

PROGRAM

ITBMS 2022

7-10 June 2022- Bagnères de Bigorre, France



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PROGRAM

DAY 1 – Tuesday, June 7

09:00 – 10:00	Registration
10:00 – 10:15	Welcome address and workshop organization Nicolas Riviere

 <p>KEYNOTE 1 10:20 – 11:00</p>	<p>Study of the atmospheric turbulence based on the observations at the P2OA</p> <p>Marie Lothon & Fabienne Lohou LAERO, Toulouse University, France</p> <p>The Pyrenean Platform for the Observation of the Atmosphere (P2OA) is composed of an altitude platform and a plain site, 28 km apart as a crow flies. The environmental platform, at the top of the Pic du Midi de Bigorre (2870 m.a.s.l.), gathers the instrumentation for aerosols, greenhouse and reactive gases, whereas the Centre de Recherches Atmospherique (600 m.a.s.l.) located on the Lannemezan Plateau is mainly devoted to the instrumentation for atmospheric dynamics. Both sites are also instrumented for atmospheric electricity studies. Besides long term measurements, the P2OA hosts limited duration field campaigns. These campaigns can contribute to the study of atmospheric processes, to the validation of new instrumentations or to any other action which could take advantage of the permanent observations...</p>
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<p>SESSION 1 11:00 – 12:40</p>	<p>Thermal modeling and data Chair: Katrin Braesicke</p>
#202204151709	Exploitation of physical virtual mockups of terrain from SE-3D-DB product Alain Le Goff, Gwendal Thomas
#202203281637	Thermal Infrared Camera System Design for High-Dynamic Range Imaging Benjamin Saute, Stéphane Boubanga-Tombet, Philippe Lagueux
#202203072039	Coupling of ShiplR with Ansys Fluent CFD David A. Vaitekunas
	ThermoAnalytics: corporate presentation
12:40 – 14:00	Lunch

 <p>KEYNOTE 2 14:00 – 14:40</p>	<p>Turbulence profile with MATISSE and applications Marie-Thérèse Velluet in collaboration with C. Robert, C. Bellisario, L. Labarre ONERA - The French Aerospace Lab, France</p> <p>Optical turbulence in the atmosphere reduces the performance of electro-optical systems. This includes passive and active imaging, free-space optical communication, directed energy laser systems. Since the evaluation of vertical turbulence profiles is implemented in Matisse, it is possible to get an idea of the impact of turbulence on performance of such a system under specific environmental conditions depending on the location, time of day, type of soil, terrain... This keynote presents this new functionality and gives some examples on how the derived turbulence parameters can inform the user about the degradation of the system performance.</p>
<p>SESSION 2 14:40 – 16:30</p>	<p>Turbulence Chair : Luc Labarre</p>
<p>#202204141851</p>	<p>Imaging turbulence simulation validated by differential tilt variance based on LED grid measurements on several record dates Daniel Wegner, Katrin Braesicke</p>
<p>#202204140951</p>	<p>Turbulence mitigation in imagery including moving objects from a static event camera Nicolas Boehrer, Robert P. J. Nieuwenhuizen, Judith Dijk</p>
<p>#202203300933</p>	<p>The EDA TURBO project: Software-based atmospheric turbulence mitigation Rilene Goelzer, Julia Hofmann, Szymon Gladysz</p>
	<p>TELOPS: corporate presentation</p>
<p>16:30 – 16:50</p>	<p>Coffee Break</p>
 <p>KEYNOTE 3 16:50 – 17:30</p>	<p>Observation of flow turbulence using aero-optical techniques: from schlieren to holographic interferometry David Donjat in collaboration with Olivier Léon ONERA - The French Aerospace Lab, France</p> <p>This keynote discusses the way fluid dynamicists at ONERA take advantage of aero-optical effects to visualize and quantitatively study turbulent flows in transparent media. These techniques will be reviewed and recent application cases studied at ONERA will be more particularly discussed.</p>
<p>SESSION 3 17:30 – 18:30</p>	<p>Turbulence</p>
 <p>ROUND TABLE</p>	<p>Turbulence: From physical description to restoration tools...</p> <p>Image data experiences geometric distortions and spatial-temporal varying blur due to the strong effects of random spatial and temporal variations in the optical refractive index of the photon path. Simultaneously removing these effects from an image is a challenging task. This round table on turbulence is a form of academic discussion. Participants agree to discuss and debate on the effects of atmospheric turbulence severely degrading image quality in the form of geometric distortions and space-time varying blur, especially in long-distance surveillance applications. Atmospheric turbulence occurs due to the turbulent flow of air cells as described by fluid dynamics and is observed throughout the extent of the atmosphere. It is particularly evident in the troposphere layer because of continuous and rapid changes of temperature and pressure near the ground surface of the earth and the air directly above it. Hence, turbulence at ground levels, known as the atmospheric boundary layer, are more severe, particularly in hot and dry environments, and their effects are more pronounced compared to that of upper layers. To address this problem, several approaches including hardware-based adaptive optics techniques and image-processing-based methods were developed to restore captured images. Due to the continuous change in the turbulence profile and the random evolution of turbulent eddies, the optical transmission path is continuously degraded. From physical description to restoration tools... The ITBMS conference will address both theoretical and experimental approaches to start discussions with the attendees.</p>
<p>18:30</p>	<p>End of the day</p>

DAY 2 – Wednesday, June 8

 <p>08:00 – 13:00</p>	<p>PIC du MIDI Observatory</p> <p>Visit</p> <p>The Pic du Midi de Bigorre or simply the Pic du Midi (elevation 2,877 m (9,439 ft)) is a mountain in the French Pyrenees. The Pic du Midi Observatory (French: Observatoire du Pic du Midi) is an astronomical observatory located at 2877 meters on top of the Pic du Midi de Bigorre in the French Pyrenees. It is part of the Midi-Pyrenees Observatory (French: Observatoire Midi-Pyrénées; OMP) which has additional research stations in the southwestern French towns of Tarbes, Lannemezan, and Auch, as well as many partnerships in South America, Africa, and Asia, due to the guardianship it receives from the French Research Institute for Development (IRD).</p>
<p>13:00 – 14:30</p>	<p>Lunch</p>
<p>SESSION 4 14:30 – 16:10</p>	<p>Targets and signatures</p> <p>Chair: Jean Latger</p>
<p>#202201171330</p>	<p>The Impact of Exhaust Plumes on the Infrared Signature of Combat Vehicles – an Experimental and Analytical Study</p> <p>Anna Pohl, Yvonne Poulley, Ove Gustafsson, Sebastian Möller, Jonas Allvar, Anthony Smith</p>
<p>#202204141738</p>	<p>Static versus Dynamic Plume Infrared Signature: Measurements and Simulations</p> <p>Valérie Riolland, Stéphane Langlois, Roland Domel, Sylvain Rommeluere, Juliette Aubrée, Adrien Langenais, Claire Lavigne, Yves Fabignon</p>
<p>#202204091536</p>	<p>Optical complex index profiling with supercontinuum lidar measurements</p> <p>Olivier Pujol</p>
	<p>SURFACE OPTICS: corporate presentation</p>
<p>16:10 – 16:40</p>	<p>Coffee Break</p>
<p>SESSION 5 16:40 – 18:10</p>	<p>Thermal modeling and data</p> <p>Chair: Romain Ceolato</p>
<p>#202204131907</p>	<p>Automated simulation-generated EO/IR image library for artificial intelligence applications</p> <p>Corey D. Packard, Mark D. Klein, Timothy S. Viola, David C. Bell, Peter L. Rynes</p>
<p>#202204200356</p>	<p>A Study on the Heat Flow Analysis of Infra-Red Signature Suppression systems for Naval Ships</p> <p>Seoktae Yoon, Yongjin Cho</p>
<p>#202203072040</p>	<p>Impact of Infrared Signature Suppression on EO-IR Soft-Kill (Follow-Up)</p> <p>David A. Vaitekunas, Srinivasan Ramaswamy, Pavel Aleksandrov</p>
<p>18:10</p>	<p>End of the day</p>
<p>19:00 – 23:30</p>	<p>Social Event</p>

DAY 3 – Thursday, June 9

 <p>KEYNOTE 4 08:30 – 09:00</p>	<p>Estimation and forecasting of optical turbulence by physical model-based and machine learning-based approaches</p> <p>Sukanta Basu Faculty of Civil Engineering and Geosciences, TU Delft, The Netherlands</p> <p>Accurate estimation and forecasting of optical turbulence (typically quantified by C_n^2) in our atmosphere is of great significance for both civil and military applications. C_n^2 values can be measured by various types of research-grade instruments (e.g., scintillometers, thermosondes). However, due to logistical and financial issues, these types of instruments, and associated data, are not widely available. In the absence of observational data, physical model-based approaches are often utilized for the estimation of C_n^2. The physical models (e.g., mesoscale models, large-eddy simulations) numerically solve the conservation equations for mass and momentum (known as the Navier-Stokes equations). They also solve the thermodynamic energy equation and the conservation equations for various phases of water (e.g., water vapor, cloud water). Most of the relevant physical processes (e.g., turbulence, radiation, microphysics, land-atmosphere interactions) are parameterized in these models. In order to diagnose C_n^2 from the explicitly modelled meteorological variables (such as wind speed, temperature, turbulent kinetic energy) various schemes have been developed over the years. Some of these schemes make use of simple regression equations, while others employ higher-order turbulence parameterizations. During this presentation, we will discuss the strengths and weaknesses of these schemes with varying complexity. In addition, we will elaborate on the sensitivities of the simulated results with respect to spatial resolution, initial and boundary conditions, and turbulence parameterization. We will briefly touch upon the future of optical turbulence forecasting research in which state-of-the-art machine learning approaches (e.g., gradient boosting machines) coupled with physical models will play vital roles.</p>
<p>SESSION 7 09:00 – 10:10</p>	<p>Imaging simulation techniques Chair: Valérie Rialland</p>
<p>#202204071018</p>	<p>Tuning of physical infrared scene simulation using real images Dominique Maltèse, Diane Morchain, Emmanuel Carnis, Jean Latger, Thierry Cathala</p>
<p>#202204071017</p>	<p>Evolution of SE-Workbench-EO for Artificial Intelligence application Alain Le Goff, Jean Latger, Thierry Cathala</p>
<p>Davis</p>	<p>Davis Engineering: corporate presentation</p>
<p>10:10 – 10:30</p>	<p>Coffee Break</p>
<p>SESSION 8 10:30 – 12:30</p>	<p>Active imaging and laser Chair: Alain Le Goff</p>
<p>#202203091054</p>	<p>Enhancing Sparse LiDAR Data Captured on an Airfield Using 3D Aircraft Models Kevin Theuma, Kenneth Chircop, Jason Gauci, David Zammit-Mangion</p>
<p>#202204211000</p>	<p>MATLIS software: End-to-end 3D LiDAR simulation for performance analysis Paul-Édouard Dupouy, Nicolas Riviere, Anita Schilling, Erwan Viala, Ahmed Moussous</p>
<p>#202204041334</p>	<p>3D LiDAR acquisition with increased resolution at long range using Compressive Sensing Erwan Viala, Paul-Édouard Dupouy, Nicolas Rivière, Laurent Risser</p>
<p>#202204010959</p>	<p>3D laser imaging in turbid water: Simultaneous modeling of surface and volume scattering Kevin Walcarius, Thibault Dartigalongue, Malik Chami</p>
<p>#202204220851</p>	<p>Multi-band 3D-LiDAR applied to classification and segmentation Nicolas Riviere, Paul-Édouard Dupouy, Ahmed Moussous, Erwan Viala, Anita Schilling</p>
<p>12:30 – 14:00</p>	<p>Lunch</p>

SESSION 9 14:00 – 14:50	Targets and signatures Chair: Nicolas Riviere
#202203240808	Modelling of aging of spectral properties of camouflage mean Frantisek Racek, Teodor Balaz, Jaroslav Krejci
#202202231425	A European Terrain Database Judith Dijk, Andrea Masini, Philippe Barillot

SESSION 10 14:50 – 15:30	Impact of climatic conditions Chair: David A. Vaitekunas
#202204211621	MATISSE-v3.6: Using Numerical Weather Prediction for contrast prediction Luc Labarre, Christophe Bellisario, Laurence Croizé, Claire Lavigne, Claire Malherbe, Frédéric Tarroux, Jean-Claude Krapez, Jean Pierro, Ugo Tricoli, Yvonick Hurtaud
#202204071708	Bayesian inference of fog visibility from LIDAR point clouds and correlation with probabilities of detection Karl Montalban, Christophe Reyman, Dinesh Atchuthan, Paul-Édouard Dupouy, Nicolas Riviere, Simon Lacroix
	OKTAL-SE: corporate presentation

15:30 – 15:50	Coffee Break
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SESSION 11 15:50 – 17:10	Impact of climatic conditions Chair: Marie-Thérèse Velluet
#202204211436	Application of the Rayleigh-Debye-Gans model for Fractal Aggregates (RDG-FA) for lidar relevant parameters of soot particles Romain Ceolato, Lucas Paulien, Andres E. Bedoya-Velasquez, Frederic Fossard, Vincent Mouysset, Sidonie Lefebvre, Claudio Mazzoleni, Christopher Sorensen, Matthew J. Berg, Jerome Yon
#202203282149	Ambient Aerosol Characterization with Digital Holography: Fundamentals and Field Instrumentation Matthew J. Berg, Osku Kemppinen, Jesse Laning, Ryan D. Mersmann
#202204190050	Characterization of semi-arid environments in South Australia for validation and verification of infrared synthetic scene generation Mark Pszczel
17:10	End of the day

DAY 4 – Friday, June 10

SESSION 12	Training sessions		
09:00 – 12:00	OKTAL-SE	ThermoAnalytics	Davis Engineering