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A decade of applied groundwater modelling in Sweden: Bridging the gaps between academic advancements, industry, and higher education

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Aim & scope

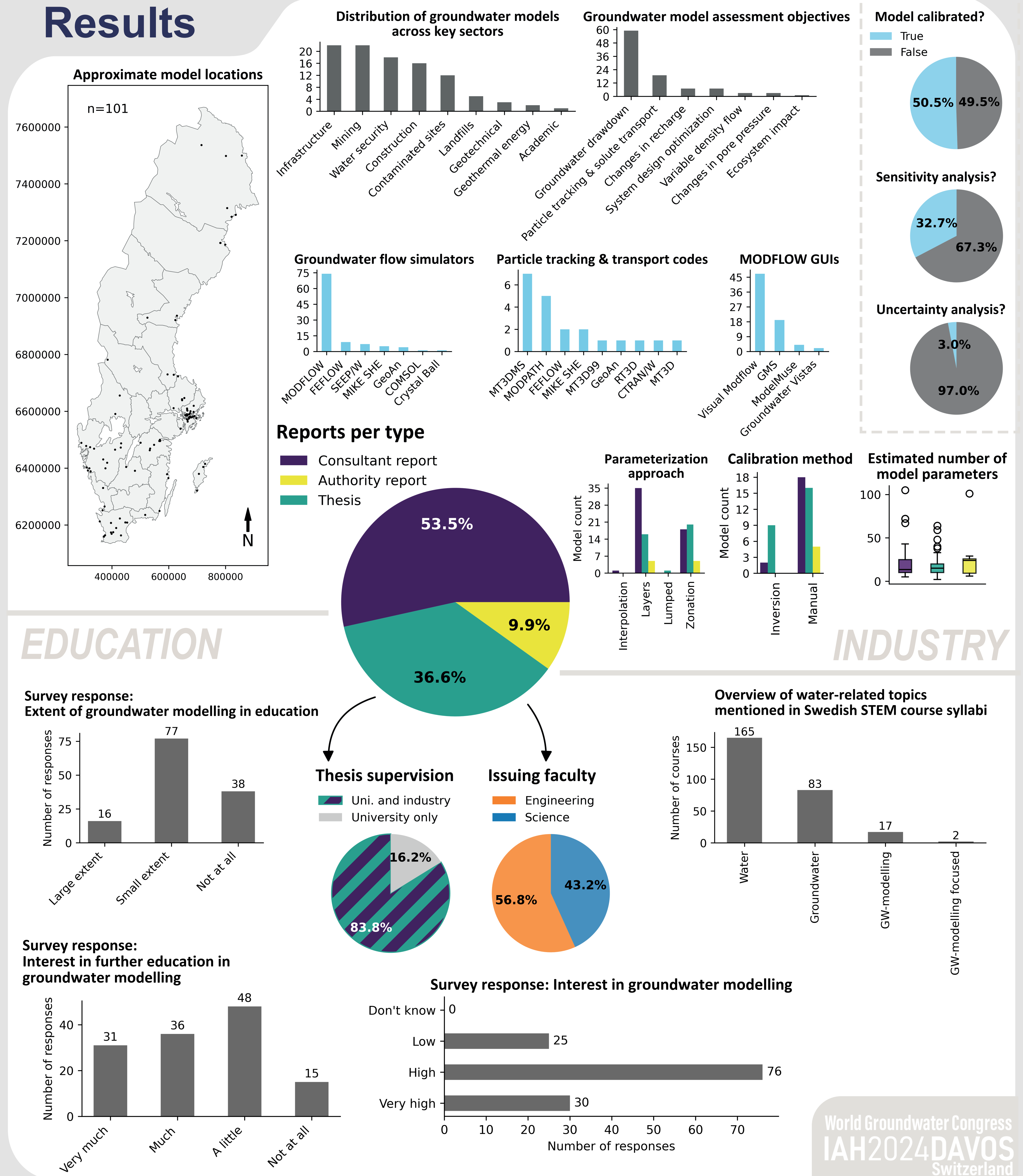
- **Explore** the presence and scope of groundwater modelling in Swedish higher education
- **Identify** industry sectors using groundwater models and their objectives and predictions
- **Evaluate** the adoption of new tools and methods in both Swedish groundwater education and applied modelling in industry
- **Discover** areas of improvement for industry practitioners, educational institutions, and environmental authority decision makers

Materials & Methods

A baseline understanding of the current state of groundwater modelling education and industry application in Sweden was assessed through:

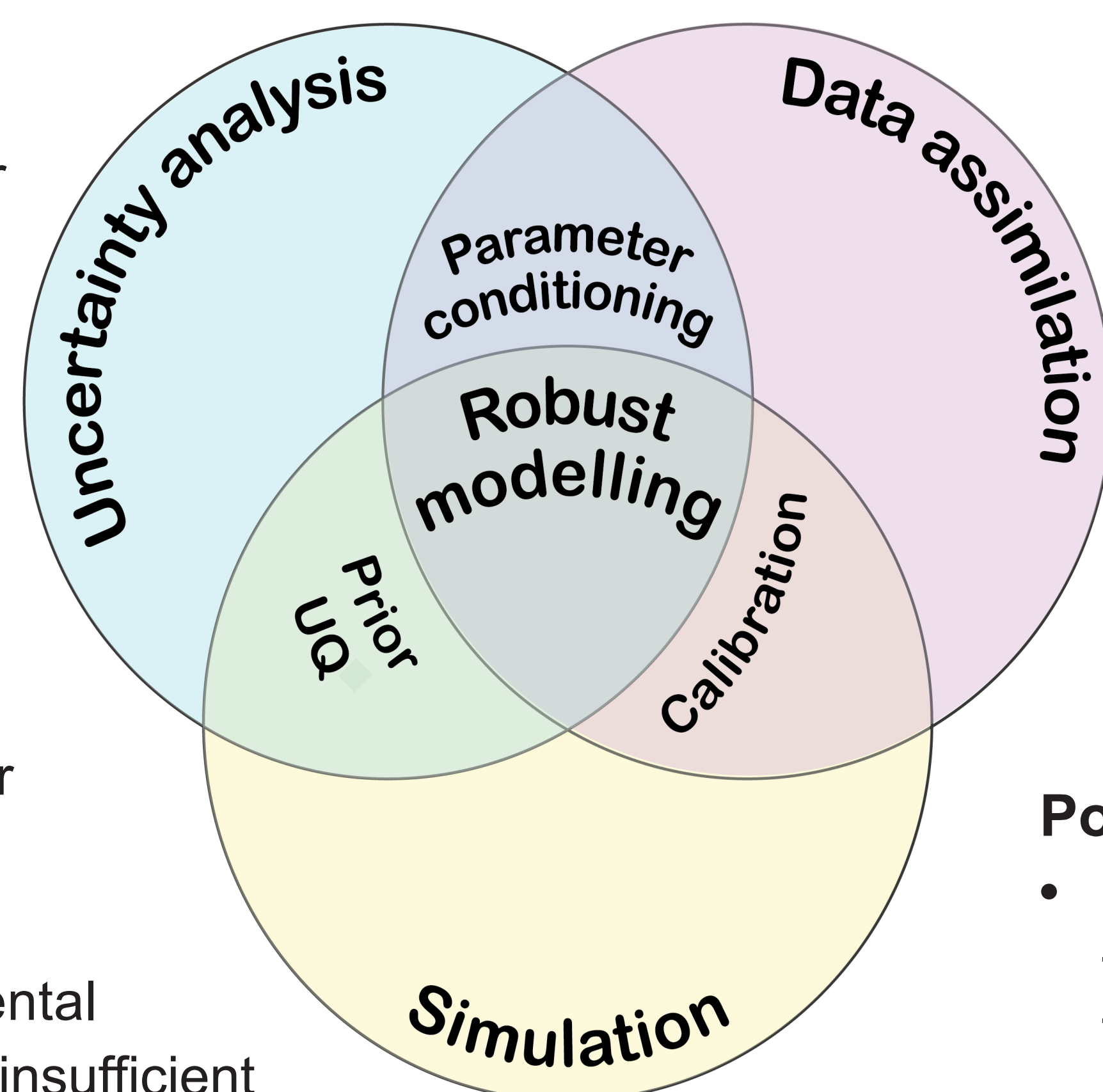
- **Analysis of syllabi:** Water-related STEM course syllabi were downloaded from Swedish higher education institutions to examine educational content
- **Survey of groundwater practitioners:** A survey was conducted among industry professionals to gather insights on practical application and sentiment
- **Collection of reports (2010-2023):** Reports documenting groundwater models in Sweden were collected by reaching out to:
 - All 21 County Administrative Boards
 - All 209 Municipalities
 - Water producers
 - Industry practitioners
 - Conducting search engine searches

Results



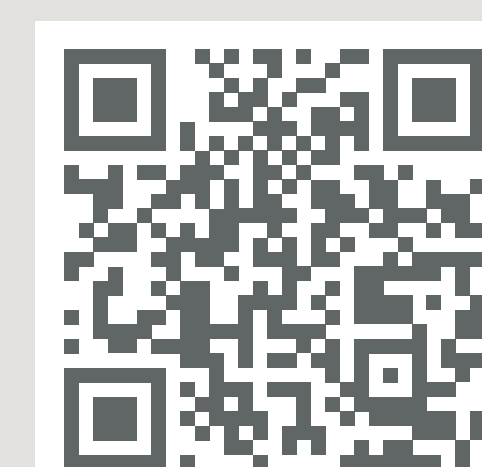
Main conclusions

- **Key concepts missing in curricula:** Groundwater modelling is often a minor part of hydrogeology courses, focusing mainly on simulation and missing key concepts like data assimilation and uncertainty analysis
- **Positive sentiment & eagerness to learn:** Practitioners see groundwater modelling as an important tool and are interested in improving their skills and knowledge to use it effectively
- **Non-robust modelling cause issues:** Environmental authorities and local interest groups often highlight insufficient assessment of model uncertainties by practitioners, potentially leading to permit denials for clients and subsequent consequences



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Potential areas of improvement include:

- **Increased focus on groundwater education**
 - Hydrogeology should be a program rather than a course
 - A dedicated groundwater modelling course which includes the topics of data assimilation and uncertainty analysis
- **Implementing guideline recommendations**
 - May promote robustness, consistency and transparency
 - Should be flexible, allow deviation when justified and facilitate innovation