

**SPATIAL AND TEMPORAL TRENDS OF GROUNDWATER
VELOCITY, AND WATER STAGE WITHIN THE NOHOCH NAH
CHICH SYSTEM: IMPLICATIONS FOR CONTAMINANT DISPERSION
(YUCATAN PENINSULA, MEXICO)**

Beddows, Patricia A., and FORD, Derek C.,
School of Geography and Geology, McMaster University, Hamilton, ON L8S 4K1,
beddowpa@mcmaster.ca

The Nohoch Nah Chich System is an extensive (60 km) flooded conduit system located on the Caribbean coast of the Yucatan Peninsula. It is contained within a late Pliocene/early Pliocene low relief carbonate platform. Similar conduit systems exist throughout the region; however, none have been as extensively explored and mapped by cave diving as the Nohoch Nah Chich System. The hydrology is characterised by a lack of surface drainage. Precipitation rapidly infiltrates recharging the shallow regional unconfined aquifer. Due to differential water densities, a distinct layer of meteoric water floats above intruding dense saline water. The fresh water lens constitutes the primary source of potable water for the local Mayan population, and is an increasing source of income from tourist visits to "cenotes" (sinkholes). Seven quantitative fluorescent dye traces were performed in June and July of 1997 (dry season) in Nohoch Nah Chich, and at one other coastal discharge point of a distinct conduit system. Surface water level monitoring (utilizing Steven's Chart Recorders) was carried out at 4 sites within the System, and at a dissociated coastal base station. The Nohoch Nah Chich System was found to be hydrologically dynamic. The aquifer is tidally influenced with approximately 20% of the tidal range expressed as groundwater stage fluctuation up to 5 km from the coast. Tidal influence decreased as a function of distance from the coast. Groundwater velocities similarly decreased as a function of distance from the coast: velocities of 0.5 - 1.0 m/min were determined for inland sections of conduit (up to 5 km from the coast), whereas groundwater velocities determined for the discharge points at the coast varied from 10 - 25 m/min. This research indicates that the potential for contaminant dispersion in the aquifer is very high. Residence time of a contaminant within the aquifer would depend on the tidal stage, the place of contaminant introduction, and the extent to which matrix diffusion had occurred. Previously published research has not acknowledged the spatial and temporal variability of the hydrology of this aquifer. To adequately evaluate and maintain the quality of the eastern Yucatan aquifer, a better understanding of the hydrogeology must be achieved.