12th ABBY-Net Research Workshop Program Calgary 2023

Workshop Overview

Workshop Venue and Participants

The workshop will be held for ABBY-Net members and collaborators on August 4, 2023 at the University of Calgary in Alberta. There will also be an opening dinner on the evening of Aug.3 for PIs and a closing workshop social in the evening of Aug. 4 for all participants.

Workshop Goals

- To provide a status of ongoing E^3-projects and other relevant ABBY-Net Research projects
- To update collaborative project outlines generated in Nov 2022 and develop/refine new project ideas for 2023/24
- To exchange visions about new paths forward for ABBY-Net starting 2025

Tentative Program

Aug 3	*Activity*	*Venue*
18:00 +	**ABBY-Net PI Team Workshop Opening Dinner**	**Jameson's Pub Brentwood**
Aug 4	*Activity*	*Venue*
8:00 – 8:30	**Workshop Registration**	**Earth Sciences 455**
8:30-8:35	**Workshop Opening** (Dr. Linke)	
8:35-8:30	**University Welcome** (Dr. Ruwanpura, VP and Associate Vice-President Research, International)	
8:40 – 9:00	**Introduction to ABBY-Net and Workshop Goals** (Dr. McDermid)	
9:00 – 11:00	***Session 1: Research Highlights and New Projects lead by ABBY-Net PIs***	**Earth Sciences 455**
9:00 - 9:30	*Carbon Neutral LNG: Perspectives from a new EU Project (Drs. Ludwig, Karl, Schubert)*	
9:30 -9:50	*Carbon Neutral LNG: Albertan Components (Drs. Bergerson and Hugenholtz)*	
9:50 – 10:05	*Coffee Break and Discussions*	
10:05 – 10:15	*Banff energy storage systems (Dr. Pierre Mertiny, UofA)*	
10:15 – 10:25	*Historic patterns and future trends of anthropogenic impacts on shallow groundwater quality in southern Alberta (Dr. Bernhard Mayer, UofC)*	
10:25 – 10:35	*In situ influence on ecosystem processes (Dr. Scott Ketcheson, Athabasca University)*	
10:35 – 10:45	*Public perceptions and preferences for Carbon Capture and Storage in Europe and Canada (Dr. Sven Anders, UofA)*	
10:45 – 10:55	*Climate change impacts on energy systems and interactions with society (Dr. Ralf Ludwig)*	
10:55-11:05	*Short Break*	

11:05 – 12:00	**<u>Session 2: Ongoing ABBY-Net Collaborative Research Projects lead by ABBY-Net Student Researchers</u>**	**Earth Sciences 455**
11:05– 11:15	Mound Microtopography on Seismic Lines & Assessing the Hydrological and Pedological Impacts of Mechanical Mounding Techniques on Wetland Ecosystems in Northeastern Alberta: Implications for Successful Restoration Efforts on Energy Footprint (Wiemer, LMU/Hillson, UofC)	
11:15 – 11:25	Industrial Process Heat Generation by Catalytic Conditioning of Synthesis Gas (Cortnum, FAU)	
11:25-11:35	Change Detection by Using Pre-change Information (Bernhard, LMU)	
11:35 – 11:45	Electric Ambulance Redeployment (Niklas, LMU)	
11:45 – 12:00	Summer school students 2-minute research highlights	
12:00 - 13:30	**LUNCH**	**Last Defence Lounge**
13:30 – 15:00	**<u>Session 3: Refining planned and new collaborative projects for 2023/2024</u>**	**Earth Sciences 455**
13:30 - 13:40	Plenary Review of project list	
13:40 – 14:45	Group work on updating project outlines/plans	
14:45 – 15:15	Plenary review of project refinements	
15:15 - 15:30	**COFFEE BREAK**	
15:30 – 17:00	***<u>Session 4: Envisioning a path forward starting 2025</u>***	**Earth Sciences 455**
17:30 +	**Workshop Closing Social**	**The Craft Beer Market downtown**

ABBY-NET E^3-Systems Research Project Update 2023:
Carbon Neutral LNG – Perspectives from a new EU-project

Research Team:
Prof. Jürgen Karl, FAU Erlangen-Nuremberg, Energy Process Engineering
Prof. Matthias Schubert, LMU Munich, Database Systems and Mata Mining
Prof. Ralf Ludwig, LMU Munich, Physical Geography and Environmental Modeling

Carbon Neutral LNG
Funded by the European Union

Project summary

Carbon Neutral LNG targets the cost-competitive and carbon effective exploitation of carbon sources from biomass in order to replace fossil diesel fuels with renewable 'electricity enhanced bioLNG' on a global scale. Low-carbon transportation will increasingly depend on liquid energy carriers like Liquefied Natural Gas from biomass (GreenLNG). Low-cost renewable energy (electricity and biomass) and reduced process complexity will be the main drivers for reduced marginal costs and increased carbon efficiency of the bioLNG synthesis.

Thus, the CarbonNeutralLNG project targets electricity enhanced conversion of biomass residues into CO/CO_2 and subsequently into liquefied bio-methane (GreenLNG). The integration of renewable electricity maximizes the methane production from a certain amount of biomass resources by a factor of 2 and simplifies the conversion processes.

The project is funded by the EU on order to provide LNG for the transport sector, in particular for shipping or heavy-duty transport. In addition to this role as an "e-fuel" or advanced (electricity enhanced) biofuel green LNG can also replace fossil natural gas for power generation, heat generation and in the chemical industry.

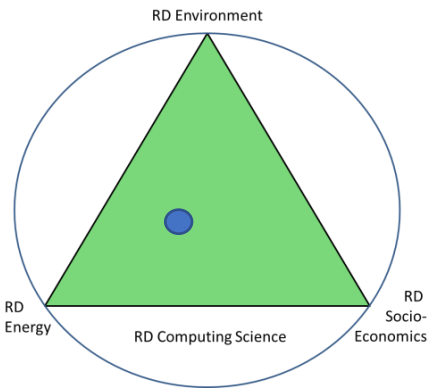
Progress to date

The project, coordinated by FAU Erlangen-Nuremberg, started in November 2022 and is still in an early stage. Coordinating tasks are now being consolidated and a successful bridge has been built to connect with the "Canadian component" of the project led by Joule Bergerson and Chris Hugenholtz.

The presentation at the workshop will be provided in three parts, focusing on the general project outline and energy processing implications (Jürgen Karl), an overview of relevant methods and early activities of remote sensing in determining methane emissions from energy infrastructure and forest biomass retrievals (Ludwig, Schubert) and an insight on the role of machine/deep learning in facilitating energy systems operations (Schubert).

Contribution to E3-system and Implications

The international (Europe, Canada) and highly interdisciplinary project group is comprised of energy systems engineers, computer scientists, lawyers, geographers and many more. The project proposes a new hybrid process chain for the synthesis of methane for liquefaction. The combination of chemical catalytic and biological catalytic processes uses the advantages of each technology to compensate for the disadvantages of the other technology. The project builds a bridge to the environmental and computing sciences, providing useful data, remote sensing tools and DL methods for a more comprehensive and integrated view on energy system transitions.



Carbon Neutral LNG: Albertan Components

Prof. Dr. Joule Bergerson and prof. Dr. Chris Hugenholtz, University of Calgary

The objective of the overall EU project is to develop and assess the cost- and carbon competitiveness of the exploitation of carbon sources from biomass to replace fossil fuels with renewable electricity enhanced bioLNG on a global scale. While the potential to harness the biomass resources converted to make use of existing infrastructure (e.g., European natural gas pipelines) shows promise, questions remain about both direct and indirect GHG emissions across the potential supply chains required. Our proposed research will improve the methods to assess emissions across the supply chain of current and potential future North American natural gas- and biomass-based sources of LNG for export to Europe. Methods for incorporating satellite based remote sensing into LCA will be developed. This will improve the LCAs of existing natural gas LNG inventories. Further innovation in these methods will improve the projection of these emissions to potential bioLNG pathways, the integration of latest research on the global warming potential biomass systems, and the biomass potential in North America. This research will also consider a broader set of environmental impacts through important connections between the research fields of LCA and ecosystem services to identify if there are any tradeoffs between economic and carbon competitiveness and other environmental impacts. The methods for assessing fugitive methane emissions across infrastructure used by the natural gas industry have received increasing attention over the past decade. New methods have been proposed and developed to better identify and measure fugitive methane emissions using satellite based remote sensing, onsite measurement techniques etc. However, consistency and consensus in the interpretation of these assessments has yet to be reached globally. More work is needed to collect, process, interpret and reconcile the various measure ments to establish the credibility and transparency that society is now demanding about climate impacts of industrial activities. This project will develop and deploy new methods to automate monitoring and emissions quantification of data collected about the fugitive emissions of methane in natural gas supply chains throughout North America across a variety of satellite platforms. We will integrate our results into the EU project including new methods to assess emissions to inform prioritization of the most cost and environmentally competitive combination of technologies.

Banff Energy Storage Systems (ESS)

Prof. Dr. Pierre Mertiny, University of Alberta

As Canada approaches its anticipated ban on internal combustion engine vehicles in 2035, adoption of electric vehicles (EVs) is on the rise. Consequently, the need for a nationwide EV charging infrastructure becomes crucial, as the current power infrastructure is inadequate to support the simultaneous charging of large fleets of EVs. However, implementing infrastructure upgrades poses challenges due to their high cost and time-consuming nature. Furthermore, in the context of touristic communities like Banff, where the visitor population significantly exceeds the resident population, the demand for EV charging facilities is expected to be substantial. To address this challenge and alleviate strain on the grid, energy storage systems (ESS) can play a vital role by enabling load shifting, where energy is stored during off-peak periods and released during on-peak periods. While battery ESS is currently prevalent due to its high energy density and cost-effectiveness, flywheel ESS (FESS) offers alternative advantages, including high power density and a longer lifespan. FESS is well-suited for load averaging and frequency regulation, making it a promising solution to manage increased EV charging demands while mitigating grid load. Moreover, the periodic and predictable nature of Banff's visiting population can facilitate the effective implementation of ESS to enhance efficiency.

Historic patterns and future trends of anthropogenic impacts on shallow groundwater quality in southern Alberta

Prof. Dr. Bernhard Mayer, University of Calgary

Water is essential to human and ecosystem health and is used for drinking, recreation, and economic development. Human activities on the land surface can alter groundwater quality by introducing contaminants and changing the hydrological regime. In southern Alberta, regional baseline conditions and the cumulative impacts of agriculture, rural development, tourism, and industrial activity on groundwater resources and quality are currently not well-known.

To address these knowledge gaps, Alberta Innovates has recently funded a 3-year project with the following objectives:
a) Determine temporal trends since the 1950's for key groundwater quality indicator parameters and identify anthropogenic or natural causes for the observed trends.
b) Investigate potential links between groundwater quality and past changes in land use practices using human footprint, crop inventory, and manure/fertilizer data.
c) Explore how climate change and water use scenarios may alter hydrological conditions and groundwater quality.
d) Assess how past and predicted trends in groundwater quality may affect the surface water quality in southern Alberta.
The anticipated outcome is the development of an accurate approach to identify past, current, and future anthropogenic and natural factors that impact the quality of groundwater, and by extension surface water, in large and partially water-restricted watersheds in Alberta.

The project will be briefly introduced since it provides the opportunity to test potential energy transition scenarios that impact the water cycle should this be of interest to ABBY-Net members.

In situ influence on ecosystem processes

Prof. Dr. Scott Ketcheson, Athabasca University/University of Calgary

The Alberta oil sands represents one of the world's largest oil deposits. Much of this oil is too deep for surface mining and must be extracted using 'in situ' techniques. This process requires the construction of well pads interconnected by roads and pipelines. Although the area of any given installation is relatively small (e.g., well pads are generally 1 - 4 ha in size), the effects on ecosystems beyond the direct footprint of the infrastructure remains unclear. Many of these developments are within the Boreal region in Alberta where there can be as much as 50-100% wetland cover. Thus, in situ oil sands developments affect large wetland areas directly, and indirectly through changes in local hydrological and chemical conditions; however, the specific impacts are poorly quantified. This talk will provide an overview of the "Aspen Project" that aims to understand how the presence of resource-access roads affect the way that water moves through the environment, and if any changes in water movement influence the wetlands near to and far from the infrastructure. A related research project evaluating regional runoff dynamics will also be highlighted.

Public perceptions and preferences for Carbon Capture and Storage in Europe and Canada

Prof. Dr. Sven Anders, University of Alberta

This project conducts representative surveys and economic experiments in Canada, Germany, the Netherlands, Norway and the UK to elicit how the public thinks and feels about making CCS reality. Many scientists and policy makers increasingly agree in that meeting ambitious CC mitigation and 2050 net-zero goals requires the large-scale implementation of carbon removal technologies, such as CCS. While the technical feasibility of CCS is well understood, and its policy-regulatory implementation is being worked on, public understanding of what CS is and how it works is still low. This is especially true for the induced earthquake and leakage risks storing CO2 underground poses in the short and long-term. We use economic survey and choice experimental methods to find out how the public views trade-offs between the CC-mitigative benefits of CCS and its risks. We also ask whether people would find it acceptable to import CO2 emissions to be stored in available reservoirs in their jurisdictions. E.g., would Canadian accept US emissions for CCS? Would Norway accept German emissions to be stored in its depleted oil fields?

ABBY-NET E^3-Systems Research Project Update 2023: Assessing the impact of Climate Change on Energy Supply & demand and on Social-related Issues

Research Team:
An interdisciplinary, international research team, stemming from the RLS Sciences Energy Network, led by Prof. Louis Gosselin, Université Laval, Québec, Canada, under participation of...

Prof. Ralf Ludwig, LMU Munich, Physical Geography and Environmental Modeling
Prof. Juergen Karl, FAU Erlangen-Nuremberg, Energy Process Engineering

Project outline

The presentation will comment on ideas from a recently launched proposal preparation for the Canadian *International Joint Initiative for Research in Climate Change Adaptation and Mitigation*. A proposal, led by Prof. Louis Gosselin from the Université Laval, Québec, is currently under development, involving partners from Canada, Germany, USA, South Africa, Brazil, Norway, Austria and Switzerland. A major building block of the consortium is already collaborating under the RLS Sciences Energy Network (www.rls-energynetwork.org).

Climate change and energy are intricately related. Our hunger for energy, and in particular fossil fuels, is the major cause of global warming. What is often less recognized is the inverse relation, i.e. how climate change impacts energy supply and demand. In fact, climate change is currently generating a number of profound changes related to how energy is produced and consumed. Most countries have engaged, at least to some extent, into an “energy transition”. These transformations encompass not only techno-environmental issues related to supply and demand (e.g., increased demand for cooling, modification to water cycle impacting hydro production, shift towards renewables, changing energy infrastructure), but also important socio-political issues (e.g., eco-behaviors, incentive for EV, social acceptance of energy projects, energy justice). Understanding these transformations and taking them into account are absolutely necessary for the energy transition to succeed.

The main objective of the present international research initiative is to develop a holistic understanding of how climate change impacts energy supply and demand and how these changes translate into social, economical, political transformations and issues. The name of the project “ACCESSI” stems for: Assessing the impact of Climate Change on Energy Supply & demand and on Social-related Issues. More specifically, the focus will be on vulnerable populations that are often disregarded when it comes to these topics (e.g., low-income families, indigenous communities, areas impacted by energy projects) even though they might be among the most impacted. Given the complexity of the topic, it is evident that there is no “one size fits all” possible approach. Different energy end-users (residential, transport, industrial, etc.), energy sources, populations, cultures, geographies, climates, etc., are involved. This justifies the need to address the topic with a large international multidisciplinary team.

The Regional Leaders Summit (RLS) is a forum of seven partner regions around the world, six of which being involved in the present proposal. The proposed project originates from existing and past collaborations within the RLS-Energy Network, a solid network mandated to support the energy transition within the RLS regions.

ABBY-NET E^3-Systems Research Project Update 2023:

Mound Microtopography on seismic lines

Felix Wiemer
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Research Team:
Dr. Ralf Ludwig, LMU, Department of Geography
Dr. Greg McDermid, University of Calgary, Department of Geography
Collaborator(s): Julia Linke, Sean Hillson, Scott Ketcheson, Colleen Sutheimer, Xue Yan Chan, Nicole Byford, Jesse Tigner

Project summary

Decades of seismic exploration and the concurrent establishment of seismic lines in northern Alberta have visibly impacted the ecosystem. Rising predator and declining caribou population, arrested succession on some lines and unclear yet to be investigated side effects of these linear features are just some of the already visible impacts. In an effort to restore said seismic lines, microtopographic features have been artificially created on some lines, by either transferring hummock from surrounding areas or by digging up soil from the line and using that soil/hummock for mounds on the line.
These microtopographic features are supposed to serve as nuclei for succeeding vegetation. However, vegetation seems to be struggling in some places to repopulate restored seismic lines. This may be due to a combination of size, density, composition or location of the created mounds on the line. Additionally surrounding factors like soil type, soil moisture, soil compaction might also be contributing in some way. Assessing microtopographic features on a larger scale is where remote sensing approaches excel. Using airborne platforms like drones makes obtaining information such as spectral or topographic data fast and easy.
The goal of this project is to find contributing factors to whether succession takes place or halts on seismic lines, by analyzing microtopographic features on restored seismic lines with UAV LiDAR Scanners and to establish and validate a dependable and scalable workflow to predict restoration success based on microtopographic metrics.

Progress to date

With this project beginning May 2023, it is a still in its infancy. Field work and data collection for this thesis will be completed by the beginning of September 2023 with preliminary results and further data analysis to follow. Together with Sean Hillson the next big step will be to analyze soil samples, vegetation and water-table data collected during fieldwork. Also post-processing all UAV datasets after our last trip in early September will be the most important puzzle piece to work on.

ABBY-NET E^3-Systems Research Project Update 2023:

Assessing the Hydrological and Pedological Impacts of Mechanical Mounding Techniques on Wetland Ecosystems in Northeastern Alberta: Implications for Successful Restoration Efforts

Sean Hillson
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Research Team:
Dr. Greg McDermid, University of Calgary, Department of Geography
Collaborators: Julia Linke, Felix Wiemer, Scott Ketcheson, Colleen Sutheimer

Project summary

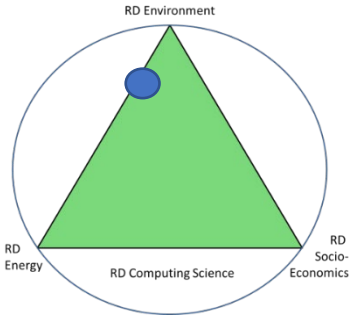
In Alberta, over one million kilometers of seismic lines have been cut, with hopes of natural regeneration over time. However, wetland ecosystems struggle to recover due to depressions on these lines that hinder healthy tree growth. To enhance recovery, intervention strategies such as mechanical mounding have been attempted, but with mixed results. To address this issue, a study was conducted to investigate the relationship between soil nutrient conditions, ecosite variety, and solar radiation in the success of restoration treatments on seismic lines. The study covered various wetland classes, analyzing successful and failed treatments to evaluate their effectiveness. Soil and water samples were collected for analysis, testing for available nutrients, organic matter content, and other factors related to treatment success. Preliminary findings indicated that certain shrubs, nutrient richness, mound dryness, and increased porosity fostered regrowth on treated and untreated seismic lines. By further understanding the reasons behind treatment success or failure, this study aims to guide restoration practitioners in selecting appropriate conditions and predicting the impact of disturbances. Ultimately, the information will lead to better treatment planning and decisions, increasing successful regeneration on seismic lines.

Progress to date

With this project beginning May 2023, it is a still in its infancy. Field work and data collection for this thesis will be completed by the beginning of September 2023 with preliminary results and further data analysis to follow. This puts us mid-way through on-going research. Our next big tasks are to begin soil lab testing where we will be able to analyze 350+ soil samples to correlate soil character and nutrients to successful mounding treatments. Following this, more intensive data analysis and statistical analysis will come.

Contribution to E3-system and Implications

This research will continue to bridge the gap between Alberta Energy planning and environmental research. With more informed planning regimes for restoration treatments and industrial disturbance, we can use this knowledge to instruct restoration practitioners on where to use treatments and how the natural and anthropogenic disturbance will affect the success rate of said treatment. This will allow for treatments to be better utilized as a higher percentage of them will prove success in leading to regeneration on the seismic line.



Geographic location

The area of study for this research is the LiDEA Pilot complex found within the Cold Lake Air Weapons Range in northeastern Alberta.

Final Outcomes

A thesis with an accompanying journal publication for this project is planned.

ABBY-NET E^3-Systems Research Project Update 2023:

Industrial Process Heat Generation by Catalytic Conditioning of Synthesis Gas

Hannah Cortnum, Master student
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Research Team:
Prof. Dr.-Ing. Jürgen Karl, FAU, Department of Chemical and Biological Engineering
Prof. Dr. Katharina Herkendell, FAU, Department of Chemical and Biological

Project summary

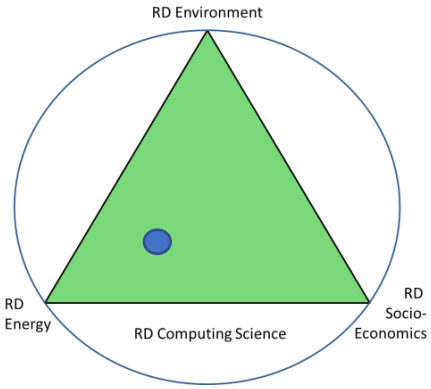
So far, only about 6% of industrial process heat in Germany is provided from renewable energy sources. The most important energy source for high-temperature process heat is natural gas. The aim of the project is to develop a process chain for the provision of high-temperature process heat through the thermal gasification of biomass. By demonstrating this process chain, incentives are to be created for plant manufacturers and operators. The process chain will initially be set up on a laboratory scale and the gas properties will be investigated. The solid biomass is allothermally gasified in the Heat Pipe Reformer at the Chair of Energy Process Technology, partially methanised and then burned in a gas burner. By catalytic partial methanation, the gas quality can be adapted to the industrial process. After completion of the laboratory tests, a field test is envisaged. The project thus contributes to the decarbonization of process heat as well as to Germany's renewable energy objectives.

Progress to date

The project is currently ongoing. The Heat Pipe Reformer for gasification of biomass was successfully repaired and put into operation. The methanisation reactor was manufactured and integrated into the process chain. By the end of summer, the complete process chain can be put into operation on a laboratory scale.

Contribution to E3-system and Implications

The project comes from the engineering perspective and mainly focuses on the energy discipline as it provides a way to substitute natural gas in industrial process heat. The project does not include an economic case study, but socio-economic and environmental impacts are investigated. The project can have a socio-economic impact as energy independence is promoted and environmental impacts as GHG emissions are saved and mainly wooden biomasse is used.



Geographic location

Due to the location of the laboratory at FAU, the project focuses on Bavaria.

Final Outcomes

The scientific outcome of this project were several Bachelor and Master theses, most of them dealing with the construction of the process chain and investigations of gas properties. My Bachelor thesis in particular dealt with the revision and recommissioning of the Heat Pipe Reformer.

ABBY-NET E^3-Systems Research Project Update 2023:

Change Detection by Using Pre-change Information

Maximilian Bernhard, PhD student
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Research Team:
Niklas Strauss, Matthias Schubert ,
LMU Munich, Department of Computer Science

Project summary

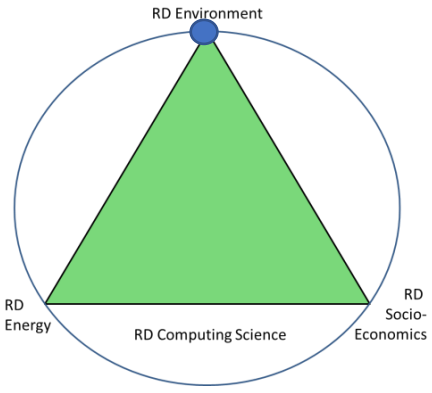
Change detection in remote sensing imagery is essential for various applications such as urban planning, disaster management, and climate research. However, existing methods for identifying semantically changed areas need to pay more attention to the availability of semantic information in the form of existing maps describing features of the earth's surface. In this paper, we leverage this information for change detection in bi-temporal images. We show that the simple integration of the additional information via concatenation of latent representations significantly outperforms state-of-the-art change detection methods. Motivated by this observation, we propose the new task of Conditional Change Detection, where pre-change semantic information is input next to bi-temporal images. To fully exploit the extra information, we propose MapFormer, a novel architecture based on a multi-modal feature fusion module that allows for feature processing conditioned on the available semantic information.

Progress to date

With our new approach, we outperformed several existing bi-temporal Change Detection methods on public change detection benchmark data sets. Further, we observed that our method is relatively robust to the quality of the pre-change information, still outperforming the conventional methods if synthetic corruptions are applied to the pre-change maps. Thus, this work is complete for being deployed on other applications areas such as examining deforestation and landcover change due to climate change.

Contribution to E3-system and Implications

Monitoring change in remote sensing imagery is a powerful tool for monitoring the development of mining and energy infrastructure. In addition, it can be applied to automatically predict land cover change and other environmental impacts like the devastation caused by extreme weather events or natural catastrophes. Though results are mostly based on areas with a large human impact monitoring streets, buildings or infrastructure, the methods could also be implied to detect deforestation areas or the impacts of reforestation on larger scales.



Geographic location

Munich Bavaria.

Final Outcomes

A preprint of this work can be found here: https://arxiv.org/abs/2303.17859 . Follow up projects for dedicated use on energy infrastructure or natural landcover change are thinkable.

ABBY-NET E^3-Systems Research Project Update 2023:

Electric Ambulance Redeployment

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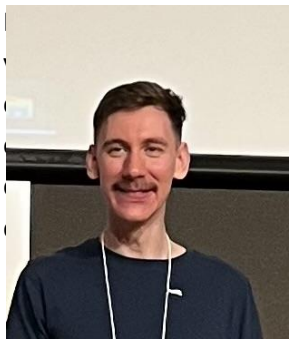
Research Team:
Lukas Rottkamp, Matthias Schubert, LMU Munich, Computer Science

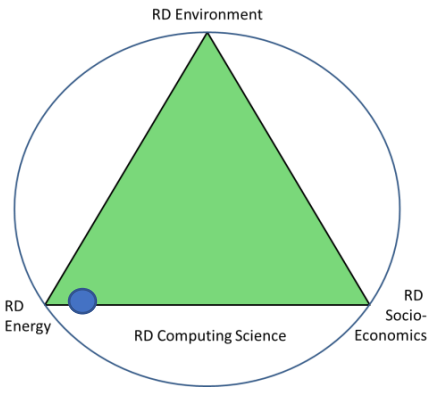


Project summary
In this project, we examine the switch to electric ambulances in an emergency medical service system through extensive simulations based on data from San Francisco. Our work focuses on ambulance redeployment, which is the task of stationing ambulances in base stations after emergency operations. Ambulance redeployment has an essential impact on emergency response times, and thus, there already exist various solutions for combustion engine-based vehicles. In our evaluation, we examine the impact of E-Ambulance recharge times and the availability of charging stations for existing solutions and observe a considerable decrease in service quality. Thus, we propose a novel method that particularly considers the properties of electric vehicles. Results show that this adaption alleviates the special requirements of electric vehicles in most settings. Thus, it should be possible to replace combustion engine ambulances with E-Ambulances without significantly losing service quality by adjusting the deployment policy.

Progress to date
We implemented and published a simulation of emergency operations based on real-world data from the city of San Francisco. After comparing state-of-the-art solutions for conventional ambulances, we extended our simulation by considering battery levels, recharging stations, and recharge procedures. After determining the shortcomings of policies not considering these additional requirements, we proposed heuristic solutions based on local energy deficits to address these shortcomings. Our paper “DEAR: Dynamic Electric Ambulance Redeployment” is under review at SSTD.

Contribution to E3-system and Implications

Converting to e-mobility for basic infrastructures such as emergency services is a step towards converting individual transport to electric drives. Though this is generally desirable, this switch can have far-reaching implications that have to be considered. The use of AI technology can be used to compensate for the constraints originating from this technological change. Though this type of infrastructure might contribute little carbon emissions, it is crucial to the public perception.



Geographic location
Munich, Bavaria

Final Outcomes
The project aims at a general assessment of switching emergency and rescue service units to E-Mobility. Due to the increased requirements for availability and reliability in these areas, the constraints of current electronic drives pose an exceptional challenge. The project aims to develop optimized policies for all processes of emergency and rescue services which allow for maintaining the high service quality known from current combustion engines.