



Fig. X Obliquity signals in tuned SiO_2/CaO (a, d), $\text{TiO}_2/\text{Al}_2\text{O}_3$ (b, e) and $\text{K}_2\text{O}/\text{Al}_2\text{O}_3$ (c, f) records. Panels a-c show the MTM power spectrum (tbw = 2) with the obliquity (o) interval (0.025-0.035) shaded in yellow. Other astronomical parameters (405 kyr eccentricity, 100 kyr eccentricity, precession) are shaded in grey. d-f show the respective proxy record (black), filtered obliquity (orange), and the Hilbert transform of filtered obliquity (red). MTM-inferred periodicities of this Hilbert transform are noted in red. Identified cycles are marked with grey arrows. On the left of panel d, a 173 kyr sine wave is plotted (arbitrary x-axis) and its cycles are marked with white and grey bands.