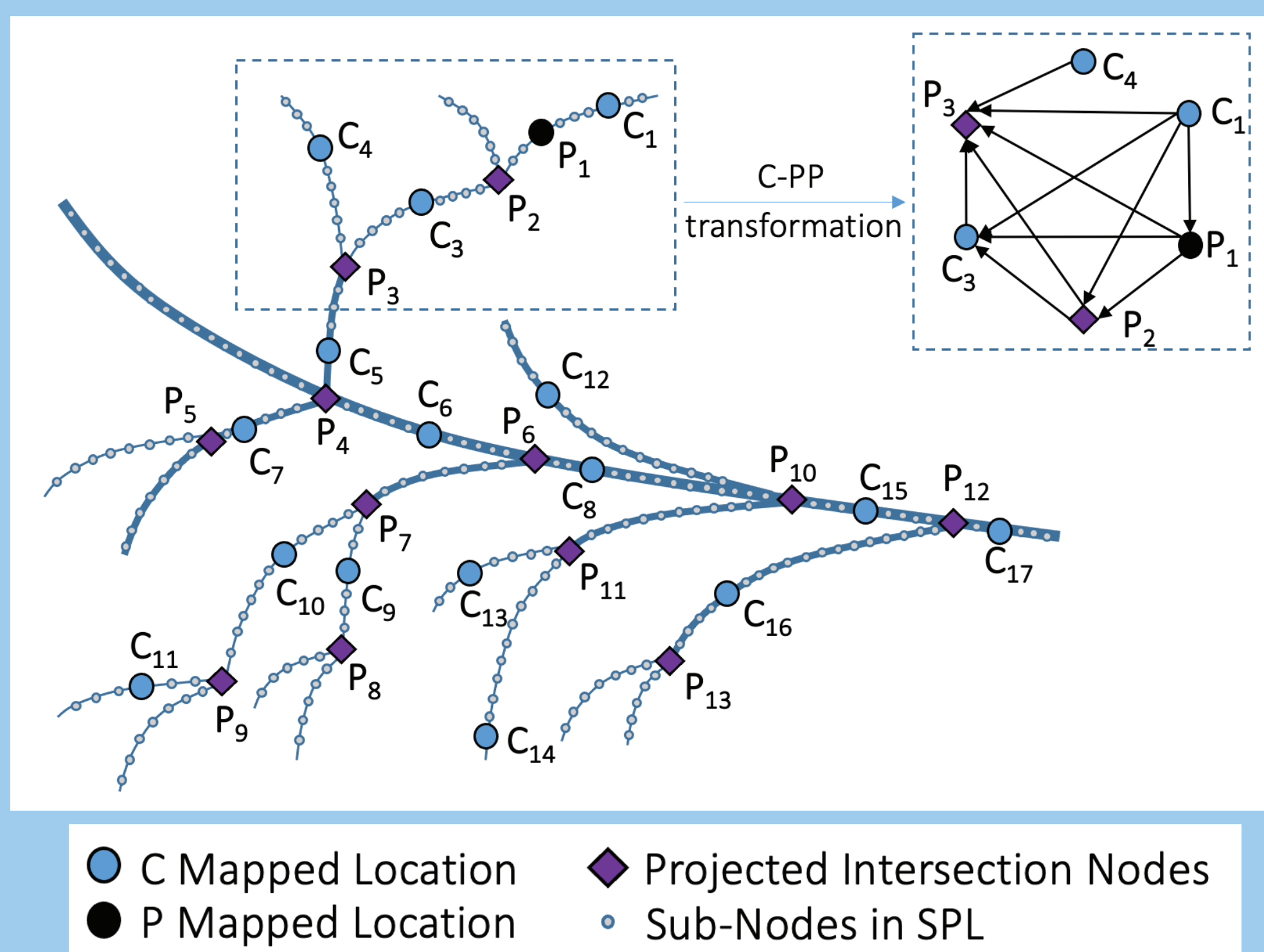
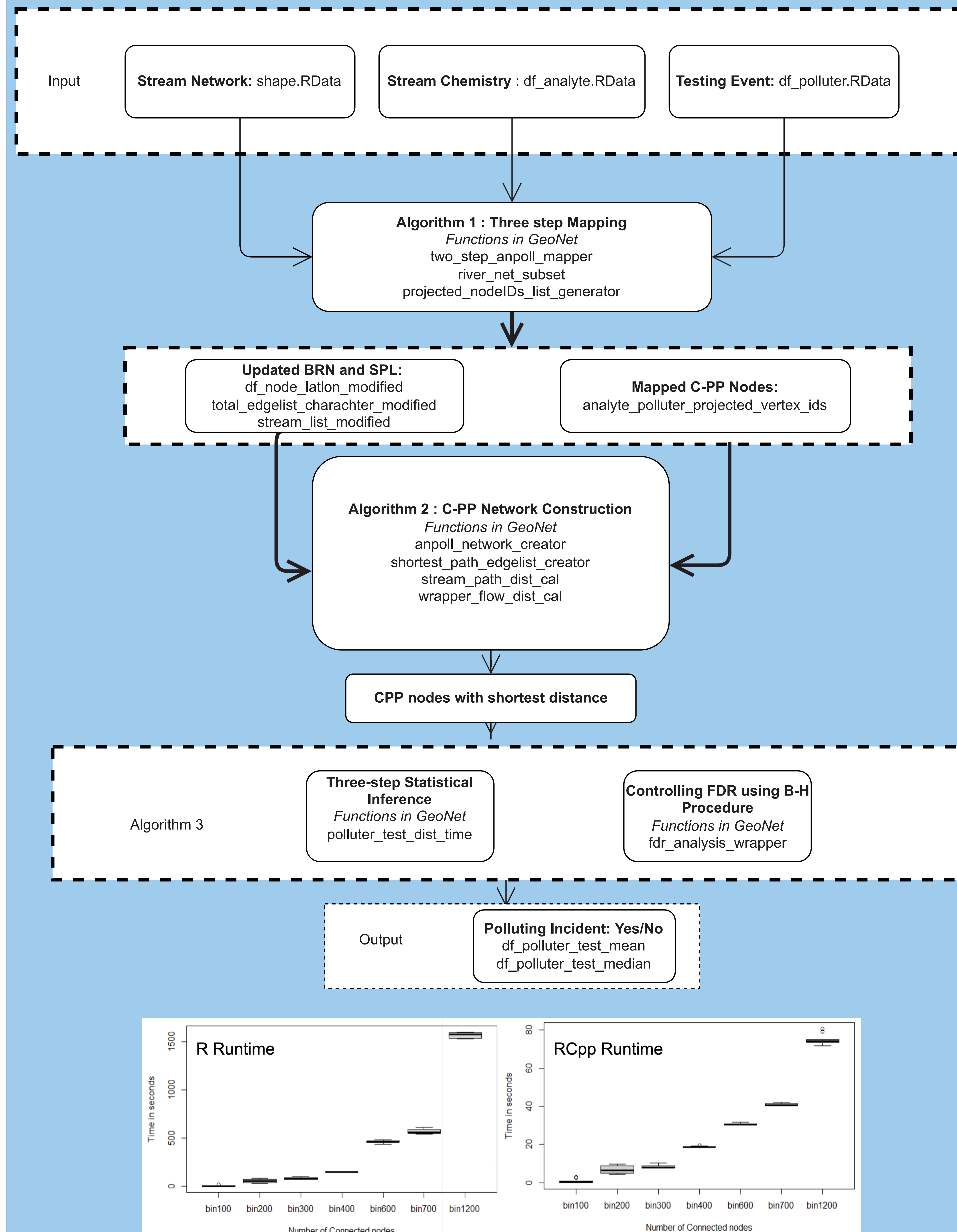


1. Motivation

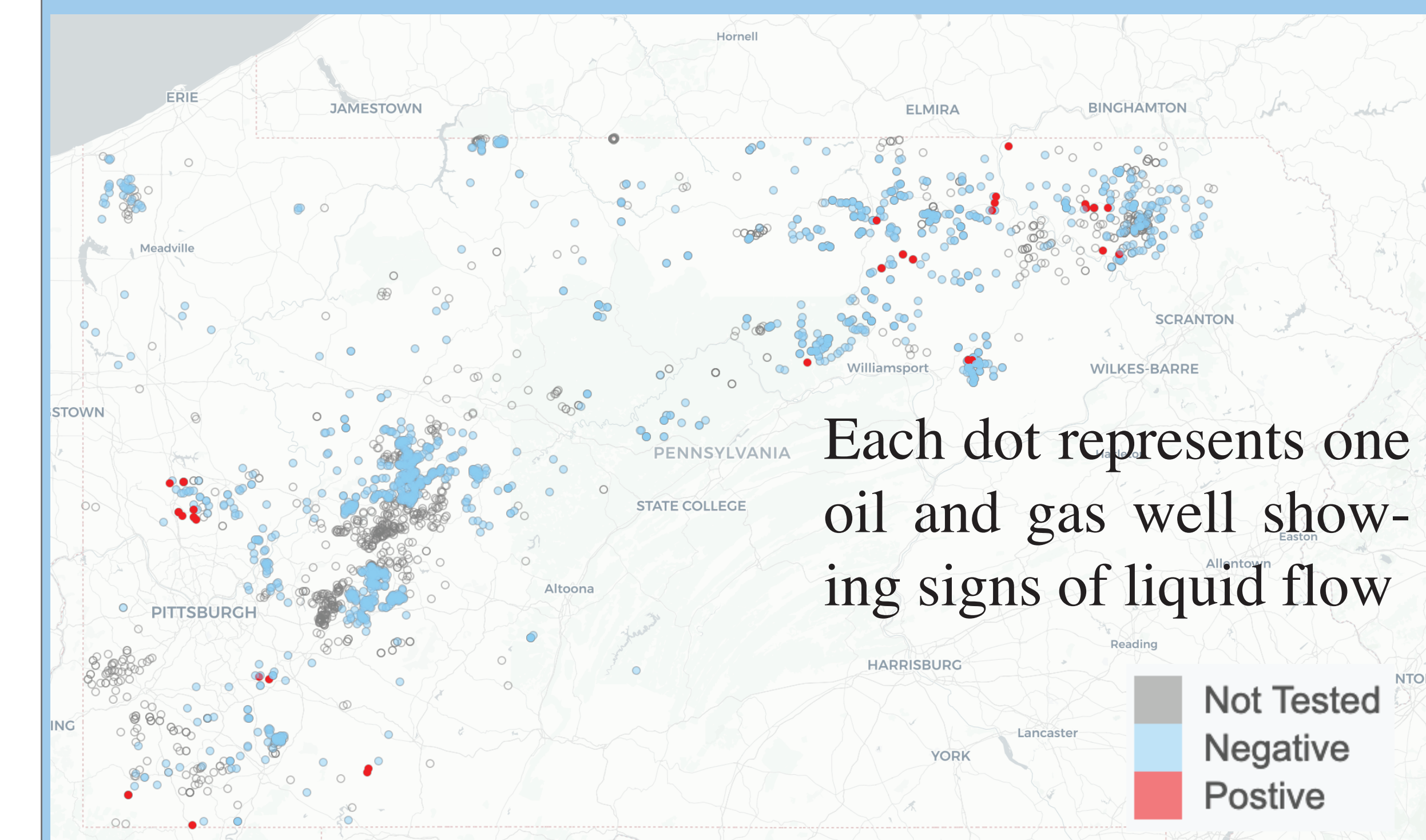
Streams and rivers integrate the products of natural processes and anthropogenic activities within their corresponding watershed. The investigation of stream water quality data (e.g., chloride and sodium concentrations, specific conductivity) can shed light on the source, mixing, and transportation/migration of the released material from human activities, among which unconventional oil and gas (UOG) production and road salting has caused public concerns related to stream water quality. Wastewater leaked from well pads and salts spread for road deicing occasionally causes surface water quality impairments, e.g., increased level of salinity and toxic element in downstream waters. Detecting these impairments using the existing surface water quality data for multiple locations in a large region is computationally challenging as it requires the integration and analysis of datasets of various types including water quality data, potential polluter locations, and stream flowlines in usually complex stream networks. The ongoing development of automatic sensor devices in U.S. streams provides a much larger and denser water quality dataset. Combined with the publicly accessible geoscience database, the advancement of cloud computing and open-source resources for web application development makes it possible to develop computer algorithms to automatically detect stream water quality impairments for the community.



2. GeoNet Workflow



3. Example Application: Detecting Changes in Stream Water Quality Caused by Leaky Oil and Gas Wells in Pennsylvania



Out of all 2,483 oil and gas wells that show signs of liquid flow, a total of 1,484 wells have a sufficient number of specific measurements reported in the nearby streams to perform the GeoNet test. Among them, only 33 wells have caused statistically significant water quality change in the nearby streams.

4. Where to Download GeoNet?

GitHub Repo



R Shiny App Demo



We will soon submit the source codes to CRAN for reviewing as a R package. Stay tuned!

Aknowledgement

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