

2<sup>nd</sup> International Convention on

# Geosciences and Remote Sensing

November 08-09, 2017 | Las Vegas, USA

## Mapping groundwater seepage in a North Dakota fen using thermal imaging

Ogochukwu Ozotta and Phil Gerla  
University of North Dakota, USA

Groundwater flow and its dissolved mineral transport play a fundamental role in the ecology of many wetlands. Installation of equipment to map groundwater seepage, however, is invasive and may damage vegetation and potentially affect biodiversity. By mapping surface temperature remotely in the late summer, when the differential between warm soil and cold groundwater is the greatest, we hypothesize that the temperature patterns will reveal areas of greatest upward gradient and flow. To test the hypothesis, we monitored the effect that hydraulic gradient has on surface temperatures in a fen located at the north end of the Cherry Lake Aquifer, Eddy County, ND (47.73, -98.66). On-the-ground thermal imaging was used to map seepage, with results compared to conventional method of installing shallow ceramic cup piezometers to measure hydraulic gradient, and flux using Darcy's law. Shallow temperature loggers were installed to characterize soil temperatures at the same sites. The approach was applied at contrasting two locations: an open site in sedge-cattail and a nearby shady willow- cordgrass site. The open site showed strong upward gradient whereas the brushy site showed variable gradients, perhaps related to greater transpiration. Temperature observations and trends determined from the thermal imagery and thermistors did not show a relationship to hydraulic gradients measured at either site, suggesting variability due to heterogeneity of hydraulic conductivity (K). Thus, application of thermal imaging to map groundwater discharge requires data on soil stratigraphy. Currently, we are using inverse modeling of temperature profiles to better characterize shallow variation of K.

### Biography

Ogochukwu Ozotta completed her Bachelor's in Geosciences from the Federal University of Technology Owerri Nigeria and she is currently a Graduate student in Geological Engineering at the University of North Dakota.

ogochukwu\_ozotta@yahoo.co.uk

### Notes: