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Identifying Watershed Sediment Sources In The Chesapeake Bay

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AB: Attenuation of light by fine-grained suspended sediment is having an adverse affect on the living resources and habitat of the Chesapeake Bay and its watershed. Different approaches are being used to identify sediment sources at several scales for the Chesapeake Bay watershed. At the subbasin scale (1.0 to 70,200 km ^2), U. S. Geological Survey suspended-sediment data from 1985 through 2001 for 35 stations with at least 3 years of record were used to determine subbasin sediment yields. In the Susquehanna River Basin results showed that four streams draining the Conestoga River Basin,(1,220 km ^{2}) which is in the Piedmont, had the highest sediment yields (60.9 to 356 t/km ^2/yr). Cosmogenic ^10Be provides another method to measure erosion which can be compared to subbasin sediment yields. Two pathways of the cosmogenic radionuclide ^10Be, atmospheric and \it in situ, were used to determine erosion rates in the Susquehanna River Basin (70,200 km ^2). Atmospheric ^10Be was used to generate erosion indices at 25 subbasins by taking a ratio of ^10Be in fluvial sediment exported out of the subbasin against the net atmospheric delivery of ^10Be (values >$1 = erosion). Examining the relation of \it in situ^10Be concentrations compared to subbasin sediment yield provided an independent method

to assess instrumental vs. background erosion rates. Subbasins in equilibrium show a linear relation of instrumental sediment yield to \it in situ^10Be concentrations. Subbasins that deviate from this relation show either export or storage of sediment. Subbasins of the Conestoga River Basin showed departure from this relation, indicating erosion. The Conestoga River Basin drains primarily agricultural land and this land use may be influencing erosion rates and sediment yields. Within Chesapeake Bay subbasins, sediment fingerprinting is being used to determine watershed sources of sediment. Sediment fingerprinting is a technique where potential sediment sources can be characterized using a number of diagnostic physical and chemical properties. Results from the Pocomoke River Basin near Willards, MD (USGS ID 01485000)(157 km ^2) for 7 storms during 2001-02 showed that the channel corridor (bed and banks) was the major source of suspended sediment, contributing between 61-100%. Cropland contributed between 0 and 39%. Significant fingerprints used in this analysis included ^137Cs, ^13C, and ^15N. Erosion mass balance using ^137Cs also confirms that cropland erosion was low.