

Supplementary data

| Depth (m) | Mo ($\mu\text{g/g}$) | TOC % | Mn/Al *100 | Mo/Al*1000 | Mo/TOC |
|-----------|------------------------|-------|------------|------------|--------|
| 42.12 | 45.59 | 8.18 | 0.47 | 4.65 | 5.78 |
| 45.11 | 32.74 | 7.63 | 0.45 | 2.72 | 4.39 |
| 46.29 | 28.95 | 5.94 | 0.46 | 2.08 | 5.04 |
| 49.83 | 17.94 | 8.74 | 0.46 | 2.29 | 2.13 |
| 51.42 | 29.35 | 9.61 | 0.33 | 1.25 | 3.06 |
| 54.30 | 59.53 | 7.94 | 0.55 | 3.35 | 7.26 |
| 56.55 | 44.65 | 9.26 | 0.58 | 2.50 | 4.75 |
| 58.93 | 31.14 | 9.32 | 0.59 | 2.10 | 3.41 |
| 61.91 | 11.96 | 4.19 | 0.62 | 0.66 | 2.97 |
| 67.52 | 29.09 | 7.93 | 0.33 | 1.35 | 3.67 |
| 69.78 | 69.39 | 10.37 | 0.21 | 2.31 | 6.56 |
| 72.10 | 77.12 | 10.82 | 0.28 | 3.01 | 7.13 |
| 74.78 | 24.20 | 8.53 | 0.44 | 2.02 | 2.91 |
| 77.12 | 13.15 | 9.64 | 0.37 | 0.70 | 1.39 |
| 79.15 | 68.48 | 12.00 | 0.35 | 4.02 | 5.74 |
| 84.07 | 53.16 | 18.72 | 0.35 | 6.47 | 2.89 |
| 86.48 | 24.84 | 14.47 | 0.60 | 4.27 | 1.72 |
| 89.23 | 7.90 | 13.83 | 0.87 | 2.35 | 0.62 |
| 90.79 | 11.24 | 12.38 | 0.63 | 2.64 | 0.96 |
| 92.52 | 7.86 | 9.03 | 1.22 | 2.95 | 0.92 |
| 95.18 | 28.70 | 16.12 | 0.74 | 5.33 | 1.80 |
| 97.34 | 11.22 | 15.26 | 0.75 | 2.43 | 0.76 |
| 99.62 | 4.45 | 7.42 | 0.54 | 0.21 | 0.66 |
| 102.17 | 5.25 | 8.87 | 0.48 | 1.02 | 0.64 |
| 104.41 | 18.72 | 13.27 | 0.43 | 3.10 | 1.47 |
| 106.83 | 20.14 | 7.82 | 0.29 | 1.42 | 2.59 |
| 109.05 | 21.55 | 9.36 | 0.33 | 1.66 | 2.36 |
| 111.31 | 34.65 | 9.38 | 0.38 | 2.32 | 3.78 |
| 113.83 | 47.47 | 8.92 | 0.48 | 5.45 | 5.48 |
| 115.16 | 32.35 | 5.17 | 0.42 | 2.30 | 6.43 |
| 117.49 | 28.23 | 4.96 | 0.51 | 1.57 | 5.82 |
| 121.07 | 50.72 | 4.82 | 0.33 | 3.30 | 10.50 |
| 122.10 | 19.23 | 8.07 | 0.35 | 1.35 | 2.46 |
| 124.16 | 27.08 | 6.53 | 0.30 | 1.63 | 4.23 |
| 126.76 | 18.69 | 5.19 | 0.43 | 1.35 | 3.65 |
| 128.94 | 33.70 | 7.51 | 0.40 | 1.42 | 4.59 |
| 131.40 | 9.13 | 5.34 | 0.74 | 1.19 | 1.84 |
| 133.65 | 23.13 | 5.28 | 0.56 | 2.04 | 4.47 |
| 137.00 | 46.69 | 7.32 | 0.22 | 1.74 | 6.41 |
| 139.33 | 20.69 | 6.70 | 0.37 | 1.11 | 3.10 |
| 141.50 | 31.91 | 7.31 | 0.30 | 1.41 | 4.35 |
| 143.52 | 13.04 | 4.24 | 0.31 | 0.60 | 3.16 |
| 146.09 | 22.77 | 5.81 | 0.27 | 0.85 | 3.89 |
| 147.98 | 11.95 | 4.53 | 0.31 | 0.47 | 2.71 |
| 150.87 | 43.83 | 7.80 | 0.21 | 1.24 | 5.53 |
| 152.42 | 12.90 | 3.42 | 0.35 | 0.66 | 3.89 |

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| 154.72 | 36.59 | 7.46 | 0.27 | 1.57 | 5.00 |
| 156.62 | 51.10 | 8.51 | 0.34 | 3.19 | 6.16 |
| 159.23 | 24.85 | 7.17 | 0.42 | 1.95 | 3.56 |
| 161.51 | 6.97 | 1.78 | 1.07 | 0.45 | 4.15 |
| 163.68 | 11.11 | 4.19 | 0.49 | 0.77 | 2.74 |
| 168.21 | 25.91 | 6.15 | 0.43 | 1.36 | 4.29 |
| 171.09 | 23.99 | 3.93 | 0.29 | 0.60 | 6.25 |
| 173.01 | 16.49 | 5.54 | 0.41 | 0.64 | 3.02 |
| 175.74 | 13.67 | 6.79 | 0.33 | 0.60 | 2.13 |
| 179.15 | 3.78 | 5.52 | 0.60 | 0.19 | 0.77 |
| 181.04 | 6.42 | 4.72 | 0.64 | 0.63 | 1.46 |
| 183.20 | 8.06 | 6.54 | 0.45 | 0.48 | 1.32 |
| 186.57 | 9.65 | 5.03 | 0.25 | 0.30 | 2.08 |
| 188.45 | 12.77 | 6.84 | 0.33 | 0.44 | 1.93 |
| 190.80 | 3.51 | 2.03 | 0.59 | 0.10 | 1.95 |
| 192.93 | 11.74 | 5.12 | 0.41 | 0.36 | 2.36 |
| 194.06 | 20.60 | 3.99 | 0.69 | 1.15 | 5.23 |
| 196.60 | 13.87 | 5.44 | 0.36 | 0.41 | 2.43 |
| 201.80 | 4.72 | 3.46 | 0.18 | 0.08 | 1.49 |
| 203.95 | 4.59 | 3.94 | 0.12 | 0.08 | 1.37 |
| 205.76 | 5.81 | 5.27 | 0.13 | 0.09 | 1.12 |
| 208.00 | 2.50 | 4.95 | 0.30 | 0.04 | 0.54 |
| 211.38 | 2.88 | 1.94 | 1.16 | 0.10 | 1.62 |
| 213.37 | 0.77 | 5.77 | 0.37 | 0.04 | 0.20 |
| 215.40 | 2.90 | 4.34 | 0.26 | 0.07 | 0.73 |
| 217.79 | 4.85 | 2.37 | 0.55 | 0.15 | 2.21 |
| 221.05 | 6.56 | 4.72 | 0.58 | 0.44 | 1.43 |
| 221.87 | 8.69 | 2.52 | 0.50 | 0.39 | 3.50 |
| 223.87 | 6.71 | 4.05 | 0.26 | 0.17 | 1.68 |
| 225.71 | 6.95 | 3.13 | 0.40 | 0.15 | 2.27 |
| 228.69 | 4.59 | 3.89 | 0.29 | 0.14 | 1.23 |
| 230.38 | 2.94 | 2.23 | 0.25 | 0.07 | 1.57 |
| 232.77 | 2.14 | 2.10 | 0.18 | 0.04 | 1.03 |
| 235.93 | 0.94 | 1.29 | 0.64 | 0.04 | 1.05 |
| 237.41 | 1.83 | 2.57 | 0.48 | 0.06 | 0.85 |
| 240.48 | 1.12 | 1.29 | 0.32 | 0.03 | 0.96 |
| 243.76 | 1.59 | 1.70 | 0.22 | 0.04 | 1.09 |
| 246.20 | 0.94 | 1.50 | 0.26 | 0.03 | 0.82 |
| 248.46 | 1.99 | 1.60 | 0.20 | 0.04 | 1.43 |
| 250.92 | 2.08 | 1.52 | 0.51 | 0.06 | 1.55 |
| 253.16 | 2.28 | 2.30 | 0.42 | 0.08 | 1.13 |
| 255.41 | 1.90 | 1.78 | 0.29 | 0.03 | 1.22 |
| 258.37 | 1.04 | 2.19 | 0.25 | 0.03 | 0.61 |
| 260.64 | 1.06 | 1.53 | 0.63 | 0.06 | 0.92 |
| 262.56 | 3.04 | 3.69 | 0.24 | 0.06 | 0.85 |
| 264.79 | 2.61 | 2.32 | 0.37 | 0.10 | 1.15 |
| 267.68 | 1.12 | 1.63 | 0.60 | 0.04 | 0.89 |
| 270.05 | 1.55 | 2.95 | 0.28 | 0.04 | 0.57 |

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|--------|------|------|------|------|------|
| 272.59 | 1.63 | 2.26 | 0.15 | 0.02 | 0.84 |
| 274.93 | 1.66 | 2.49 | 0.25 | 0.03 | 0.69 |
| 276.90 | 1.35 | 1.21 | 0.26 | 0.02 | 1.21 |
| 279.34 | 0.52 | 1.13 | 0.45 | 0.01 | 0.77 |
| 280.42 | 0.48 | 0.99 | 0.33 | 0.02 | 0.86 |
| 282.84 | 0.47 | 1.47 | 0.16 | 0.01 | 0.66 |
| 285.15 | 1.46 | 1.73 | 0.31 | 0.03 | 0.97 |
| 287.44 | 1.78 | 2.05 | 0.18 | 0.03 | 1.10 |
| 289.78 | 0.89 | 1.29 | 0.36 | 0.03 | 0.97 |
| 292.04 | 1.58 | 2.77 | 0.48 | 0.06 | 0.74 |
| 294.37 | 1.11 | 1.21 | 2.19 | 0.05 | 1.15 |
| 297.80 | 1.51 | 2.70 | 0.36 | 0.04 | 0.67 |
| 300.25 | 0.93 | 1.81 | 0.97 | 0.03 | 0.71 |
| 302.68 | 1.14 | 2.35 | 0.16 | 0.02 | 0.64 |
| 303.65 | 1.23 | 1.99 | 0.18 | 0.02 | 0.80 |
| 305.78 | 0.84 | 0.98 | 0.81 | 0.03 | 1.57 |

* Long term reproducibility of USGS SRM SDO-1 ($\pm 0.09\%$ (2SD), n=28). Internal a of sample repeats are within the long-term reproducibility of SDO-1 for all presentec

| ⁹⁸ Mo _{NIST3134} (‰) | 2SD* |
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|------|------|
| 0.42 | 0.09 |
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| 0.50 | 0.09 |
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| 1.04 | 0.09 |
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| 0.38 | 0.09 |
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| 0.28 | 0.09 |
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| 0.38 | 0.09 |
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| 0.52 | 0.09 |
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| 0.13 | 0.09 |
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| 0.36 | 0.09 |
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| 0.04 | 0.09 |
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| 0.38 | 0.09 |
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| 0.65 | 0.09 |
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| 0.36 | 0.09 |
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| 0.65 | 0.09 |
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| 0.63 | 0.09 |
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| 0.55 | 0.09 |
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| 0.62 | 0.09 |
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|------|------|
| 0.47 | 0.09 |
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|------|------|
| 0.50 | 0.09 |
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|------|------|
| 0.45 | 0.09 |
|------|------|

0.65 0.09

0.70 0.09

0.40 0.09

0.52 0.09

0.72 0.09

0.70 0.09

0.13 0.09

0.14 0.09

0.33 0.09

-0.44 0.09

0.22 0.09

0.18 0.09

-0.05 0.09

-0.09 0.09

0.08 0.09

nd external errors
d samples.