

PHYSICAL AND MATHEMATICAL MODELING OF  
PROCESSES IN GEOMEDIA



**Ishlinsky Institute for Problems  
in Mechanics of RAS**

**October 20–22, 2021**

**Moscow**

## SCIENTIFIC PROGRAM

Theoretical and experimental studies of processes in atmosphere, ocean, lithosphere and their interactions; a wide range of problems associated with the production of hydrocarbons; ecological problems of the environment; problems of human impact on the environment; geophysical methods.

Papers on similar topics can be included in the School Program. Number of papers presented by one author is not limited.



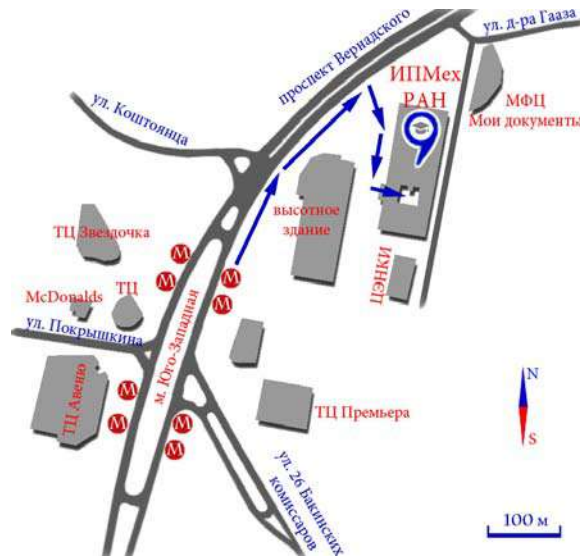
The School is scheduled to be listen to more than 100 invited, oral and poster presentations. It is planned to hold open discussions on the subject of Schools with the participation of leading experts in appropriate fields. School materials will be published.

### PROGRAM COMMITTEE:

Ac. V.N. Akopyan, Prof. L.A. Abukova, Prof. A.A. Babanin, Dr. N.S. Bezaeva, Dr. T.O. Chaplina (Sc. Secretary), Prof. A.V. Kholoptsev, Ac. A.N. Dmitrievsky, Ac. I.G. Goryacheva, Prof. V.I. Karev (Dep. Chair), Prof. A.V. Kistovich, Prof. M. Kwasniewsky, Ac. D.M. Klimov (Chairman), Dr.Sc. Yu.F. Kovalenko, Prof. V.B. Lapshin, Ac. V.P. Matveenkov, Prof. L.A. Nazarova, Ac. R.I. Nigmatulin, Prof. V.N. Nosov, Prof. K.V. Pokazeev (Dep. Chair), Prof. N.N. Sysoev, Prof. I.A. Repina, Prof. A. Saakyan, Prof. A.A. Schreider, Prof. A.A. Soloviev, Prof. B.G. Tarasov, Prof. V.V. Fadeev, Corr. RAS N.N. Filatov, Prof. S.E. Yakush, Prof. P. Young, Prof. P.O. Zavyalov, Prof. A.G. Zatsepin, Prof. A.S. Zapevalov, Prof. I.A. Znamenskaya, Prof. V.N. Zyryanov.

Conference venue: A.Ishlinsky Institute for Problems in  
Mechanics of Russian Academy of Sciences.  
Prospekt Vernadskogo 101/1, 119526 Moscow, Russia

Conference languages: Russian and English



## Schedule

*Tuesday 19 October 2021*

14:00 – 17:00	<b>Registration of participants</b>	<i>Assembly hall foyer IPMech RAS</i>
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*Среда-пятница, 20-22 октября 2021*

09:00 – 17:30	<b>Registration of participants</b>	<i>Assembly hall foyer IPMech RAS</i>
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09:00 – 19:45	<b>Session</b>	<i>IPMech assembly hall</i>
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**Attention!**  
**The Program is subject to change.**  
**Follow the announcements.**

# Scientific Program

*Wednesday 20 October 2021*

<i>10:00 – 10:15</i>	<i>School opening Opening Director of IPMech RAS S.E. Yakush Opening remarks by the Chairman of the Program Committee, Academician of the Russian Academy of Sciences D.M. Klimov</i>
<i>10:15 – 10:40 plenary</i>	<i>Karev V.I., Kovalenko Yu.F. SIMULATION OF DIRECTIONAL UNLOADING OF THE FORMATION AT A TRUE THREE-AXIS LOADING PLANT FOR LOW PERMEABLE COLLECTORS</i>
<i>10:40 – 11:10 plenary</i>	<i>Galybin A.N., Yakush S.E., Polishchuk A.M. CRACK SYSTEM DEVELOPMENT FROM PRESSURIZED PORES IN ROCK MATRIX</i>
<i>11:10 – 11:30 plenary</i>	<i>Ustinov K.B. DETERMINATION OF THE STRESS STATE OF THE ROCK MASS. METHODS, DIFFICULTIES AND WAYS TO OVERCOME THEM</i>

*11:30 – 11:45 Coffee - break*

## *Section 2. Physics of the sea and the atmosphere.*

### *Theory, experiment, practice*

<i>11:45 – 12:00 invited</i>	<i>Morozov E.G. GLOBAL FIELD OF SEMIDIURNAL INTERNAL TIDES</i>
<i>12:00 – 12:15 invited</i>	<i>Fedyushkin A.I., Rozhkov A.N. CRITERION FOR DROP SPREADING / SPLASHING UP ON IMPACT ON A SOLID TARGET</i>
<i>12:15 – 12:30 invited</i>	<i>Zapevalov A.S. APPROXIMATION OF THE SEA SURFACE RISE DENSITY FUNCTION BY THE SIMPLEST GAUSSIAN MIXTURE</i>
<i>12:30 – 12:45</i>	<i>Kuznetsov S.Yu., Saprykina Ya.V. NONLINEAR CONNECTIONS OF NONSTATIONARY FLUCTUATIONS OF STORMINESS AND CLIMATE</i>
<i>12:45 – 13:00 invited</i>	<i>Morozov E.G. WAVE PROCESSES IN THE ARCTIC</i>
<i>13:00– 13:15 invited</i>	<i>Kholoptcev A.V., Shubkin R.G., Babenyshev S.V. WATER EXCHANGE OF AREAS OF THE EARTH SURFACE WITH THE ATMOSPHERE AND FOREST FIRES, ON THE EXAMPLE OF</i>

	<i>SIBERIA</i>
<b>13:15– 13:30</b>	<i>Smirnov S.I., Smirnovsky A.A., Bogdanov S.R. NUMERICAL SIMULATION OF THE SPRING UNDER-ICE TURBULENT FREE CONVECTION DRIVEN BY PERIODIC RADIATIVE HEATING</i>

**13:30 – 14:00 Lunch**

***Section 1. Geomechanics and hydromechanics of oil and gas fields and other sources of hydrocarbon raw materials***

<b>14:00 – 14:15</b>	<i>Shevtsov N.I. RESEARCH OF ROCK EMISSION MECHANISMS WITH MEASUREMENT OF ACOUSTIC EMISSION</i>
<b>14:15 – 14:30</b>	<i>Khimulia V.V. PHYSICAL MODELING OF FILTRATION AND DEFORMATION PROCESSES IN RESERVOIRS OF UNDERGROUND GAS STORAGE DURING WELL PRESSURE DRAWDOWN</i>
<b>14:30 – 14:45</b>	<i>Zakirov T.R., Garaeva A.N. PHASE DIAGRAMS OF THE INVASION PATTERNS DURING TWO-PHASE FLOWS IN ANISOTROPIC POROUS MEDIA UNDER DIFFERENT WETTING CONDITIONS AND CAPILLARY NUMBERS</i>
<b>14:45 – 15:00</b>	<i>Barkov S.O. HISTORY OF DEVELOPMENT OF STATISTICAL METHODS IN OIL AND GAS SCIENCE</i>
<b>15:00 – 15:15</b>	<i>Anakhaev K.N., Belikov V.V. SIMULATION OF DEPTH IMPULSE IMPACT ON HYDROGEOLOGICAL ARRAY</i>
<b>15:15– 15:30</b>	<i>Volkova A.Yu. ANISOTROPY OF STRENGTH AND FILTERING PROPERTIES OF ROCKS IN GEOMECHANICAL MODELING OF WELLS</i>
<b>15:30 – 16:00 invited</b>	<i>Tarasov B.G. THE UNDERSTOOD EARTHQUAKE PARADOXES IN THE WHOLE ROCKS OF THE EARTH'S CRUST WITH AN ANOMALOUS LOW SHEAR VOLTAGE</i>
<b>16:00 – 16:30 invited</b>	<i>Nazarova L.A., Golikov N.A., Nazarov L.A., Nesterova G.V. METHOD FOR DETERMINING THE DEPENDENCE OF PERMEABILITY ON STRESS DURING ELASTOPLASTIC DEFORMATION OF GEOMATERIALS FROM THE DATA OF FILTERING TESTS OF CYLINDRICAL SAMPLES WITH A CENTRAL HOLE</i>



**Thursday, 21 October 2021**  
**Section 2. Physics of the sea and the atmosphere.**  
**Theory, experiment, practice**

<b>09:00 – 09:15</b>	<i>Shreider A.A., Sazhneva A.E., Klyuev M.S., Brekhovskikh A.L., Bohoyo F., Galindo-Zaldivar H., Morales Ts., Evsenko E.I. EVOLUTION OF THE BOTTOM OF JANE'S BOTTLE IN THE NORTH-WEST OF THE WEDDELL SEA</i>
<b>09:15 – 09:30</b>	<i>Riabova S.A. APPLICATION OF THE CHAPMAN-MILLER METHOD IN THE ANALYSIS OF DAILY LUNAR VARIATIONS IN GEOMAGNETIC DATA AT BELSK OBSERVATORY</i>
<b>09:30 – 09:45</b>	<i>Terentiev E.N., Shugaev F.V., Suhareva N.A., Nikolaeva O.A., Shilin-Terentyev N.E. IDENTIFYING POINT OBJECTS IN MEASURING INSTRUMENTS WITH UNKNOWN APPARATUS FUCTIONS</i>
<b>09:45 – 10:00</b>	<i>Terentiev E.N., Prikhodko I.N., Volkov M.B. THE ESTIMATION OF PARAMETERS OF OBJECTS IN IMAGES</i>
<b>10:00 – 10:15</b>	<i>Shtremel M.N. METHODOLOGY FOR ASSESSING THE COASTAL ZONE VULNERABILITY TO WAVE IMPACT BASED ON TAKING INTO ACCOUNT THE PROPERTIES OF NONLINEAR WAVE TRANSFORMATION</i>
<b>10:15– 10:30 invited</b>	<i>Fedyushkin A.I., Rozhkov A.N. FINE THREAD DROP MODES</i>
<b>10:30– 10:45</b>	<i>Kotov M.A., Soloviev N.G., Shemyakin A.N., Yakimov M.Yu. PROSPECTS FOR APPLICATION OF MATERIALS WITH HIGH DIFFUSE SCATTERING OF UV RADIATION IN BACTERICIDE CLEANERS AND RECIRCULATORS</i>
<b>10:45– 11:00</b>	<i>Klyagina O.S., Zatsepa S.N., Pokazeev K.V., Solbakov V.V. STUDYING THE TRANSPORT ROUTES OF POLLUTANTS IN THE CASPIAN SEA BY THE METHOD OF SIMULATION OF LAGRANGESE TRAJECTORIES</i>
<b>11:00 – 11:15</b>	<i>Klyuev M.S., Shreider A.A., Zverev A.S., Brekhovskikh A.L., Rakitin I.Ya., Sazhneva A.E. ON THE BOUNDARIES OF THE PALEOSTRUCTURES OF THE ASHAMBA RIVER IN THE BLUE BAY NEAR GELENDZHİK ACCORDING TO THE DATA OF BROADBAND CONTINUOUS SEISMIC-ACOUSTIC PROFILING AND GPS POSITIONING</i>
<b>11:15 – 11:30</b>	<i>Zatsepin A.G., Gerasimov V.V. RESULTS OF A STUDY OF</i>

<i>invited</i>	<i>TURBULENT MASS EXCHANGE IN A STRATIFIED LIQUID AND THE CONDITIONS OF ITS FINE STRUCTURE</i>
<i>11:30 – 11:45 invited</i>	<i>Epifanov V.P. EVOLUTION OF THE STRUCTURE IN THE LAYERS OF SNOW COVER</i>
<i>11:45 – 12:00</i>	<i>Kumakshev S.A. SIMULATION OF THE SOURCE OF RING WAVES NEAR DARWIN ISLAND USING PHOTOS FROM SPACE</i>

***Section 1. Geomechanics and hydromechanics of oil and gas fields and other sources of hydrocarbon raw materials***

<i>11:40– 11:55</i>	<i>Shkapov P.M., Sulimov A.V., Sulimov V.D. COMPUTATIONAL DIAGNOSTICS OF JACOBIALLY UNSTABLE DYNAMIC SYSTEMS USING HYBRID GLOBAL OPTIMIZATION ALGORITHMS</i>
<i>11:55– 12:10</i>	<i>Yudochkin N.A., Belyakov G.V. DEVELOPMENT OF A CRACK IN A COMPRESSIBLE SATURATED MEDIUM</i>
<i>12:10– 12:25</i>	<i>Soboleva E.B. ON THE INFLUENCE OF FLUCTUATIONS ON THE START OF RELAY-TAYLOR CONVECTION IN A POROUS MEDIUM</i>
<i>12:25 – 12:40 invited</i>	<i>Kholoptsev A.V., Podporin S.A. CHANGES IN THE TOPOGRAPHY OF THE WATER SURFACE OF THE CHUKOTSKY SEA AND SAFETY OF SHIPPING WITH A MODERN WARMING CLIMATE</i>
<i>12:40– 12:55</i>	<i>Chernous P.A., Kazakova E.N. SOME PROBLEMS OF ESTIMATING SNOW INSTABILITY ON MOUNTAIN SLOPES</i>
<i>12:55– 13:10</i>	<i>Tolchennikov A.A. UNIFORM FORMULAS FOR ASYMPTOTIC SOLUTION OF A LINEAR PSEUDODIFFERENTIAL EQUATION FOR WAVES IN WATER GENERATED BY A LOCALIZED SOURCE</i>

***13:10 – 14:00 Lunch***



**Section 1. Geomechanics and hydromechanics of oil and gas fields and other sources of hydrocarbon raw materials**

<b>14:00 – 14:20</b> <i>invited</i>	<i>Karev V.I. RELATED PROBLEM OF ELASTOPLASTIC DEFORMATION OF RESERVOIR ROCKS AND FILTRATION INTO A WELL</i>
<b>14:20 – 14:35</b>	<i>Malyukov V.P. SEPARATED DESTRUCTION OF ROCK SALT AND MASS RECOVERY BY HYDRODYNAMIC IMPACT OF AQUEOUS SOLUTION</i>
<b>14:35 – 14:50</b>	<i>Lobkovsky L.I., Ramazanov M.M. GENERALIZED MODEL OF FILTRATION IN A CRACKED POROUS MEDIUM</i>
<b>14:50 – 15:05</b>	<i>Vasiliev I.A., Dubinya N.V., Nachev V.A., Alekseev D.A., Tikhotskiy S.A. RESEARCH OF PHYSICAL PROCESSES AFFECTING SEISMIC STABILITY OF SELF-LIFTING DRILLING RIGS</i>
<b>15:05 – 15:20</b>	<i>Nachev V.A., Turuntaev S.B. NUMERICAL SIMULATION OF CRACK PROPAGATION IN ROCKS AT THE MICRO LEVEL</i>

**15:20 – 16:40      Coffee - break**

**Section 2. Physics of the sea and the atmosphere.**

**Theory, experiment, practice**

<b>15:40 – 15:55</b>	<i>Kochergin V.S., Kochergin S.V. NUMERICAL IMPLEMENTATION OF THE MODIFIED VARIATION ALGORITHM FOR ASSIMILATION OF MEASUREMENT DATA IN THE PASSIVE IMPURITY TRANSFER MODEL</i>
<b>15:55 – 16:10</b>	<i>Afanasyev V.V., Vaseikina N.A. ANTHROPOGENIC CORRECTION AND EVOLUTIONAL CHANGES IN THE RECREATIONAL PROPERTIES OF MORPHOLYTOSYSTEMS OF THE SOUTH COAST OF THE CRIMEA (SC) AND THE SOUTH COAST OF SAKHALIN (YBS)</i>
<b>16:10 – 16:25</b>	<i>Kotov M.A., Soloviev N.G., Shemyakin A.N., Yakimov M.Yu. BEHAVIOR OF A CONVECTIVE OPTICAL DISCHARGE TORCH WITH A REDUCTION OF THE ACCELERATION OF FREE FALL</i>
<b>16:25 – 16:40</b>	<i>Pashkov I.I., Kotov M.A. DISINFECTION AND ACTIVATION OF SEEDS DURING COLD PLASMA TREATMENT</i>

<b>16:40 – 16:55</b>	<i>Kosykh N.B. PRACTICAL METHOD FOR DETERMINING SURFACE WAVE PARAMETERS USING UNDERWATER OBSERVATION IN THE COASTAL AREA</i>
<b>16:55 – 17:10</b>	<i>Kasyanov S.Yu. STRUCTURE OF THE SYSTEM OF INTRA-MANTIC VORTEX IN SIBERIA AND THEIR IMPACT ON THE ARCTIC CLIMATE</i>
<b>17:10 – 17:25</b>	<i>Zhuk E.V. INTERFACE OF ACCESS TO DATA OF THE COASTAL AREA OF RUSSIA IN THE BLACK SEA</i>
<b>17:25 – 17:40</b>	<i>Berezkin M.Yu., Degtyarev K.S., Sinyugin O.A. TIDAL ENERGY RESOURCES OF THE SEA OF OKHOTSK TO PROVIDE JAPANESE IMPORT OF HYDROGEN</i>
<b>17:40 – 17:55</b>	<i>Pogorelova P.V., Podrezova N.A. STUDY OF DENSITY STRATIFICATION IN THE WHITE SEA</i>
<b>17:55 – 18:10</b>	<i>Pashkov I.I., Shishkin F.A., Zhelezova S.V. DISINFECTION AND ACTIVATION OF WINTER WHEAT SEEDS BY COLD BARRIER DISCHARGE PLASMA</i>
<b>18:10 – 18:25 invited</b>	<i>Pokazeev K.V., Soloviev D.A. PROSPECTS FOR THE DEVELOPMENT OF RENEWABLE ENERGY IN THE HYDROSPHERE</i>
<b>18:25 – 18:40</b>	<i>Pakhnenko V.P. APPLICATION OF THE POTRACE SOFTWARE TO STUDY THE MOVEMENT OF MARKERS ON A WATER SURFACE</i>
<b>18:40 – 18:55 invited</b>	<i>Kistovich A.V. CONVECTIVE PHENOMENA IN NATURAL CONDITIONS AND ITS COMPARISON WITH THEORETICAL MODELS</i>
<b>18:55– 19:10</b>	<i>Chaplina T.O. METHODS FOR CLEANING MARINE AREAS FROM OIL POLLUTION</i>

***Friday, 22 October 2021***

***Section 2. Physics of the sea and the atmosphere.***

***Theory, experiment, practice***

<b>09:30 – 09:45</b>	<i>Elkin D.N., Zatsepin A.G. LABORATORY MODELING OF THE MECHANISM OF FORMATION OF SUB-SCALE VORTEX ON THE SHELF OF THE BLACK SEA</i>
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<b>09:45 – 10:00</b>	<i>Ramazanov M.M., Bulgakova N.S., Gadzhimagomedova S.R. STABILITY OF ONE-DIMENSIONAL FLOWS IN A TILT POROUS LAYER SATURATED WITH WATER AND VAPOR SEPARATED BY AN INTERPHASE BOUNDARY</i>
<b>10:00 – 10:15</b>	<i>Ivanova I.N., Budnikov A.A., Agapova D.A., Zarubina A.I., Carrion Gonzalez P., Butko M.S., Ilinykh D.I. DYNAMIC DYNAMICS OF HYDROLOGICAL PARAMETERS OF WATER NEAR THE BLACK SEA OCEANOGRAPHIC PLATFORM (KATSIVELI)</i>
<b>10:15 – 10:30</b>	<i>Demyshev S.G., Evstigneeva N.A., Dymova O.A. ANALYSIS OF CURRENT FIELDS AND ENERGY CHARACTERISTICS OF WATER CIRCULATION IN THE NORTHERN BLACK SEA BASED ON ASSEMBLING HYDROLOGICAL OBSERVATION DATA IN THE AUTUMN 2016 AUTUMN</i>
<b>10:30 – 10:45</b>	<i>Kazankov V.K., Peregudin S.I., Kholodova S.E. WAVE DYNAMICS IN GEODYNAMIC PROCESSES</i>
<b>10:45 – 11:05</b>	<i>Kalugin A.S. MODELING THE NATURAL FORMATION OF THE VOLGA RUNOFF UNDER CONDITIONS OF MODERN CLIMATIC CHANGE</i>
<b>11:05 – 11:20</b>	<i>Gutsev S.A., Varzin S.A., Glavnov P.V., Yafyasov A.M., Kosykh N.B. METHODS FOR ASSESSING ION CONCENTRATION IN ELECTROLYTE SOLUTIONS</i>

**11:20 – 11:40      Coffee - break**

<b>11:40 – 11:55</b>	<i>Markova N.V., Dymova O.A. COURSES IN THE BLACK SEA: OBSERVATIONS AND NUMERICAL SIMULATION</i>
<b>11:55– 12:10</b>	<i>Тейдер М.С., Оскотская С.А., Фролова Н.С., Подрезова Н.А. Teyder M.S., Oskotskaya S.A., Frolova N.S., Podrezova N.A. ANNUAL ARCTIC ICE CHANGE</i>
<b>12:10 – 12:25</b>	<i>Slepyshv A.A., Vorotnikov D.I. NUMERICAL CALCULATION OF PULSE WAVE FLUXES ON A TWO-DIMENSIONAL STRATIFIED FLOW</i>
<b>12:25 – 12:45</b>	<i>Bulatov V.V., Ponomarev A.N. THEORETICAL STUDY OF THE POSSIBILITY OF IMPROVING LASER LOCATION IN AQUATIC ENVIRONMENTS</i>
<b>12:45 – 13:00</b>	<i>Poplavsky E.I., Kuznetsova A.M., Dossaev A.S., Troitskaya Yu.I.</i>

	<i>TRENDS OF CLIMATOLOGY IN THE BARENTS AND KARA SEAS BASED ON REANALYSIS DATA</i>
<b>13:00 – 13:15</b>	<i>Nosov V.N., Ivanov S.G., Kaledin S.B., Timonin V.I., Pogonin V.I., Zevakin E.A. TWO-CHANNEL SEA BRIGHTNESS PHOTOMETER FOR AVIATION-BASED SEA RESEARCH</i>

**13:15 – 14:00      Lunch**

<b>14:00– 14:15</b>	<i>Kasyanov S.Yu. ON THE MECHANISM OF CONNECTION OF CHANGES IN DURATION OF DAYS AND ANOMALIES IN EARTH TEMPERATURE</i>
<b>14:15– 14:30</b>	<i>Kupriyanova A.E., Gritsenko V.A. NUMERICAL AND LABORATORY MODELING OF THE MOTION OF SALT WATER SPOTS IN A TWO-LAYER LIQUID</i>
<b>14:30– 14:45</b> <i>invited</i>	<i>Rudenko A.O., Rozhkov A.N. FALLING AN ELASTIC DROP ON A PLATE WITH A HOLE</i>
<b>14:45– 15:00</b>	<i>Bulatov V.V., Vladimirov Yu.V. INTERNAL GRAVITATIONAL WAVES FROM AN FLASHED RADIAL SYMMETRY SOURCE</i>
<b>14:15– 14:30</b>	<i>Kistovich A.V. PETROLEUM LENTILS ON THE WATER SURFACE</i>
<b>14:30– 14:45</b>	<i>Pakhnenko V.P. USING THE SALOME SOFTWARE PACKAGE FOR NUMERICAL MODELING OF PROCESSES IN GEOPHYSICS</i>
<b>14:45– 15:00</b>	<i>Chaplina T.O. EXPERIMENTAL AND ANALYTICAL STUDY OF THE AIR CAVITY OVER A COMPLEX VORTEX</i>
<b>15:00– 15:20</b>	<i>Afanasyev V.V. STABILIZATION OF LAGOON STRAITS AND ATTENUATION OF CARBON BIOSEQUESTRATION BY COASTAL WETLAND GEOSYSTEMS</i>
<b>15:20– 15:35</b>	<i>Abramovich A.Yu., Yanovskaya V.S., Shumeiko I.P. MEASURING VIBRATION OF OBJECTS IN THE MARINE ENVIRONMENT</i>
<b>15:35 – 15:50</b> <i>invited</i>	<i>Pokazeev K.V., Sokolov V.A. ANALYSIS OF SEA WATER CALCULATIONS FROM THE POSITION OF THE THEORY OF OPEN NON-EQUILIBRIUM DISSIPATIVE THERMODYNAMIC SYSTEMS</i>

<b><i>15:50 – 16:05</i></b>	<i>Riabova S.A. CHANGES IN THE GEOMAGNETIC FIELD DUE TO ROCKET LAUNCHES FROM THE BAIKONUR COSMODROME (2019-2021)</i>
<b><i>16:05 – 16:20</i></b>	<i>D.A. Soloviev, L.V. Nefedova PROBLEMS OF MUTUAL INFLUENCE OF ECONOMY AND CLIMATE</i>
<b><i>16:20 – 16:35</i></b>	<i>Zapevalov E.G. RADAR WAVE CONTROL</i>

<b><i>17:20 – 17:40</i></b>	<b><i>Summing up the School Results. Discussion</i></b>
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