CONF-940553--92

LATE GLACIAL CLIMATE ESTIMATES FOR SOUTHERN NEVADA THE OSTRACODE FOSSIL RECORD -

chard M. Forester
919 U. S. Geological Survey
x 25046 Denver Federal Center
nver Colorado 80225
3)236-5656

Alison J. Smith
Department of Geology
Kent State University
Kent Ohio 44242
(216)672-3709

BSTRACT

Climate change plays an important role in determining possible long term hydrological performance of the tential high level nuclear waste repository within Yucca ountain, Nevada. Present-day global circulation results this region having an arid to semi-arid climate haracterized by hot and relatively dry summers. Global rculation during the late glacial (about 14 to 20 ka) was ry different from the present-day. Preliminary study of te-glacial fossil ostracodes from "marsh deposits" in the pper Las Vegas Valley suggests mean annual recipitation may have been four times higher, while mean nnual temperature may have been about 10°C cooler than oday. A major difference between present-day and late-lacial climate was likely the existence of cooler, cloudier, nd wetter summers in the past.

INTRODUCTION

The Las Vegas and Indian Spring Valleys contain ediments deposited along the valley axis during the late Pleistocene in wet-ground, spring-discharge, stream, and wetland environments.[1,2,3] Those deposits were ubsequently dissected to form the modern day badlands. Fossils are common and include bones of amphibians, mall to large mammals, such as meadow mice and mammoths, abundant molluscs, and ostracodes. The fossil molluscs indicate deposition in a spring and wetland complex similar to those in northeastern Nevada.[2] By nference, because the climate common to northeastern Nevada supports wetlands like those that existed during the ate Pleistocene in southern Nevada, the climate of ortheastern Nevada provides a modern climate analog for he late glacial climate in southern Nevada.

Unit D along the valley axis commonly consists of a bioturbated, silty to clayey, ledge forming, green, fossiliferous, calcareous mudstone.[1] Preparation of samples collected from unit D outcrops studied by Quade and Pratt[2] in the Las Vegas Valley and from other localities in nearby valleys revealed the presence of diverse ostracode species assemblages. Those taxa show these sediments were commonly deposited in many kinds of aquatic environments. The ostracode species, like the molluscs,[2] provide information about the properties of the water in which they were living and, from their modern biogeographic distribution, information about past climate in areas where they are found as fossils.

The ostracode species extracted from a few samples of the upper part of unit D[1,2] in the Las Vegas Valley, where the D to E transition is about 14 ka, provide the basis for making preliminary paleohydrologic and paleoclimatic estimations. Smith and Forester[4] describe the methodology for extracting climate and aquatic parameters from ostracode assemblage data. Forester and Smith[5] applied some of these methods to make a climate estimation for another ostracode assemblage collected from unit D. The wetlands associated with unit D are more extensive than those from younger units implying climate was wetter and or colder at that time. Therefore, estimation of climate parameters from fossil records in unit D may provide an estimate of the upper limits for mean annual precipitation (MAP) and mean annual temperature (MAT) for late glacial climate change. Those values would then provide hydrological models with realistic boundary conditions.

DT