Spatiotemporal changes of CVOC concentrations in karst aquifers: analysis of three decades of data from Puerto Rico

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**Problem**
- The CVOCs (Chlorinated volatile organic compounds) pose serious threat to both natural ecosystem integrity and human water uses.
- The aquifers of Puerto Rico has been heavily impacted by CVOC contamination historically.
- The aquifers in Puerto Rico are characterized as limestone karst with very complex flow paths.

**Motivation**
- Need to understand the current contamination situation of CVOCs.
- Need to understand the spatial and temporal changes of CVOCs.
- Need to understand what causes the changes.

**Data acquisition**
- USGS
- PREQB
- PRDOH
- PRDNER
- PRASA
- PROTECT

**Data analysis**
- Initial screening
- Detection frequency
- Spatial analysis
- Temporal analysis
- Source analysis
- Karst properties
- Climatological conditions

**Pattern analysis**

**Conclusions**

**Detections**
- The most detected CVOCs include TCE, PCE, CT, TCM, and DCM.
- All detected CVOCs have samples exceed maximum contamination limits.

**Spatiotemporal trends**
- Concentrations show a decreasing trend.
- General northward movement of the contaminants.
- CVOCs were also detected beyond the known source extent.

**Sources and influencing factors**
- TCM and DCM may be formed by the parent form of CT.
- Influencing factors:
  - Hydrogeological conditions, such as karst properties and the biological movement.
  - Source origin.