

You are invited to attend the following “Brown-Bag Web Seminar”— the third in a 7-part series on regional assessments of Principal Aquifers

Hydrochemical regions in the glacial aquifer system

To see more information about the meeting, including its agenda, or to join the meeting, go to:

<https://usgs.webex.com/usgs/j.php?ED=99991902&UID=0>

When: Thursday, October 11, 2007 from 1:00-2:00 pm CDT (2:00 - 3:00 pm EST)

Presenter: Terri Arnold, Illinois USGS WSC

How to connect:

Website: Go to <http://usgs.webex.com> (password: glacial)

Audio line: (641) 715-3200 participant code = 558655#

Meeting Number: 714 576 643

Meeting password: glacial

Abstract

Data analyzed for this study were collected at 1,716 wells open to the glacial aquifer system over the period 1991-2003. Examination of regional water quality indicates that variations in major and minor ion and some trace-element concentrations are most likely the result of natural variations in the geologic and physical environment.

Cluster analysis was used to group wells with similar concentrations of calcium, chloride, fluoride, magnesium, potassium, sodium, sulfate, and bicarbonate into five unique clusters. Maximum Likelihood Classification was used to make the extrapolation from clustered groups of wells, defined by points, to areas of similar water quality (hydrochemical regions) defined in a geospatial model. A combination of average annual precipitation, average annual temperature, land use, land-surface slope, vertical soil permeability, average soil clay content, texture of surficial deposits, type of surficial deposit, and ground-water recharge was used to classify the areas so the characteristics of the areas would resemble the characteristics of the clusters. The result of the Maximum Likelihood Classification is a map showing five hydrochemical regions of the glacial aquifer system.

Statistical analysis of ion concentrations collected from ground water in the glacial aquifer system illustrates that there are variations in water quality that can, in part, be explained by related environmental characteristics that control the movement of ground water through the aquifer system. Comparing median concentrations among the five hydrochemical regions, the Midwestern Agricultural region, Urban-Influenced region, and Western Agriculture and Grassland region have the highest concentrations of major and minor ions; whereas, the Northern and Great Lakes Forested region and Mountain and Coastal Forested region have the lowest concentrations of major and minor ions. Barium, arsenic, lithium, boron, strontium, and nitrite plus nitrate as nitrogen also are significantly different among the hydrochemical regions.