



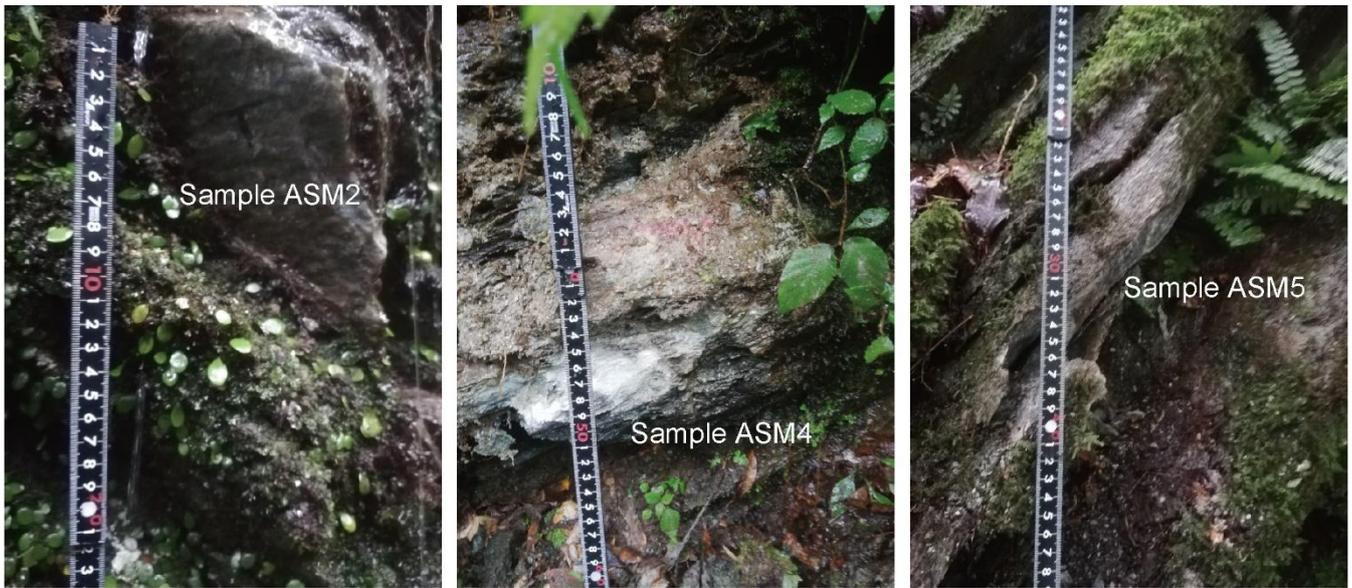
*Supplement of*

## **Subduction plate interface shear stress associated with rapid subduction at deep slow earthquake depths: example from the Sanbagawa belt, southwestern Japan**

**Yukinojo Koyama et al.**

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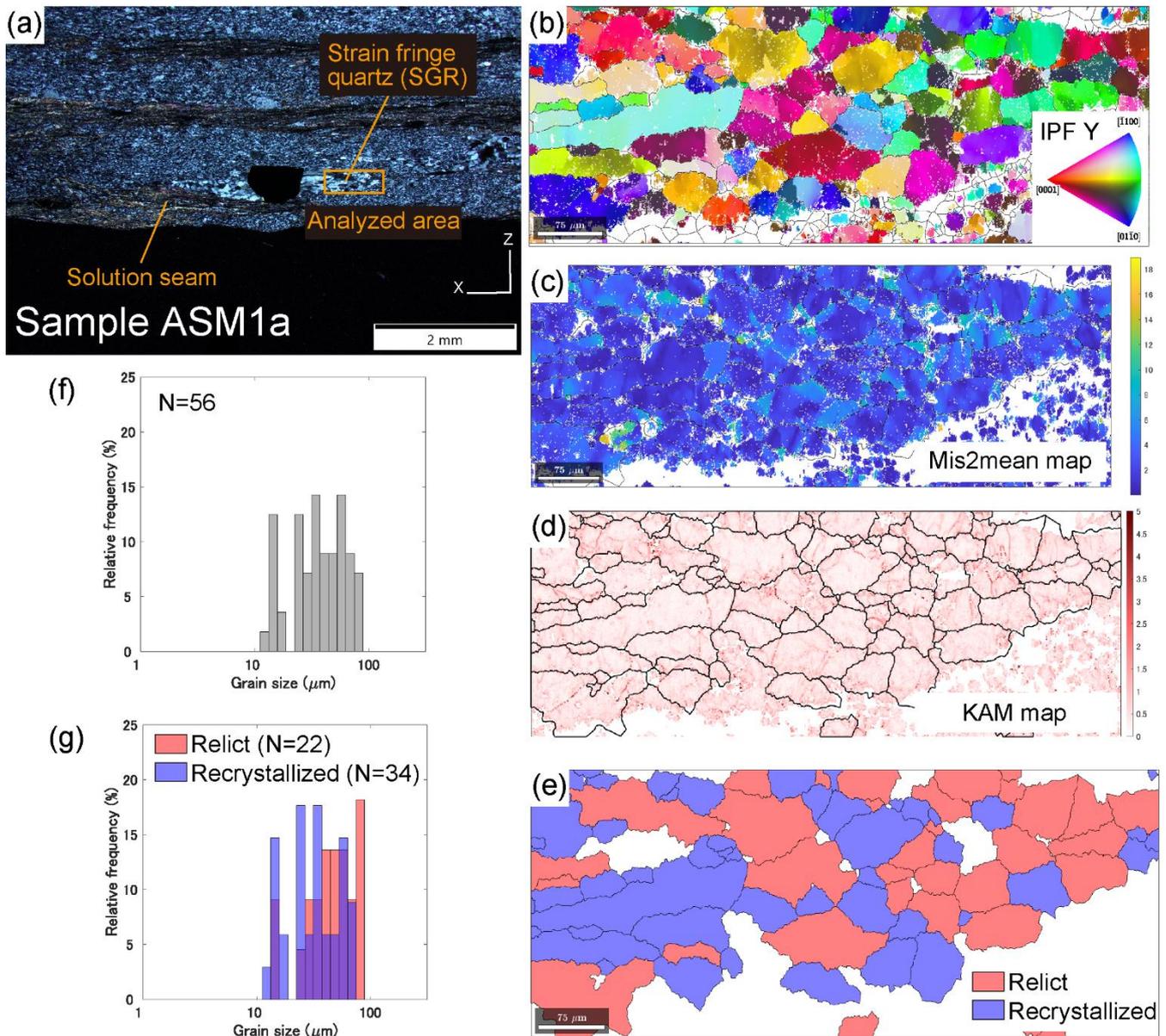
**Figure S1: Photographs of outcrops at sampling sites ASM2, ASM4 and ASM5. The surrounding area is covered by vegetation. Sample ASM3 was collected a few metres away from sample ASM4.**

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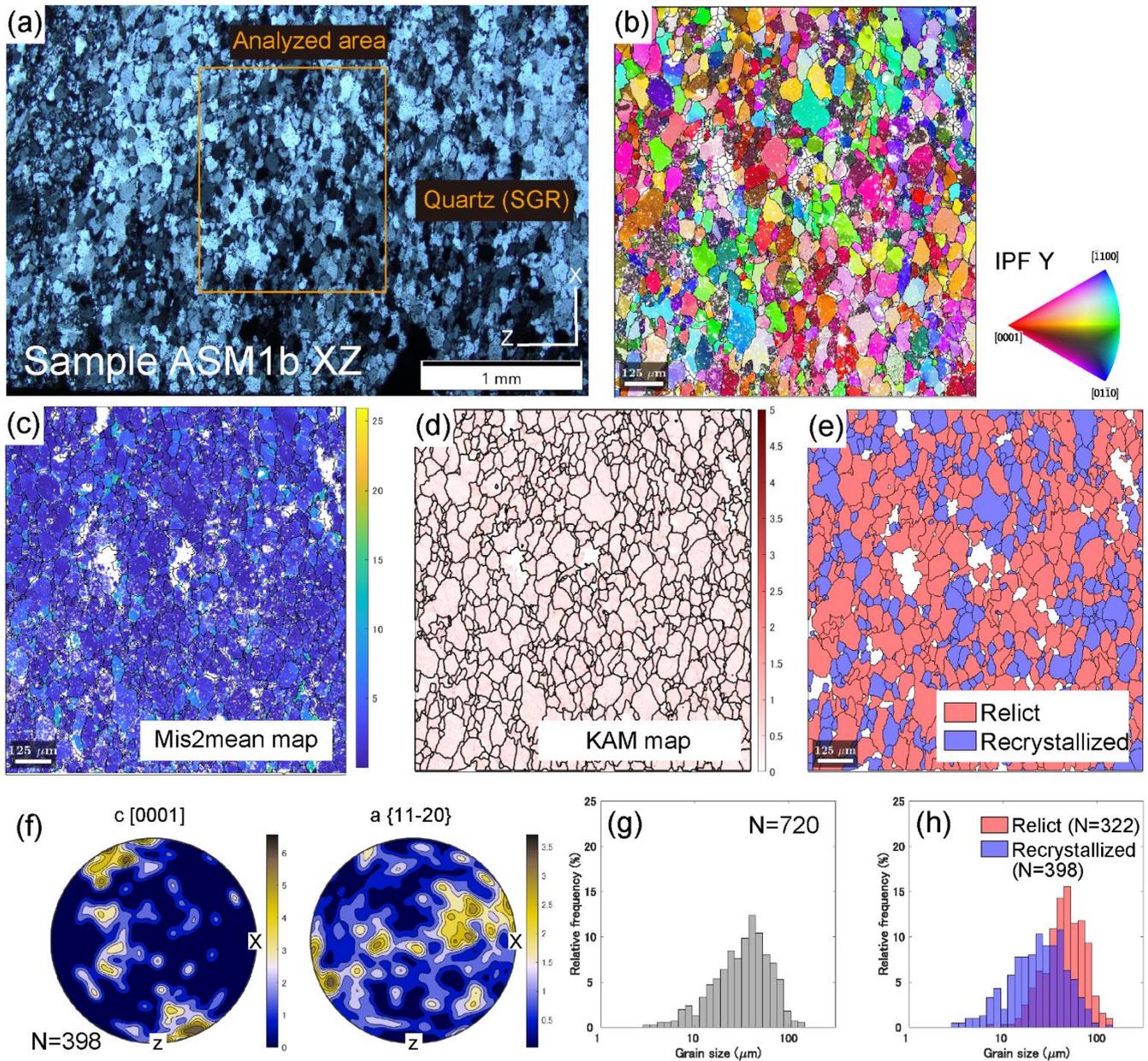
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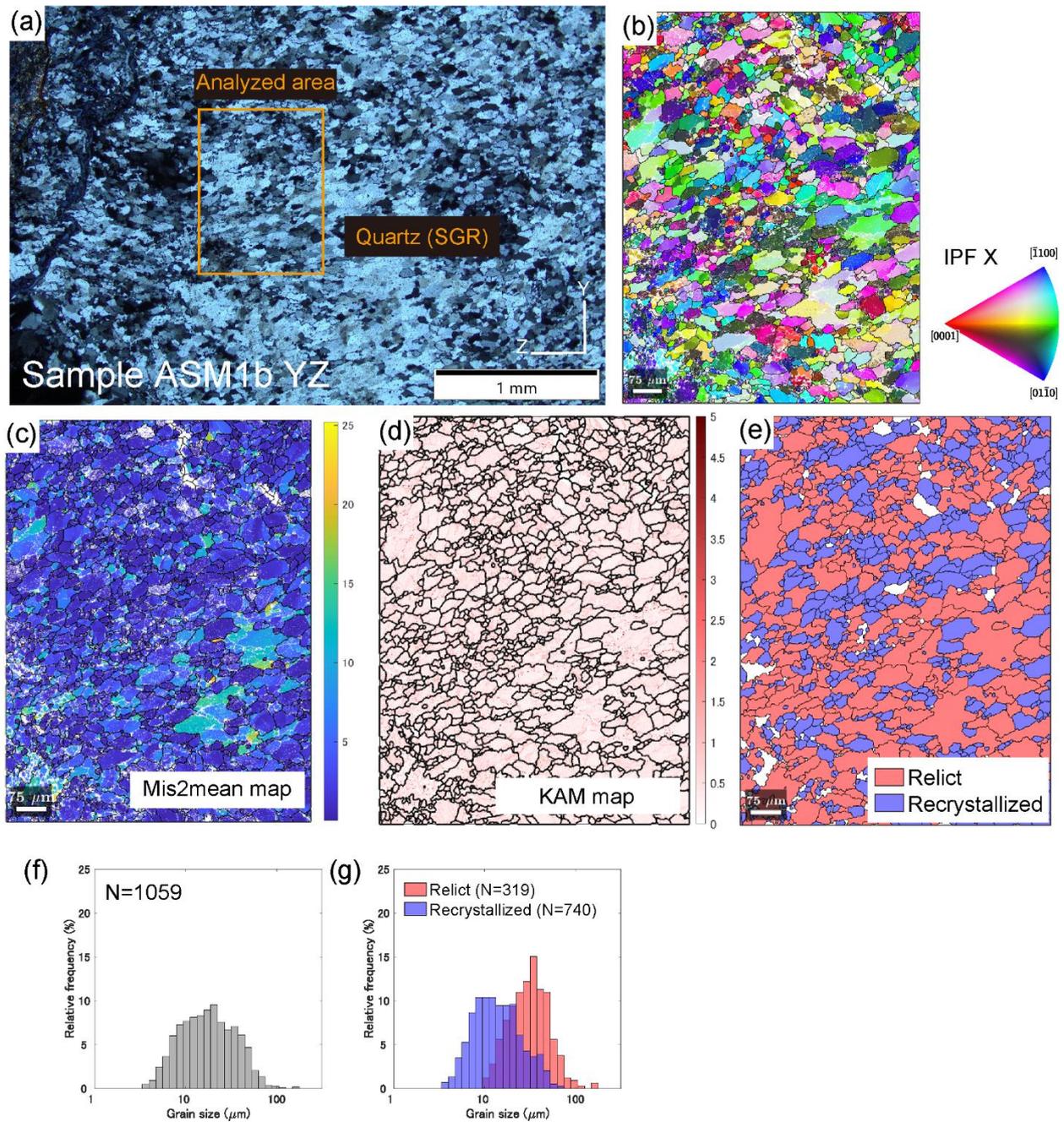
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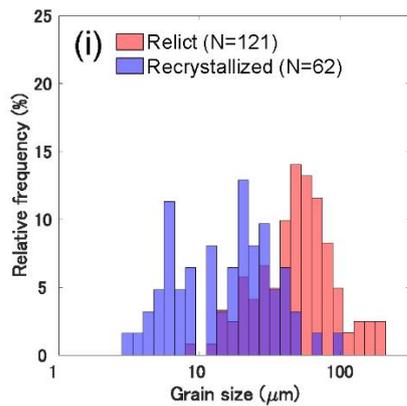
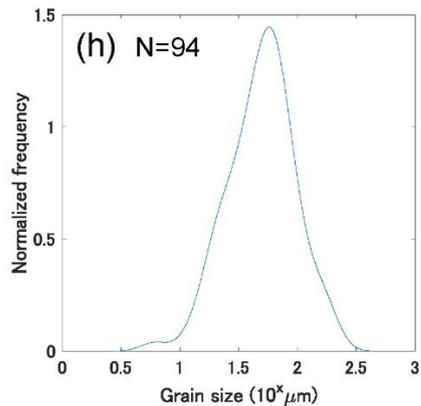
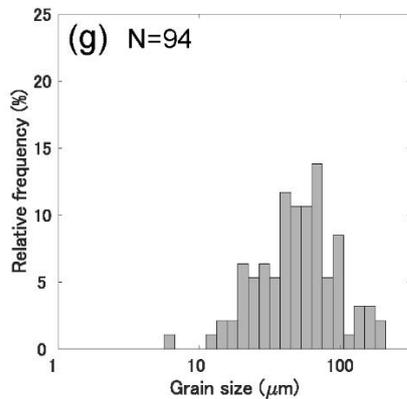
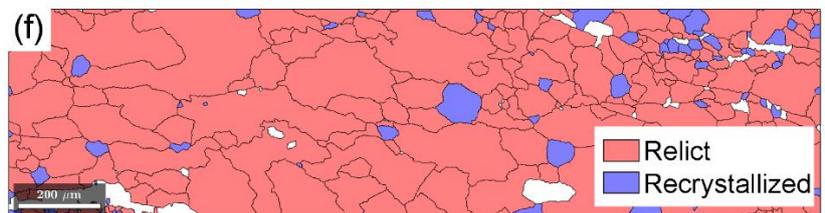
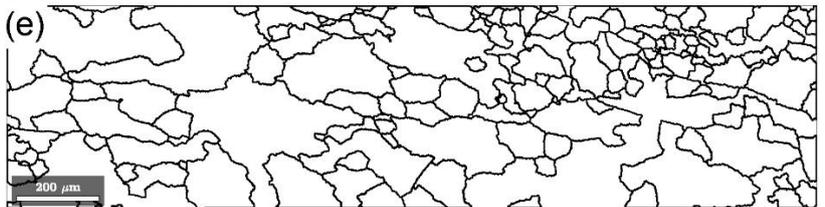
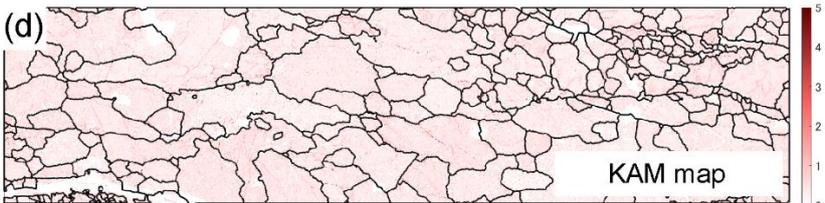
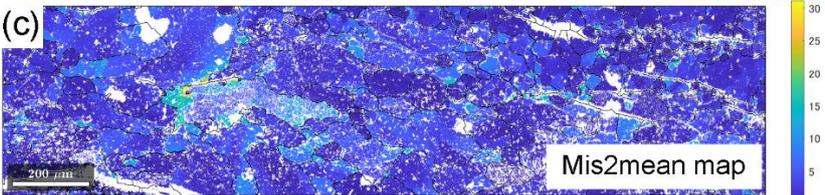
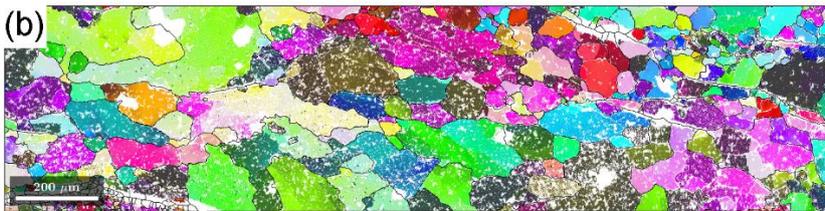
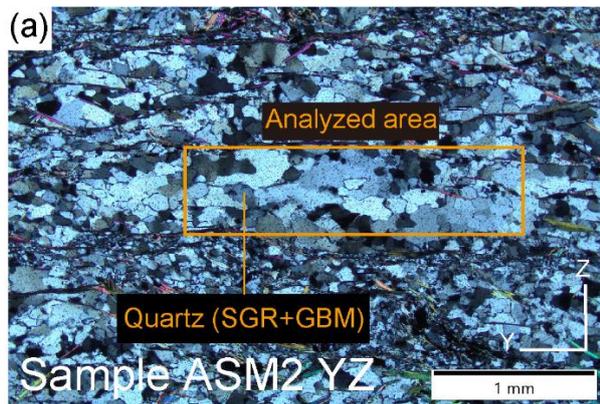
25 **Figure S2: Sample ASM1a. (a) Polarising microscope image (crossed nicols) and (b) inverse pole figure (IPF) map. Quartz grains exhibit wavy extinction, indicating deformation by dislocation creep. Both (c) mis2mean map and (d) kernel average misorientation (KAM) map show large grains that were recrystallized into multiple finer subgrains. These microstructural characteristics indicate dynamic recrystallization by SGR. (e) Grain boundary map for the piezometer of Cross et al. (2017). (f) (g) Grain size histogram for the piezometer of Cross et al. (2017).**



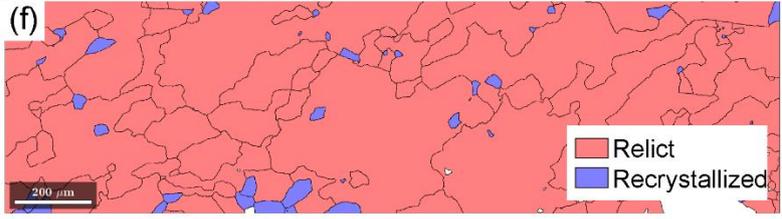
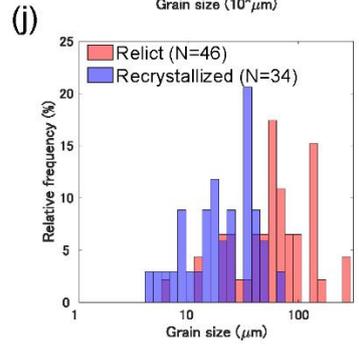
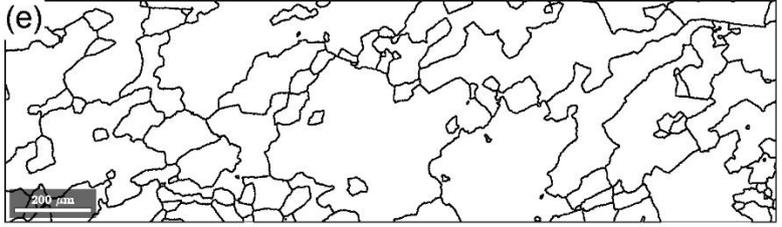
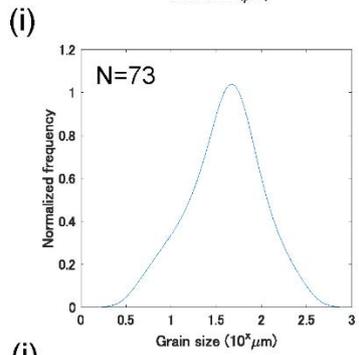
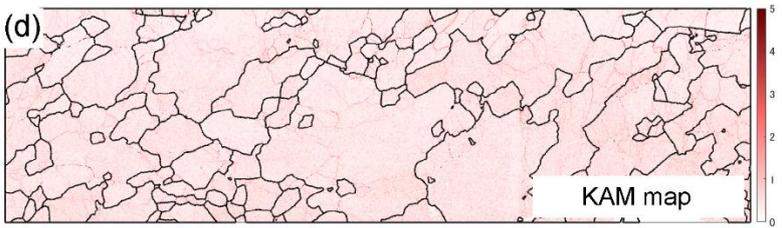
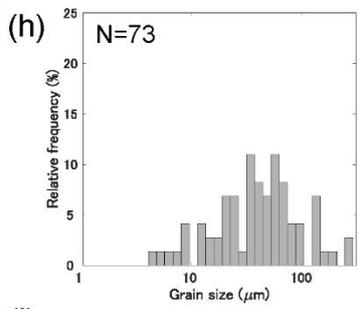
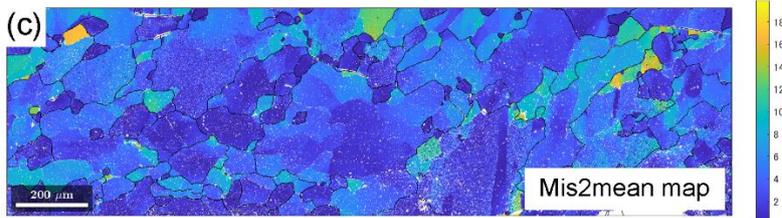
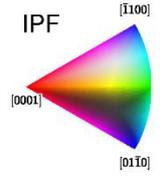
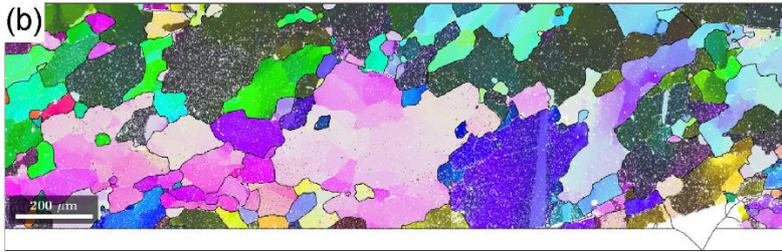
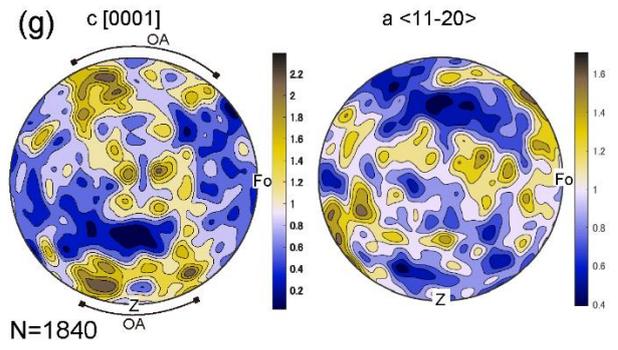
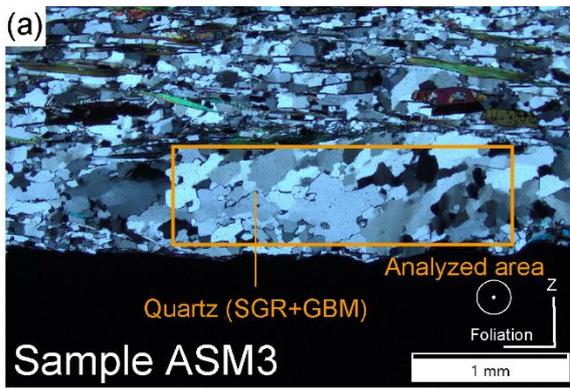
30 Figure S3: Sample ASM1b XZ. (a) Polarising microscope image (crossed nicols) and (b) inverse pole figure (IPF) map. Quartz grains exhibit wavy extinction, indicating deformation by dislocation creep. Both (c) mis2mean map and (d) kernel average misorientation (KAM) map show large grains that were recrystallized into multiple finer subgrains. These microstructural characteristics indicate dynamic recrystallization by SGR. (e) Grain boundary map for the piezometer of Cross et al. (2017). (f) Crystallographic orientations. (g) (h) Grain size histogram for the piezometer of  
 35 Cross et al. (2017).



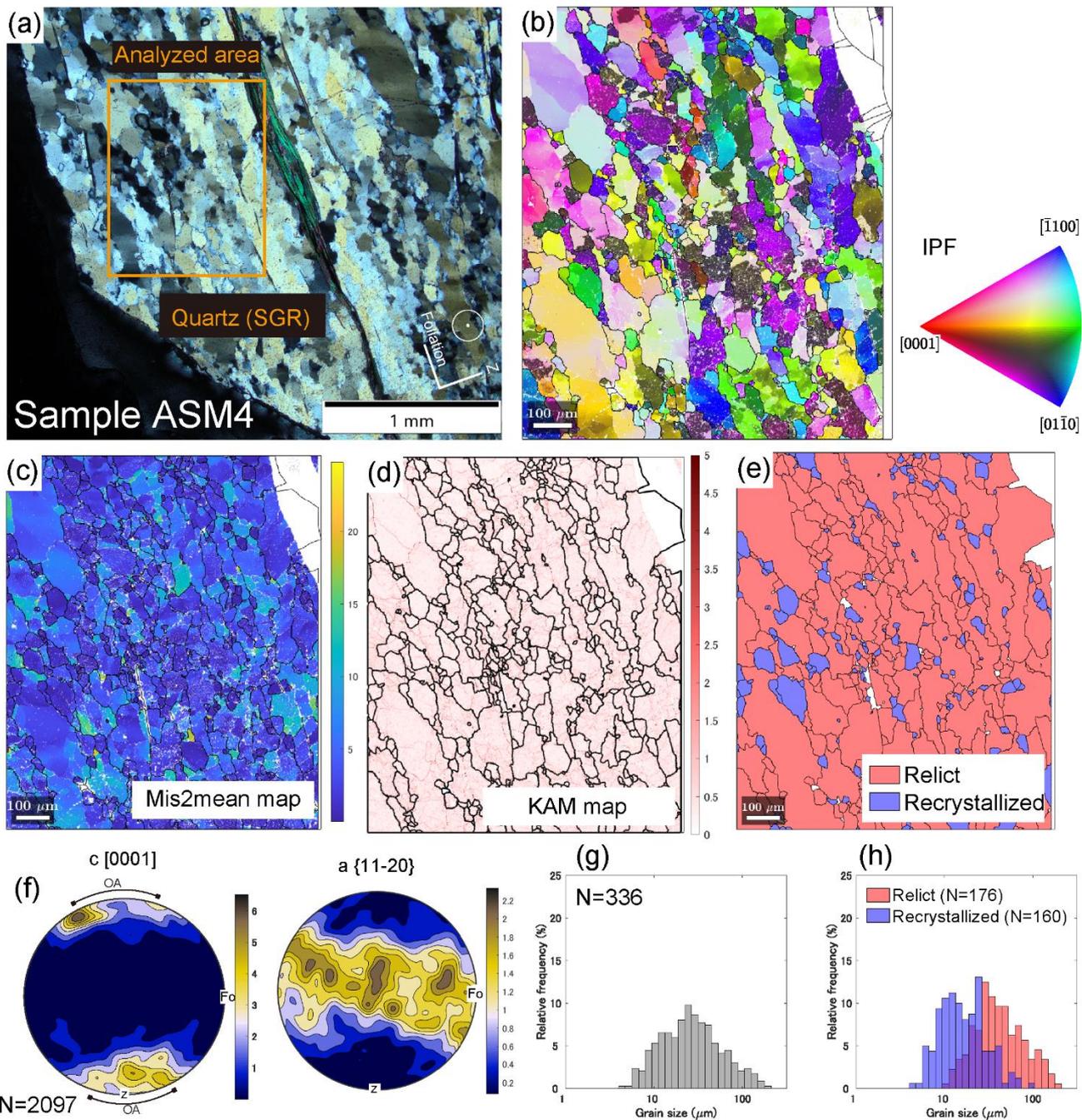
40 **Figure S4: Sample ASM1b YZ. (a) Polarising microscope image (crossed nicols) and (b) inverse pole figure (IPF) map. Quartz grains exhibit wavy extinction, indicating deformation by dislocation creep. Both (c) mis2mean map and (d) kernel average misorientation (KAM) map show large grains that were recrystallized into multiple finer subgrains. These microstructural characteristics indicate dynamic recrystallization by SGR. (e) Grain boundary map for the piezometer of Cross et al. (2017). (f) (g) Grain size histogram for the piezometer of Cross et al. (2017).**



45 **Figure S5: Sample ASM2 YZ. (a) Polarising microscope image (crossed nicols) and (b) inverse pole figure (IPF) map. Quartz grains exhibit wavy extinction, amoeboid grain boundaries, and irregular grain sizes. Both (c) mis2mean map and (d) kernel average misorientation (KAM) map show large grains that were recrystallized into multiple finer subgrains. These microstructural characteristics indicate dynamic recrystallization by GBM (SGR+GBM). (e) Grain boundary map for the piezometer of Shimizu (2012). (f) Grain boundary map for the piezometer of Cross et al. (2017). (g) Grain size histogram and (h) probability distribution for the piezometer of Shimizu (2012). (i) Grain size histogram for the piezometer of Cross et al. (2017).**

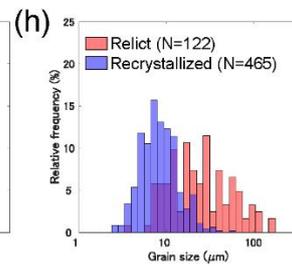
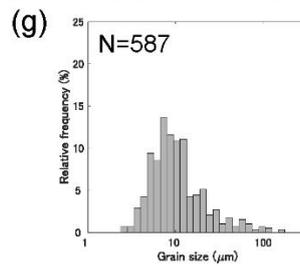
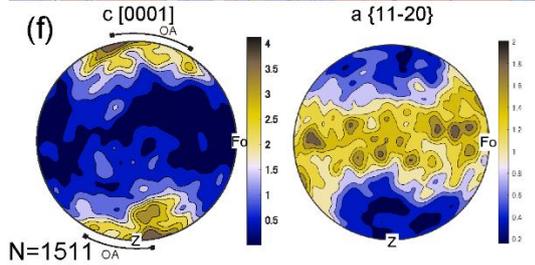
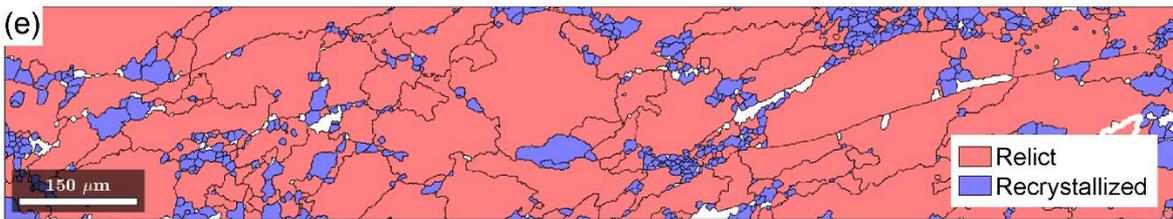
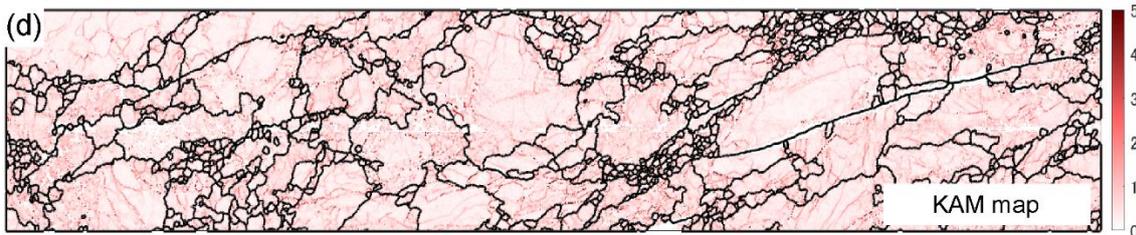
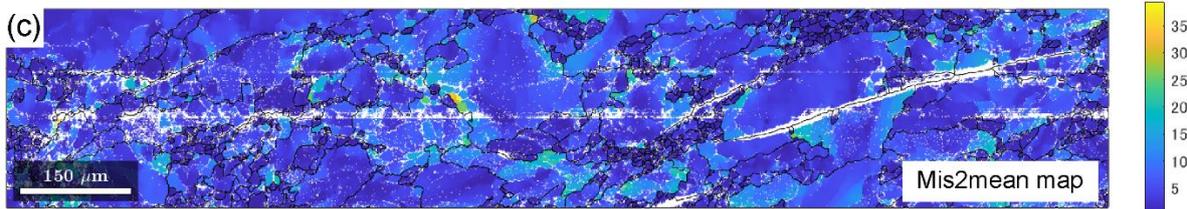
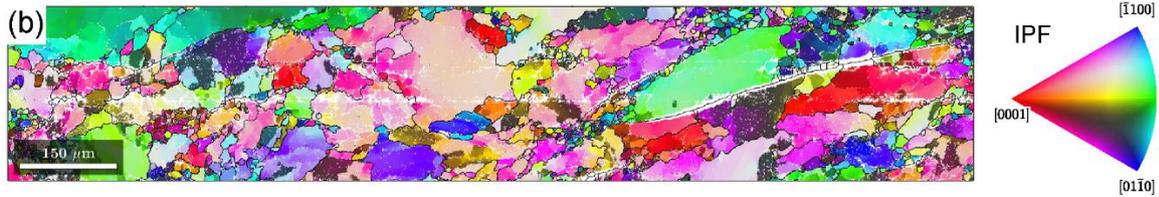
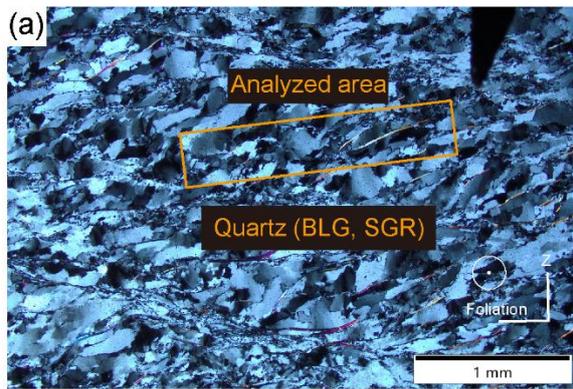


55 **Figure S6: Sample ASM3. (a) Polarising microscope image (crossed nicols) and (b) inverse pole figure (IPF) map.  $\odot$  shows the observation direction of the crystallographic orientation (perpendicular to the paper). Quartz grains exhibit wavy extinction, amoeboid grain boundaries, and irregular grain sizes. Both (c) mis2mean map and (d) kernel average misorientation (KAM) map show large grains that were recrystallized into multiple finer subgrains. These microstructural characteristics indicate dynamic recrystallization by GBM (SGR+GBM). (e) Grain boundary map for the piezometer of Shimizu (2012). (f) Grain boundary map for the piezometer of Cross et al. (2017). (g) Crystallographic orientations and measured OA. Fo: foliation. (h) Grain size histogram and (i) probability distribution for the piezometer of Shimizu (2012). (j) Grain size histogram for the piezometer of Cross et al. (2017).**



60 Figure S7: Sample ASM4. (a) Polarising microscope image (crossed nicols) and (b) inverse pole figure (IPF) map.  $\odot$  shows the observation direction of the crystallographic orientation (perpendicular to the paper). Quartz grains exhibit wavy extinction, indicating deformation by dislocation creep. Both (c) mis2mean map and (d) kernel average misorientation (KAM) map show large grains that were recrystallized into multiple finer subgrains. These

microstructural characteristics indicate dynamic recrystallization by SGR. (e) Grain boundary map for the piezometer  
65 of Cross et al. (2017). (f) Crystallographic orientations and measured OA. Fo: foliation. (g)(h) Grain size histogram for  
the piezometer of Cross et al. (2017).



70 **Figure S8: Sample ASM5. (a) Polarising microscope image (crossed nicols) and (b) inverse pole figure (IPF) map.  $\odot$  shows the observation direction of the crystallographic orientation (perpendicular to the paper). Quartz grains exhibit wavy extinction, and both bulges and recrystallized grains are present along grain boundaries, indicating deformation by dislocation creep and recrystallization by BLG. Both (c) mis2mean map and (d) kernel average misorientation (KAM) map show large grains that were recrystallized into multiple finer subgrains, indicating that SGR is also occurred. (e) Grain boundary map for the piezometer of Cross et al. (2017). (f) Crystallographic orientations and measured OA. Fo: foliation. (g)(h) Grain size histogram for the piezometer of Cross et al. (2017).**