58-5 BTH 35 Wilen, James E.

TEMPORAL SIGNIFICANCE OF VOLCANIC ASH, PETRIFIED WOOD, AND UPLIFTED FLUVIAL TERRACE DEPOSITS IN THE CHILENO AND SAN ANTONIO CREEK DRAINAGES, MARIN COUNTY, CALIFORNIA

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Uplifted Quaternary cut-and-fill terraces can provide crucial information in terms of the temporal, tectonic, and fluvial history of a given region. Whereas it is not particularly different to obtain relative dates from fluvial terrace deposits, there is a paucity of actual absolute dates available for such deposits in Marin County, California. Several cut-and-fill terraces as well as one strath terrace were investigated by the primary author during previous research. Although a relative age-dating scheme was devised, no absolute dates were obtained. The purpose of this study is to provide a preliminary characterization of a recently examined cut-and-fill terraces which might provide important information about the timing and rate of uplift in the southern North Coast Ranges.

An uplifted cut-and-fill terrace was studied by the authors near the headwaters of the Chileno and San Antonio Creek drainages in northwestern Marin County, California. The terrace is located ~90m above the modern floodplane. Clasts range in size from cobble to boulder and are primarily sub-rounded to well-rounded, and oblate (disk) to equant. Clasts are almost entirely Franciscan and Sonoma Volcanics cobbles with lesser amounts of Tertiary sedimentary rocks (Wilson Grove FM.?) and petrified wood fragments. Surface soil color is 5YR 5/6D. Initial relative age estimates based on soil rubification, geomorphic position, clast composition, and correlation with other published data, suggest an age of >300 ka for the cut-and-fill terrace. Ash beds as well as reworked, ashy, fluvial deposits were also found in the terrace deposits by the authors. It is possible that the deposits in this study might be correlative with the Glen Ellen Formation located to the northeast. Chemical correlation of the ash deposits is currently underway and will hopefully provide crucial information in terms of the temporal significance of the terrace deposits.

58-6 BTH 36 Cole, Rex

SEDIMENTOLOGIC COMPARISON OF TWO NEW LAVA CREEK B ASH OCCURRENCES IN WESTERN COLORADO

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Remnants of the Lava Creek B (LCB) ash, which erupted from the Yellowstone volcanic center approximately 640 ka, have been characterized at two new locations (Prairie Canyon and Petrie Mesa) in western Colorado. At both locations, the ash is typically detrital, occurs in paleotopographic depressions, appears to be related to aggradational depositional episodes, and is capped by resistant Quaternary conglomerates that preserve the underlying ash. Differences between the two occurrences include the position of the ash within aggradational sequences, its thickness, geometry, degree of lithification, and overall depositional setting.

In Prairie Canyon, which is very near the Colorado-Utah border and the join between Garfield and Mesa Counties, CO, the LCB ash occurs within Pleistocene valley fills that are up to 20 m thick, resting on Cretaceous Mancos Shale. The ash occurs as white lenses of well-stratified sand-size glass shards that are 2 to 3 m thick, 100 to 200 m wide, and overlie river gravels, which constitute the base of the valley fill. The ash is buried by up to 10 m of weakly bedded beige sandy muds that encase minor gravel and sand lenses. A well-cemented fluvial conglomerate overlies the valley-fill sequence. Stratigraphic relations indicate that ash, followed by siliciclastic sediments, was reworked from hill slopes into stream bottoms, which led to stream aggradation and valley filling. These events were probably triggered by slope destabilization caused by ash deposition and the loss of vegetation from hill slopes.

Petrie Mesa, a dissected Pleistocene gravel-capped terrace resting on Mancos Shale, is located approximately 9.4 km northeast of Delta, CO, on the south flank of Grand Mesa. The ash has a maximum thickness of 2.5 m and occurs as an isolated lens approximately 150 m wide. The ash is relatively pure (less than 10 % detrital impurities), strongly cemented by calcite, faintly laminated to cross-stratified, and locally bioturbated. The ash rests on a sequence of well-stratified sand and granule-pebble gravel (5-8 m thick) deposited in a relatively low-energy alluvial setting, and is overlain by a heterogeneous sequence (15-20 m thick) of poorly sorted and stratified cobble-boulder gravel deposited in a high-energy setting (alluvial fan?). The stratigraphic relationships suggest that the ash accumulated in an abandoned channel or pond.

58-7 BTH 37 Bierman, Paul R.

THE BOULDERS OF MADISON COUNTY

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Large, quartz-bearing, gneissic boulders, both in clusters and sitting alone, are common on the surface of numerous (>km^2) debris fans at the base of Virginia's Blue Ridge Mountains. Widespread debris flows, triggered by extraordinarily heavy rains in 1995, were a dramatic reminder that these fans are active landforms. Debris flow events, particularly those large enough to transport the greater than car-size boulders we sampled, can be a significant geologic hazard to those living on the fans; thus, it is important to know the age and recurrence interval of boulder deposition.

We measured 10-Be and 26-Al in samples collected from the top of 21 boulders on the General's Fan, a complex landform adjacent to Kinsey Run in western Madison County, VA. Model exposure ages (SL, >60 deg, 10-Be PR=5.17 atoms/g) for these samples range from about 7 to 140 ky. There is no relation between boulder size or boulder height and age; nor is there strong spatial patterning of boulder ages on the fan surface. We do not know the nuclide activity that the boulders contained when they were deposited; nor do we know how much they have eroded since deposition. Large inventories of meteoric 10-Be, measured in soil profiles underlying the boulders, suggest that the fan surfaces on which the boulders sit are old and stable, the oldest exceeding 500 ky.

An exceedance probability plot of boulder ages shows a non-random distribution through the last 150 ka. Boulder ages cluster in times known to be cold (18, 30, 67, 105, and 140 ky), consistent with periglacial processes supplying more boulders at high elevation and/or more moisture effective conditions catalyzing increased debris flow activity and boulder transport.

58-8 BTH 38 Lenz, Brett

NUMERIC AGES OF FINAL CROSS-SCABLAND PLEISTOCENE FLOODING, COLUMBIA PLATEAU

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Research into timing of final cross-Scabland floods related to recession of the Cordilleran ice sheet is reported. Numeric ages associated with final flooding span a 600 year period of Uppermost Pleistocene flood events. Numeric ages associated with final flooding include a date of 12,800+/-60BP on bone from a ruminant killed by one of the flood events, and a date of 12,130+/-50BP on the extinct Jefferson Ground Sloth (Megalonyx jeffersoni) which was discovered immediately overlying rhythmically bedded flood sediments. At least six successive flood occurrences post-date deposition of the St. Helens Set S tephra (~13,000BP). Sediments deposited as a result of these late floods include pedogenic and geologic evidence which indicate a depositional hiatus between individual flood events.

58-9 BTH 39 Reusser, Lucas

★ MAJOR, CLIMATE-CORRELATIVE INCISION OF THE POTOMAC RIVER GORGE AT GREAT FALLS ABOUT 30,000 YEARS AGO

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Large rivers along the mid-Atlantic coast flow through spectacular bedrock gorges as they exit the Piedmont onto the Coastal Plain and their tidewater reaches. Was this incision driven by tectonic or climatic forcing? When did it occur?

In order to infer the cause and understand the timing, spatial distribution, and rate of the bedrock incision in two such gorges, we collected >70 samples for 10-Be and 26-Al analysis from exposed, fluvially eroded outcrops of quartz-bearing schist along strath terraces of the Potomac and Susquehanna Rivers at the Piedmont/Coastal Plain transition. Here we report primarily on the Potomac gorge.

The first 18 samples, collected from Mather Gorge below Great Falls on the Potomac River, indicate that the most prominent strath terrace, a several km-long bedrock feature 20 to 25 m above the current low water level, was abandoned rapidly as the Potomac River incised about 30 kya (SL, >60 deg, 10-Be PR=5.17 atoms/g). Nine samples, collected from water-polished rock surfaces down a cross-section from this terrace to just above the river, have decreasing nuclide activities consistent with a fluvial, bedrock incision rate of about 70 cm/ky and an effective 6 ky exposure age at water level. Four samples, collected from below the normal low-flow level during the 2000 drought, have activities equivalent to about 5 ky of exposure. Thus, to account for cosmic-ray dosing at and just below the water's surface, we have subtracted 6 ky of exposure from older terrace surface ages.

The incision of Mather Gorge began about 30 ky coincident with a major drop (>50 m) in eustatic sea level, the result of glacial ice-volume increase. Incision is clearly coincident with cooling climate but we do not know if it was driven by base-level fall or by changes in discharge and sediment loading. However, the similarity of model exposure ages for samples collected from a km-long transect parallel to the river and within 2 km of the present-day knick point at Great Falls, suggests that retreat of the knick point which formed the gorge must have been rapid, lasting only a few thousand years.

58-10 BTH 40 Durbin, James M.

THE STRATIGRAPHY AND GEOMORPHOLOGY OF THE PATOKA RIVER VALLEY, SOUTHWESTERN INDIANA

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The Patoka River is a unique stream in that it heads in the unglaciated uplands of south-central Indiana, before joining the White River a few kilometers upstream from the confluence with the Wabash River. Both the White and the Wabash Rivers were major outwash sluiceways during the Wisconsinan glaciations. This project reports on the preliminary data recovered from cores extracted from the alluvium and terraces in the lower 2/3 of the Patoka River valley. It is apparent from the available map, core and field observations that the unglaciated bedrock controlled parts of the valley recorded the same glacial and climatic history with fluvial morphology and stratigraphy unique to specific segments of the basin. In the middle unglaciated reach of the river, the stream constructed strath terraces, with a thin veneer of alluvium and/or colluvium in which soils have developed. In the lower reach of the stream terraces are not obvious, although buried paleosols are present at shallow depths within the alluvium. It is not apparent if there are multiple terraces and paleosols at this writing, or what was the exact timing of valley being cut and/or filled. The history of glacial meltwater flowing down the Wabash and White Rivers, when combined with substantially more alluvial fill suggests that the trunk streams acted as a local base level. As the glaciated rivers aggraded, the tributary floodplains did as well, at least in the lower part of the valley. The Patoka may have lacked clastic sediments and/or the stream power needed to construct terraces, and incise thick alluvial floodplains upstream from Jasper, IN. The climatic history of the region during the latest Pleistocene and the Holocene may be responsible, in part or total, for the development of the strath terraces in the upper and middle part of the basin.

58-11 BTH 41 Doerr, Erica

TRIBUTARY RESPONSE TO LATE WISCONSIN PALEOWATER LEVELS IN THE NORTHERN MISSISSIPPI ALLUVIAL VALLEY OF MISSOURI AND ARKANSAS

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Tributaries to the Mississippi River record paleowater levels of the main channel. When the river stage rises, water backs up into the tributaries and deposits slackwater sediment. If river levels are high for an extended time, the tributaries become temporary lakes and unoxidized lacustrine sediment accumulates.

Cores from tributaries along the Western Lowlands and the Eastern Lowlands of the northern Mississippi Alluvial Valley show that many of these valleys were inundated by floodwater associated with late Wisconsin deglaciation for extended periods. The floodwater inundates