PROCEEDINGS OF SPIE

26th International Symposium on Atmospheric and Ocean Optics, Atmospheric Physics

Gennadii G. Matvienko Oleg A. Romanovskii Editors

6 – 10 July 2020 Moscow, Russian Federation

Organized by

V.E. Zuev Institute of Atmospheric Optics SB RAS (Russian Federation) Institute of Geosphere Dynamics RAS (Russian Federation) Institute of Solar-Terrestrial Physics SB RAS (Russian Federation)

Sponsored by

Russian Foundation for Basic Research (Russian Federation)
Siberian Branch of Russian Academy of Sciences (Russian Federation)
V.E. Zuev Institute of Atmospheric Optics SB RAS (Russian Federation)
"Atmosphere" an Open Access Journal by MDPI (Switzerland)
Photonics Journal (Russian Federation)
Laser Systems LLC (Russian Federation)

Published by SPIE

Volume 11560

Part One of Three Parts

Proceedings of SPIE 0277-786X, V. 11560

SPIE is an international society advancing an interdisciplinary approach to the science and application of light.

The papers in this volume were part of the technical conference cited on the cover and title page. Papers were selected and subject to review by the editors and conference program committee. Some conference presentations may not be available for publication. Additional papers and presentation recordings may be available online in the SPIE Digital Library at SPIEDigitalLibrary.org.

The papers reflect the work and thoughts of the authors and are published herein as submitted. The publisher is not responsible for the validity of the information or for any outcomes resulting from reliance thereon.

Please use the following format to cite material from these proceedings:

Author(s), "Title of Paper," in 26th International Symposium on Atmospheric and Ocean Optics, Atmospheric Physics, edited by Gennadii G. Matvienko, Oleg A. Romanovskii, Proceedings of SPIE Vol. 11560 (SPIE, Bellingham, WA, 2020) Seven-digit Article CID Number.

ISSN: 0277-786X

ISSN: 1996-756X (electronic)

ISBN: 9781510639416

ISBN: 9781510639423 (electronic)

Published by

SPIE

P.O. Box 10, Bellingham, Washington 98227-0010 USA Telephone +1 360 676 3290 (Pacific Time) · Fax +1 360 647 1445 SPIF ora

Copyright © 2020, Society of Photo-Optical Instrumentation Engineers.

Copying of material in this book for internal or personal use, or for the internal or personal use of specific clients, beyond the fair use provisions granted by the U.S. Copyright Law is authorized by SPIE subject to payment of copying fees. The Transactional Reporting Service base fee for this volume is \$21.00 per article (or portion thereof), which should be paid directly to the Copyright Clearance Center (CCC), 222 Rosewood Drive, Danvers, MA 01923. Payment may also be made electronically through CCC Online at copyright.com. Other copying for republication, resale, advertising or promotion, or any form of systematic or multiple reproduction of any material in this book is prohibited except with permission in writing from the publisher. The CCC fee code is 0277-786X/20/\$21.00.

Printed in the United States of America by Curran Associates, Inc., under license from SPIE.

Publication of record for individual papers is online in the SPIE Digital Library.



Paper Numbering: Proceedings of SPIE follow an e-First publication model. A unique citation identifier (CID) number is assigned to each article at the time of publication. Utilization of CIDs allows articles to be fully citable as soon as they are published online, and connects the same identifier to all online and print versions of the publication. SPIE uses a seven-digit CID article numbering system structured as follows:

- The first five digits correspond to the SPIE volume number.
- The last two digits indicate publication order within the volume using a Base 36 numbering system employing both numerals and letters. These two-number sets start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B ... 0Z, followed by 10-1Z, 20-2Z, etc. The CID Number appears on each page of the manuscript.

Contents

Part One:

11560 02

11560 03

11560 04

11560 05

11560 06

11560 07

11560 08

11560 09

11560 0A

11560 OB

11560 0C

11560 0D

11560 OE

11560 OF

11560 0G

[11560-184]

Flame stabilization at moderate flow swirling [11560-36] Ground-based FTIR observations of CH4 total column at Tomsk in comparison with IASI satellite data [11560-65] Algorithm for calculating the reflected radiation in the presence of broken clouds for limb sensing geometry [11560-126] Air-broadening H₂O absorption line parameters in the 5900 – 6100 cm⁻¹ spectral region [11560-162] Light-emitting-diode Fourier-Transform spectroscopy of H₂17O between 17 000 and 20 000 cm⁻¹ [11560-176] Line assignment of the ¹³CH₄ v₂ +2v₃ band at low temperature [11560-178]

Simulation of nitrogen Raman vibrational-rotational band for temperature determination

Intensities of 2v₄ and 2v₂ methane Raman bands as a function of pressure [11560-185]

Contribution of new water vapor absorption lines to the atmospheric transmission in the

Water vapor self-continuum model in the rotational absorption band (Invited Paper) [11560-96]

MOLECULAR SPECTROSCOPY AND ATMOSPHERIC RADIATIVE PROCESSES

11560 OH	Dunham coefficients for the A ² Σ and molecular constants for the B ² Σ , C ² Σ electronic states of the ¹⁶ OH molecule: preliminary results [11560-340]
11560 OI	H ₂ O-air line broadening coefficients: effects of vibration [11560-342]
	OPTICAL RADIATION PROPAGATION IN THE ATMOSPHERE AND OCEAN
11560 OJ	Theoretical and experimental investigations of optical bistatic communication systems in Russia (Invited Paper) [11560-118]
11560 OK	Design and development adaptive optical system installed on small-aperture telescope with predictive algorithm [11560-5]
11560 OL	Coherence degree of a partially coherent Bessel beam in turbulent atmosphere [11560-6]
11560 0M	Mean intensity of a partially coherent Bessel beam in turbulent atmosphere [11560-8]
11560 ON	Coherence scales of a partially coherent Bessel beam propagating in turbulent atmosphere [11560-9]
11560 00	Propagation of conic waves in turbulent atmosphere [11560-10]
11560 OP	Numerical investigation of laser light scattering by dielectric microtoroids [11560-15]
11560 OQ	Computer simulation of wave processes in optical media for nanophotonic devices [11560-24]
11560 OR	Regional bio-optical algorithm for remote estimation of the Sea of Azov's IOPs [11560-34]
11560 OS	Effective dispersion length during the propagation of powerful femtosecond laser pulses in the air [11560-41]
11560 OT	Characteristics of the energy-replenishing diffraction-ray tube at the postfilamentation stage of the propagation of femtosecond laser pulses in the air [11560-42]
11560 OU	The development of optical device for a SWIR range [11560-49]
11560 OV	Geophysical effects of large fires in the Moscow region [11560-50]
11560 OW	Weak localization in highly anisotropically scattering media [11560-69]
11560 0X	Detection method of highly turbulent regions in the atmosphere using the backscattering enhancement effect [11560-89]
11560 OY	Saturation of radiation fluctuations of a narrow divergent laser beam in the surface atmosphere in snowfalls [11560-90]

11560 OZ	Influence of the shock wave structure of the separation flow near the turret model located in the T-313 wind tunnel on the laser beam displacement angles [11560-93]
11560 10	Characteristics of atmospheric and underwater optical communication channels on scattered radiation [11560-95]
11560 11	Q-parametric estimations for the turbulent characteristics of a thermodynamically inhomogeneous non-stationary optical path [11560-107]
11560 12	Superstatistics models for the free space optical path [11560-108]
11560 13	The results of the measurements of the nighttime optical turbulence parameters at the Baykal Astrophysical Observatory [11560-109]
11560 14	Towards improvements of the adaptive optics systems in astronomy [11560-110]
11560 15	The variations of the optical distortions with height at the Baykal Astrophysical Observatory site [11560-111]
11560 16	Analysis of the gas streaming in a diffusion flame using the IR thermography method [11560-115]
11560 17	Some results of seminatural researches of small seat of wildland fire [11560-116]
11560 18	Effects of pressure pulsations on liquid fuel combustion characteristics [11560-117]
11560 19	Influence of the outer scale of turbulence on acoustic radiation propagation in a moving turbulent atmosphere [11560-122]
11560 1A	Results of measurements of the vertical derivative of temperature and velocity in a mountainous turbulent boundary layer [11560-136]
11560 1B	Propagation of vortex beam superposition through a turbulent atmosphere [11560-137]
11560 1C	Results of measurements of characteristics of the universal similarity function in the Monin-Obukhov similarity theory [11560-138]
11560 1D	Century spectra of temperature fluctuations in the atmospheric boundary layer for the cities of Tsimlyansk and Tomsk [11560-139]
11560 1E	Evolution of optical vortices [11560-140]
11560 1F	Analysis: the intensity of fluctuations of a laser beam crossing a rotating flame [11560-145]
11560 1G	Estimation of the transverse wind velocity from image fluctuations of the illuminated diffuse target [11560-147]
11560 1H	Visualization of the structure of a supersonic underextended jet with the array of positionally sensitive photodetectors [11560-148]

11560 11	Investigation of spatial coherence of vortex laser beam propagated on monostatic location path in turbulent atmosphere using numerical simulations methods [11560-153]
11560 1J	Diffraction of optical vortices on a circular diaphragm [11560-163]
11560 1K	Statistical properties of the eikonal fluctuations of normal waves at inclined reflection from magnetically ionosphere [11560-170]
11560 1L	Stochastic simulation of radiation transfer in inhomogeneous cloud layers with optical thickness based on experimental data [11560-173]
11560 1M	Fast calculation of phase functions and study of optical phenomena for various cloud and fog models using numerical simulation [11560-179]
11560 1N	Reconstruction of the Earth's surface reflection coefficients from MODIS images taking into account radiation polarization [11560-180]
11560 1O	Monte Carlo simulation of solar radiative transfer over a ruffled water surface taking into account the polarization effects [11560-186]
11560 1P	Monte Carlo simulation of a laser beam image in the landing navigation system [11560-187]
11560 1Q	Role of diffraction effects in the formation of a radio signal reflected from a randomly inhomogeneous ionospheric layer [11560-206]
11560 1R	Dispersion spreading of a femtosecond laser pulse in a mixture dry air – water vapor [11560-213]
11560 1S	Methods of microwave radiometric studies of mesospheric clouds [11560-215]
11560 1T	Measurements of IR radiation of cold aerosol in the atmosphere above the city of Chita [11560-216]
11560 1U	Impact of atmospheric conditions and a scanned surface type on laser scanning results [11560-232]
11560 1V	Video-digital crosswind meters [11560-234]
11560 1W	Peculiarities of zonal approach to wave front reconstruction by measurements of a Shack-Hartmann sensor [11560-248]
11560 1X	Influence of the optical elements on the accuracy of reconstruction of a wavefront distributed by atmospheric turbulence [11560-250]
11560 1Y	New construction decisions in the creation of the wavefront tilt corrector [11560-251]
11560 1Z	Development and investigation of small-aperture bimorph deformable mirror for correction of low-order aberrations of laser radiation [11560-263]
11560 20	Evaluation of the effect of noise in a digital holographic system on the quality of reconstructed particle image [11560-265]

11560 21	Temporary dynamics of sodium emission lines intensity at filamentation of laser pulses in aqua aerosol [11560-284]
11560 22	About the methodology and tools for meteo LIDAR metrological support [11560-292]
11560 23	Parameters of holographic gratings for surface-enhanced gas Raman spectroscopy [11560-293]
11560 24	Reconstruction of the Lambertian surface in a weakly scattering medium [11560-294]
11560 25	Correction of dynamic phase turbulent aberrations of a laser beam with a frequency of 1500 Hz [11560-300]
11560 26	Adaptive optical system for correction of laser beam going through turbulent atmosphere [11560-303]
11560 27	Compensation of random distortions of the wavefront based on the atmospheric backscatter signal [11560-308]
11560 28	Analysis of the influence of double reflection on the bathymetric function restoration [11560-309]
11560 29	Dependence of the density of the probability of turbulent fluctuations of the orbital angular moment of a laser beam on the size of the receiver aperture [11560-314]
11560 2A	Comparison of efficiency of bimorph mirror and spatial light modulator for laser beam focusing through a moderately scattering medium [11560-316]
11560 2B	Analyses of optical vortex registration methods [11560-321]
11560 2C	Calculation by the Monte-Carlo method of optical radiation scattering by cirrus crystals in the geometric optics approximation [11560-332]
11560 2D	Light scattering matrix for quasi-horizontally oriented atmospheric ice crystals for radiation transfer problems [11560-334]
	OPTICAL INVESTIGATION OF ATMOSPHERE AND OCEAN
11560 2E	Retrieving microphysics of cirrus clouds from lidar-radar and depolarization ratios (Invited Paper) [11560-155]
11560 2F	Aerosol indicatrices scattering of coastal haze [11560-11]
11560 2G	Extinction spectra depending on the marine particles range of sizes [11560-12]
11560 2H	Variations in optical and microphysical characteristics of atmospheric aerosol in expeditions: Transarctic 2019 [11560-14]

11560 21	Numerical simulation of dust-gas cloud rise from explosion near Earth's surface [11560-55]
11560 2J	Seasonal and interannual variations in atmospheric aerosol optical depth during 2011-2019 in Barentsburg, Spitsbergen [11560-16]
11560 2K	Relationships between the characteristics of the aerosol optical depth of the atmosphere and the asymmetry factor of the aerosol scattering phase function under ordinary conditions and in smoke haze events in Tomsk region [11560-17]
11560 2L	The aerosol effect on laser beam guidance [11560-18]
11560 2M	The organic carbon-to-chlorophyll ratio as a necessary parameter for estimating the Black Sea phytoplankton biomass from satellite data [11560-19]
11560 2N	Evaluation of methane emission intensities for agglomeration territory of Saint-Petersburg [11560-20]
11560 20	Mirror-lens camera system for underwater drones [11560-21]
11560 2P	The influence of weather conditions on the concentration of PM2.5 in the surface layer of the atmosphere of Krasnoyarsk [11560-22]
11560 2Q	Assessment of the atmosphere in the city of Krasnoyarsk based on indicators of sustainable development [11560-23]
11560 2R	Spatial features of the hydro-optical waters structure in the northern part of the Black Sea in spring 2019 according to contact measurements on R/V Professor Vodyanitsky [11560-35]
11560 2S	Mobile compact IR differential absorption lidar for research of methane in the atmoshpere [11560-39]
11560 2T	Processing of lidar data on trace atmospheric gases [11560-40]
11560 2U	Seasonal and interannual variations of aerosol and black carbon concentrations in near-surface atmospheric layer over Barentsburg (Spitsbergen, 2011-2019) [11560-43]
11560 2V	Evaluation of atmospheric pollution with PAHs and PM $_{10}$ above the water area of Lake Baikal during wildfires in Summer 2019 <code>[11560-46]</code>
11560 2W	Effect of meteorological conditions on the distribution of PAHs in the atmosphere of the southern Baikal region [11560-47]
11560 2X	Vertical distribution of aerosol layers and water vapor in the troposphere [11560-48]
11560 2Y	Variability of pulse wave characteristics under the influence of electromagnetic radiation of optical range [11560-52]
11560 2Z	Measurement complex Siberian lidar station [11560-56]
11560 30	Evaluation of efficiency of the combined LIDAR signal photodetection technique [11560-57]

Part Two: Comparison of aerosol characteristics at polar stations Cape Baranov and Barentsburg in 11560 31 measurement seasons of 2018-2019 [11560-58] 11560 32 Investigation of the elemental composition of snow cover in industrial cities of the Irkutsk **Region** [11560-59] 11560 33 Analysis of the relationship between the environmental pollution and morbidity of the population of industrial cities in the southern Baikal region [11560-60] 11560 34 Verification of results of measurements of concentration of PM_{2.5} by Cityair air monitoring stations for autumn [11560-64] Feasibility study of oil pollution detection on the terrestrial surface using a flash tube for 11560 35 fluorescence excitation [11560-66] 11560 36 Experimental studies of laser-induced fluorescence spectra of plants under adverse development conditions [11560-67] 11560 37 Capability analysis of optical sensors for vegetation monitoring in different spectral bands [11560-68] Monitoring of the snow cover chemical composition and its role in the acidification of the 11560 38 southern Baikal tributaries [11560-70] To estimation of the chlorophyll concentration from measurements of fluorescent 11560 39 characteristics at Lake Baikal [11560-75] Apwelling role in the municipal sewage waters' transportation in the coastal part of the Crimea 11560 3A according to data of hydro-optical observations [11560-79] 11560 3B Methods and device for dissolved oil in water environment in-situ monitoring [11560-80] 11560 3C Refractometric parametrization of weighted and dissolved components' qualitative composition in aqueous media: methods and device for in situ monitoring [11560-81] 11560 3D The penetration depth determination of total suspended matter [11560-82] 11560 3E Diurnal behavior of hygro- and thermooptical parameters of near-ground aerosol in winter **2019-2020** [11560-88] 11560 3F Model of spectral course of aerosol attenuation coefficient for meteorological range of visibility more 20 km [11560-97] Model calculation of the aerosol optical characteristics at different variants of considering 11560 3G hygroscopic and absorbing properties on the example of atmospheric hazes [11560-99] Diurnal behavior of concentrations of submicron and coarse particles in different seasons in the 11560 3H frameworks of empirical classification of types of aerosol weather [11560-102]

11560 31	Seasonal variations of anthropogenic contribution into diurnal behavior of the aerosol and soot mass concentrations and the aerosol hygroscopicity in the suburb of Tomsk [11560-103]
11560 3J	Assimilation modeling and MODIS color scanner data to obtain continuous information about the thermohaline structure in the Sea of Azov [11560-104]
11560 3K	Characterization of 2017 coccolithophore bloom in the Black Sea using optical and biological data [11560-105]
11560 3L	Relation of suspended organic particle size with water productivity [11560-106]
11560 3M	Estimation of influence of optical radiation on the characteristics of human pulse signals using wavelet coherence [11560-119]
11560 3N	Chemical composition of snow cover in specially protected, non-industrial and industrial areas of the Baikal region [11560-120]
11560 3O	Methods and algorithms for processing a series of cloud images when observing from the Earth's surface [11560-121]
11560 3P	Chemical composition of atmospheric deposition on the southwest coast of Lake Baikal in July 2018 [11560-123]
11560 3Q	Aerosol thermooptical characteristics in different types of aerosol weather [11560-129]
11560 3R	Relations between the aerosol condensation activity and the content of compounds of different volatility in its composition [11560-130]
11560 3S	Optical characteristics of atmospheric aerosol from satellite and photometric measurements at the dust transfers dates [11560-132]
11560 3T	Repeatability of various types of "aerosol weather" in diurnal behavior of the aerosol and soot concentrations in various seasons in the Tomsk suburban region and background conditions [11560-135]
11560 3U	Modeling the absorption properties of organic carbon in biomass burning smoke in Siberia using remote sensing data [11560-141]
11560 3V	Estimation of how temperature data from MetOp and Aura satellites influence retrieval of ozone profiles at Siberian lidar station [11560-142]
11560 3W	Aureole scattering phase function for various types of aerosol weather in 2010-2019 [11560-149]
11560 3X	The effect of weak low-frequency pulsed acoustic exposure on hemogram values in children with pulmonary tuberculosis [11560-152]
11560 3Y	Change in skin conductance with a weak low-frequency pulsed acoustic exposure in children with pulmonary tuberculosis [11560-157]
11560 3Z	Synchronous measurements of atmospheric characteristics in the surface layer [11560-158]

11560 40	Chemical composition of aerosol and gas impurities in the Baikal region during wildfires in the summer of 2018-2019 [11560-159]
11560 41	Distribution of bio-optical parameters in the Lomonosov equatorial undercurrent in December 2019 [11560-171]
11560 42	Phytomass and photosynthetically active radiation distribution in the brown alga Cystoseira crinite (Desf.): Bory canopy, the Black Sea, at different time of day [11560-172]
11560 43	Measurements of the smoke emission chemical composition upon simulated combustion of forest fuel materials in a large aerosol chamber [11560-174]
11560 44	Retrieval of tropospheric aerosol parameters from nighttime and daytime lidar measurements [11560-177]
11560 45	Imaging of backscattered pulsed laser radiation with a SPAD camera [11560-188]
11560 46	Dynamics of optical-microphysical characteristics of smokes from Siberian wildfires in the Big Aerosol Chamber at the stages of smoke generation and aging [11560-189]
11560 47	Portable multichannel heterodyne spectroradiometer for simultaneous atmospheric CO ₂ and CH ₄ precision column measurement in the near-infrared range [11560-191]
11560 48	Raman scattering on particles: experimental stand for the phase function measurement [11560-194]
11560 49	Relations between the aerosol optical characteristics measured on a near-ground long path and in a local volume of air [11560-195]
11560 4A	New remote sensing applications for marine monitoring of oil pollution using UAV [11560-198]
11560 4B	Specificity of the contribution of forest to atmospheric CO ₂ [11560-200]
11560 4C	Temporal variability of the specularity of high-level clouds according to the data on laser polarization sensing [11560-203]
11560 4D	Effect of specular high-level clouds on solar radiation fluxes according to the data of the lidar-actinometric experiment [11560-204]
11560 4E	The spatial distribution of chlorophyll-a on the North-Western Black Sea Shelf related by types of wind forcing [11560-212]
11560 4F	Analysis of correlations between aerosol characteristics of the atmosphere at different altitudes based on the results of aircraft measurements in the Novosibirsk region, Zavyalovo, in 2000-2018 [11560-217]
11560 4G	The distribution of the polarization degree of the double scattering lidar return from droplet aerosol formations with various microstructure in the registration plane [11560-219]
11560 41	Determination of opportunities for detecting chemical elements in aqueous aerosol in filament-induced emission spectroscopy [11560-237]

11560 4J	The role of multiple scattering in the inverse problem of the light absorption in the sea [11560-241]
11560 4K	Element analysis of solid particles in Mezhdurechensk city and adjacent territories according to the study of snow cover: Kemerovo region [11560-245]
11560 4L	Atmospheric supply of microplastics in the south of Western Siberia according to microscopic analysis of snow cover samples [11560-246]
11560 4M	Elemental composition and mass concentration of near surface aerosols in Moscow region during unusual weather conditions in the fall 2019 [11560-247]
11560 4N	Impact of combustion phase on scattering and spectral absorption of Siberian biomass burning: studies in Large Aerosol Chamber [11560-252]
11560 40	Pollen identified in precipitation fallen in the south of West Siberia in 2019 [11560-254]
11560 4P	Investigation of condensation grows of aerosol particles [11560-257]
11560 4Q	System for building air patrol routes for fire-prone areas of vegetation [11560-258]
11560 4R	The study of aerosol deposition in the environ of TPP-5 in Novosibirsk [11560-267]
11560 4S	Estimation of the height of the turbulent mixing layer from lidar data on height profiles of the turbulent energy dissipation rate [11560-270]
11560 4T	The study of the indicate and characteristics of internal waves according to satellite images of the color of the sea $[11560-272]$
11560 4U	Background concentrations and diurnal variability of carbon dioxide, methane, and carbon monoxide in the city of Ekaterinburg [11560-274]
11560 4V	Research of the fires influence on the state of atmosphere pollution and atmospheric sediments over the Sevastopol [11560-277]
11560 4W	Linear operators approach for solving the problem of evaporation of two large interacting atmospheric aerosol drops with arbitrary radii heated by electromagnetic radiation [11560-278]
11560 4X	Determination of wind turbulence parameters from measurements with a Stream Line lidar in strong winds [11560-279]
11560 4Y	Atmospheric methane retrieval from TANSO-FTS/GOSAT-2 thermal IR spectra using FIRE-ARMS software [11560-282]
11560 4Z	Peculiarities of spectral dependences of aerosol extinction and scattering coefficients as judged from measurements in artificial smokes [11560-283]
11560 50	Distribution of the Barguzin River waters in the Barguzin Bay estimated by the content of dissolved methane [11560-287]
11560 51	Features of lidar return depolarization by warm clouds of various types [11560-296]

11560 52	Experimental studies of aerosol in South-East Crimea [11560-304]
11560 53	The FRC KSC SB RAS air monitoring system of Krasnoyarsk: technological tools and preliminary results [11560-305]
11560 54	Monitoring of agricultural vegetation development based on time series analysis of satellite data [11560-306]
11560 55	Variability of fine-scale vertical structure of bioluminescence in the north-eastern part of the Black Sea [11560-307]
11560 56	Phycoerythrin influence on the optical characteristics of seawater in the Atlantic sector of the Southern Ocean [11560-317]
11560 57	The polarization characteristics of cirrus cloud using lidar and radar in Hefei [11560-318]
11560 58	Experimental prototype of automatic weather station ArcticMeteo [11560-319]
11560 59	Experimental studies of the spectral dependence of backscattering signals on aerosol at wavelengths of a CO ₂ laser [11560-320]
11560 5A	The atmospheric aerosol carbon isotope composition studies at the Svalbard and the Severnaya Zemlya archipelagos [11560-322]
11560 5B	Features of measuring parameters of snow accompanied by wind [11560-323]
11560 5C	Nonlinear features of the atmospheric evolution of the absorption properties of biomass burning aerosol [11560-324]
11560 5D	The coherent and incoherent light scattering in the vicinity of backscattering direction on the particles of cirrus clouds [11560-333]
11560 5E	Numerical solution of the light scattering problem for atmospheric ice particles in the infrared range for retrieving the microphysical properties of cirrus clouds [11560-335]
11560 5F	Light scattering on large ice spherical particles for lidar sounding of atmosphere [11560-337]
11560 5G	Calculating the radar signal reflected from cirrus cloud by discrete dipole approximation [11560-338]
11560 5H	Spectra of turbulent fluctuations of Euler angles of unmanned aerial vehicles in the altitude holding mode [11560-339]
11560 51	Optical depth of smoke aerosol over the Lake Baikal aquatories in the period of forest fires in the summer of 2019 [11560-341]
11560 5J	Black Carbon in urban emissions on the Polar Circle [11560-344]

PHYSICS OF THE TROPOSPHERE

11560 5K	Radiation properties of high-level clouds (Invited Paper) [11560-205]
11560 5L	Results of numerical simulation of air quality above city (Invited Paper) [11560-260]
11560 5M	Propagation of LF-MF radio wave over structure: thick ice sea in the Arctic Ocean (Invited Paper) [11560-266]
11560 5N	Construction of forecasts in environmental protection as a solution to the continuation problem (Invited Paper) [11560-299]
11560 5O	Remote method determining the formation of forest fires from thunderstorms on the example of Yakutia [11560-4]
11560 5P	Distribution of low stratiform clouds and precipitation over the Siberian region [11560-25]
11560 5Q	Modern trends of long-term change in the amount of low stratiform clouds over the Siberian region [11560-26]
11560 5R	Long-term change in precipitation over the Siberian region [11560-27]
11560 5S	Estimation of contributions from different-scale components of the wind vector and air temperature to turbulent heat fluxes in the atmospheric surface layer [11560-30]
11560 5T	Estimation of the height of intense turbulent heat exchange layer in the stably stratified atmospheric boundary layer [11560-31]
11560 5U	Parameterization of the turbulent kinetic energy as a function of the wind velocity [11560-32]
11560 5V	Statistics of the components forming vertical turbulent heat fluxes in the atmospheric surface layer [11560-33]
11560 5W	Semiparametric maximum likelihood estimates in problems of processing data of minisodar measurements in the ABL [11560-37]
11560 5X	Thermal and slow neutrons in the atmosphere near the Earth's surface [11560-38]
11560 5Y	Atmospheric circulation internal variability contribution and global climate change [11560-44]
11560 5Z	Robust nonparametric generator of random variables for processing of minisodar measurements [11560-45]
11560 60	Influence of Siberian forest fires smoke in July 2019 on the atmosphere pollution of Krasnoyarsk by particulate matter [11560-61]

Part Three:

11560 61	Inter-annual dynamics of regional and transboundary transport of air masses of the Baikal region for 2010-2018 [11560-62]
11560 62	Temperature dependences of specific electric resistivity of natural water [11560-73]
11560 63	Hemodynamic indicators in young men in Yakutia with long monitoring and different activity of the geomagnetic field [11560-83]
11560 64	Statistical model for characteristics of atmospheric internal waves and their signatures by satellite data $[11560-84]$
11560 65	Climate atmospheric parameters and surface albedo in the Russian Arctic in spring [11560-87]
11560 66	Seasonal variations of outgoing longwave radiation from satellite data [11560-94]
11560 67	Conditions for occurrence of dangerous weather events in winter when southern cyclones enter the Black Sea [11560-98]
11560 68	Statistical characteristics of cloud cover in the Mediterranean-Black Sea region from satellite data [11560-100]
11560 69	Manifestation of volcanic eruptions in acoustic vibrations [11560-101]
11560 6A	Investigation on the reduction of toxic emissions from the coal slurry fuel combustion [11560-113]
11560 6B	Diurnal variation of surface ozone concentration in the atmosphere of the arid territory of Mongolia, station Sainshand, in the warm period 2005-2014 [11560-114]
11560 6C	Surface impedance of the structure: thick ice-sea in VLF-VHF range of radio waves [11560-124]
11560 6D	Analysis of the subsea permafrost dynamics at the Arctic shelf accounting for climate change uncertainty during glacial cycles [11560-133]
11560 6E	Results of ultrafine aerosol measurements on the southeastern coast of Lake Baikal: st. Boyarsky [11560-134]
11560 6F	Fluxes and rates of ozone dry deposition in the forest environment near Lake Baikal [11560-144]
11560 6G	Comparison of characteristics for different cloud types over the territory of Western Siberia according to MODIS and VIIRS data in the daytime and nighttime [11560-146]
11560 6H	Atmospheric circulation indices and their influence on the temperature regime of south coast of Crimea in winter periods [11560-161]
11560 6l	Interannual variability of the integral water vapor in Europe, global circulation and El Niño [11560-168]

11560 6J	Near-surface electric field variations in Moscow City [11560-169]
11560 6K	Research of a neutral and stable boundary layer of the atmosphere using an explicit algebraic model of Reynolds stresses [11560-175]
11560 6L	Investigation of local atmospheric processes with measuring instruments of JUC atmosphere and high-resolution mesoscale model [11560-181]
11560 6M	Observed extreme precipitation-temperature scaling in Russia during 1961-2017 [11560-192]
11560 6N	Analysis of latitudinal features of wildfires seasonal cycle in Eastern Siberia by multidecadal remote sensing data [11560-202]
11560 6O	Analysis of atmospheric aerosols variability in the Baikal region [11560-207]
11560 6P	Spatial-temporary distribution of small gas impurities above Lake Baikal during the forest fires in the summer 2019 [11560-209]
11560 6Q	Field of the ground wave over inhomogeneous frozen radio paths [11560-214]
11560 6R	The effect of smoke plumes from remote forest fires on the surface electric field [11560-221]
11560 6S	Interpolation of numerical weather forecast data for initialization and support of a mesoscale meteorological model [11560-223]
11560 6T	Numerical modeling of aerosol pollution for the observatory Fonovaya IAO SB RAS [11560-224]
11560 6U	Spatial-temporal variability of temperature stratification of the lower atmosphere layer during the development of abnormally early thunderstorms and squalls [11560-227]
11560 6V	Variations of atmospheric-electrical quantities in the surface layer during severe frosts in Siberia [11560-228]
11560 6W	Interannual variability of abnormal wind gust frequency in the south of Western Siberia for winter period of 2009-2020 [11560-230]
11560 6X	Connected variations of meteorological and electrical quantities of surface atmosphere under the influence of heavy showers [11560-231]
11560 6Y	Study of the long-term phenology changes of boreal forests in Siberia on satellite data [11560-233]
11560 6Z	Models of smoke plumes from high-altitude sources [11560-235]
11560 70	Calculation of stratification effects and parameters of atmospheric currents over steep surface obstacles [11560-236]
11560 71	Modeling the propagation of impurities from point sources in the winter atmosphere of the Baikal region [11560-238]

11560 72	Estimation of the characteristics of mesoscale convective complexes over the south of Western Siberia based on MODIS data [11560-239]
11560 73	Modeling of air quality of the surface layer of the atmosphere in the Tomsk using CAMx model [11560-240]
11560 74	The long-term course of the chemical composition of atmospheric aerosol in the troposphere of the south of Western Siberia based on the results of airborne sounding [11560-242]
11560 75	Positive lightning strokes during long thunderstorms in Central Yakutia [11560-243]
11560 76	Dust aerosol emission on the desertified area [11560-249]
11560 77	Fine particles concentration registration in geophysical monitoring center IDG RAS [11560-253]
11560 78	Variations of density of lightning discharges in tropical cyclones in Primorye in August 2016 [11560-256]
11560 79	Tropospheric refraction in near-polar observation points [11560-261]
11560 7A	Estimation of the Richardson number in the atmospheric boundary layer using data from temperature radiometer and Doppler lidar [11560-262]
11560 7B	Research of the hydroelectric (electrokinetic) process on the shoreline of Lake Baikal [11560-264]
11560 7C	Research of the influence of the street canyon geometry on the turbulent flow structure [11560-269]
11560 7D	Structure of the atmospheric circulation variability over Northern Hemisphere extratropical zone according to the observation and modelling data [11560-271]
11560 7E	Snow water equivalent variability in the northwest of European Russia according to observation and modeling [11560-273]
11560 7F	Verification of the isotopic atmospheric general circulation model for a monitoring station in Labytnangi [11560-276]
11560 7G	Estimation of non-linear links characteristics for basic meteorological fields over Northern Eurasia [11560-280]
11560 7H	Transporting <i>Spirogyra</i> algae in waters of Lake Baikal: results of mathematical modeling [11560-298]
11560 7I	Numerical study of emission sources identification algorithm with joint use of in situ and remote sensing measurement data [11560-302]
11560 7J	Features of geomagnetic variations in the period range from 12 to 17 days according to the Mikhnevo Observatory data [11560-311]

11560 7K	Geophysical effects in the surface atmosphere caused by earthquake in Turkey on January 24, 2020 [11560-312]
11560 7L	Use of polarization multi-angular measurements of the parasol satellite radiometer for detection of Asian dust storms over the marine surface [11560-330]
11560 7M	Comparison of flows of greenhouse gases at the atmosphere—soil interface for three areas of the Tomsk Region [11560-336]
11560 7N	Remote electrical effects of the explosive stage of the Stromboli, Italy, volcano eruption on 3 July, 2019 [11560-343]
11560 70	Acoustic effects of great fire on gas pipelines [11560-346]
	PHYSICS OF THE MIDDLE AND UPPER ATMOSPHERE
11560 7P	Influence of the stratospheric polar vortex on the tropospheric vortex dynamics in winter [11560-1]
11560 7Q	Influence of the polar vortex strength and the QBO phase on Arctic ozone depletion [11560-2]
11560 7R	Temperature variability in the upper polar stratosphere depending on the polar vortex strength [11560-3]
11560 7S	The relationship between mid-latitude Kp index and the interplanetary medium parameters in magnetic storm main phases during CIR and ICME events [11560-7]
11560 7T	Methodology of the lower ionosphere models verification based on VLF radio wave propagation during x-ray flares [11560-51]
11560 7U	Antarctic polar vortex weakening due to a temperature decrease in the lower subtropical stratosphere [11560-54]
11560 7V	Effects of nonlinear interactions of spectral components of acoustic-gravity waves in the atmosphere [11560-71]
11560 7W	Mesoscale variations of hydroxyl rotational temperature from observations at Russian sites [11560-72]
11560 7X	Multi-year changes in the mesoscale waves according to the data of drift and radio-meteor measurements at Collm, Germany [11560-76]
11560 7Y	Experimental study of the mechanisms of the impact of large tropical cyclones on the ionosphere [11560-77]
11560 7Z	Toward turbulence manifestation in time series of ozone and aerosol contents in the stratosphere [11560-85]
11560 80	Remote electromagnetic and ionospheric effects of the earthquakes in Greece [11560-91]

11560 81	The study of temperature and night green airglow at mid-latitude in MLT during winter [11560-92]
11560 82	The correction of ionosphere parameters on the base of vertical and backscatter sounding data by continuous chirp signal [11560-125]
11560 83	Solar-terrestrial links and aeronomy of the middle atmosphere [11560-127]
11560 84	The investigation of signal shape for backscatter ionosphere sounding by continuous chirp signal [11560-128]
11560 85	Numerical modeling of additional traces on vertical incidence ionograms in their state of merging with the main trace [11560-131]
11560 86	Proton aurora observation as a result of ion cyclotron instability [11560-143]
11560 87	Study of variability of the background aerosol content in the stratosphere over Tomsk by lidar measurement data in 2016-2019 [11560-150]
11560 88	Lidar studies of winter stratospheric warming over Tomsk [11560-151]
11560 89	Interrelation of the anomalies of cosmic and solar radiation and meteorological parameters observed at south coast of Crimea [11560-160]
11560 8A	Influence of stratospheric warmings on formation of sporadic layers over the Asian region of Russia [11560-165]
11560 8B	Modeling of injection of aluminum plasma jet to the upper atmosphere at the initial stage of active geophysical rocket experiment [11560-166]
11560 8C	Method for radiation transfer calculation in numerical simulation of strong perturbation in the atmosphere [11560-167]
11560 8D	Refinement of model ionospheric critical frequency values for current conditions from data on the difference between delays of ionospheric signals from two navigation satellites [11560-183]
11560 8E	VLF signal phase variations due to annular solar eclipses of May 20-21, 2012 and December 26 2019 [11560-190]
11560 8F	Investigation of medium-scale traveling ionospheric disturbances over the Asian region of Russia during solar cycle 24 [11560-193]
11560 8G	Studying of spectra of lightning discharge signals propagating in the earth-ionosphere waveguide disturbed seismically [11560-196]
11560 8H	Method of semi-automatic registration of MS TID using oblique-incidence sounding data [11560-197]
11560 8I	Modeling of heat transfer in the ionosphere and plasmasphere [11560-199]

11560 8J	Mid-latitude ionospheric TEC variations during the period from 2016 to 2019 using GNSS data from the geophysical observatory Mikhnevo [11560-201]
11560 8K	Influence of solar activity on electron density fluctuations in the Earth's ionosphere according to Swarm satellite data [11560-211]
11560 8L	Interannual variations of planetary wave activity from OH (6-2) observations at the Maimaga station [11560-220]
11560 8M	Studying atmospheric and ionospheric variabilities associated with sudden stratospheric warmings [11560-222]
11560 8N	Features of GNSS signals processing for monitoring rapid changes of ionosphere parameters [11560-225]
11560 80	lonospheric effects of earthquake on November 13, 2016 in New Zealand [11560-259]
11560 8P	Dependence of variation of parameters of the D-layer of the ionosphere during x-ray flashes of M and X classes from their energy [11560-268]
11560 8Q	Accuracy characteristics of automatic interpretation of vertical sounding data [11560-285]
11560 8R	lon heating mechanisms in ionosphere high-speed plasma jet in presence of a background electric field [11560-286]
11560 8S	FDTD, FDFD, and mode sum methods for VLF-LF propagation in the lower ionosphere [11560-288]
11560 8T	Unipolar component of the electric field and vertical atmospheric currents according to the GFO "Mikhnevo" [11560-289]
11560 8U	Changes in molecular oxygen and hydroxyl airglow of the mesosphere and lower thermosphere as observed at Zvenigorod in 2000-2019 [11560-290]
11560 8V	Modulation of the meridional ozone transfer by the Southern oscillation, ENSO, in the time of filling Antarctic ozone hole [11560-291]
11560 8W	Structural diversity of the ionosphere at high and middle latitudes in the eastern and western hemispheres as observed by satellite radio tomography [11560-297]
11560 8X	The effect of winter stratospheric warmings on the intensity of the muon component of secondary cosmic rays [11560-310]
11560 8Y	On the mechanism of formation of a resonant backscattering signal in the middle atmosphere [11560-313]

11560 8Z	Software for experimental studies of the atmospheric turbulence structure [11560-326]
11560 90	Research of singular spectrum analysis in the processing of meteorological measurings [11560-327]
11560 91	Mobile lidar station [11560-328]