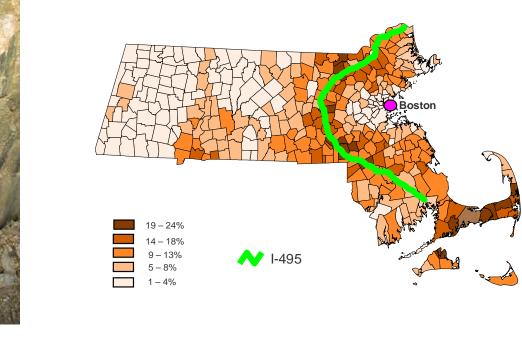
A new way of looking at, and mapping, bedrock: The hydrostructural domain map

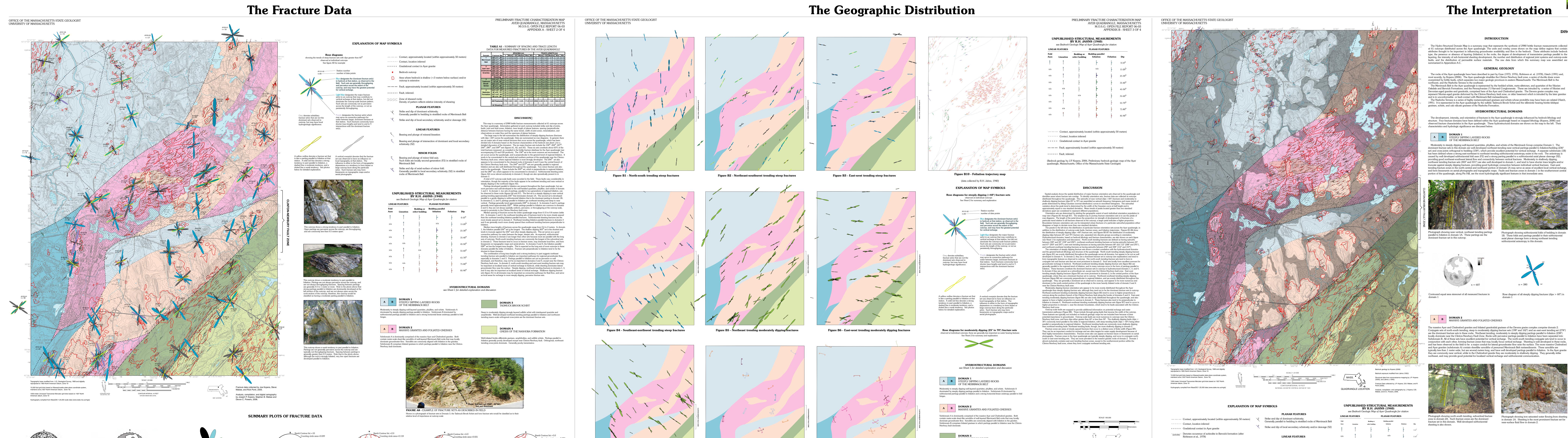
Massachusetts Office of the State Geologist University of Massachusetts, Amherst

Redefining traditional bedrock maps to address water asset issues: Why are we doing it?

What are we doing? The result?

Fracture characterization Increased use of fractured bedrock aquifers in New England New geologic units based on fracture characteristics





pping fractures perpendicular to strong parting parallel to foliation in domain 3. Extensive iro staining of these fractures is evidence of past



SUMMARY OF IMPORTANT HYDROLOGIC FEATURES A strong northeast trending regional flow anistotropy exists in the bedrock of the Aver quadrangle due to well developed partin parallel to foliation. This flow anisotropy is especially pronounced in domains 1 and 3, and domain 2B near the Clinton-Newburg

Domain 1A is dominated by northeast trending, steeply dipping fractures that provide excellent vertical recharge. Domain 1B has a strong northeast-southwest subhorizontal flow anisotropy. The conjugate north-south and east-west steeply dipping fractures and fracture zones of domain 2A provide excellent localized recharge and may appear on topographic maps and aerial photos as lineaments. Northeast trending, moderately to steeply sheetlike xenoliths and fault zones in Domain 2 provide excellent localized recharge and

ne highly sulfidic schists of domain 3 may provide poor water quality. The strongly developed, steep to moderately northwestdipping partings parallel to foliation and northwest trending steep fracture sets in this zone provide excellent vertical recharge. ne faulted boundary between domains 3 and 4 may be a highly transmissive phyllonite zone, as evidenced by abundant wetland ng its length. This fault zone is parallel to local foliation, and dips approximately 60-70° to the northwest. This zone is most likel y the northeast trending, moderately southeast dipping 028° and 110° sets in domain 3, which are parallel to the steep ridge to e northwest of the faulted boundary. Domain 4 is generally poorly transmissive, with northwest trending, steeply dipping cross-fractures being most important for vertice

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D.R., 1983, Bedrock geologic map of Massachusetts: U.S. Geological Survey Special Geologic Map.

PRELIMINARY FRACTURE CHARACTERIZATION MAP OF THE AYER QUADRANGLE. MASSACHUSETTS ¹Office of the Massachusetts State Geologist APPENDIX A: RAW FRACTURE DATA - Sheet 2 of 4 Department of Geosciences University of Massachusetts, Amherst, MA 01003 By Joseph P. Kopera^{1*}, Stephen B. Mabee¹, and Devon C. Powers¹

Figure A7. Lower hemisphere equal area projection of all foliations.

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Figure B7 -Northwest trending moderately dipping fractures

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PRELIMINARY FRACTURE CHARACTERIZATION MAP OF THE AYER QUADRANGLE, MASSACHUSETTS **APPENDIX B: SPATIAL ANALYSIS - SHEET 3 OF 4** Joseph P. Kopera, Stephen B. Mabee, and Devon C. Powers

GNEISS OF THE NASHOBA FORMATION

TADMUCK BROOK SCHIST

rending cross-joints dominate. Generally poorly transmissive.

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Bedrock outcrop

---- Fault, inferred.

— — Fault, approximately located (within approximately 50 meter

Density of pattern reflects relative intensity of shearing

observed at the surface and may lie above the bedroo

Bearing and plunge of minor fold axi

Such folds are locally second-generation (F2) in stratified rocks of

Generally parallel to local secondary schistosity (S2) in stratified ocks of Merrimack Belt

MASSACHUSETTS

APPROXIMATE MEAN
DECLINATION, 1999

MAP LOCATION

representing the official policies, either expressed or implied, of the U.

Fracture data collected by Joe Kopera, Steve Mabee, and Rick Ponti, 2005.

PRELIMINARY FRACTURE CHARACTERIZATION MAP OF THE AYER QUADRANGLE. MASSACHUSETTS **HYDROSTRUCTURAL DOMAIN MAP - Sheet 1 of 4** By Joseph P. Kopera¹, Stephen B. Mabee¹, and Devon C. Powers

Contoured equal area stereonet of all measured fractures in