Supplementary Material

for

Title:

Identifying detrital and diagenetic illitic minerals in paleosols of the Illinois Basin

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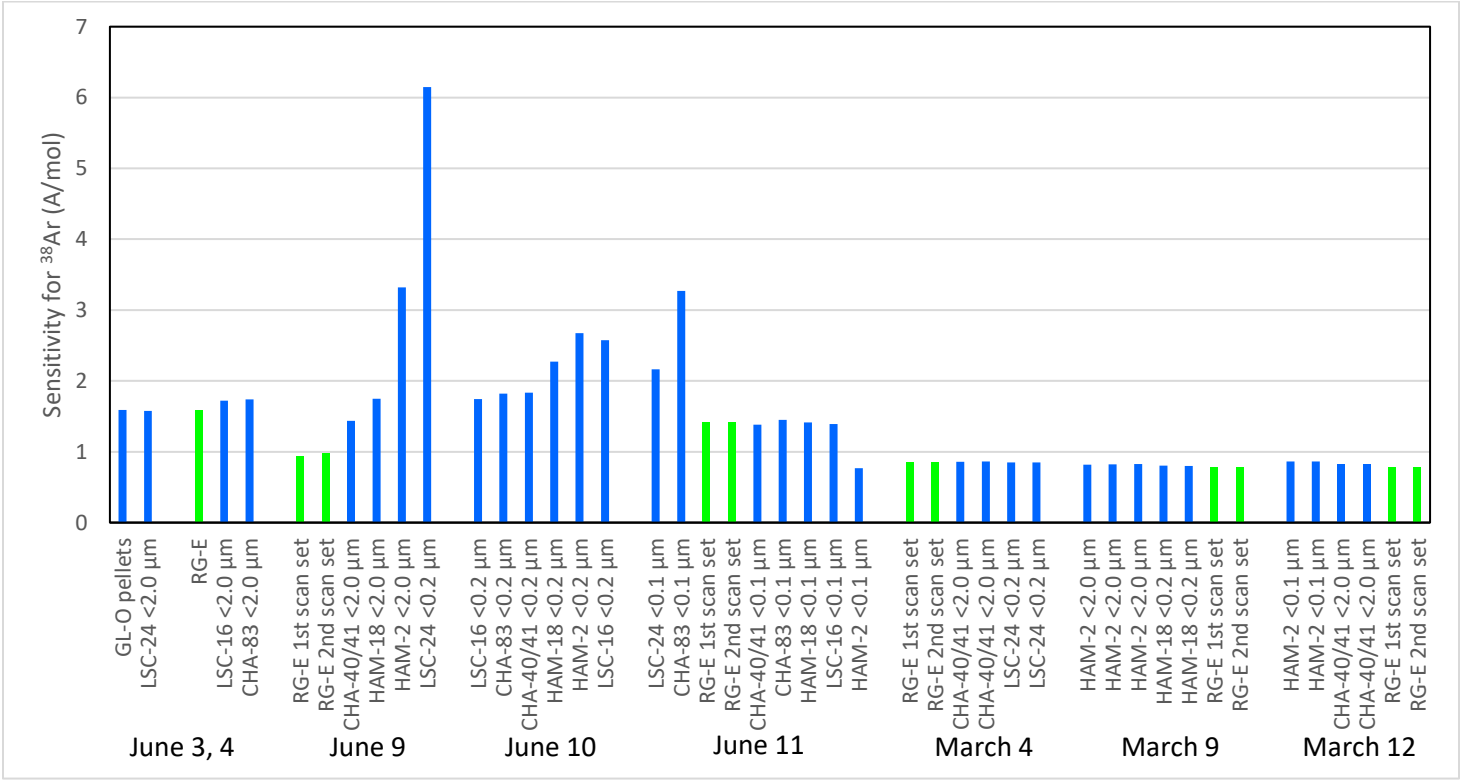
Mass spectrometer sensitivity variation during isotopic analyses of Illinois Basin samples



Mass spectrometer sensitivity (for ^{38}Ar) variation during isotopic analyses of Illinois Basin samples. Green bars are from analyses of Reference Gas E (RG-E). Blue bars are from analyses of argon from samples diluted by pure ^{38}Ar from Tank F (except the argon from GL-O pellets, which was diluted by ^{38}Ar from Tank C2). The electron current controller for the mass spectrometer's ion source failed on June 4, leading to widely variable sensitivity until RG-E was run on June 11. The small value for HAM-2 <0.1 µm (last run of June 11) is thought to be due to loss of ^{38}Ar during a special spiking procedure. For age-value calculation, the sensitivity for that run was taken to have been the same as that of the immediately preceding run (for LSC-16 <0.1 µm), 1.39 A/mol.

Notes:

Two sets of scans were taken for all RG-E runs after the controller failed. Also, two sets of scans (three for HAM-2 <2.0 μm) were taken for all samples analyzed in March. The duplicate bars for RG-E after June 10 and samples in March indicate good within-run stability after June 10 (as do the isotope-ratio statistics except for CHA-83 <0.1 μm on June 11). Because more than one bar is shown for each sample analyzed in March, however, the chart is misleading in respect to the amount of work done then.

The very large increase in sensitivity during the day on June 9 probably was accompanied by an unknown change in the mass discrimination factor. Because the reference gas was run early that day, the mass discrimination factor for the last run is not well known. Although the isotope ratio statistics for that run of LSC-24 <0.2 μm are favorable, there may be a substantial systematic error that we cannot know. Consequently, it is not surprising that the two age values for LSC-24 <0.2 μm do not agree within the statistically determined 2σ error ranges.