# Záznamy vložené do ASEP za UI (1. 7. – 31. 8. 2024)

# New ICS records in ASEP (1. 7. – 31. 8. 2024)

0597727 - ÚI 2025 RIV CZ cze M - Monograph Chapter
**Wiedermann, Jiří**
Roboti a jejich vědomí.
[Robots and their consciousness.]
*Eseje o vědomí. Směrem k umělé inteligenci.* Červený Kostelec: Pavel Mervart, 2024 - (Mařík, V.; Maříková, T.; Svítek, M.), s. 279-291. ISBN 978-80-7465-621-7
**Projects - other:** AV ČR(CZ) StrategieAV21/26
**Program:** StrategieAV
**Institutional Support**: RVO:67985807
**Kewords**: robot * cyber-physical systems * machine consciousness * Industry 4.0
**Obor OECD**: Computer sciences, information science, bioinformathics (hardware development to be 2.2, social aspect to be 5.8)

Vědomí je klíčovou záhadou moderní vědy. Dosud ale neexistuje jeho jednoznačná definice. Kniha se zabývá otázkou vědomí z mnoha různých pohledů ve formě esejů: od textů filosofických, křesťanských, buddhistických a spiritualistických přes eseje z oblasti biologie, psychiatrie, neurologie, genetiky či neurochirurgie až po názory fyziků, kybernetiků, robotiků a odborníků na umělou inteligenci. Jednotícím prvkem všech těchto pohledů se zdá být jak nezbytnost přítomnosti tzv. vnitřního pozorovatele, který pozoruje, hodnotí a prožívá vlastní činnost jedince, tak i schopnost jedince vědomě si stanovovat cíle a „vnitřní nutkání" směřovat k těmto cílům. Tyto schopnosti však nejsou a nemohou být vlastní počítačům dnešní von Neumannovy architektury ani neživým systémům obecně. Proto umělé vědomí strojů (zatím) nelze realizovat a musíme se spokojit pouze s jeho více či méně věrnou počítačovou simulací v podobě náhražky, tedy strojového vědomí. Bez umělého vědomí nemůže nikdy nastat obávaná vzpoura strojů proti člověku, takzvaná Kurzweilova singularita. Výzkum vědomí pomáhá postupně posouvat hranice výzkumu i v oblasti obecné umělé inteligence (AGI).

Robots, and any cyber-physical systems in general, can be endowed with a certain type of machine consciousness that is necessary for the system to acquire knowledge of what to do in each situation it may encounter. The relevant theory is based on insights from computational cognition, automata theory, artificial intelligence and cybernetics. Such machine consciousness and understanding will enable the design of trustworthy, safer and more reliable AI systems by increasing the flexibility and autonomy of their behavior in changing environments and by strengthening their resilience to errors in both their components and the overall system. Machine consciousness has the potential to become one of the defining attributes of Industry 4.0.
**Permanent Link:** https://hdl.handle.net/11104/0355574

0587413 - ÚI 2025 RIV JP eng J - Journal Article
**Choi, J.-I. - Kiatchoosakun, S. - Jiampo, P. - Tse, H. F. - Soo, Y. O. Y. - Wang, C.-C. - Lee, Ch. H. - Pecen, Ladislav - Unverdorben, M. - De Caterina, R. - Kirchhof, P.** ... celkem 12 autorů
Prescribing Patterns and Outcomes of Edoxaban in Atrial Fibrillation Patients From Asia - One-Year Data From the Global ETNA-AF Program.

BACKGROUND: This study reports prescribing patterns and the 1-year effectiveness and safety of edoxaban in an Asian cohort of Edoxaban Treatment in routiNe clinical prActice (ETNA)-Atrial Fibrillation (AF) patients. METHODS AND RESULTS: The Global ETNA-AF program integrates prospective, observational, noninterventional regional studies, collecting data on characteristics and clinical outcomes of patients with AF receiving edoxaban for stroke prevention. Baseline characteristics, medical history, and 1-year clinical event rates were assessed in patients from South Korea, Taiwan, Hong Kong, and Thailand. Clinically relevant events assessed at 12 months included all-cause death, cardiovascular death, ischemic and hemorrhagic stroke, systemic embolic events (SEEs), bleeding, and net clinical outcome (NCO). Overall, 3,359 patients treated with edoxaban 60 or 30 mg once daily completed 1-year follow-up, 70.9% of patients received recommended dosing according to local labels. Baseline mean±standard deviation age was 71.7±9.6 years, CHA2DS2-VASc score was 3.1±1.5, and modified HAS-BLED score was 2.3±1.1. Mean age and sex were similar across countries/regions. The 1-year event rate for all-cause death was 1.8%, major bleeding, 1.3%, ischemic stroke, 1.1%, cardiovascular mortality, 0.7%, hemorrhagic stroke, 0.3%, SEEs, 0%, and NCO, 4.1% ,with differences observed between countries/regions and dosing groups. CONCLUSIONS: Most Asian patients with AF were prescribed recommended edoxaban dosing in routine care settings. At 1-year follow-up, this analysis supports the effectiveness and safety of edoxaban in these patients.
**Permanent Link:** https://hdl.handle.net/11104/0354597

This study provides a thorough psychometric evaluation of construct and criterion validity and measurement invariance of the promising Florence Bullying-Victimization Scales (FBVS). A special focus was devoted to the concurrent criterion validity of the victimization scale with regard to well-being and social self-efficacy. Exploratory and confirmatory multidimensional item response theory and structural equation modeling were applied to cross-sectional data retrieved from 3 rd to 6 th-grade Czech primary school students (N = 1795, 49% female, M age = 10.42, SD = 1.25). The results supported the use of unidimensional factor structure that demonstrated acceptable model fit and measurement invariance across genders and grades. Moderate to high correlations of the FBVS scores

with bullying and victimization measured by the Olweus Bully/Victim Questionnaire and other instruments indicated very good convergent validity. Regarding criterion validity, higher victimization was associated with lower levels of well-being and social self-efficacy.
**Permanent Link:** https://hdl.handle.net/11104/0355500

**Esau, I. - Belda, M. - Miles, V. - Geletič, Jan - Resler, Jaroslav - Krč, Pavel - Bauerová, P. - Bureš, Martin - Eben, Kryštof - Fuka, V. - Jareš, R. - Karel, J. - Keder, J. - Patiño, W. - Pettersson, L. H. - Radović, J. - Řezníček, Hynek - Šindelářová, A. - Vlček, O.**
A city-scale turbulence-resolving model as an essential element of integrated urban services.

Large-eddy simulation (LES) models, such as the PALM modeling system in this study, are actively used for urban micro-climate modeling. We consider urban LES in a broader context as a mature high-resolution model for integrated urban services (IUS), which is an initiative of the World Meteorological Organization that provides a modeling component for urban decision-support systems. A decision-support system requires iterations of quantitative information from knowledge providers and qualitative expert assessments from communities of practice. We present two pilot PALM-aided IUS from the "Turbulent-resolving urban modeling of air quality and thermal comfort" (TURBAN) project. One pilot has its focus on an air quality service contributing to a decision-support system of the port of Bergen, Norway. Another pilot contributes to air quality and thermal comfort services in the city of Prague, Czech Republic. Co-production sessions with stakeholders identified critical enablers for urban LES in IUS. We present integration and interpretation of the modeling information within the decision-making process with a "storylines and simulations" (SAS) approach based on a web-based geoinformation system (WebGIS).
**Permanent Link:** https://hdl.handle.net/11104/0354752

**Manshour, Pouya - Papadimitriou, C. - Balasis, G. - Paluš, Milan**
Causal Inference in the Outer Radiation Belt: Evidence for Local Acceleration.

the outer radiation belt. Herein, the methodology based on causal inference is applied for identification of factors that control fluxes of relativistic electrons in the outer belt. The patterns of interactions between the solar wind, geomagnetic activity and belt electrons have been investigated. We found a significant information transfer from solar wind, geomagnetic activity and fluxes of very low energy electrons (54 keV), into fluxes of relativistic (470 keV) and ultra-relativistic (2.23 MeV) electrons. We present evidence of a direct causal relationship from relativistic into ultra-relativistic electrons, which points to a local acceleration mechanism for electrons energization. It is demonstrated that the observed information transfer from low energy electrons at 54 keV into energetic electrons at 470 keV is due to the presence of common external drivers such as substorm activity. Despite the fact that the discovery of the radiation belts occurred more than 60 years ago, a comprehensive understanding of the physical processes that are involved in the dynamics of the fluxes of relativistic electrons in the outer radiation belt is still lacking. Development of a thorough physical model accounting for the radiation belt dynamics has the potential to assist mitigation of spacecraft hazards caused by energetic particles. Herein, an information-theoretical approach, based on the methodology of causal inference, is applied for identification of factors that control fluxes of relativistic electrons in the outer belt. The patterns of interactions between the solar wind, geomagnetic activity and belt electrons have been investigated. We have found that inward radial transport from an external source is a less favorable mechanism than local acceleration for the energization of outer radiation belt electrons from relativistic to ultra-relativistic energies. Evidence of direct causality from relativistic into ultra-relativistic electrons, compatible with local acceleration in the outer belt Detection of information transfer unveils the mechanisms of energy transfer in radiation belts, important for space weather forecasting Information flow formulation of causality has a great potential for space physics discoveries
**Permanent Link:** https://hdl.handle.net/11104/0355270

0588372 - ÚI 2025 RIV US eng J - Journal Article
**Paluš, Milan - Chvosteková, Martina - Manshour, Pouya**
Causes of extreme events revealed by Rényi information transfer.
*Science Advances*. Roč. 10, č. 30 (2024), č. článku eadn1721. ISSN 2375-2548. E-ISSN 2375-2548
**Projects - other:** AV ČR(CZ) AP1901
**Program:** Akademická prémie - Praemium Academiae
**Institutional Support**: RVO:67985807
**Impact factor**: 11.7, rok: 2023
**Method of publishing**: Open access
https://doi.org/10.1126/sciadv.adn1721
DOI: 10.1126/sciadv.adn1721

Information-theoretic generalization of Granger causality principle, based on evaluation of conditional mutual information, also known as transfer entropy (CMI/TE), is redefined in the framework of Rényi entropy (RCMI/RTE). Using numerically generated data with a defined causal structure and examples of real data from the climate system, it is demonstrated that RCMI/RTE is able to identify the cause variable responsible for the occurrence of extreme values in an effect variable. In the presented example, the Siberian High was identified as the cause responsible for the increased probability of cold extremes in the winter and spring surface air temperature in Europe, while the North Atlantic Oscillation and blocking events can induce shifts of the whole temperature probability distribution.
**Permanent Link:** https://hdl.handle.net/11104/0355271

**Hok, P. - Thai, Q. T. - Rehák Bučková, Barbora - Domin, M. - Řasová, K. - Tintěra, J. - Lotze, M. - Grothe, M. - Hlinka, Jaroslav**
Global functional connectivity reorganization reflects cognitive processing speed deficits and fatigue in multiple sclerosis.

Background and purpose
Cognitive impairment (CI) in multiple sclerosis (MS) is associated with bidirectional changes in resting-state centrality measures. However, practicable functional magnetic resonance imaging (fMRI) biomarkers of CI are still lacking. The aim of this study was to assess the graph-theory-based degree rank order disruption index (kD) and its association with cognitive processing speed as a marker of CI in patients with MS (PwMS) in a secondary cross-sectional fMRI analysis.
Methods
Differentiation between PwMS and healthy controls (HCs) using kD and its correlation with CI (Symbol Digit Modalities Test) was compared to established imaging biomarkers (regional degree, volumetry, diffusion-weighted imaging, lesion mapping). Additional associations were assessed for fatigue (Fatigue Scale for Motor and Cognitive Functions), gait and global disability.
Results
Analysis in 56 PwMS and 58 HCs (35/27 women, median age 45.1/40.5 years) showed lower kD in PwMS than in HCs (median $-0.30/-0.06$, interquartile range 0.55/0.54; $p = 0.009$, Mann–Whitney U test), yielding acceptable yet non-superior differentiation (area under curve 0.64). kD and degree in medial prefrontal cortex (MPFC) correlated with CI (kD/MPFC Spearman's $\rho = 0.32/-0.45$, $p = 0.019/0.001$, n = 55). kD also explained fatigue ($\rho = -0.34$, $p = 0.010$, n = 56) but neither gait nor disability.
Conclusions
kD is a potential biomarker of CI and fatigue warranting further validation.
**Permanent Link:** https://hdl.handle.net/11104/0355496

**Asif, M. - Yaseen, M. - Umair Shahid, S. - Latif, Yasir - Anwar, S. - Abbas, S.**
Geospatial identification of possible rainwater harvesting locations within a high-altitude Gilgit River basin, Pakistan.

The management of water resources is no longer an option but a necessity especially in countries with a high rate of population growth like Pakistan. Pakistan has a high-water scarcity, an extremely varying topography, and is also one of the countries encountering the problem of climate change. Therefore, prudent utilization of available water resources is a matter in the plains of Pakistan as in its high-altitude regions. Instead of wasting water which is a valuable resource, rainwater harvesting is a way of saving rainwater as an alternative source of fresh water for better use. The aim of this study was to search for potential rainwater-harvesting areas in a high-altitude Gilgit River basin. This research employed the SCS-CN technique in estimating surface runoff in the GIS environment. The geospatial study used four input parameters: slope of the land, land covers, surface runoff and drainage density. The research concluded that some lands, especially those that are deserted in dry area and agricultural lands, can serve as the sites of rainwater harvesting, with only 4% of area that was highly suitable for the purpose. Nevertheless, 37% of the investigated area was shown as totally unviable for rainwater collection installations because of steep slopes and substantial volume of snow. Simultaneously, the rainwater storage design solutions suggested were check dam, percolation tank, and agricultural ponds with the area of 3.5%, 1%, and 0.75% of the given land area, respectively, for rainwater harvesting. The locations of potential catchment and planned rainwater harvesting structures would assist the local authorities and the policy makers to provide plans and design on the construction of water storages and also the optimization of water use.
**Permanent Link:** https://hdl.handle.net/11104/0354967

**Jiang, Y. - Luo, Ch. - Wang, J. - Tomeček, David** ... celkem 105 autorů
Neurostructural subgroup in 4291 individuals with schizophrenia identified using the subtype and stage inference algorithm.

Machine learning can be used to define subtypes of psychiatric conditions based on shared biological foundations of mental disorders. Here we analyzed cross-sectional brain images from 4,222 individuals with schizophrenia and 7038 healthy subjects pooled across 41 international cohorts from the ENIGMA, non-ENIGMA cohorts and public datasets. Using the Subtype and Stage Inference (SuStaIn) algorithm, we identify two distinct neurostructural subgroups by mapping the spatial and temporal 'trajectory' of gray matter change in schizophrenia. Subgroup 1 was characterized by an early cortical-predominant loss with enlarged striatum, whereas subgroup 2 displayed an early subcortical-predominant loss in the hippocampus, striatum and other subcortical regions. We confirmed the reproducibility of the two neurostructural subtypes across various sample sites, including Europe, North America and East Asia. This imaging-based taxonomy holds the potential to identify individuals with shared neurobiological attributes, thereby suggesting the viability of redefining existing disorder constructs based on biological factors.
**Permanent Link:** https://hdl.handle.net/11104/0355241

0588505 - ÚI 2025 RIV GB eng J - Journal Article

**Patiño, W. - Vlček, O. - Bauerová, P. - Belda, M. - Bureš, Martin - Eben, Kryštof - Fuka, V. - Geletič, Jan - Jareš, R. - Karel, J. - Keder, J. - Krč, Pavel - Radović, J. - Řezníček, Hynek - Šindelářová, A. - Resler, Jaroslav**

On the suitability of dispersion models of varying degree of complexity for air quality assessment and urban planning.

The development of integrated urban services requires the implementation of informative tools that provide a balance between quality, time and costs for air quality assessment. Within this framework, three modeling techniques with different levels of complexity were compared during a winter inversion episode against PM10 concentrations measured in a built-up area in Prague (Czech Republic) characterized by heavy traffic. Although the Gaussian model ATEM satisfied the common statistical-performance criteria, the predictions poorly represented the spatial variability of concentrations in the study domain. The Lagrangian model GRAL provided a better simulation of the effects of terrain and vortice formation inside street canyons, but tended to overpredict the influence of these phenomena. Finally, the most sophisticated of the three models, the Large-Eddy Simulation model PALM, demonstrated the best performance based on an exhaustive analysis of the model outputs in the temporal and spatial dimensions. After model comparison, a sensitivity test of the selected models to the driving meteorology and emissions inputs was carried out. While advanced models can simulate complex urban environments, their suitability for use in urban planning is subject to further considerations, such as computational cost, user expertise, and the usefulness of the output. Thanks to increasing computation power and intensive work on the entire modeling chain, sophisticated models could become routine tools for use in regulatory applications, contributing to future integrated urban service provision.

**Permanent Link:** https://hdl.handle.net/11104/0355377

0587911 - ÚI 2025 RIV DE eng J - Journal Article

**Černý, M. - Bok, J. - Hartman, David - Hladík, M.**

Positivity and convexity in incomplete cooperative games.

Incomplete cooperative games generalize the classical model of cooperative games by omitting the values of some of the coalitions. This allows for incorporating uncertainty into the model and studying the underlying games and possible payoff distributions based only on the partial information. In this paper, we conduct a systematic investigation of incomplete games, focusing on two important classes: positive and convex games. Regarding positivity, we generalize previous results from a special class of minimal incomplete games to a general setting. We characterize the non-extendability to a positive game by the existence of a certificate and provide a description of the set of positive extensions using its extreme games. These results also enable the construction of explicit formulas for several classes of incomplete games with special structures. The second part deals with convexity. We begin with the case of non-negative, minimal incomplete games. We establish the connection between incomplete games and the problem of completing partial functions and, consequently, provide a characterization of extendability and a full description of the set of symmetric convex extensions. This set serves as an approximation of the set of convex extensions.
**Permanent Link:** https://hdl.handle.net/11104/0354981

Extreme heat in urban areas has a severe impact on urban populations worldwide. In light of the threats posed by climate change, it is clear that more holistic and people-oriented approaches to reducing heat stress in urban areas are needed. From this perspective we aim to identify and compare thermal hotspots and places with favourable thermal conditions, based on three different methods – thermal walk, participatory-based cognitive mapping, and remote sensing in a Central European city. Although major hotspots in large low-rise development zones were identified by all three methods, the overall agreement between on-site thermal sensation votes, cognitive maps and surface temperatures is low. In the urban canyon of compact mid-rise and open mid-rise development, the thermal walk method proved to be useful in the identification of the specific (parts of) streets and public spaces where citizens can expect thermal discomfort and experience heat stress, e.g. crossroads, arterial streets with a lack of greenery, north facing unshaded parts of streets, and streets with inappropriate tree spacing. Cognitive maps on an urban neighbourhood scale are not specific enough on a street level, however, as a supplementary method they can help identify discrepancies between on-site sensations and thermal conditions. For further research on effective and cost-efficient urban heat mitigation, we suggest combining thermal walks with numerical model simulations.
**Permanent Link:** https://hdl.handle.net/11104/0355602

**Geletič, Jan** - Bauerová, P. - Belda, M. - **Bureš, Martin** - **Eben, Kryštof** - Fuka, V. - Jareš, R. - Karel, J. - Keder, J. - **Krč, Pavel** - Patiño, W. - Pikousová, T. - **Radović, J.** - **Resler, Jaroslav** - **Řezníček, Hynek** - Šindelářová, A. - Vlček, O.

Monitoring a simulace kvality ovzduší v mikroměřítkové úrovni; hot-spot Praha-Legerova.

Zhoršená kvalita ovzduší ve městech představuje jeden z aktuálních problémů, se kterým se administrativy měst potýkají. Vzrůstající požadavky na mobilitu obyvatel, kteří ve městech žijí, vedou ke zvýšení počtu registrovaných automobilů a růstu intenzity dopravy. S rostoucím počtem studií, které při zhoršené kvalitě ovzduší kladou důraz na významný příspěvek antropogenní činnosti, se začínají objevovat požadavky spojené s podporou cyklistické přepravy, elektromobility nebo omezení automobilové dopravy jakožto primárního zdroje znečištění v oblastech měst. Zejména v případě evropských měst, která mají často památkově chráněná historická centra, ovšem neexistují jednoduchá řešení, jako je přidání pruhu pro kola nebo rozšíření stávající komunikace. Aby bylo možné spolehlivě kvantifikovat vliv automobilové dopravy, stejně jako dalších významných antropogenních zdrojů, jsou zapotřebí velmi detailní a ověřené simulace pomocí numerických modelů. Cílem článku je poukázat na složitost měření a modelování znečištění ovzduší v mikroměřítkovém rozlišení a umožnit tak uživatelům těchto výsledků jejich poučenější a obezřetnější interpretaci.

Deteriorated air quality in cities worldwide is a current problem city administrations face. With the growing mobility requirements of the population living in cities, the number of registered cars and traffic intensity keeps increasing. Numerous studies emphasize the significant contribution of anthropogenic activity to deteriorated air quality. Initiatives linked to promoting bicycle transport, electromobility, or reducing car traffic as the primary source of pollution in urban areas are beginning to appear. However, simple solutions such as adding bicycle lanes or widening existing roads are often not applicable in European cities with heritage-protected historic centers. Modern numerical models are becoming mature enough to serve as a basis for reliable tools providing quantification of the impact of automobile traffic and significant anthropogenic sources in high-fidelity resolution - up to metre scale. However, several important limitations resulting from high-resolution processes need to be considered. First of all, models require very detailed input data about air quality; this includes the transport of pollution from outside the area of interest, emissions from local sources, or resuspension. Second, simulations using numerical models need to be properly validated. Particulate matter, as well as nitrogen (di-)oxide, are highly variable both in space and time. Finally, air quality strongly depends on meteorological conditions. Air quality models typically use national forecast models or regional climate models as meteorological drivers. Our results suggested that currently, no one model can be considered "best" for all potential applications. It seems to be beneficial to test at least two or three different models to analyse potential over- or under-estimation of the results. Practically, the article aims to point out the complexity of measuring and modelling air pollution at micro-scale resolution and uncertainties in fine-scale model resolution.

0588342 - ÚI 2025 RIV CH eng C - Konferenční příspěvek (zahraniční konf.)
**Dimai, M. - Brabec, Marek**
Bayesian Modeling of Mortality in Italian Regions: A Three-Component Approach Incorporating Cohort Effects.
*Mathematical and Statistical Methods for Actuarial Sciences and Finance. MAF2024 Conference Proceedings.* Cham: Springer, 2024 - (Corazza, M.; Gannon, F.; Legros, F.; Pizzi, C.; Touzé, V.), s. 149-153. ISBN 978-3-031-64272-2.
[MAF 2024: International Conference of Methods and Applications in Fluorescence /18./. Valencia (ES), 08.09.2024-11.09.2024]

The increases in life expectancy over the last decades have strongly impacted the distribution of ages at death. Its parametric estimation can be complicated by cohort effects. Our addresses the issue by extending a recent three-component parametric model to include cohort effects in a Bayesian framework. The model is fit to male mortality data from five diverse Italian regions between 1974 and 2022. Our results demonstrate significant regional variations in mortality, influenced by cohort effects, particularly among cohorts born around World War I. The model effectively captures the evolution of mortality components, with cohort effects markedly improving fit of complex, even multi-modal curves.
**Permanent Link:** https://hdl.handle.net/11104/0355249


0587630 - ÚI 2025 DE eng V - Výzkumná zpráva
**Bauerová, P. - Keder, J. - Šindelářová, A. - Vlček, O. - Patiño, W. - Resler, Jaroslav - Krč, Pavel - Geletič, Jan - Řezníček, Hynek - Bureš, Martin - Eben, Kryštof - Belda, M. - Radović, J. - Fuka, V. - Jareš, R. - Ezau, I.**
*Measurement report: TURBAN observation campaign combining street-level low-cost air quality sensors and meteorological profile measurements in Prague.*
München: EGU, 2024. 46 s. EGU Preprints, egusphere-2024-1222.

Within the TURBAN project, a "Legerova campaign" focusing on air quality and meteorology in the traffic-loaded part of the Prague city (Czech Republic) was carried out from 30 May 2022 to 28 March 2023. The network comprised of 20 combined low-cost sensor (LCS) stations for $NO_2$, $O_3$, $PM_{10}$ and $PM_{2.5}$ concentrations, along with a mobile meteorological mast, a single-channel microwave radiometer and Doppler LIDAR for measurement of vertical temperature and wind profiles. Significant individual deviations of LCSs were detected during the 165 day initial field test of all units at the urban background Prague 4-Libuš reference station (coefficient of variation 17–28 %). Implementing the Multivariate Adaptive Regression Splines method for correction reduced the LCS inter-individual variability and improved correlation with reference monitors in all pollutants ($R^2$ 0.88–0.97). The LCSs'

data drifts and ageing were checked by the double mass curve method for the entire measurement period. During the Legerova campaign, the highest NO2 concentrations were in traffic-loaded street canyons with continuous building blocks and several traffic lights. Aerosol pollution showed very little variation between the monitored streets. The highest PM10 and PM2.5 concentrations were recorded during temperature inversions and an episode involving pollution transported from a large forest fire in northern Czech Republic in July 2022. This report provides valuable data to support the validation of various predictive models dealing with complex urban environment, such as microscale LES model PALM tested in the TURBAN project.
**Permanent Link:** https://hdl.handle.net/11104/0354744
**Vědecká data:** Zenodo.org

0588554 - ÚI 2025 CZ cze N - Článek v novinách
**Římanová, R. - Hlinka, Jaroslav**
Jak zkrotit záchvaty.
*A / Magazín*. Roč. 8, č. 2 (2024), s. 46-51. ISSN 2788-2918
**Institutional Support**: RVO:67985807
**Kewords:** popularisation of science * popularizace vědy
https://kramerius.lib.cas.cz/uuid/uuid:46c8816e-2a74-4f19-a586-ecd27b3c55ba
**Permanent Link:** https://hdl.handle.net/11104/0355414

0587415 - ÚI 2025 eng A - Abstrakt
**Papáček, Štěpán - Matonoha, Ctirad**
A note on the D-QSSA method with optimal constant delays applied to a class of mathematical models.
*PANM 22: Programy a algoritmy numericke matematiky 22. Abstrakty.* Praha: Matematický ústav AV ČR, 2024. s. 12-12.
[PANM 22: Programy a algoritmy numericke matematiky /22./. 23.06.2024-28.06.2024, Hejnice]
**Institutional Support**: RVO:67985807
https://panm22.math.cas.cz/PANM2024_abstrakty.pdf
**Permanent Link:** https://hdl.handle.net/11104/0354598

0588195 - ÚI 2025 RIV GR eng A - Abstrakt
**Valenta, Zdeněk - Dudášová, J. - Magalie, A. - Sachs, J. R.**
An alternative measure of vaccine effect based on Aalen's additive survival model framework.
*ISCB 45 - Final Programme & Book of Abstracts.* Thessaloniki: ISCB, 2024. s. 293-293.
[ISCB 2024: Annual Conference of the International Society for Clinical Biostatistics /45./. 21.07.2024-25.07.2024, Thessaloniki]
**Institutional Support**: RVO:67985807
**Kewords**: Dengue disease * vaccine effectiveness * time-to-event data * Aalen additive model * relative survival
**Obor OECD**: Infectious Diseases
https://convin.gr/assets/files/misc/ISCB2024Program_AbstractBook.pdf

BACKGROUND: The protective effect of a vaccine is typically evaluated as vaccine efficacy in randomized controlled clinical trials. Efficacy is defined as a proportional reduction in risk of disease among vaccinated subjects relative to a placebo control. Previous work considered immune response biomarker values (immunogenicity) for assessing vaccine efficacy in the context of cross-sectional and time-to-event data, using logistic regression and Cox proportional hazards (PH) or Fine-Gray regression models, respectively. METHODS: In this novel approach, we employ flexible properties of

Aalen's additive survival model framework and define an alternative measure of vaccine effect as "relative survival" (RS) of vaccinated versus control subjects. RS compares estimated probabilities of not contracting the disease in vaccinated and control population. Given time-dependent covariates and/or time-varying effects, this measure can vary with respect to time. It extends well to models involving interactions. In this metric, better survival (here meaning lower risk of disease) among vaccinated subjects leads to an RS value greater than 1. RESULTS: This work studies data on the effect of live attenuated tetravalent dengue vaccine (Dengue Tetravalent Vaccine, Live, CYD-TDV, Sanofi Pasteur, Inc.) on the incidence of DENV2 virologically confirmed dengue disease. We estimate the RS, its standard error and confidence limits based on Aalen's additive model. The best-fitting Aalen's additive model involves time-dependent DENV2-specific immunogenicity baseline dengue serostatus, vaccination status, and an interaction between baseline dengue serostatus and vaccination status, in this model the effects of the two categorical predictors and their interaction change over time, while the immunogenicity effect is constant with respect to time. When fitting the main effects model only, the effect of vaccination status and dengue serostatus were insignificant while the protectiv effect appeared to be mediated solely by time-dependent immunogenicity values. When employing the Cox PH model in estimating time-invariant (i.e., averaged) main effects of dengue serostatus, vaccination status and time-dependent immunogenicity, addition of an interaction term resulted in convergence failure. CONCLUSIONS: This work extends the time-to-event data analysis approach to situations where either the assumption of proportional hazards is violated, or the estimation based on the Cox PH multiplicative survival framework fails. Understanding the time-varying effects of vaccination status, immunogenicity and baseline covariates can elucidate persistence (durability) of vaccine-induced protection and its potential heterogeneity. This knowledge is essential to decisions on vaccine recommendations, design of immunization schedules and revaccination strategies

**Permanent Link:** https://hdl.handle.net/11104/0355190

**Radović, J. - Belda, M. - Geletič, Jan - Bureš, Martin - Eben, Kryštof - Resler, Jaroslav - Řezníček, Hynek**

Influence of buildings and trees on PALM model's shortwave radiation modeling.
*EMS Annual Meeting Abstracts, vol. 21.* Berlin: European Meteorological Society, 2024.
[EMS Annual Meeting 2024. 02.09.2024-06.09.2024, Barcelona & Online]

The utilization of micrometeorological models for urban planning purposes, mitigation strategies development, and studying the atmospheric boundary layer of densely built urban environments has become ever-increasing. Due to the high complexity and variety of urban structures within the cities (e.g., urban fabric, transit roads, green urban areas, water bodies, sports, and leisure facilities, etc.), a comprehensive assessment of these areas and their interaction with the atmosphere is a complicated task. One of the physical processes strongly influenced by the city's configuration, presence of trees, and buildings is the radiative transfer within the urban environment (e.g., absorption, scattering, emission, reflections between individual surfaces, etc.). Precise modeling of the radiative transfer processes is of particular importance due to their influence on the surface radiation budget, human energy balance, building energy management, etc. Hence, for a model to be operational for various purposes its validation and assessment of the radiation modeling aspect is necessary for everyday usage.

In this study, the numerical simulations are performed by the micrometeorological model PALM. The model was configured and run in the spin-up mode, during which LSM, BSM PCM, RTM, BIO, and MESO modules were utilized. The selected domain is located in a realistic and densely built urban area

within the city of Prague, has an extent of 800 x 500 m, and is simulated in 1 m resolution. For experiment purposes, we selected two different episodes with clear-sky conditions during the year 2019. The PALM model outputs have been evaluated against three different stations, both quantitatively and qualitatively.

We validate the shortwave radiation modeled by PALM at the height corresponding to the height of the sensor and show how the microscale model modifies direct and reflected shortwave radiation by performing a comparison against measurements collected at three different locations within the simulation domain. The findings of this study show and lead to a better understanding of how trees, buildings, and albedos of different surfaces affect and modify shortwave radiation in urban environments.

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0587638 - ÚI 2025 eng A3 - Přednáška/prezentace nepublikovaná
**Sedlár, Igor**
Substructural Logics of Programs.
[Seminars "Proof Theory" and "Logic Online Seminar". Moscow, 14.02.2022-14.02.2022]
**Způsob prezentace:** Přednáška
**Pořadatel akce**: Steklov Mathematical Institute
**URL
akce**: https://www.mathnet.ru/php/conference.phtml?option_lang=eng&eventID=9&confid=876
**Institutional Support**: RVO:67985807
https://www.mathnet.ru/php/seminars.phtml?presentid=33992&option_lang=eng

Substructural logics seem to provide a natural framework formalizing reasoning about programs, as witnessed by R-models of the Lambek calculus, for instance. Indeed, Pratt's action algebras are expansions of residuated idempotent semirings, structures naturally arising in algebraic semantics for substructural logics. Kozen and Tiuryn have introduced a substructural logic tailored to formalize reasoning about correctness of programs (Substructural Logic and Partial Correctness, ACM Trans. Comput. Logic, 2003), sound and complete with respect to a semantics based on binary relations. In this talk, we prove that Kozen and Tiuryn's logic embeds into an expansion of *-continuous action algebras with a pair of adjoint test-like operators.

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0587634 - ÚI 2025 RIV cze A3 - Přednáška/prezentace nepublikovaná
**Řezníček, Hynek - Krč, Pavel - Resler, Jaroslav - Eben, Kryštof - Geletič, Jan - Bureš, Martin** - Vlček, O. - Belda, M. - **Radović, J.** - Keder, J. - Bauerová, P. - Fuka, V. - Patiño, W.
Představení výsledků projektu TURBAN a jejich využití pro městské plánování.
[Konzultační setkání o průběžných výsledcích mikroklimatických měření v městském prostředí. Praha, 12.06.2024-12.06.2024]
**Způsob prezentace:** Přednáška
**Pořadatel akce:** Odbor ochrany prostředí Magistrátu hl. m. Prahy
**CEP Project:** GA TA ČR(CZ) TO01000219
**Institutional Support**: RVO:67985807
**Obor OECD**: Meteorology and atmospheric sciences
https://www.youtube.com/live/1B1U-lLqHi4 https://secure.pkrc.net/pres/2024-mhmp/#/

V projektu jsme se zabývali šířením znečištění (PM, NOx, O3) v oblasti kolem pražské magistrály (Sokolská + Legerova ulice) v průběhu celého roku. Bylo vybráno 6 třídenních episod, které byly ve vysokém rozlišení nasimulovány mikro-měřítkovým modelem PALM a výsledky byly porovnány s měřením z observační kampaně. Zdroje emisí byly podrobně analyzovány a s pomocí firmy ATEM (spoluřešitel projektu) doplněny do modelu, jenž simuluje proudění v městské zástavbě a tedy i šíření koncentrací polutantů. U poslední zimní epizody byl studován vliv nastavení modelu a jeho okrajových podmínek na předpověď koncentrací poblíž měřící stanice ČHMÚ (AIM) v oblasti. V neposlední řadě byly také zpracovány urbanistické studie pro oblast "Holešoviček" (s možnostmi dopravního řešení ulice V Holešovičkách).
**Permanent Link:** https://hdl.handle.net/11104/0354746

0587635 - ÚI 2025 RIV cze A3 - Přednáška/prezentace nepublikovaná
**Geletič, Jan - Lehnert**, M.
Vyhodnocení měření a mapování tepelného komfortu v Praze-Holešovicích.
[Konzultační setkání o průběžných výsledcích mikroklimatických měření v městském prostředí. Praha, 12.06.2024-12.06.2024]
**Způsob prezentace:** Přednáška
**Pořadatel akce:** Odbor ochrany prostředí Magistrátu hl. m. Prahy
**Projects - other:** AV ČR(CZ) StrategieAV21/23
**Program:** StrategieAV
**Institutional Support:** RVO:67985807
**Obor OECD:** Meteorology and atmospheric sciences
https://www.youtube.com/live/1B1U-lLqHi4

V kontextu snahy o adaptaci na změnu klimatu a snížení městského tepla dnes na území Prahy řada výzkumných kampaní zaměřených na monitoring a hodnocení tepelného prostředí. V rámci tohoto příspěvku představujeme naše zkušenosti s vlastním měřením pomocí přenosných stanic, vyhodnocením dat z účelové staniční sítě, aplikací metod dálkového průzkumu Země a realizací výzkumu tepelných pocitů. Dále diskutujeme možný přínos a limity jednotlivých metod a nastiňujeme vizi budoucího monitoringu a studia tepelného prostředí města.
**Permanent Link:** https://hdl.handle.net/11104/0354749