marshes accreted vertically at 1-2 mm/yr, a rate similar to the global average sea level rise during the late Holocene. In four of the five marshes, inorganic suspended sediment accumulated mostly along marsh-river margins; in one marsh interior, cyclic sedimentation may indicate pulses from small tributary basins. Inorganic sediments reached a long-term maximum in most marshes approximately 1000-to-<400 years BP, probably because of increased clearing of fields. The high variability of down-valley patterns suggests that the upper Mattaponi River basin is not the principal source of marsh sediments in the study area.

BTH 70 Doyle, Martin W.

CHANNEL FORMATION AND EVOLUTION FOLLOWING DAM REMOVAL

DOYLE, Martin W., Earth and Atmospheric Sciences, Purdue Univ, 1397 Civil Engr Bldg, West Lafayette, IN 47907-1397, mdoyle@purdue.edu, STANLEY, Emily H., Center for Limnology, Univ of Wisconsin, 680 N. Park St, Madison, WI 53706-1492, and HARBOR, Jon M., Purdue Univ, 1397 Civil Engr Bldg, West Lafayette, IN 47907-1397

Results of two dam removal studies in southern Wisconsin include fluvial geomorphic and biogeochemical monitoring before and after dam removal. Study sites are on low-gradient, fine to coarse-grained channels with low-head, run-of-river dams that have been present for over 100 years and have impoundments filled with fine sediment. Both dams were breached in the late summer of 2000, and subsequent channel formation in the impoundments and downstream sediment transport following removal was monitored. Both channels removed large quantities of fine sediment immediately following breaching, resulting in 3-5 cm of fine sediment deposition along the wetted channel perimeter for approximately 3-5 km downstream. At the first site, channel formation in the former impoundment was rapid and consisted of vertical erosion of the channel bed, slight channel widening, and then deposition of coarse and fine sediment on the channel margins and on the newly forming floodplain. Deposited coarse sediment was derived from previously stored sediment in the former impoundment delta. At the second site, channel formation was governed by the formation and migration of a headcut. A deep and narrow channel was formed downstream of the headcut, with negligible changes occurring in the impoundment upstream of the headcut. Sediment cores taken in the former impoundments show that one channel has not formed along the alignment that it followed before dam construction. Overall results demonstrate the progression of geomorphic changes likely to follow dam removal, and offer insight and a framework for prediction and modeling efforts.

BTH 71 Persico, Lyman

TRACKING PAINTED PEBBLES IN THE MOJAVE- OFFROAD VEHICLES AND THEIR IMPACT ON SEDIMENT TRANSPORT

PERSICO, Lyman, Geology, Univ of Vermont, Perkins Hall, Burlington, VT 05405, lpersico@zoo.uvm.edu, NICHOLS, Kyle K., Geology and School of Natural Resources, Univ of Vermont, Burlington, VT 05405, and BIERMAN, Paul, Geology, Univ of Vermont, Burlington, VT 05405

Since February 2000, we have tracked 1600 painted pebbles across 4 sites in the Mojave Desert, Southern California: the Iron Mountains, the Chemeheuvi Mountains, the Goldstone Deep Space Communications Complex, and Ft. Irwin. Three sites are in areas not disturbed by humans; the fourth, located in Ft. Irwin, is on a surface that experiences extensive off-road vehicular use. We find that off-road vehicle use dramatically accelerates pebble movement.

At each site, 400 numbered pebbles, 1-cm diameter, were laid out along orthogonal 20-m lines and surveyed (total station, 1-cm accuracy) 2-4 times a year to quantify pebble displacement and determine how vehicular traffic affects pebble movement. Pebbles are moved short distances by small rainstorms and animal activity. Pebble tracking demonstrates that animal burrowing, as well as tracked and wheeled vehicles move sediment up as well as down gradient. Large rainstorms, generating channelized flow, and vehicles disturbing the desert surface, move pebbles greater distances.

The average pebble movement in the 2 natural systems is between 4 and 6.5 cm/year but as high as 18 cm/year at the Chemeheuvi site, where runoff in one channel transported pebbles up to 31.5 meters in at least two transport events. These pebbles were not buried in the bedload and are still easily found downstream on the channel surface. All data are right skewed so median speeds for natural systems (2.9, 2.8, and 2.7 cm/year) are less than average speeds and cluster closer together because the outliers moved in channels inflate average velocities. In contrast, the average and median pebble speeds at the disturbed Ft. Irwin site are both 30 cm/year. Average pebble movement at Ft. Irwin is not levered by a small number of pebbles that have moved great distances, rather a large number of pebbles have been moved by vehicular disturbance.

The surface disturbance caused by vehicles is very different than the natural disturbance regime. In active training areas, pebbles get caught in tank tracks and tires and are either buried or scattered. Recovery of pebbles and average pebble movement are affected by the presence of offroad vehicles. The average recovery rate, after one year, of pebbles in natural systems is 98% but only 76% at Fort Irwin where vehicles repeatedly disturb the surface.

BTH 72 Lord, Mark L.

ASSESSMENT OF CHANGING LAND-USE PRACTICES ON BASIN SEDIMENT YIELDS AND PROVENANCE IN WESTERN NORTH CAROLINA USING MULTIVARIATE FINGER PRINTING TECHNIQUES

LORD, Mark L.[1], MILLER, Jerry R.[1], YURKOVICH, Steve P.[1], KOLENBRANDER, Larry G.[1], and MACKIN, Gail[2], (1) Geosciences & Natural Resources Mgmt, Western Carolina Univ, Cullowhee, NC 28723-9047, mlord@wcu.edu, (2) Mathematics & Computer Science, Northern Kentucky Univ, Highland Heights, KY 41099

The negative impacts of sediment on streams of the southern Appalachians have become a significant issue in the past decade, however, there have been few attempts to quantify the impacts of land-use alterations on upland erosion. This investigation used geochemical fingerprinting techniques and sediment mixing models within a small lake basin, Fairfield Lake (0.3 sq. km), to assess the applicability of such methods to this region. Specifically, the study attempted to determine the relative contributions of sediment through time to Fairfield Lake from 2 geologic units and 4 delineated land-cover types (forests, roads, lawns, and streamside alluvium.).

The multivariate fingerprinting and mixing model techniques used required the collection of sediment samples from upland areas and the bed of Fairfield Lake. Upland soil samples (n=108) were collected over the Whiteside Granite-Gneiss and the Tallulah Falls Formation in both forested and developed areas. In the lake, 19 cores were collected from 16 locations; 3 cores were studied in detail. Lake and upland samples were analyzed for a suite of 16 elements. Lead-210 data on the lake sediments, combined with mapped information from air photos obtained in 1963, 1975, 1988, and 2000, indicate that sedimentation rates have increased several fold during the past two decades in response to local development.

The results of linear discriminant analysis of upland soil geochemical data indica soils from different bedrock and land use areas can be statistically distinguished. Us statistically selected parameters, the sediment mixing models show a change in roc land cover source that corresponds to the increase in sedimentation rates. Also, the indicates that anthropogenic source areas (i.e. roads and lawns) increase in sync wi of development. The mixing model, however, does provide some unreasonable resu may be due to elemental loss between the uplands and the lake basin, and the pres geologic units that are not lithologically unique. This method has promise but require cation before use as a management tool; suggested modifications are to (1) use ele ratios and/or less soluble elements as geochemical fingerprints, and (2) map/sampl units by lithotype rather than formations.

BTH 73 Kite, J. Steven

WEST VIRGINIA FLOODS AND DEBRIS FLOWS, JULY 2001

KITE, J. Steven, Department of Geology & Geography, West Virginia University, White Hall, Morgantown, WV 26506-6300, jkite@wvu.edu and NEWELL, Dawn WVGES/USGS-WRD Coop, 11 Dunbar Street, Charleston, WV 25301

Training thunderstorm cells in a mesoscale convective complex triggered substantia flooding in southern West Virginia and adjacent Virginia on 8 July 2001. Several offic stations recorded 120-135 mm of rainfall in 3-6 hr, with rainfall intensities of up to 5(Unofficial data suggest that > 175 mm may have fallen locally. Ensuing events left 2 preliminary damage estimates of up to $150 million in 23 counties.

The hydrologic and geomorphic response to this precipitation was regionally dive Floods exceeding a 100 year recurrence interval occurred in the headwaters of the ' and Guyandotte rivers and similar magnitudes may have been reached in adjacent (basins. Low-lying communities in the narrow valleys of the Appalachian Plateaus we mered by high-velocity stream flows with little warning. Most of the damage stemme these water-dominated floods. Debris flows were most common in the New River Gc is not yet clear whether their distribution relates to local geology and geomorpholog variation in precipitation intensity.

Although local residents have pointed toward timber and coal-mining practices as cause of flooding, further study will be required to evaluate the relationship between and flood intensity or slope stability. Reconnaissance suggests that active mines exp dam breaks and slope failures, which exacerbated local flooding, but that fully reclai sites presented no exceptional downstream risk.

BTH 74 Scheidt, Matthew D.

DIFFERENTIATION OF IRON PHASES THROUGH SEQUENTIAL EXTRACTIONS IMPROVE AGE ESTIMATES OF BLUE RIDGE DEBRIS FAN SURFACES, MADISO COUNTY, VA

SCHEIDT, Matthew D. and KOCHEL, R. Craig, Geology, Bucknell Univ, Lewisbu 17837, mattscheidt225@hotmail.com

Four Quaternary surfaces were mapped on two debris fans activated by the 1995 R Flood in Madison Co., VA. As in previous studies (Daniels, 1997; Kochel et al., 1997 stratigraphy and indices of soil development were compared to a regional soil chron quence for the VA Piedmont (Pavich et al., 1989) to determine the relative ages of fa faces and bracket the absolute ages of soils on these surfaces. Eaton (1999) dated from stratigraphies at fan-head trenches using radiometric techniques. Soil weatheri chemistry was investigated in this study as a proxy for isotopic methods used to dat faces. Crystalline and amorphous phases of metal hydroxides were removed from s through sequential extractions. Crystalline phases are more thermodynamically stab and therefore should increase relative to amorphous phases with time (Drever, 1997

Extraction results show that the ratio of Fe bound to crystalline phases vs. Fe bou amorphous phases increases systematically with the age of a soil. This ratio was us chronofunction to determine the relative ages of soils and distinguish soils of differe showing similar levels of geomorphic development. Extraction results were calibrate chemically analyzing samples from 14C-dated stratigraphies. Comparison of the geo signatures of soils from debris fan surfaces investigated in this study to radiocarbon samples allowed the absolute ages of fan surfaces to be approximated.

Geochemical age estimates of younger fan surfaces (Qf4 and Qf3) correlate well mates based on soil chronosequence comparison. However, dates approximated for older surfaces (Qf1) based on geochemical analysis underestimate those determine comparison of soil indices to published chronosequence studies. Soils dated using 1 methods in a related study are currently being geochemically analyzed using extract ods. Results from these cosmogenically-dated samples may improve estimates of fa ages beyond the range of radiocarbon dating. Overall, the geochemical methods he useful for estimating ages of Quaternary landforms and will further the development chronosequence for debris fans in the Appalachian Blue Ridge.

BTH 75 Rogers, Joseph N.

LATE PLEISTOCENE AND HOLOCENE DEBRIS AVALANCHES RECORDED BY F LAKE, FRANCONIA NOTCH, WHITE MOUNTAINS, NEW HAMPSHIRE

ROGERS, Joseph N.[1], MCCOY, William D.[1], and DAVIS, P. Thompson[2], (1) Dep of Geosciences, University of Massachusetts, Amherst, MA 01003-5820, jrogers@geo.umass.edu, (2) Department of Natural Sciences, Bentley College, MA 02452-4705

Debris avalanching events are relatively common during historic time in the White M however, little is known about their frequency through the Holocene. Profile Lake pro opportunity to establish a chronology of prehistoric landslide events. The lake is situ between two historic slide zones along the steep east wall of a classic U-shaped gla and contains a complete Holocene record. One sediment core recovered from the n the lake is dated 10,480 +/- 170 14C yrs BP (GX-26620) at a depth of 6.04-6.14 m, gray inorganic silt abruptly yields to weak gyttja above. Eight other sediment cores h recovered in a transect along the length of the lake. Occasional lenses of coarse sa we suggest represent landslide events, periodically punctuate the sediment cores fr southern end of the lake. Documented accounts of eight local landslide events over 200 years provide an historic analog for some of these coarse lenses near the core most significant of these historic slides occurred on 07/23/47, 06/24/48, and 10/24/5 ing old Rt.3 with up to 8 m of debris and extending into the lake. Some of these lanc eroded the valley wall to bedrock, leaving scars that remain only partially vegetated three major historic events were triggered by prolonged intense rainfall. LOI and ma susceptibility have proven useful in distinguishing less significant prehistoric landslid in the sediment cores. Preliminary work suggests that slides appear to be clustered zones of higher activity separated by two periods of relative quiescence. The early a