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Arc-parallel extension and fluid flow in an ancient accretionary wedge: The San Juan Islands, Washington, by E.R. Schermer et al.; *GSA Bulletin*; May/June 2007; v. 119; no. 5/6; p. 753-767; doi: 10.1130/B25985.1

Data Repository Figure captions

Figure DR1. Simplified geology of the San Juan Islands showing terranes and thrusts of the San Juan Thrust system. Terrane abbreviations: CO=Constitution; DB=Deadman Bay; FC=Fidalgo Complex; OF=Ocean Floor Complex; LS=Lopez; TB=Turtleback, EA=Easton. After Brown et al., (2005). Black squares with letters show location of reconnaissance studies on brittle structures outside the Lopez structural complex; data for these locations are shown in Figures DR2-9. A=San Juan Island (Fig. DR2); B=Northern Lopez (Fig. DR3); C=Watmough Head, southern Lopez (Fig. DR4); D=Guemes Island (Fig. DR5); E=Jack Island (Fig. DR6); F=Lummi Island (Fig. DR7); G=Eliza Island (Fig. DR8); H=Samish Island (Fig. DR9).

Figure DR2. Equal area plots of brittle structures in the Constitution Terrane on eastern San Juan Island. (a) D4 normal faults. (b) D5 strike-slip faults. Arrows show direction of hanging wall movement. Kinematic axes shown for each fault: P = closed circles, T = open squares. Location A on Figure DR1.

Figure DR3. Equal area plots of brittle structures in sedimentary rocks of the Fidalgo Complex on northern Lopez Island. (a) D4 extension vein sets with poles to veins (=T axes) plotted as open squares. (b) D4 normal faults. (c) D5 strike-slip faults. Arrows show direction of hanging wall movement. Kinematic axes shown for each fault: P = closed circles, T = open squares. Location B on Figure DR1.

Fig. DR4. Equal area plots of brittle structures in metagraywacke of the Ocean Floor Complex at Watmough Head on southeastern Lopez Island. (a) Bedding parallel slip planes showing right and left-lateral strike slip, interpreted as D2. (b) D3 thrust faults. (c) D4 extension veins. (d) D4

normal faults. Arrows on striae show sense of hanging wall movement. Kinematic axes shown for each fault: P = closed circles, T = open squares. Location C on Figure DR1.

Fig. DR5. Equal area plots of brittle structures in the Fidalgo complex on Guemes Island. (a) mixed thrust and normal faults interpreted as reactivated thrusts by Lamb (2000). (b) D4 normal faults. (c) D5 strike-slip faults. Arrows show direction of hanging wall movement; dashed great circles show subparallel faults with no slickenlines but apparently similar kinematics from drag folding. Kinematic axes shown for each fault: P = closed circles, T = open squares. Location D on Figure DR1. Detailed structural descriptions in Lamb (2000).

Fig. DR6. Equal area plots of brittle structures in metagraywacke of the Ocean Floor Complex on Jack Island. (a) Mixed thrust faults and normal faults, without clear cross-cutting relations. (b) D5 strike-slip faults. (c) en echelon vein sets show NE-SW extension but cross cutting relations between strike-slip and dip-slip veins, and between veins and faults is unclear. Arrows show direction of hanging wall movement; dashed great circles show subparallel faults with no slickenlines but apparently similar kinematics from drag folding. Kinematic axes shown for each fault: P = closed circles, T = open squares. Location E on Figure DR1. Detailed structural descriptions in Lamb (2000).

Fig. DR7. Equal area plots of brittle structures in metagraywacke of the Ocean Floor Complex on western Lummi Island. (a) D3 thrust faults. (b) D4 normal faults. (c) D4 extension veins. Arrows show direction of hanging wall movement. Kinematic axes shown for each fault: P = closed circles, T = open squares. Location F on Figure DR1.

Fig. DR8. Equal area plots of brittle structures in metagraywacke of the Ocean Floor Complex on Eliza Island. (a) D4 normal faults. (b) D4 sigmoidal en-echelon veins with normal shear sense (V2 of Lamb, 2000). (c) D5 sigmoidal en-echelon veins with strike-slip shear sense (V3 of Lamb, 2000). Arrows show direction of hanging wall movement; dashed great circles show subparallel faults with no slickenlines but apparently similar kinematics from drag folding. Kinematic axes shown for each fault: P = closed circles, T = open squares. Location G on Figure DR1. Detailed structural descriptions in Lamb (2000).

Fig. DR9. Equal area plots of brittle structures in metagraywacke of the Ocean Floor Complex, or possibly Easton terrane (Brown and Dragovich, 2003) on Samish Island. (a) D3 thrust faults (b) D4 down-to South faults interpreted as rotated normal faults by Lamb (2000) (c) D4 sigmoidal en-echelon veins with normal shear sense. Arrows show direction of hanging wall movement; dashed great circles show subparallel faults with no slickenlines but apparently similar kinematics from drag folding. Kinematic axes shown for each fault: P = closed circles, T = open squares. Location H on Figure DR1. Detailed structural descriptions in Lamb (2000).

Table DR1. Results of X-Ray diffraction on vein samples from the LSC

Structure	Sample	Quartz	Calcite	Aragonite	Plagioclase	Chlorite	Prehnite
Deformed	OC06c	X	X		m	m	
Veins	**LP01b**	m	X	X			
(D1)	**LP01c**	m	X	m		m	
	LP09b	X	X	m		m	m
	LP10a	X	X	X		m	
	LO02a	X	X	X	m		
	LP36a	X	X	m		m	
	LP40b	X	X		X		
	SJ1c	X	X	X	m	m	
	LP45b	X	X				
	LP45c	X	X		X	m	m
	LP53e	X	X	X		m	m
Shear	**OC06b**	X	X	X	m	m	
Veins	**LP08d**	X	X	m	X		
(D2)	**L001b**	X	X	m	m	m	
	SJ2a	X	X	X	m	m	
	SJ3a	X	X	m	m		
	SJ4b	X			X	X	
	LP43a	X	X		m		
	LP51a	X	X	m		m	
	LP51b	X	X	X	X	X	
	LP53k	X	X	X		m	
Thrusts	**LP04c**	X	X	X	m		
(D3)	**LP23a**	X		m	m		m
	LP25a	X	X	X			
	LP34a	X	X	X	X		
	LP34b	X	X	X			
	LP53h	X	X	m	X	m	m
	LP57a	X	X			m	
Extension	LP01a	X	X		X	m	m
Veins	**LP14a**	X	X	X	m		
(D4)	**LP14b**		X	X			
	LP16b	m	X				
	LP28b	X	X	X			
	LO02b	m	X	X			
	LP33a	X	X		m	m	
	LP34d	X	X		X		
	LP34e	X	X		m	m	
	LP38a	X	X			m	
	LP38b	X	X			m	
	SJ2b	X	X			X	

Table DR1. (continued)

Structure	Sample	Quartz	Calcite	Aragonite	Plagioclase	Chlorite	Prehnite
Extension	**LP42a**	X	X	X			
Veins	**LP43b**	X	m	X	m	X	m
(D4)	**LP43c**	X	X	X			
	LP52a	X	X			m	
	LP53b	X	X	X		m	X
	LP53c	X	X	X		m	m
	LP53d	m	X	X	m		
	LP19d	X	X	X		m	m
	LP25a	X	X	X			
	RI06-1*	X	m	X		m	m
Normal	**LP28a**	X	X	m	X		m
Faults	**LP41a**	X	X	X			
(D4)	**LP48a**	X	X	X		m	
	LP51c	X	X	X			
	LP52b	X	X			m	
	LP52c	X	X			m	m
	LP52d	X	X			m	
	LP53a	X	X			m	m
	SJ9a	X	X	X			
	SJ9b	X	X	X			
Strike-slip	LP09a	X	X			m	
Faults	LP31a	X	X			X	
(D5)	LP43e	X	X		X		
	LP48b	X	X			m	
	LP48c	X	X	X	m	m	m
	LP48e	X	X			m	
	LP48f	X	X			m	
	LP53i	X	X		X		

Note: X=major component, m=minor component. Bold sample numbers indicate aragonite present. Sample locations in Gillaspy (2004) except for RI06-1.

*Richardson sample collected from a vein that cross-cuts the foliation in thin mudstone unit; this unit contains thin lenses with Albian foraminifera, as described by Brown et al. (2005).

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Brown, E. H., Lapen, T. J., Leckie, M. R., Silva, I. P., Verga, D., and Singer, B. S., 2005, Revised ages of blueschist metamorphism and the youngest pre-thrusting rocks in the San Juan Islands, Washington: Canadian Journal of Earth Sciences, v. 42, p. 1389-1400.

Gillaspy, J., 2004, Kinematics and P-T conditions of brittle deformation in an ancient accretionary prism setting: Lopez Structural Complex, San Juan Islands, NW Washington [M.S. thesis]: Western Washington University, 134 p.

Lamb, R., 2000, Structural and tectonic history of the eastern San Juan Islands, Washington [M.S. thesis]: Western Washington University, 236 p.

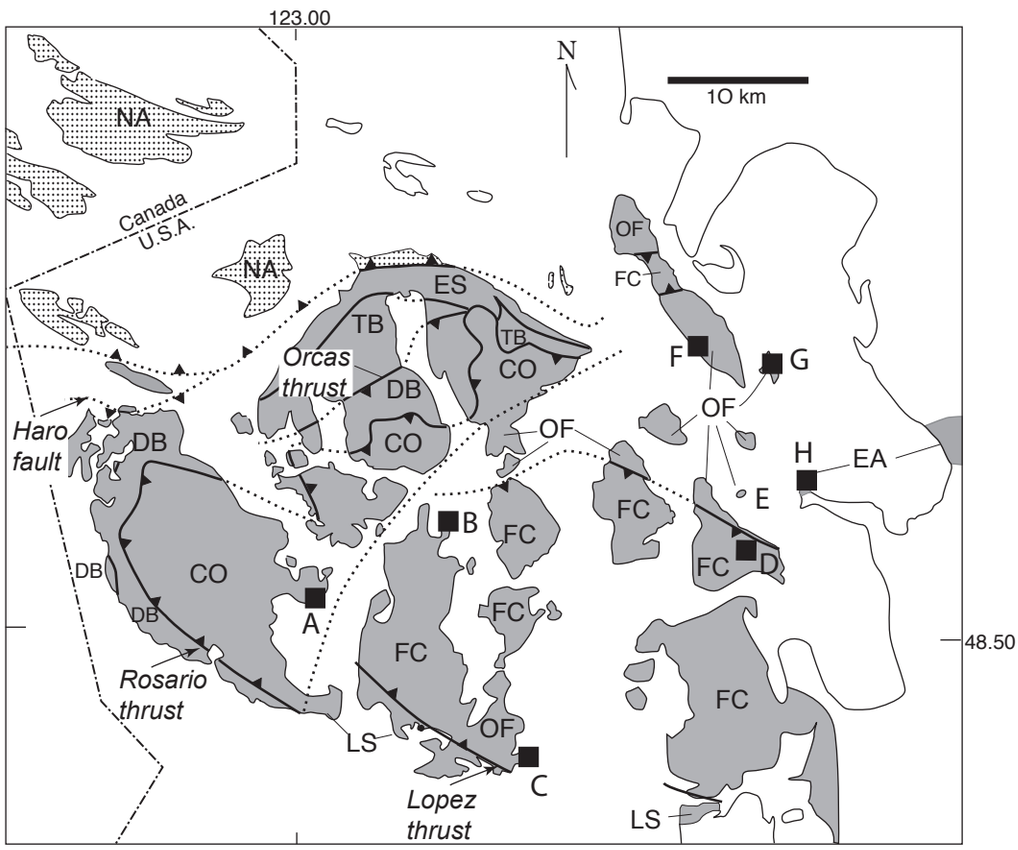
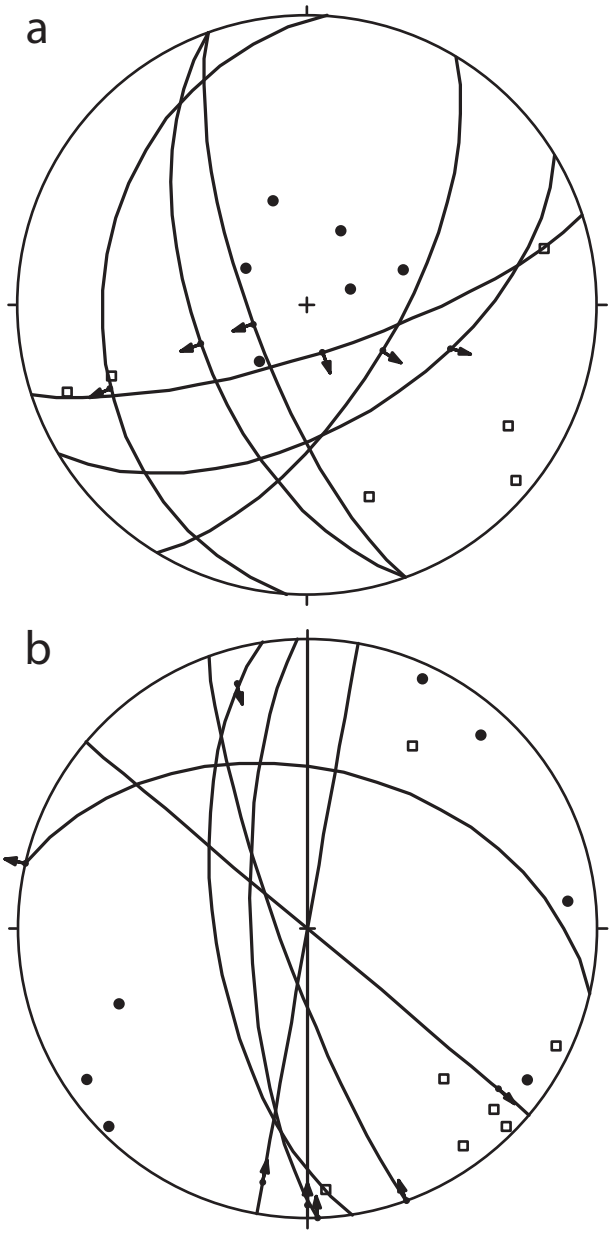


Fig. DR1 B25985.

Fig. 1



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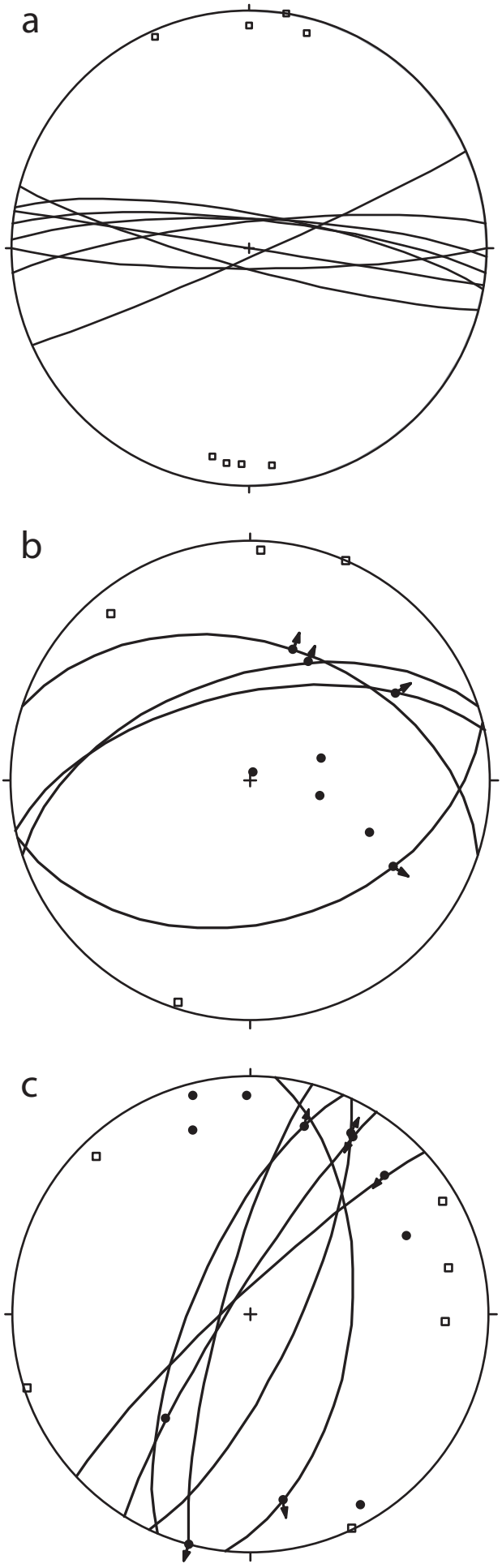

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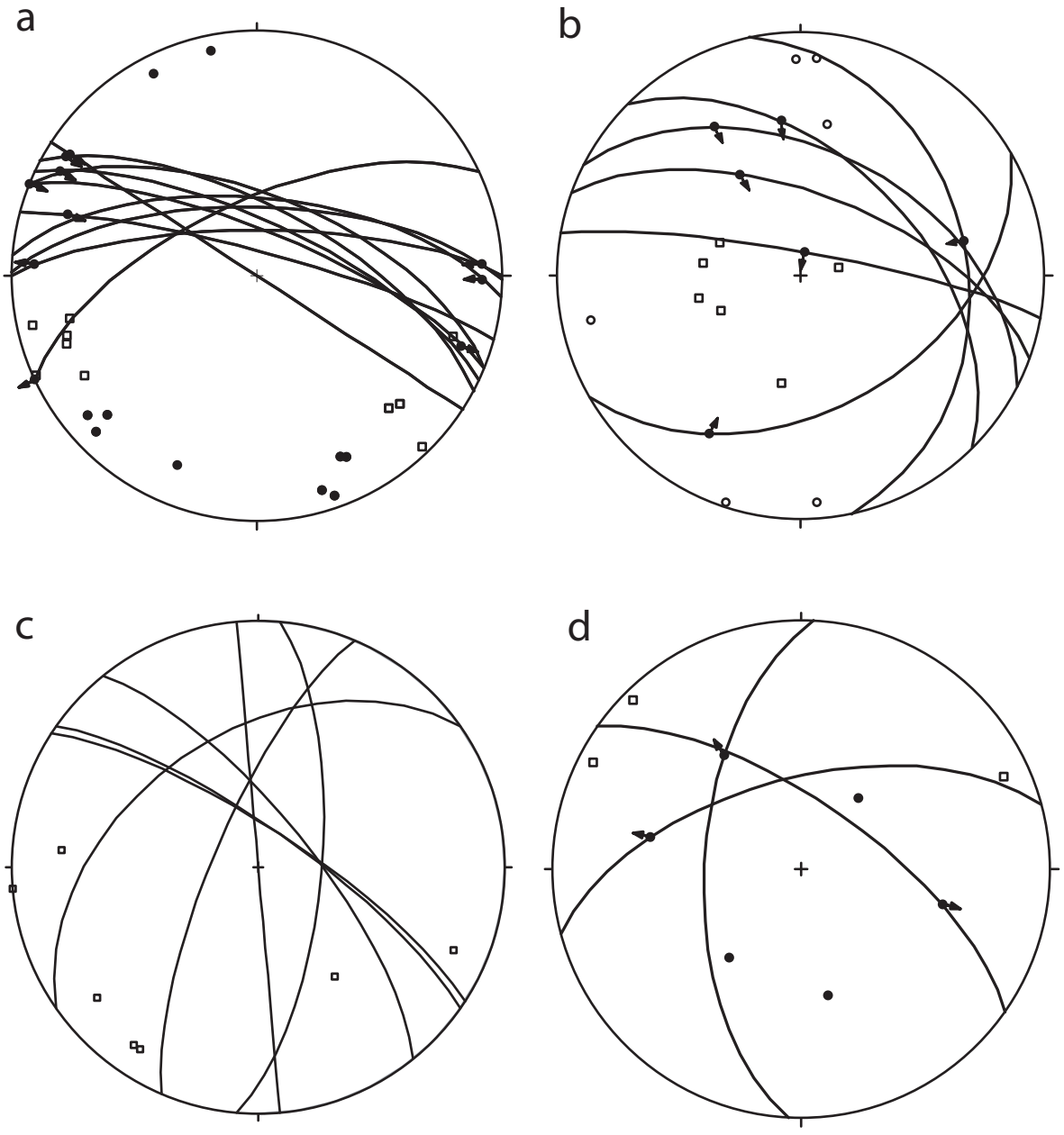

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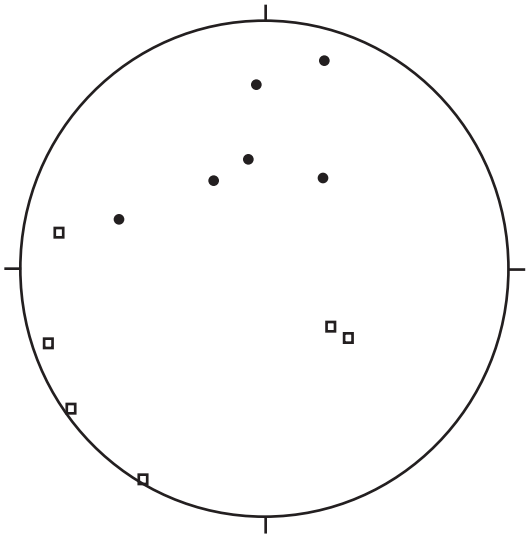

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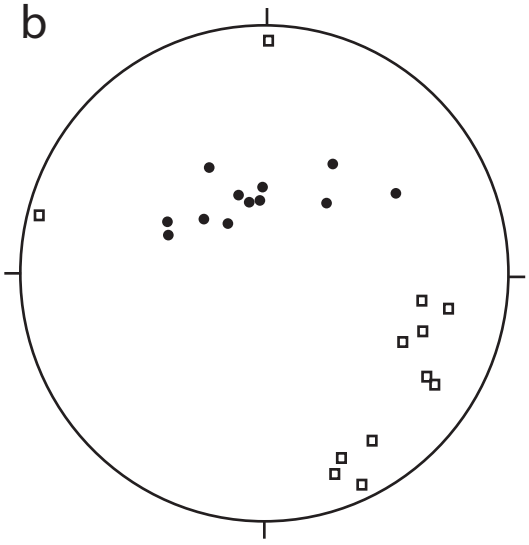

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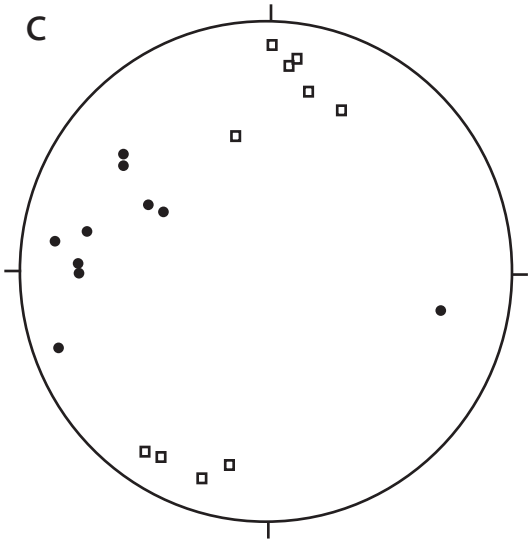

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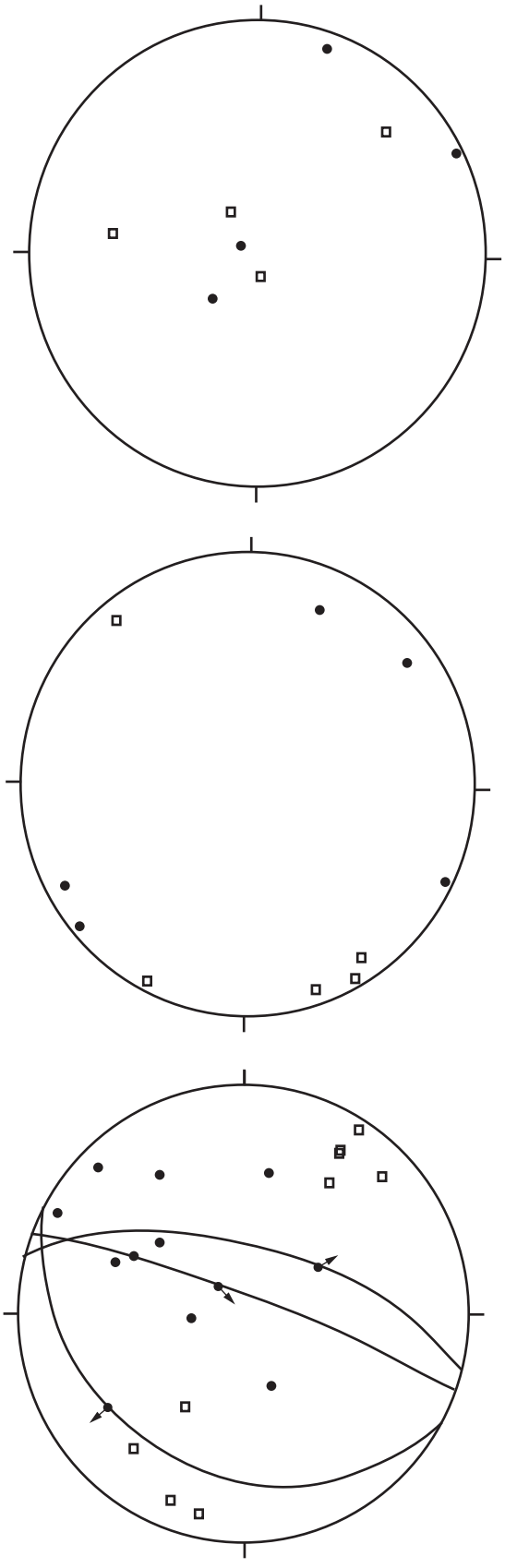

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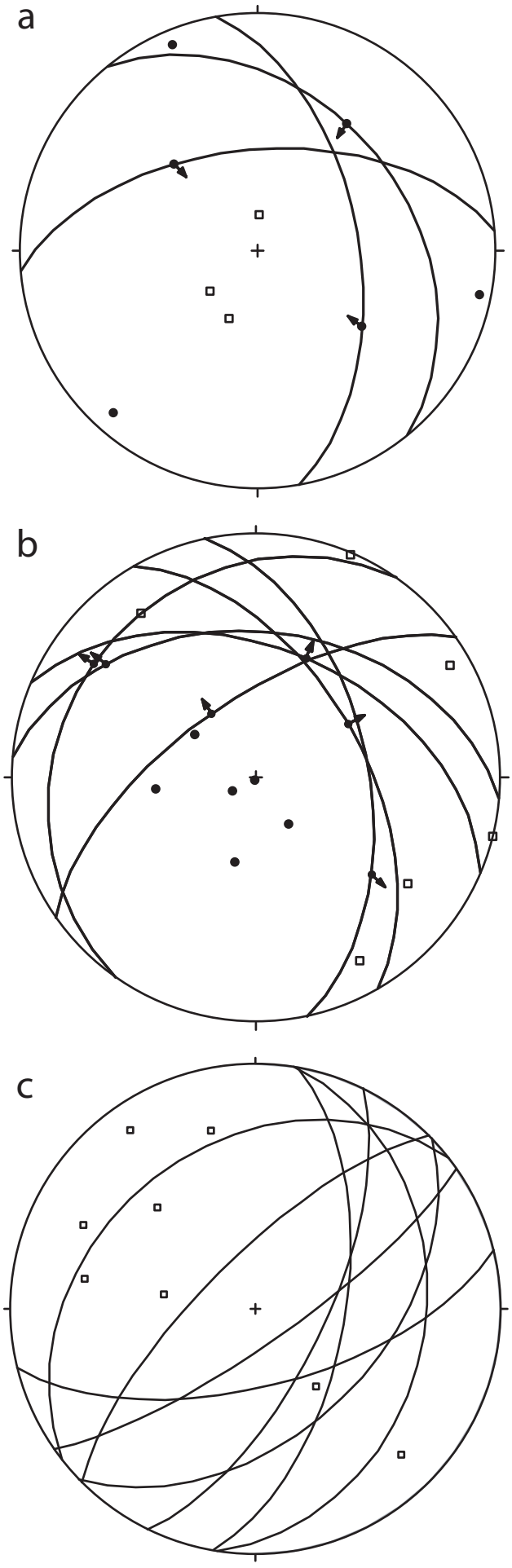

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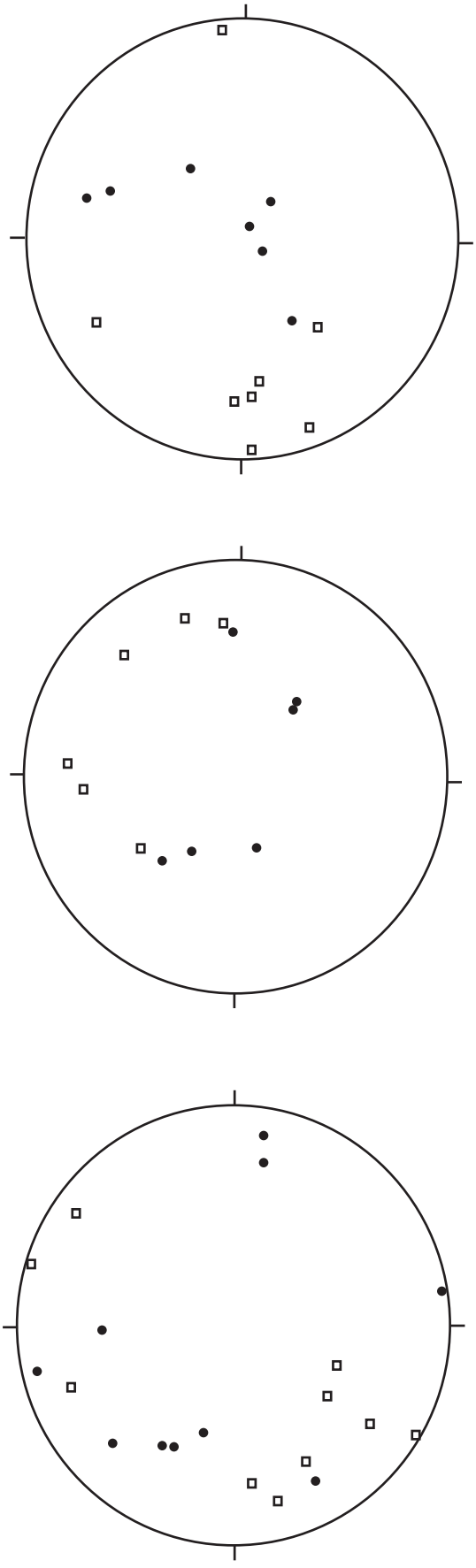

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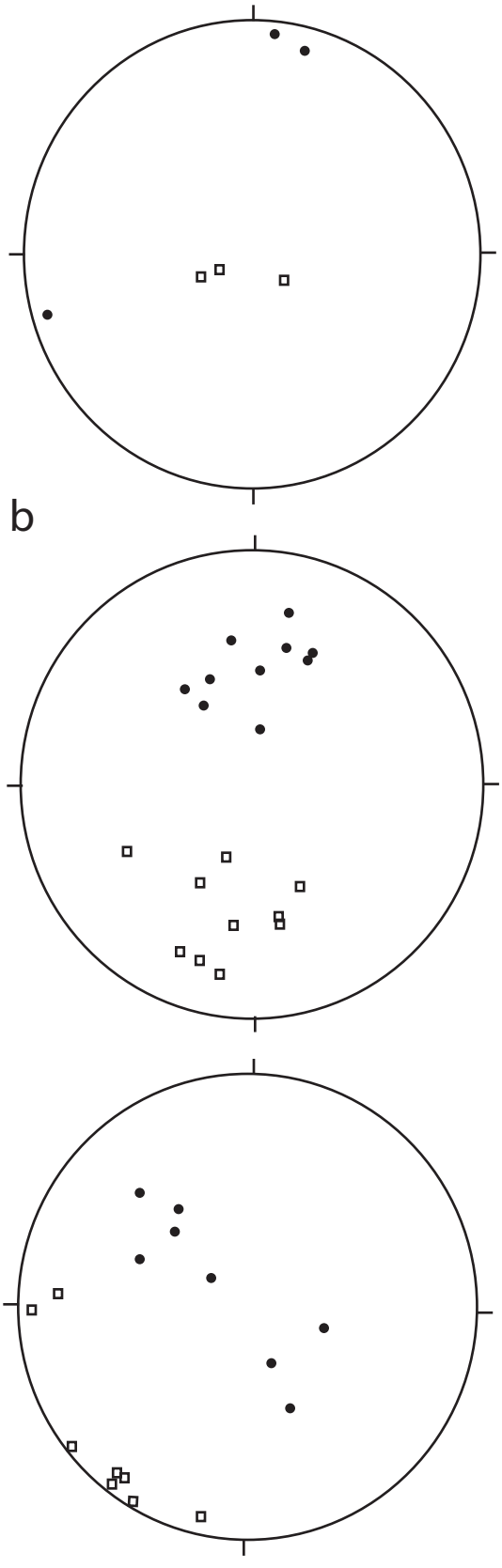

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