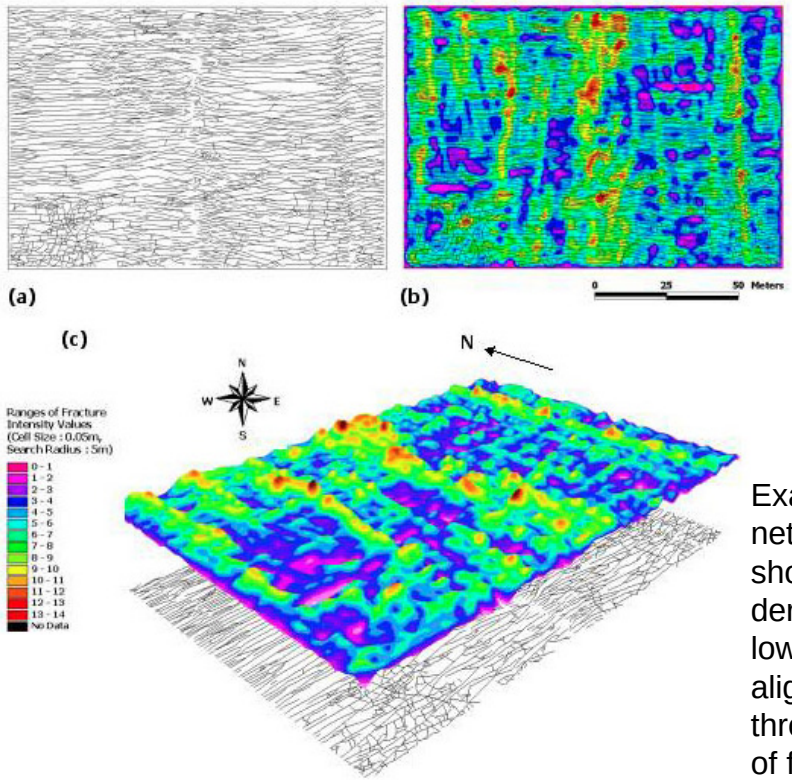
Characterization of Heterogenities at the Reservoir Scale: Spatial Distribution and Influence on Fluid Flow



Objective of the Project:

- Characterize the spatial distribution of heterogeneities within reservoirs and determine what and how heterogeneities play roles in fluid flow

Example of two-dimensional geospatial analysis of fracture networks. Fracture trace map (a) of Gillespie et al. (2001) showing E-W trending fracture set; fracture intensity map (b) derived from (a) showing regions of high (bright colors) and low (dark colors) of fracture intensity (note preferred N-S alignment of zones of high fracture intensity, signifying throughgoing fracture zones); three-dimensional visualization of fracture intensity map (c) superimposed on fracture trace map.

Florida International University

DE-FG26-01BC41356 *Source: name of company*

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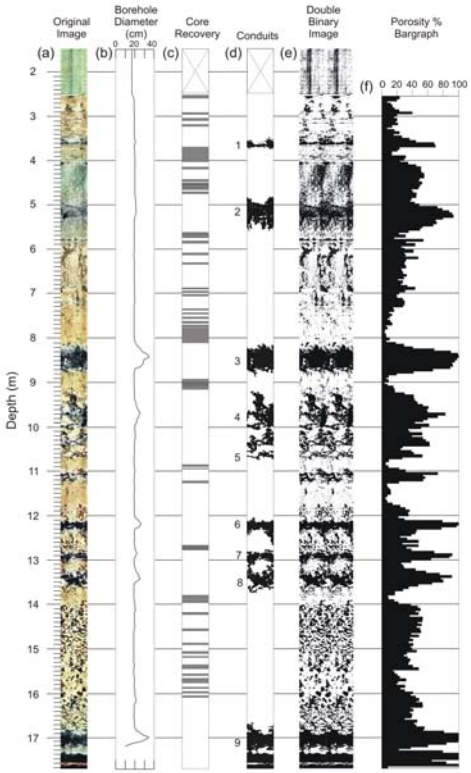
Geospatial analysis applied to quantifying porosity in the karst limestone of the Biscayne aquifer, Miami-Dade County, Florida. (a) Original borehole televiewer image (provided courtesy of the US Geological Survey); (b) caliper log; (c) intervals of core recovery; (d) conduits identified by GIS-vector analysis; (e) binary (double) image of pore space (black) and rock matrix (white); (f) porosity profile of percent porosity as a function of wellbore depth. Note that conduits are identified as zones of high porosity



Results of the Project:

- Many hydrologically significant fractures at the reservoir scale cannot be directly detected, neither by borehole imaging tools nor by seismic imaging
- Reservoir characterization, in terms of fracture architecture models, must be derived from a combination of limited subsurface data and knowledge of the factors that control fracture development in rocks

Source: TEES

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Publication of the Project:

- Finn, M.D., Gross, M.R., Eyal, Y., and Draper, G., Kinematics of through-going fractures in jointed rock: Tectonophysics, V. 376, 2003, pp. 151-166.
- Manda, A.K., and Gross, M. R., Estimating aquifer-scale porosity (the representative elementary volume, REV) for karst limestones using geospatial (GIS) analysis: in Harmon and Wicks, eds., Geological Society of America Special Paper on Advances in Karst Research honoring Derek Ford and William White (in press).
- Manda, A.K., and Gross, M.R., Identifying and characterizing solution conduits in karst aquifers through geospatial (GIS) analysis of porosity from borehole imagery: an example from the Biscayne aquifer, south Florida (U.S.A.): Advances in Water Resources (in press).

Source: TEES