Supplementary Information (SI) for Journal of Analytical Atomic Spectrometry.

Cat–87 clinopyroxene: a new reference material for oxygen isotope microanalysis, with applicability tested across a range of Ca–Mg–Fe clinopyroxene compositions

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Supplementary Figures

This file includes: Figures S1–S11

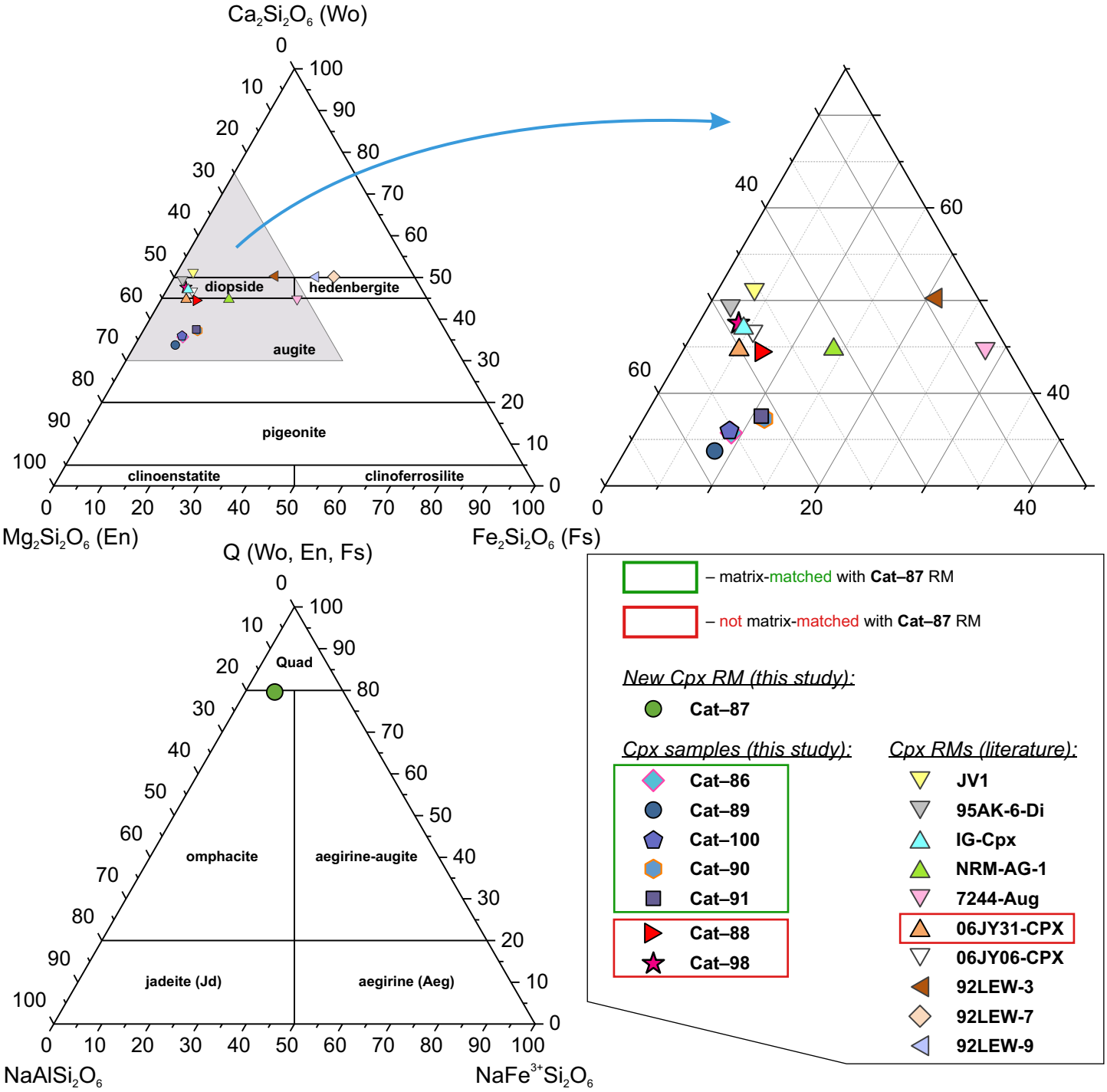

Figure S1. Classification diagrams for pyroxenes showing the average compositions of clinopyroxene (Cpx) samples from the Catoca kimberlite pipe (Fig. S2), together with previously published Cpx reference materials (RMs) used for O isotope microanalysis (references listed in Table 1). Pyroxene classification follows Morimoto[10] and chemical component calculations were performed using PX-NOM (Sturm[22]). Quad represents Ca-Mg-Fe pyroxenes.

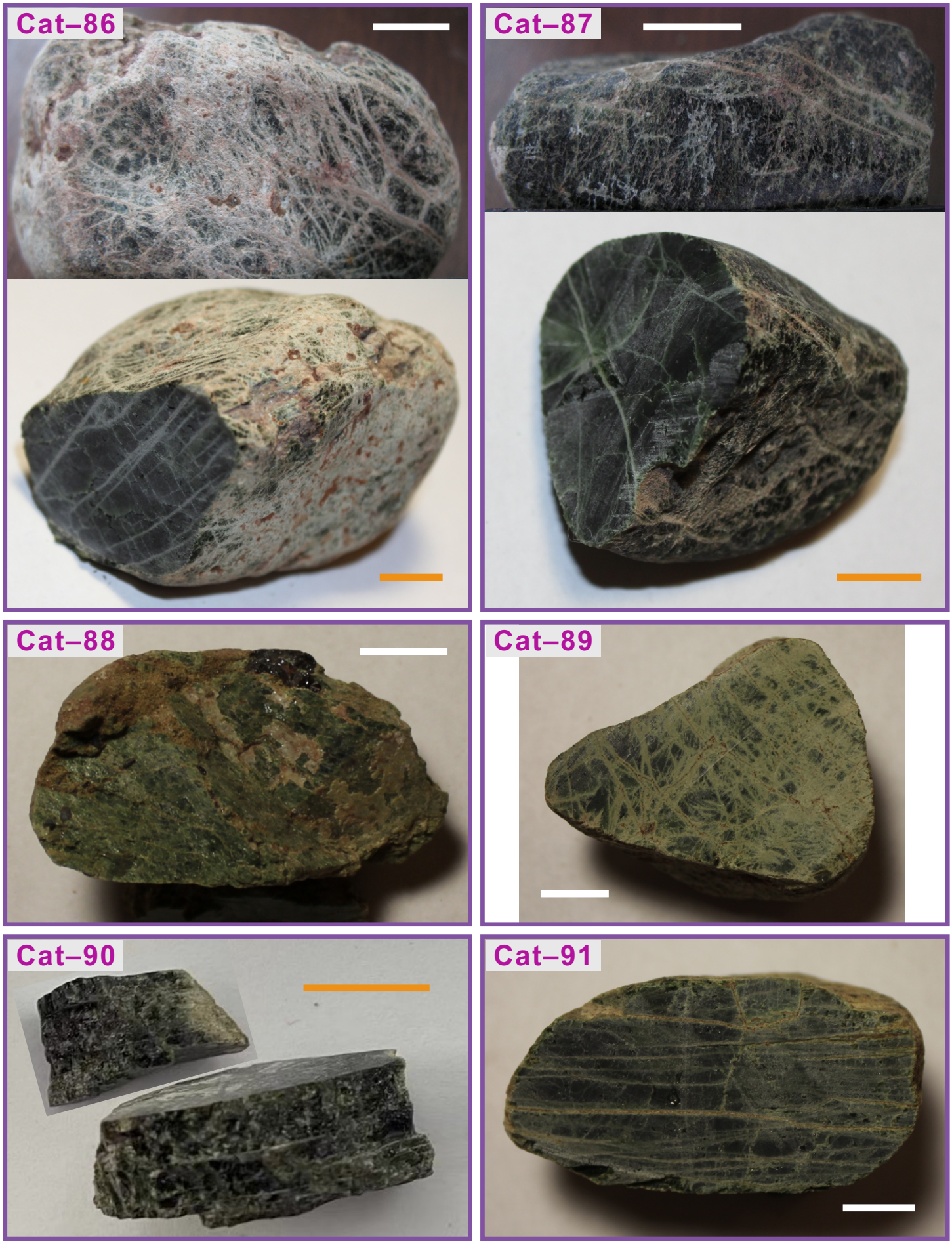

Figure S2. Photographs of clinopyroxene megacrysts and the Cat–98 xenolith from the Catoca kimberlite pipe. Scale bars represent 1 cm.

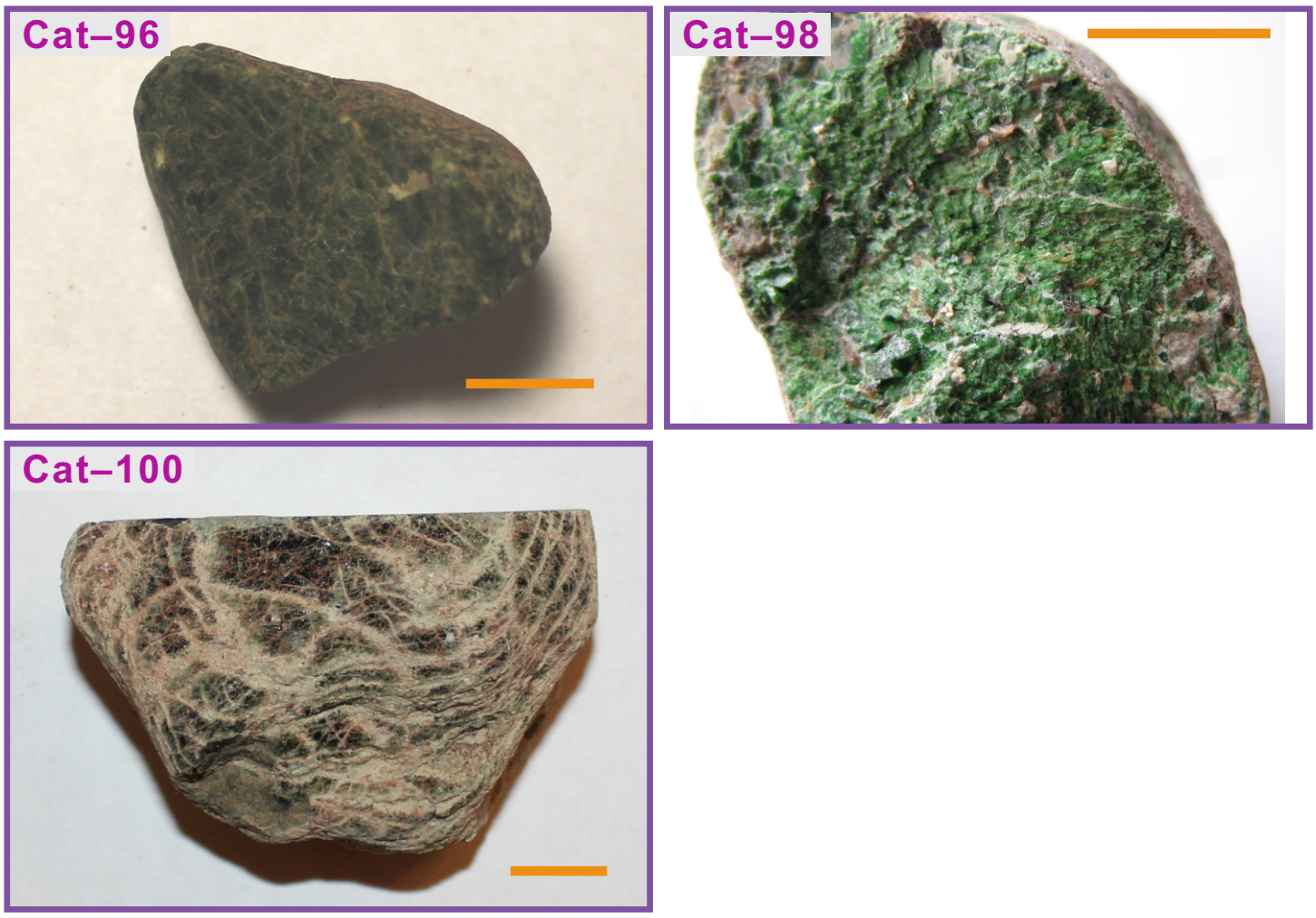

Figure S2. Continued.

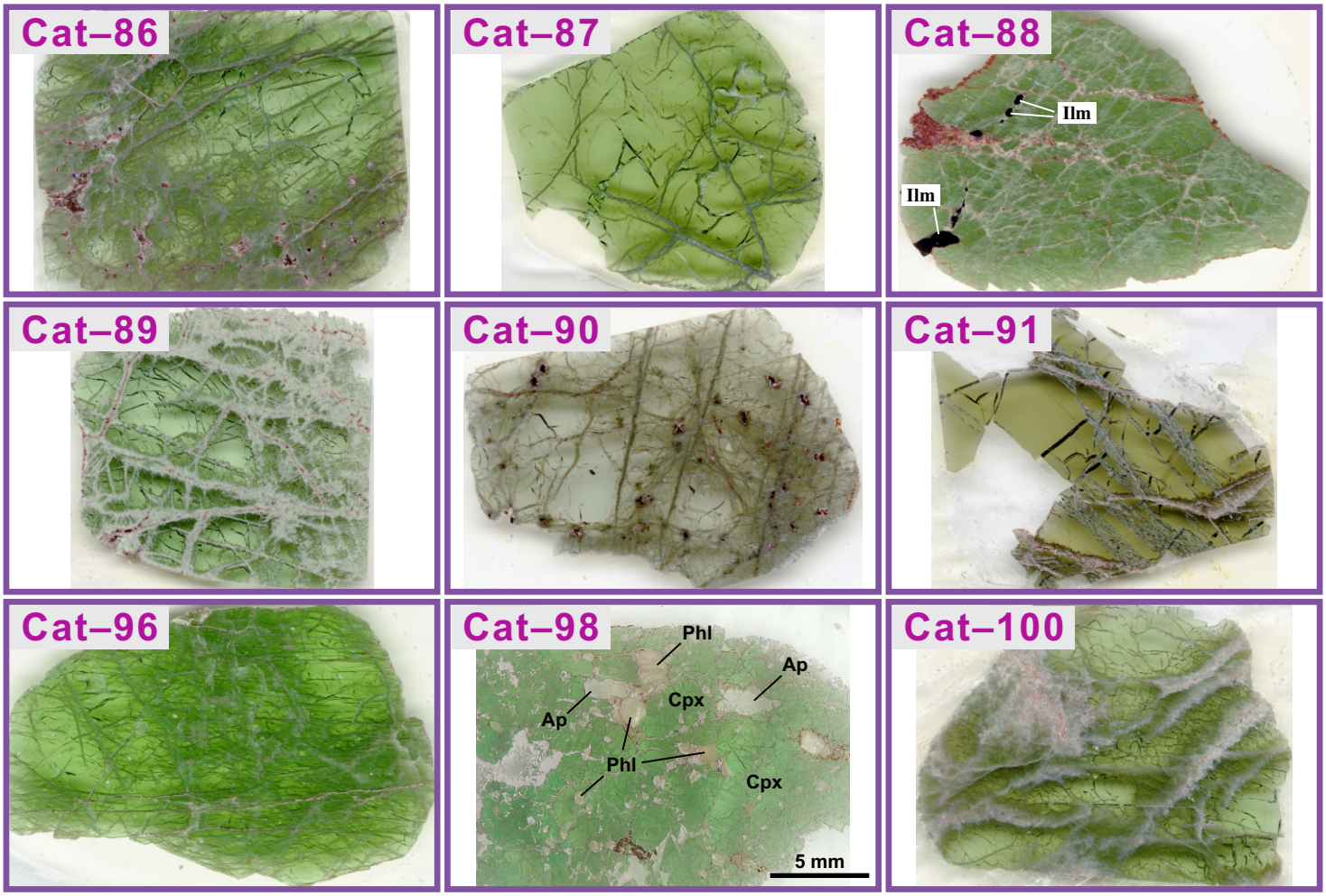

Figure S3. Thin sections of clinopyroxene megacrysts and the Cat–98 xenolith from the Catoca kimberlite pipe. The longest dimensions of the clinopyroxene megacryst sections range from 2.5 to 4 cm. Ap = apatite; Cpx = clinopyroxene; Phl = phlogopite; Ilm = ilmenite.

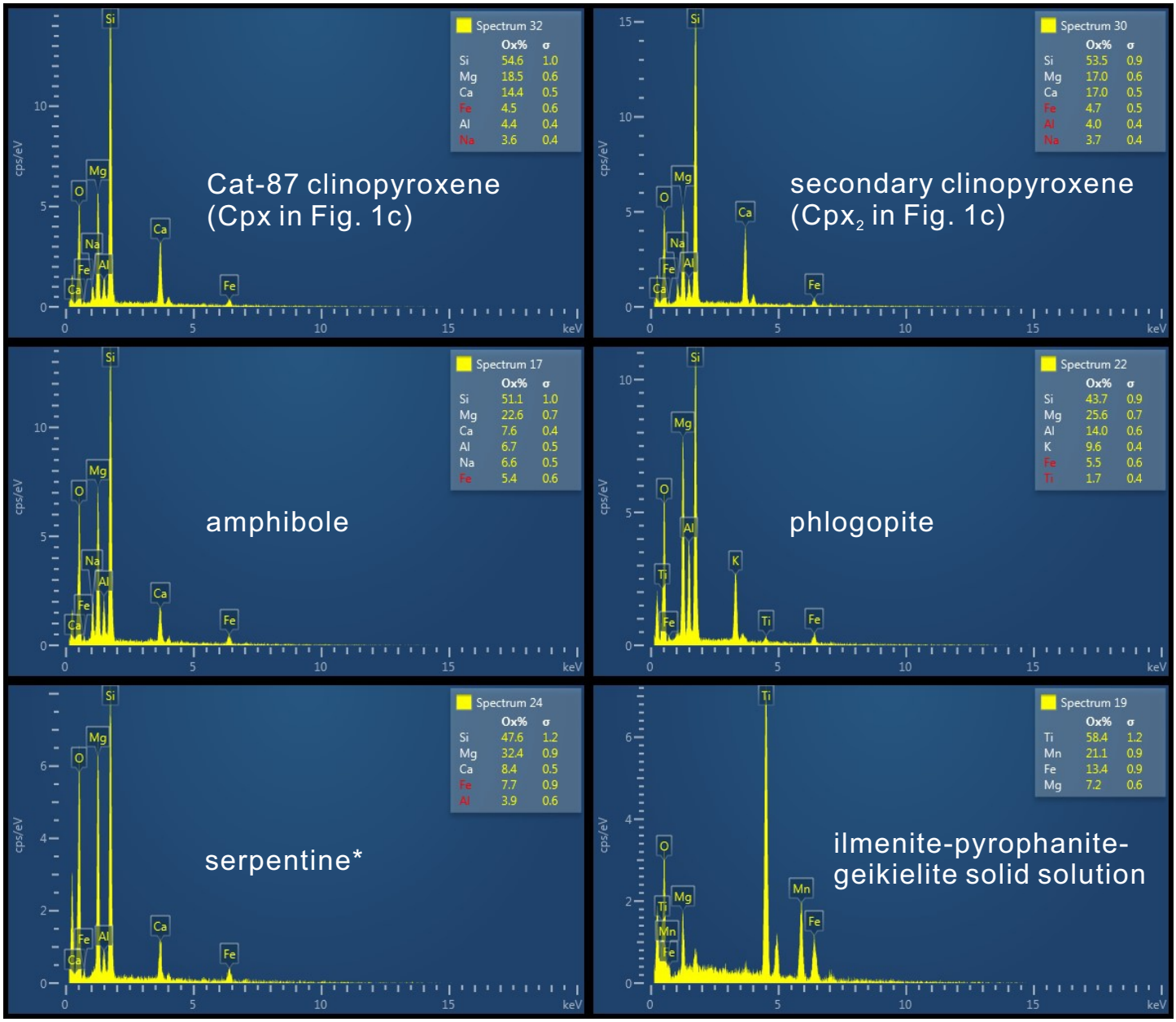

Figure S4. Representative EDS spectra for secondary minerals and the host Cat–87 clinopyroxene. *The Ca peaks observed in the EDS spectrum of serpentine are due to the presence of clinopyroxene at the analyzed sites.

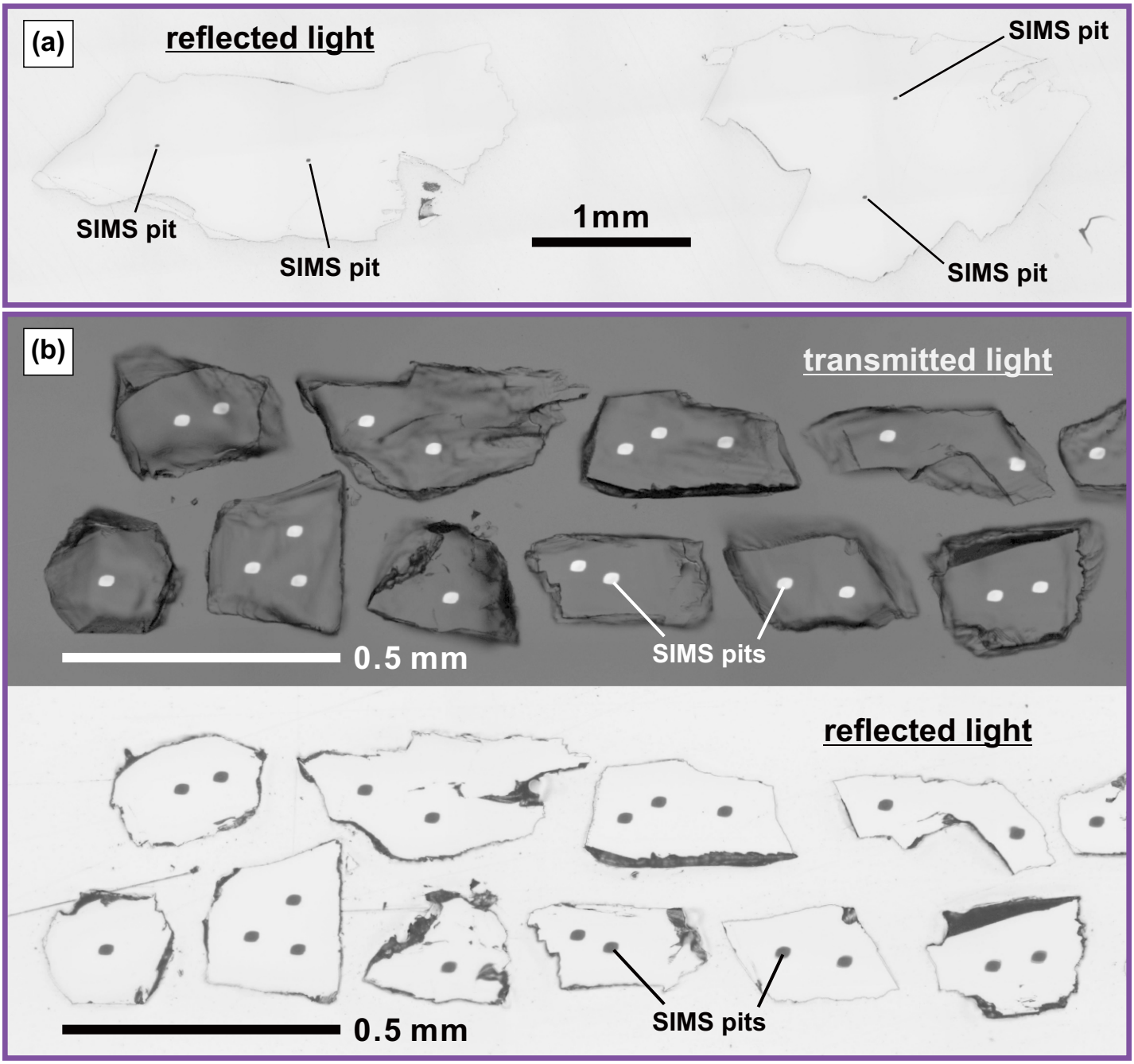

Figure S5. Transmitted and reflected light microphotographs of representative Cat–87 clinopyroxene fragments. (**a**) Selected fragments from mount A6573 analyzed for O isotopes and chemical composition. (**b**) Selected fragments from mount A6585 analyzed for O isotopes and chemical composition. All microphotographs were taken on gold-coated mounts after SIMS O isotope analysis; thus, SIMS pits are visible in all fragments shown in panels (**a**) and (**b**).

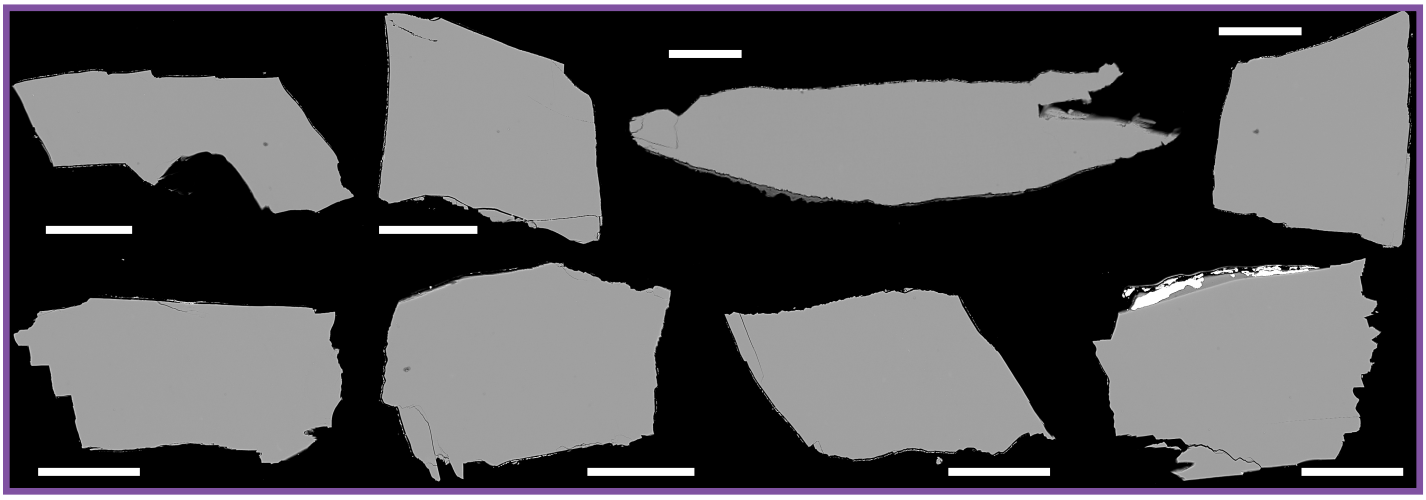

Figure S6. BSE images of representative Cat–87 clinopyroxene fragments in mount A6585. Scale bars represent 100 μm.

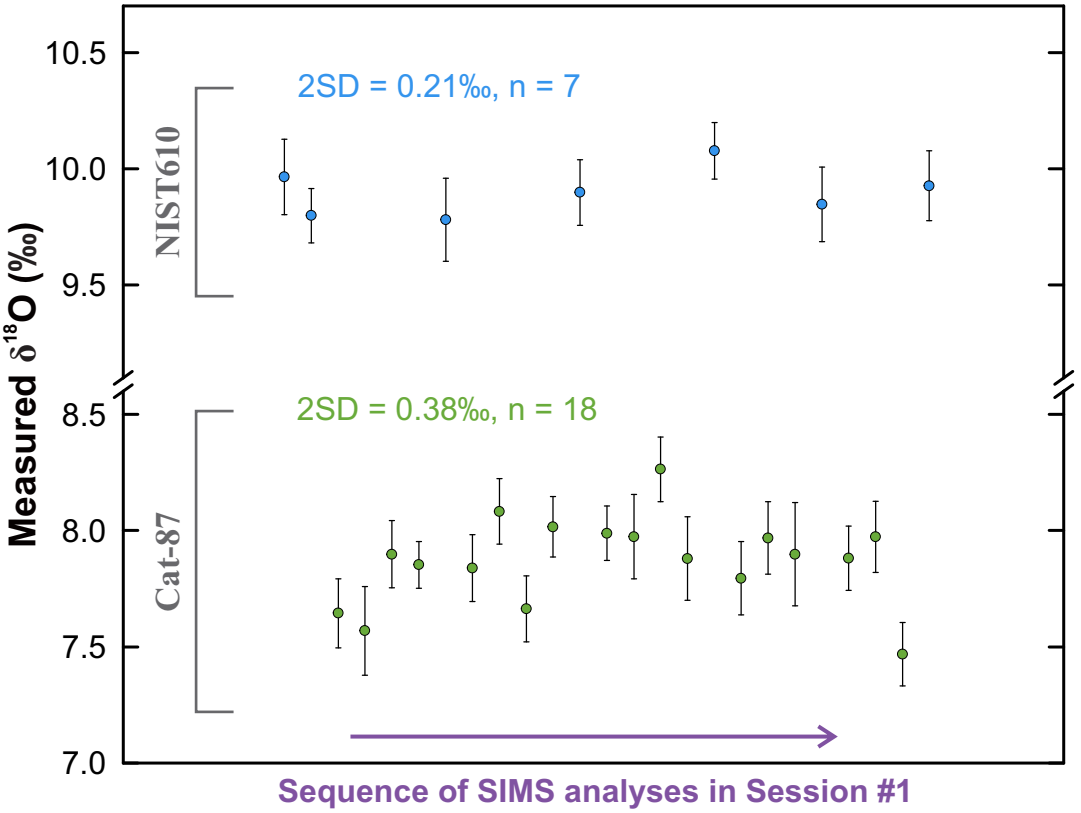

Figure S7. Temporal distribution plots of SIMS oxygen isotope analyses for Cat–87 clinopyroxene and NIST SRM 610 reference material in Session #1. Error bars represent ±2SE.

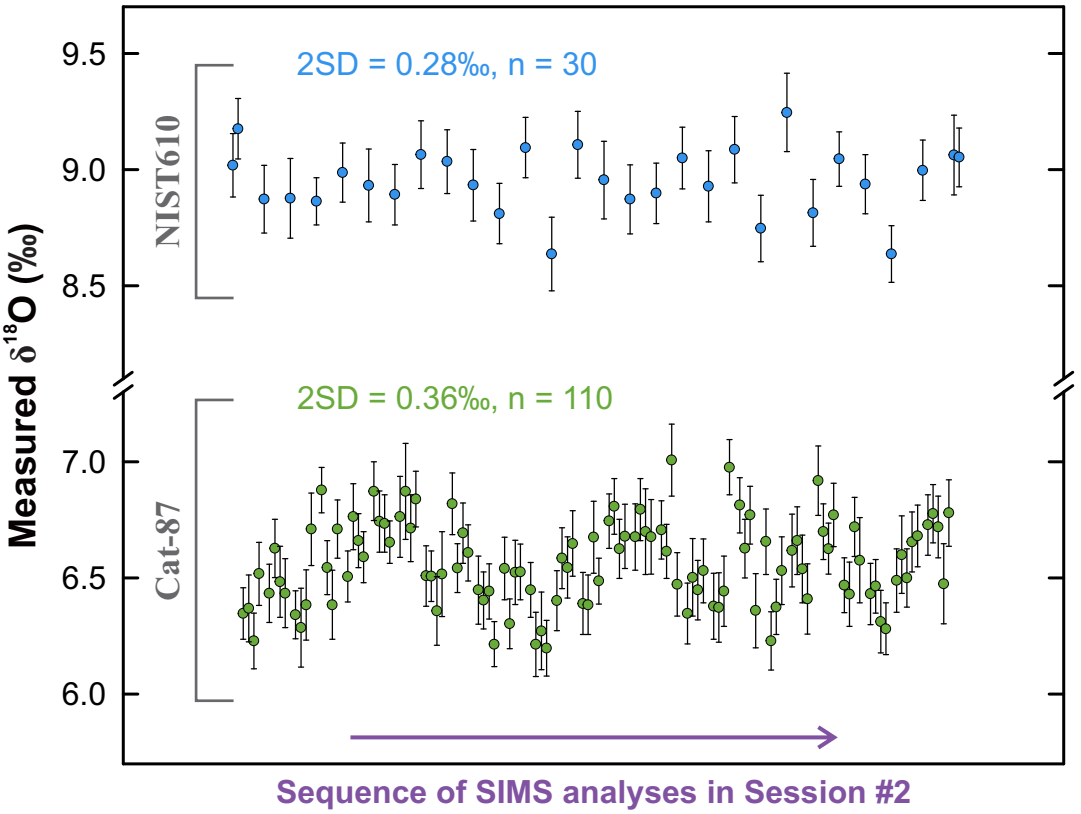

Figure S8. Temporal distribution plots of SIMS oxygen isotope analyses for Cat–87 clinopyroxene and NIST SRM 610 reference material in Session #2. Error bars represent ±2SE.

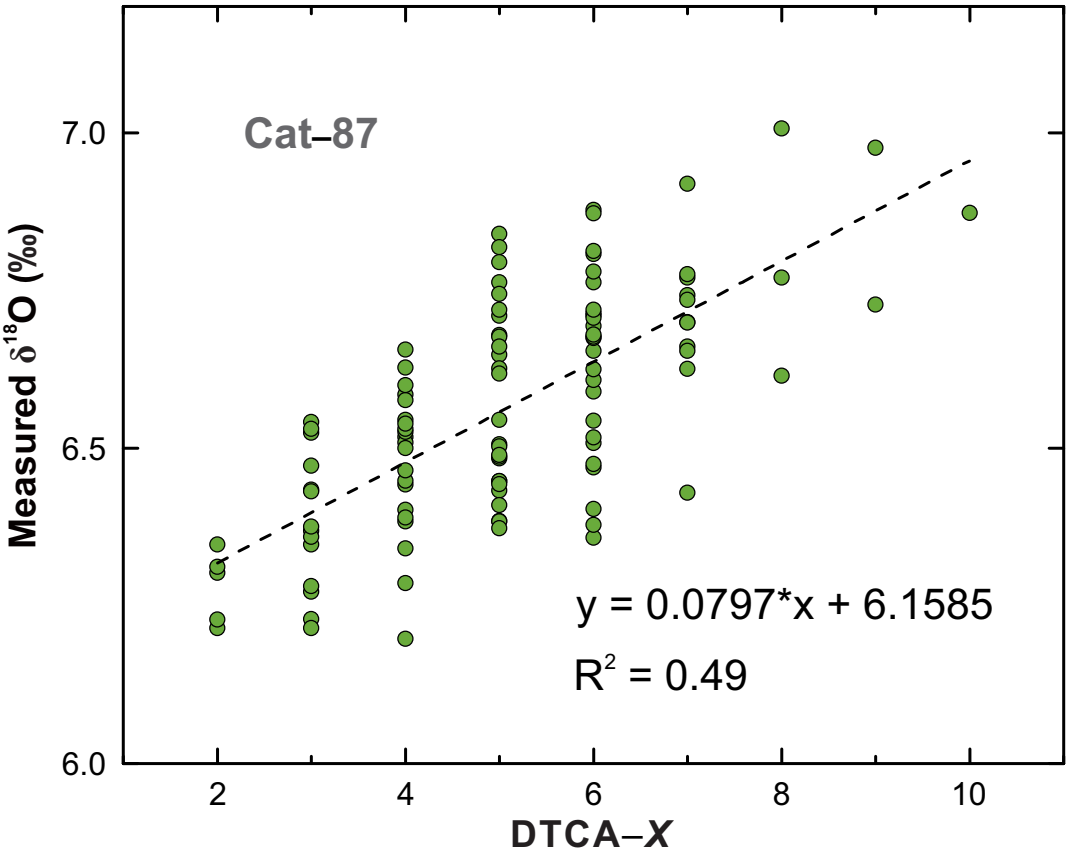

Figure S9. Relationship between DTCA–*X* and measured $\delta^{18}O$ for Cat–87 clinopyroxene in Session #2.

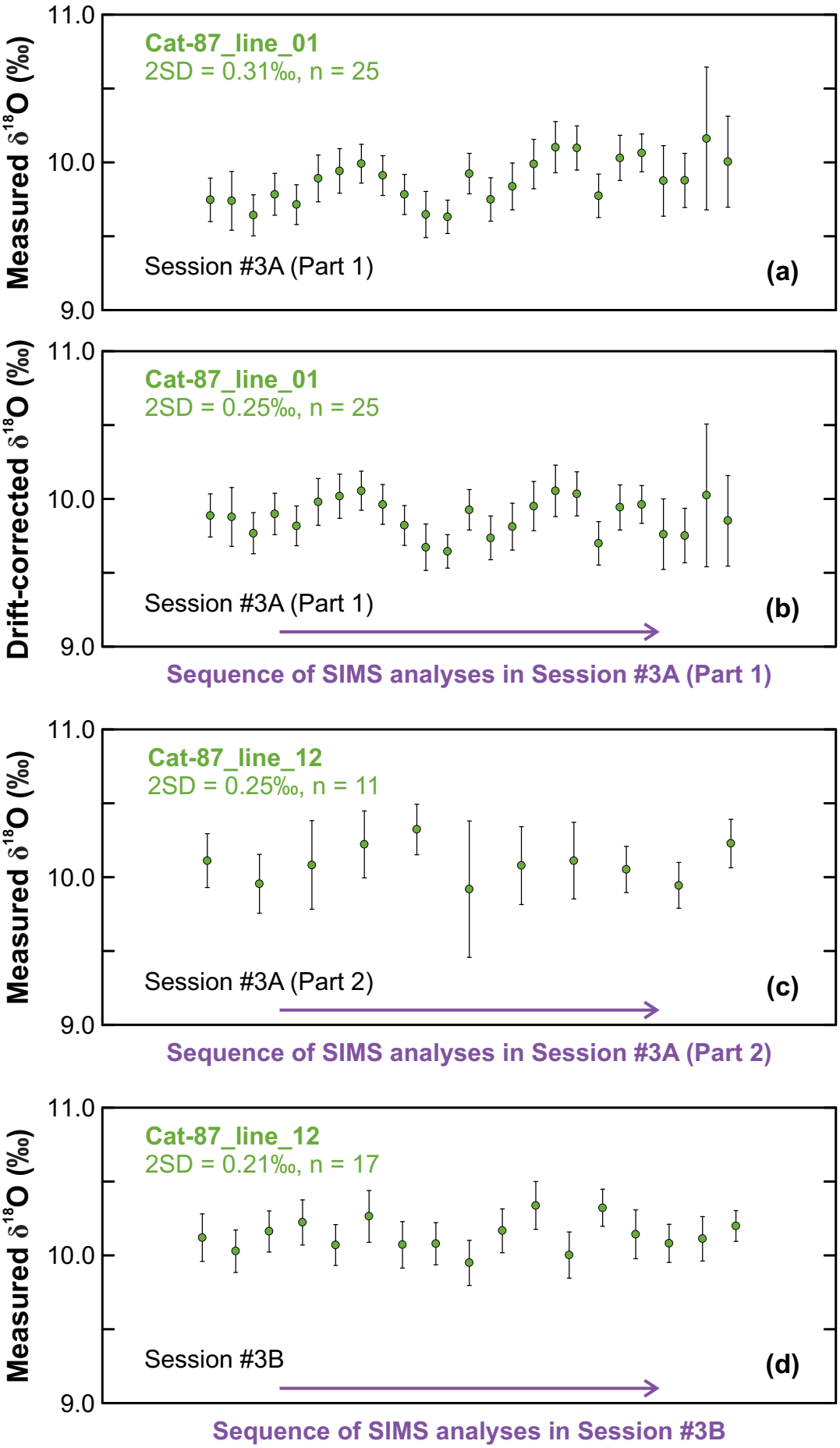

Figure S10. Temporal distribution plots of SIMS oxygen isotope analyses for Cat–87 clinopyroxene in Session #3A (**a**–**c**) and Session #3B (**d**). Error bars represent ±2SE.

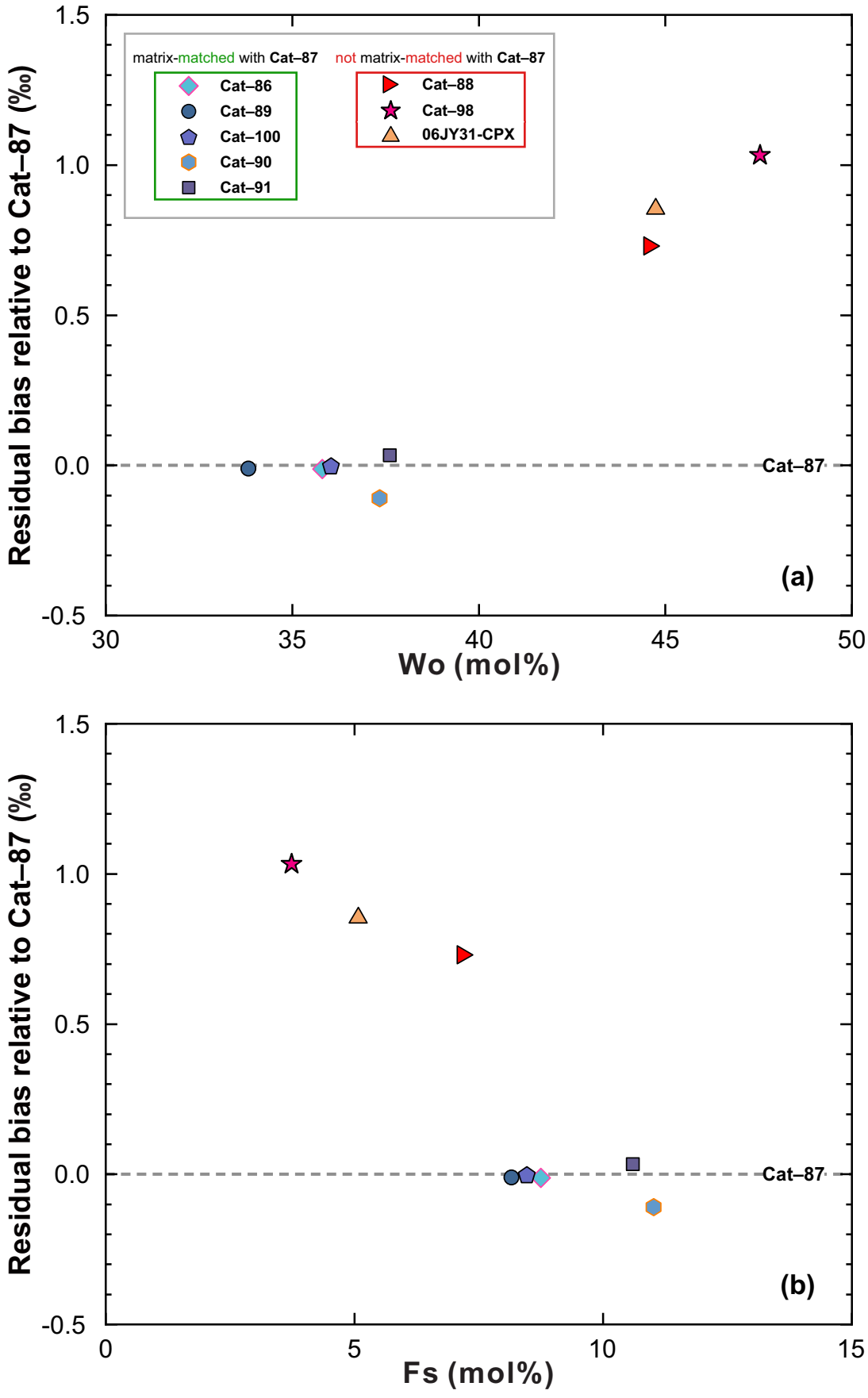

Figure S11. Relationship between residual bias (relative to Cat–87) and Wo (**a**) or Fs (**b**) content for the analyzed clinopyroxene samples (Section 4.4.2).