

## Atmospheric AI (Highlight D)

Atmospheric AI is a new FCAI Highlight under preparation. It is focused especially of application of interactive AI in atmospheric and Earth system research.

Status (Oct 2020)

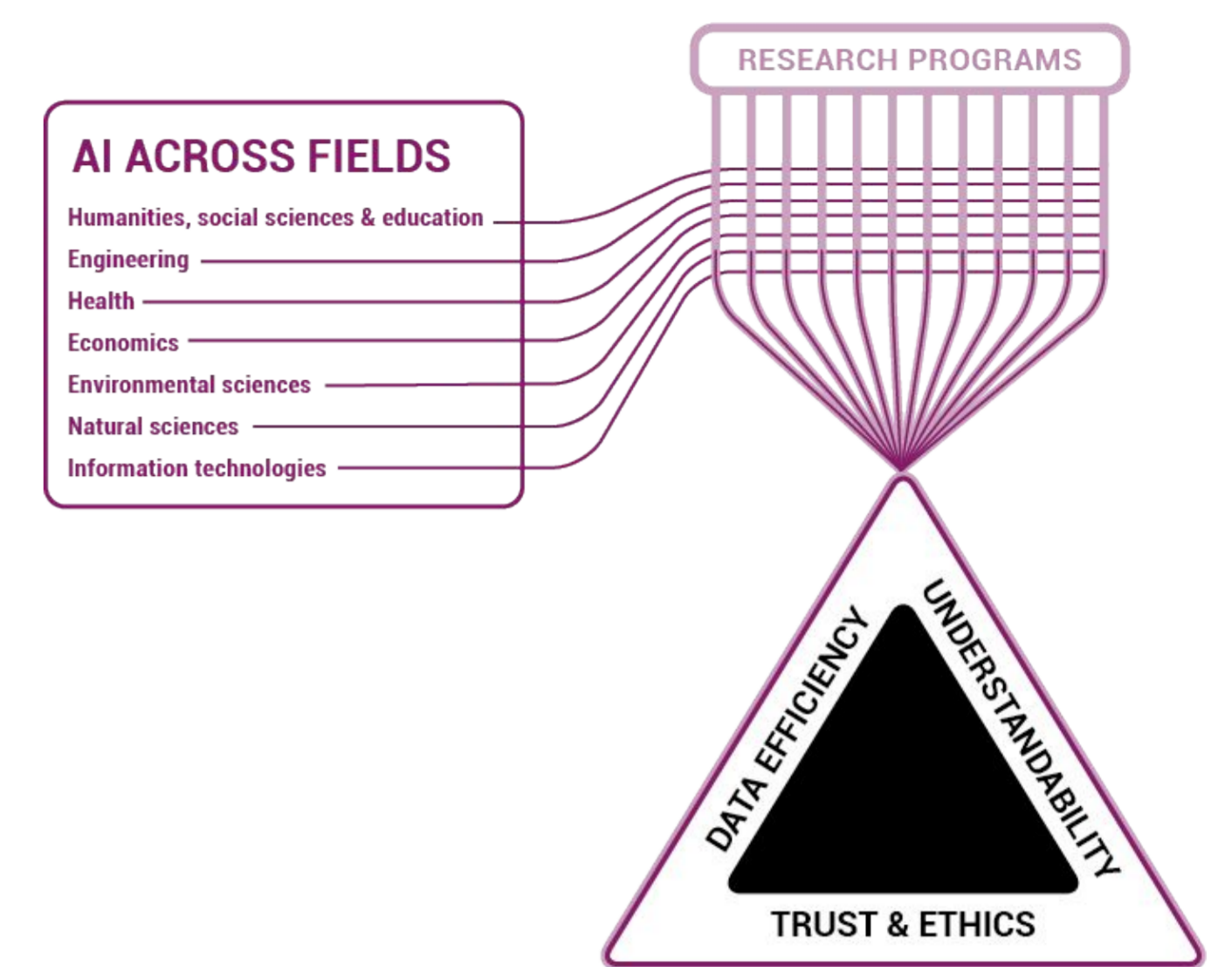
We have already initialised collaboration with atmospheric scientists at UH and planning joint projects. Recruitment of a FCAI postdoctoral researcher to facilitate collaboration between FCAI AI research programmes and atmospheric scientists is under progress.

Research topics

Artificial intelligence (AI) and machine learning (ML) are making their inroads to atmospheric and earth sciences.

There are lots of opportunities to do research in physical sciences more efficiently and to obtain novel results of high impact—both in atmospheric and computer sciences—by developing and applying novel AI methods to solve scientific problems. Specifically:

- Building probabilistic models of measured and simulated natural world phenomena, trained by using simulator outputs or real-world observations, which allow us for example to replace computationally expensive simulator runs with faster ML computations, to fill in missing data from observations, and to better understand complex systems and processes and underlying causal relations.
- Modelling the interactive data analysis and model building process of the substance area, which allows us to address problems such as as how to design the exploratory data analysis workflows and systems and how to best incorporate the knowledge and insights of the experts into the model building process.



Related FCAI Research Programs

The planned highlight is most related to the following FCAI research programs:

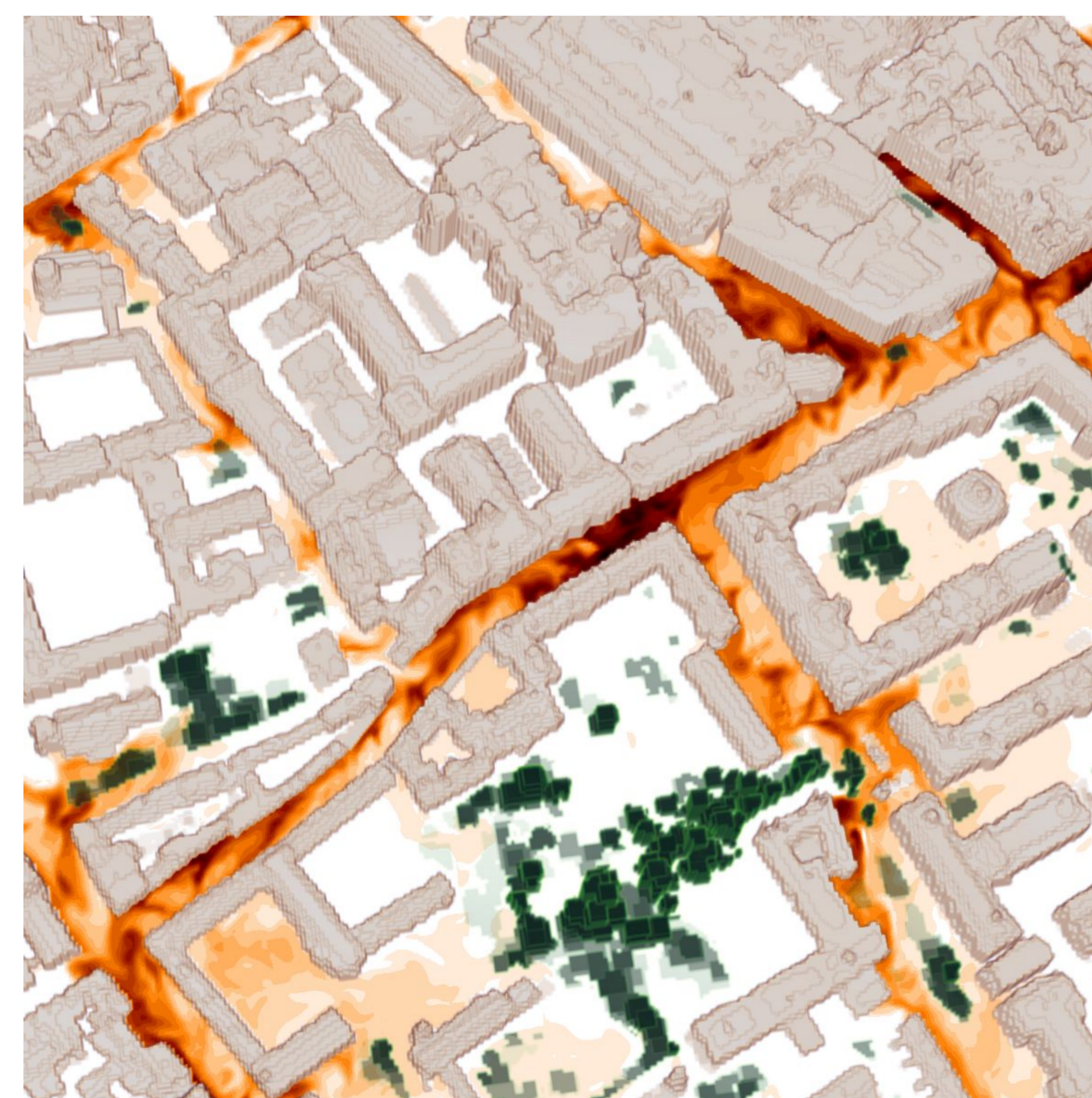
- Agile probabilistic AI (R1)
- Simulator-based inference (R2)
- Interactive AI (R5)

Related ongoing projects

Interactive AI for R&D (Future Makers 2018) – S. Kaski, K. Puolamäki, A. Oulasvirta, J. Corander, A. Klami, A. Vehtari, J. Lehtinen, Aalto & UH

### Example of the research

Lange et al. (2020) Geosci. Model Dev. Discuss., in review. <https://doi.org/10.5194/gmd-2020-200>



Regression models can be used to replace computationally expensive first-principles simulators used to model air pollutant concentrations in urban boulevards.

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