schoute-Vanneck H.
Ionospheric electric field and associated auroral arc.
- 16.40-16.55 Uspensky M., Starkov G.V.
Aurora and auroral radar backscattering
- 16.55-17.10 Antonova E.E., Stepanova M.V., Teltzov M.V., Tverskoy B.A.
The stratification of auroral plasma and multiple inverted-V structures.
- 17.10-17.25 Turunen T., Kaila K., Aikio A., Pollari P., Manninen J., Nygren T.
Comparison of the local electron density variations in the E-layer during substorm onset with optical data.

Posters for session 1.

- Kozelova T.V., Lazutin L.L.
Auroral dynamics and magnetospheric disturbances near the synchronous orbit in afternoon sector.
- Antonova E.E., Ganyushkina N.Yu.
On the selection of co-ordinate system for the auroral observations.
- Scourfield M.W.J., Kosch M.J., Nielsen E., Schoute-Vanneck H.
Modelling the vorticity in the ionospheric electric field associated with a large scale fold propagating along an auroral arc.
- Podgorny I.M., Podgorny A.I., Minami S.
The origin of fast electrons precipitation in the polar atmosphere.
- Kanev K.D., Mendeva B.D., Krastev D.G.
Equatorward auroral boundary determined from IK-Bulgaria -1300 satellite measurements.
- Baishev D.G., Solovjev S.I.
Characteristics of Pc-2 and IPDP geomagnetic pulsations during large-scale undulations on the evening diffuse auroral boundary.
- Solovjev S.I., Sobolev A.V., Baishev D.G.
Irregular pulsations of geomagnetic field within 0.5- 5 Hz range on L=3-4 during pulsating polar auroras.
- Zaitsev D.B., Novikov Yu.P., Tagirov V.R., Chernouss S.A.
Investigations of space-time behaviour of disturbed polar ionosphere by optical TV and low-frequency electromagnetic fields measurements.
- Parge R.P., Dhande S.R., Tillu A.D.
Development of literature database and information retrieval system for the study of coupling processes in the magnetosphere-ionosphere thermosphere system.
- Novikov Yu.P., Mironov A.A., Titova E.E., Yahnina T.A., Tagirov V.R., Chernouss S.A., Salin V.I., Manninen J., Turunen T.
On the spatial-temporal variations of pulsating auroral patches and their connection with VLF chorus.
- Smirnov V.S., Titova E.E., Yahnina T.A.
Narrow-banded ELV emissions and auroral arcs.
- Alexeyev V.N., Yugov V.A., Ievchenko I.B., Ignatyev V.M.
Optical and interferometric measurements in the region of SAR-arc.
- Alexeyev V.N., Ievchenko I.B., Afonin V.V.
Simultaneous ground-based and satellite measurements in the region of SAR-arc.
- Alexeyev V.N., Ignatyev V.M., Khalipov V.L.
Presence of strong local electric fields in the region of SAR-arc.
- Shumilov O.I., Kasatkina E.A., Raspopov O.M., Elphinstone R.
SC as a trigger of substorm far inside the polar cap.

Wednesday
September 15

Session 2 (Tirvas, Hall 1)

Auroral Spectroscopy

Chairman: Yu.N. Kulikov

- 09.00-09.25 Decker D.T., Jasperse J.R., Basu B. Strickland D.J. (*invited*)
The theory of the electron-proton-hydrogen atom aurora: comparison with observations.
- 09.25-09.45 Ivanov V.E., Kozelov B.V., Sergienko T.I. (*invited*)
Some results on e-p-H transport in the atmosphere.
- 09.45-10.00 Sigernes F., Fasel G., Deehr C.S., Lorentzen D., Henriksen K.
Calculations and observations of proton precipitation in the dayside aurora.
- 10.00-10.15 Ablitsov P., Yankovsky V.A.
The computers analysis of auroral green line emission variations.
- 10.15-10.30 Kozelov B.V., Ivanov V.E., Sergienko T.I.
Simplified algorithm for precise calculation of spatial distributions in combined electron-proton-hydrogen atom aurora.

Coffee

Posters for Session 2.

Ivanov V.E., Kirillov A.S., Sergienko T.I., Steen Å.

Excitation mechanisms for the production of O(¹S) in aurora.

Kozelov B.V.

Calculation of H β emission in aurora. Comparison with observations.

Dashkevich Z.V., Kozelov B.V., Ivanov V.E.

Excitation of LBH bands by proton precipitations.

Evlashin L.S., Shefov N.N., Ponomarev V.M.

Spectral distribution of energy of auroral emissions.

Gogoshev M., Gogosheva Ts.

Mapping the equatorward border of diffuse aurora in 5577 Å and N₂ I Pos Band.

Atmospheric OzoneChairman: **K.Henriksen**

- 09.00-09.25 Varotsos C. (*invited*)
The physics of the lamination effect in the vertical ozone profiles.
- 09.25-09.40 Yushkov V., Khattatov V., Rudakov V., Zaitzev I., Rozen I., Kjome N.
Balloon investigation of the stratospheric ozone and aerosol in the Arctic region during EASOE campaign.
- 09.40-09.55 Terez E.I., Pivovarov V.G.,
On the global monitoring of total ozone in the Earth atmosphere.
- 09.55-10.10 Henriksen K., Larsen S.H.H., Shumilov O.I., Thorkelsson B.
Variations in the stratospheric ozone in the Scandinavian sector of the Arctic during the AASE campaign and 1989.
- 10.10-10.25 Kuznetsov I.V., Andriyanov A.F., Dryagin S.Yu., Kukin L.M., Mocheneva O.S., Nikiforov P.L.
Stratospheric ozone depletion over Antarctica during October 1989 events.

*Coffee*Co-chairman: **O.I.,Shumilov**

- 11.00-11.25 Kulikov Yu.Yu., Kuznetsov I.V., Pegeev V.P., Ryskin V.G., Suvorov E.V., Witt G., Steen Å. (*invited*)
Microwave observation of stratospheric ozone in Kiruna.
- 11.25-11.40 Zelenkova L.V., Pudovkin M.I., Boroznets M.
Ozone total content variations on polar latitudes in relation to solar activity and geomagnetic disturbances.
- 11.40-11.55 Kulikov Yu.Yu., Fedoseev L.I., Krasil'nikov A.A., Ryskin V.G.
Microwave monitoring of stratospheric ozone over Nizny Novgorod.
- 11.55-12.10 Erukhimova T.L., Trakhtengerts V.Yu.
Ozone disturbance by internal gravity wave and possible observation appearance in microwave sounding.
- 12.10-12.25 Shumilov O.I., Kasatkina E.A., Henriksen K., Raspopov O.M.
The polar stratospheric ozone "mini-holes" and increase of biologically active UV in Arctic during periods of solar cosmic ray events.

*Lunch*Chairman: **K.Henriksen**

- 14.00-14.25 Ivlev L., Sirota V., Smyshlyaev S. (*invited*)
Estimation of influence of aerosol sink on the latitude distribution of tropospheric ozone.
- 14.25-14.40 Domnin P.
Comparative studies of ozone gas analyzers in reference to the problems of atmospheric monitoring.
- 14.40-14.55 Theodorsen A., Bersås S., Ornes H., Henriksen K., Vasilijev A.
Measurements of surface ozone in Tromsø, using American and Russian type ozonometers.
- 14.55-15.10 Yurganov I.N., Grechko E.I., Dzhola A.V.
An impact of total ozone variations on tropospheric carbon monoxide and methane.
- 15.10-15.25 Larin V.F., Beloglazov M.I., Lazutin L.L., Rumyantsev S.A., Vasil'ev A.N.
Surface ozone measurements within the industrial city limits during polar winter period.

Coffee

Posters for session 3.

Bojkov R.D., Zerefos C.S., Balis D.S., Ziomas I.C., Bais A.F.

Record ozone minimum over middle and high latitudes of the northern hemisphere during the winter-spring seasons 1991/92 and 1992/93.

Beloglazov M.I., Borovkov L.P., Larin V.F., Lazutin L.L., Schur L.I., Tumanov V.A., Sysoeva T.I.
Measurements of surface and boundary layer ozone during various meteorological conditions using various methods.

Bolshakova L., Shpakov N.

Numerical estimation of permissible level of the background and the shape of the narrowband interference UV light-filters to ensure a high accuracy of a measurement of atmospheric ozone by filter ozonometers.

Yushkov V., Khaplanov M.

Stratospheric water vapour measurements with balloon fluorescent hygrometer at Kiruna during EASOE.

Andrukhiv V.I., Bertsev V.V., Bulanin M.O., Zelikina G.J., Pastor A.A., Serdobintsev P.Yu.
Initial ozone creation mechanism in oxygen included mixtures under KrF laser excitation.

Osechkin V.

Chemiluminescent sensors and ozone gas analyzers for atmospheric monitoring.

Nightglow, Atmospheric and Thermospheric Emissions

Chairman: O. Harang

- 11.00-11.25 Grossmann K.U. (*invited*)
Lower thermosphere NLTE ozone emissions.
- 11.25-11.40 Kulikov Yu.N.
Ozone and hydroxyl infrared emissions in the polar night-time upper atmosphere: some aspects of comparison between measurements and theory.
- 11.40-11.55 Tiliu A.D.
Airglow studies in India.
- 11.55-12.10 Picard R.H., Winick J.R., Wintersteiner P.P., Joseph R.A., Paboojian A.J.
Spectral measurements and modeling of high-latitude non-equilibrium midwave infrared emissions from space-shuttle and rocket borne platforms
- 12.10-12.25 Gogoshev M., Gogosheva Ts.
A significant low latitude ionospheric effect at the time of very low solar and geomagnetic activities detected by airglow data.

Posters for Session 4.

Chaudhary P.B., Tiliu A.D.

5577Å night airglow in the IQSY and the IMAP.

Pivovarov V.V.

Local MR-12 rocket environment glow and its influence on rocket-borne atmospheric optical studies.

Toroshelidze T.I., Fishkova L.M., Chilingarashvili S.P., Chichikoshvili M.F.

The mid-latitude aurora observations in Abastumani, November 9, 1991.

Gordiets B.F., Grossmann K.U., Stepanovich A.N.

Model of vibrational kinetics of CO₂ in the upper atmosphere.

Semenov A.I.

Comparison of temperature and wind variations near the mesopause with surface wind of the atmosphere.

Kirillov A., Aladjev G.

Enhanced 5.3-µm and 2.7-µm emissions of nitric oxide in the aurora.

Yugov V.A., Ignatyev V.M.

On relationship of low thermosphere temperature and solar activity.

Ammosov P.P., Gavrilyeva G.A.

Horizontal parameters of internal gravity waves with period >3 hours in at the mesosphere.

Nazarova E.G.

Analytical expression of noctilucent clouds and polar mesospheric clouds occurrence probability from data of the mesospheric temperature measurements.

Davydov V.S., Khokhlov V.N.

The method for daylit auroras detection during rocket investigations of the Earth's upper atmosphere visual dayglow.

Friday
September 17

Session 5 (Tirvas, Hall 1)
Artificial Aurora, Airglow and Clouds

Chairman: **G. Milinevsky**

- 09.00-09.25 Alpatov V.V., Gurvich A.V., Yevtushevsky A.M., Kazhirin A.N., Klyuev O.F., Milinevsky G.P., Romanovsky Yu.A. (*invited*)
Dynamics and structure of artificial clouds in the experiments under CRRES project.
- 09.25-09.40 Belicov Yu.E., Gurvich A.V., Milinevsky G.P., Romanovsky Yu.A.
"Colour dynamics" of an artificial barium cloud.
- 09.40-09.55 Milinevsky G.P., Evtushevsky A.M., Romanovsky Yu.A.
Peculiarities of barium ion cloud dynamics in CRRES caribbean releases in the ionosphere (optic data).
- 09.55-10.10 Khvorostovskiy S., Zelenkova L., Soldatov V.
Interaction of injected electrons with energy more than 100 keV with atmosphere.
- 10.10-09.25 Kaila K.
Electric field determination of remnant ionization cloud of meteor trail.

Posters for session 5.

Golbraikh E.I.

On the problem of the Frank's holes formation in the upper atmosphere.

Vetchinkin N.V., Yevtushevsky A.M., Milinevsky G.P., Platov Yu.V., Romanovsky Yu.A.
Optical phenomena in the near space during the operation of rocket engines and space instruments.

Lebedeva G.N., Milinevsky G.P., Namazov S.A., Romanovsky Yu.A., Faermark D.S.
Long-lived ion clouds in the ionosphere: experiments and model estimates.

Gurvich A.V., Milinevsky G.P., Romanovsky Yu.A., Chernous S.A.
Optic observations of artificial clouds in the ionosphere.

Belicov Yu.E., Gurvich A.V.
Optic model of an artificial cosmosol cloud.

Gavrilov B.G., Podgorny I.M., Zetzer J.I.
The investigation of the field-aligned current generation during the injection of plasma jet into the magnetosphere.

Khvorostovskiy S., Zelenkova L., Soldatov V.
Interaction of proton fluxes with energy more than 10 MeV with atmosphere.

Ivchenko V.N., Ruzhin Yu.Ya.
The midnight observations of lithium and barium clouds in the CRRES G-06 and G-08 releases.

Ivchenko V.N.
Optical observations in active experiments and atmospheric research.

Auroral and Atmospheric Tomography

Chairman: K. Kaila

- 11.00-11.25 Alpalov V.V. (*invited*)
Information analysis in auroral tomography problems.
- 11.25-11.40 Kaila K., Aikio A.
Electron density profiles in auroral arc determined by optical and radar measurements.
- 11.40-11.55 Arinin V.A.
The auroral tomography. The ways of solving the problem.
- 11.55-12.10 Pudovkin M.I., Troyan V.N., Ryzhikov G.A.
Tomography reconstruction of a 3D-auroral luminosity distribution.
- 12.10-12.25 Dubovik O.V., Oshchepkov S.L., Lapyonok T.V.
Improved numerical method for solving inverse problems of atmospheric optics.
- 12.25-12.40 Ustinov E.A.
The general principles of formulation of inverse problems for interpretation of data.

Posters for session 6.

Pivovarov V.V.
Some results of 3-D aurora reconstruction based on single TV image and height profiles of brightness.

Arinin V.A.
The estimations of informational limit of the auroral tomography task.

Arinin V.A.
Simulation and informational estimations of the ALIS image registration channel.

Chumakov A.G.
Image processing in Karhunen-Loeve representation.

Optical Methods in Ecology and Atmospheric Pollution problem

Chairman: K.Kondratjev

- 14.00-14.25 Baclanov A.A. (invited)
The evaluation of environmental radiational consequences for Kirovsk and Apatity areas after hypothetical accident on Kola Nuclear Power Plant.
- 14.25-14.40 Svenoe T., Olsen M., Henriksen K., Stamnes K.
UV spectra from the sun and the moon and geophysical and biological applications.
- 14.40-14.55 Lukin A., Balashov I., Chernouss S.
System of a control of atmospheric pollution in settlements
- 14.55-15.10 Bais A.F., Zerefos C.S., Tourpali K.
Solar UV-B measurements at high latitudes with a double monochromator Brewer spectrophotometer.
- 15.10-15.25 Starkov G.V., Roldugin V.C.
On a connection of the atmospheric transparency with the geomagnetic activity.

Coffee

Session 8

Optical Space and Ground-based Techniques for Atmospheric and Ecological Research. (exhibition and posters)

- Gorbunov G.G., Iljuhin V.N., Moshkin B.E.
Spaceborne IR Fourier-spectrometer for atmospheric investigations.
- Krastev D.G., Petkov N.P., Kanev K.D., Tanev T.P., Hristov G.K.
Photometric system for active experiments in space plasma.
- Afonin A.V., Davydov V.S.
A combined system for attitude control of the rotating geophysical rockets.
- Brasletov V.A., Davydov V.S., Kazansky V.V., Khokhlov V.N.
Detection of dust particles layers at 60-90 km altitude by rocket-borne spectropolarimeter.
- Stolyarevskaya R.I., Pavlovich M.N., Khlevnoi B.B., Mekhontsev S.N., Ulyanov A.M., Morozova S.P., Sapritsky V.I.
Metrological assurance of optical methods for atmospheric studies within the optical wavelength range.
- Pavlovich M.N., Stolyarevskaya R.I., Khlevnoi B.B., Mekhontsev S.N., Ulyanov A.M., Belousov A.V.
Radiometric and photometric secondary standards.
- Khaplanov M., Yushkov V.
The experience of using a krypton and hydrogen lamps for fluorescent hydrometer.
- Khaplanov M., Shishatskaya L., Yakovlev S., Gumbel J.
VUV light sources for fluorescent hydrometer.
- Lukac J., Kocifaj M.
Determination of aerosol structure on ground-based radiation measurements.
- Domnin P.
Use of Helmholtz resonator for enhancement of photoacoustic signals.
- Glebovsky D.N., Kozlov Ju.G., Krivilev V.A., Laletin A.V., Lopatin A.I., Petrunkin L.A., Petrunkin M.A., Pigin E.V., Revenko V.S., Vasil'ev A.N.
High-speed monitoring spectrometer - alternating light interference x-emergency system
- Barchuk O.I., Kovalenko A.V., Kurashov V.N.
Diagnostic of the extended scattering medium from spatial distribution of the ray sounding polarization.

Saturday
September 18

Session 9

**New Projects, Facilities and Opportunities for Upper Atmosphere Investigations
by Optical Methods**

Chairman: Å.Steen

- 11.00-11.25 Kondratjev K. Ya. (*invited*)
Environmental future of the next century and requirements to observational data.
- 11.25-11.40 Gogoshev M.M, Schmidtke G., Gogosheva Ts.
An international project: STAR (Solar and Tessertrial Atmosphere Radiation).
- 11.40-11.55 Kosch M.J., Hagfors T., Nielsen E.
A new auroral imager for STARE.
- 11.55-12.10 Zakharenko V.N., Meunier J.M., Popov L.N.
The interrelation of electrical processes in the lithosphere, lower atmosphere and ionosphere of the Earth.
- 12.10-12.25 Widell O.
New information about ESRANGE facilities.
- 12.25-12.40 INTERBALL project - current information

Posters for session 9

Krakovetsky Yu.K., Popov L.N.

The analysis of interaction between the anomalies field of auroras spatial structures and the Earth's crust structure.

Zakharenko V.N., Krakovetsky Yu.K., Popov L.N.

The investigations results on the programme "Global Change" on the territory of Siberia in the optical , VLW, LW, MW ranges.

Bokov S.M., Popov L.N.

The results of investigations the terrogenic effect in auroras with the help of the automatized scanning photometer in lines 5577A and 4278A.

Shumilov O.I., Vashenyuk E., Kasatkine E.A., Baidalov S., Henriksen K.

The lidar measurements of stratospheric aerosols during solar proton events.

Papayannis A., Zerefos C.S.

Development of a laser remote sensing system (LIDAR) for aerosol and ozone vertical profile measurements in the lower troposphere.

Session 10.

Discussion and Conclusion

Chairman: S.Chernouss