Late Quaternary Eolian Dunes and Fluvial Terraces of the Lower Chippewa River Valley

Lindsay M. Olson, Phillip H. Larson, Douglas J. Faulkner, Garry L. Running, Harry M. Jol, Joe Hupy, University of Wisconsin-Eau Claire Geography and Anthropology

Abstract

Methods

T1 and T2 terraces are inset below the Wissota Terrace and suggest a sequence of episodic deposition. The set T1 terrace was previously mapped as the Wissota terrace by Larson et al. (2007), although modifications were made to the extent and correlation of several terraces. Terraces below the Wissota terrace have an apparent spatial distribution. The spatial distribution is most evident in the prevalence of the T6 terrace downstream of Round Hill (A, Figure 6) and the T2-T1 terrace level (B, Figure 6). Portions of these terraces were included in the map. However, many possible eolian dune locations, where dunes are present near a terrace scarp, are consistent with the cliff-top dune formation model proposed by Larson et al. (this submission). This model is further supported by the results of our preliminary optical stimulated luminescence dates.

LCRV Terraces and Eolian Dunes

Ground Penetrating Radar

The LCRV eolian dunes are notably absent from the study area, providing an opportunity to evaluate the potential of GPR to image dune deposits. Additionally, a comparison of the known locations of eolian dunes (Larson et al., 2007) to GPR profiles will allow correlation between surface and subsurface geology. GPR is a non-invasive geophysical technique that uses radar waves to create subsurface imagery. The LCRV eolian dunes are 3-6 meters high and up to 300 meters long, apparently the result of cliff-top depositional processes, are concentrated adjacent to northwest-facing scarps of the highest order. As a result, GPR was used to explore the applicability to future investigation of both dunes and terrace deposits. The GPR survey area was chosen as representative of the landscape, consisting mainly of terrace remnants, as well as eolian dune deposits, arable soil, and basalt.

Preliminary Optical Stimulated Luminescence Dates

UNL-1716 Hwy D-DC1 (T6,1)       8.3     3.78  1.30   0.7    2.78   0.06  1.43±0.06  30.11±0.68   26       21.00±1.16

Discussion

The development of annual optical stimulated luminescence dates from the LCRV has been hindered by the absence of a well characterized source material and the challenge of determining the correct burial age. To provide a framework for OSL ages, the terrace locations were ground truthed and a new terrace map was created using the following criteria: 1) mapping the distribution of dunes in the LCRV and 2) testing ground penetrating radar (GPR) to explore its applicability to future investigation of both dunes and terrace deposits. The final compilation of terrace data sets was organized in a GIS database. The final compilation of terrace data sets was organized in a GIS database. The final compilation of terrace data sets was organized in a GIS database.

Summary

The LCRV eolian dunes are notably absent from the study area, providing an opportunity to evaluate the potential of GPR to image dune deposits. Additionally, a comparison of the known locations of eolian dunes to GPR profiles will allow correlation between surface and subsurface geology. The LCRV eolian dunes are 3-6 meters high and up to 300 meters long, apparently the result of cliff-top depositional processes, are concentrated adjacent to northwest-facing scarps of the highest order. As a result, GPR was used to explore the applicability to future investigation of both dunes and terrace deposits. The GPR survey area was chosen as representative of the landscape, consisting mainly of terrace remnants, as well as eolian dune deposits, arable soil, and basalt.

Acknowledgements

This project was funded by the University of Wisconsin-Eau Claire Undergraduate Research and the Wisconsin Center for the Advancement of Postsecondary Education (WCAP). The authors would like to thank the staff and students of the Wisconsin-Eau Claire Geography and Anthropology Department for their assistance.

Literature Cited