precipitation regime. Although winter-spring precipitation is more important to the region's hydrological budget and groundwater recharge, the monsoon precipitation profoundly influences natural vegetation systems and can relieve the use of winter-derived water during the summer months. An NSF-supported project is underway to reconstruct monsoon precipitation in the Southwest using widths of the latewood portion of tree rings of *Pseudotsuga menziesii* and *Pinus ponderosa* from a network of sites in four southwestern states and Mexico. The stable-carbon isotope composition ($\delta^{13}C$) of a subset of these sites is being examined as an additional proxy of monsoon precipitation amount, based on the influence of moisture on stomatal conductance, which in turn affects stable-carbon isotope composition (reduced moisture causes ^{13}C enrichment). We present latewood carbon-isotope results from several sites and evaluate the extent to which they capture summer monsoon moisture conditions by comparison with precipitation and drought derived from instrumental records. The natural variability of monsoon precipitation reconstructed over centuries will provide (1) a baseline against which to compare future trends, (2) data for model validation, and (3) a record that may be valuable to water managers planning for future water resources available to the region's burgeoning population.

THE DEVELOPMENT OF THE NORTHERN UPPER RHINE RIVER VALLEY SINCE THE MID-HOLOCENE IN CHANGING OF CONTINUITIES AND DYNAMICS OF PALAEOHYDROLOGIC CONDITIONS AND GEOMORPHOLOGIC PROCESSES

Andreas Lechner. *Leibniz University, Germany*
E-mail address: lechner@geobotanik.uni-hannover.de

The assumption, that the large mid-european flood plains experienced a relative natural development up to the river corrections of the 18th century, is still widespread. This assumption implies a natural zonation into soft wood and hard wood vegetation depending on substrate, microrelief as well as the duration and intensity of flooding events. This paleoecological studies show, that these assumptions are not correct:
Palynological research documents no anthropogenic indicators in the flood plains of the Rhine Valley at least until 3450 cal. BP. Accordingly, until the Mid-Subboreal (equal Middle Bronze Age), there is no evidence of the development of soft wood vegetation in the flood plain (e.g. hardly any willow or poplar). During the Late Atlanticum and the Early Subboreal, oak-elm forests were widespread. Dry conditions with very few flooding events of high magnitude and terrestrial soil conditions dominated the flood plains during the Mid-Holocene (e.g. pine, sea buckthorn). These conditions changed only during the Late Subboreal (equal Late Bronze Age): The increasing number and magnitude of floodings during the late Subboreal lead to massive changes in fluvial geomorphology. The resulting river channel shifting and differential flood plain deposits of fine sediments lead to a mosaic of locations that enabled the development of soft wood vegetation in the flood plains of the Upper Rhine Valley. According to palynological evidence, the first massive anthropogenic influence on the vegetation occurred during the Late Iron Age. In these Early Subatlanticum times the intensity and frequency of floods were low. Accordingly, during that period, the agricultural land use intensity in the flood plains was considerably higher than during the Roman period and was only surpassed during the High Middle Ages. In contrast, during the Late Roman period and mainly in Migration period agricultural land use in Upper Rhine river floodplain largely were impossible as a consequence of increasing flood activities.

UNUSUAL MATERIAL IN EARLY YOUNGER DRYAS AGE SEDIMENTS AND THEIR POTENTIAL RELEVANCE TO THE YD COSMIC IMPACT HYPOTHESIS

Malcolm LeCompte. *Elizabeth City State University, United States*
E-mail address: malcolm.lecompte@cerser.ecsu.edu

The cause of the abrupt Younger Dryas (YD) climate change with its North American megafauna extinctions, population bottlenecks, and cultural disappearance remains enigmatic. Iron- and silica-rich magnetic spherules reported from Younger Dryas Boundary (YDB) sediments and dated to the stadial's onset were interpreted by some as cosmic impact relicts. They interpreted Northern Hemisphere YDB spherules as either impact ablation accumulations or ejecta. Others, claiming adherence to the same protocol, reported an inability to find spherule enhancement in YDB strata. We review spherule identification and counting methodology of two opposing studies. An independent blind-test examination was conducted using samples from two pre-YD occupation sites common to both studies: Blackwater Draw, NM, and Topper, SC. At Topper, samples were taken from sediments located above, adjacent to, and at the Clovis artifact debitage layer. Absence of overlying debitage indicates a multi-century hiatus in human activity before successor culture reoccupation. We found increased spherule abundance in YDB strata at both common sites. We also report spherules present in YD-age sediment from Paw-Paw Cove, MD, contrary to its reported absence. Spherule geochemistry reflects similar iron, titanium, aluminosilicate, oxygen, and carbon content at three widely separated sites. Spherules with elevated concentrations of rare earth elements including Cerium, Lanthanum, and Praseodymium are occasionally detected. Our spherule positive results are consistent with the YD Cosmic Impact Hypothesis study that found similar spherule composition and increased abundances in YDB sediments. Earlier negative results appear due to non-adherence of grain-size sorting protocol and subsequent examination of smaller than recommended aliquots. Size sorting mitigates neurocognitive factors making optical microspherule searches much less labor intensive.

CAROLINA BAYS: YOUNGER DRYAS TIME CAPSULES

Malcolm LeCompte. *Elizabeth City State University, United States*
E-mail address: malcolm.lecompte@cerser.ecsu.edu

Cold, dry, windy conditions prevailed far south of the Laurentide Ice Sheet during glacial epochs. A half-million, similarly aligned, elliptically shaped, shallow depressions or Carolina Bays are artifacts of potent Pleistocene geomorphic forces. We assume Bay formation by strong late Pleistocene winds deflating loose sandy sediments to create hollows or blowouts. Episodic modification continued into the early Holocene when dry, windy periods alternated with wet, calm periods. Windblown and water-borne sediments repeatedly filled Bay bottoms. Their fill became a layered repository of transported material; time capsules for post LGM history. OSL, 14C dating, pollen analysis, and cultural assemblages have been used to date Bays. Rockyhock, Chowan County, NC and Kimbel, Cumberland County, NC, provide an opportunity to examine Younger Dryas paleoenvironmental conditions and test the Younger Dryas Impact hypothesis. Both Bays were surveyed using Ground Penetrating RADAR to evaluate subsurface structure. Sediment composition differs between Bays; Rockyhock contains fluvial sediments, while Kimbel is primarily aeolian fill. Kimbel Bay's windblown sediments contain significant quantities of potential impact markers including: nanodiamonds, carbon spherules, glasslike carbon, charcoal, and magnetic spherules. Their exact chronostratigraphic significance remains undetermined. Rockyhock Bay's fluvial sediments contain only a very few magnetic spherules in rim sediments. Carbon spherules, glasslike carbon, and charcoal were not found with analysis of bay center samples pending. A relationship is probable between wind action and impact marker abundance. Marker concentration may be enhanced by complex size segregation dynamics during eolian activity. Bay floors with bounding surfaces could be described as traps that collected otherwise rare and widely scattered soil constituents.

REVISITING THE PHYLOGEOGRAPHICAL HISTORY OF THE BRAZILIAN ATLANTIC FOREST IN THE LIGHT OF PALEOENVIRONMENTAL RECORDS

Marie-Pierre Ledru. *université de Montpellier 2, France*
E-mail address: marie-pierre.ledru@ird.fr

The Amazonian rainforest is not the only threatened forest in Brazil. After the Amazonian rain forest, the Atlantic rainforest has the second highest biodiversity, it is home to 20,000 plant species, 40% of which are endemic, and is considered to be one of the three most threatened ecosystems on Earth. Long isolated from other major rainforest blocks in South America,