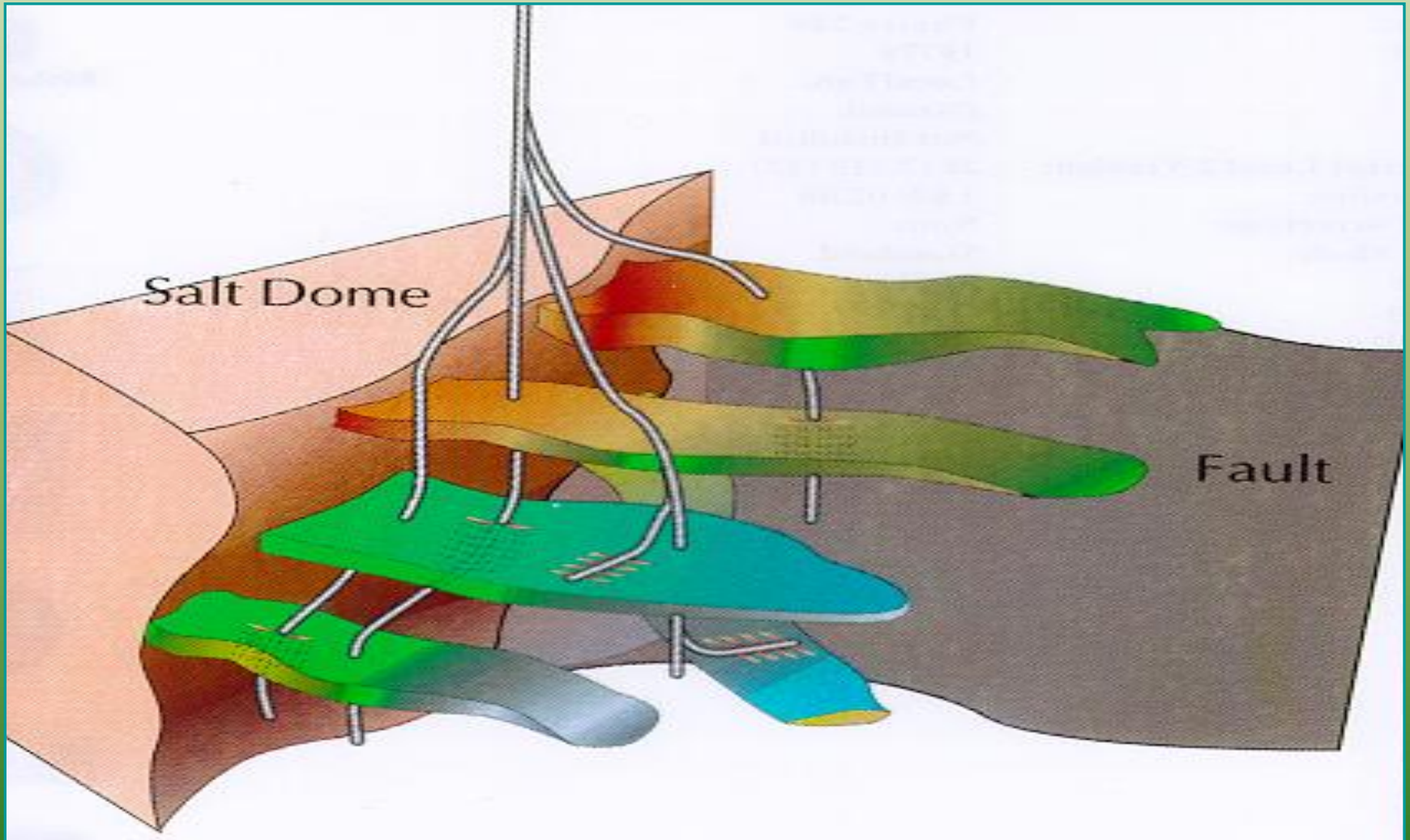


Model Design

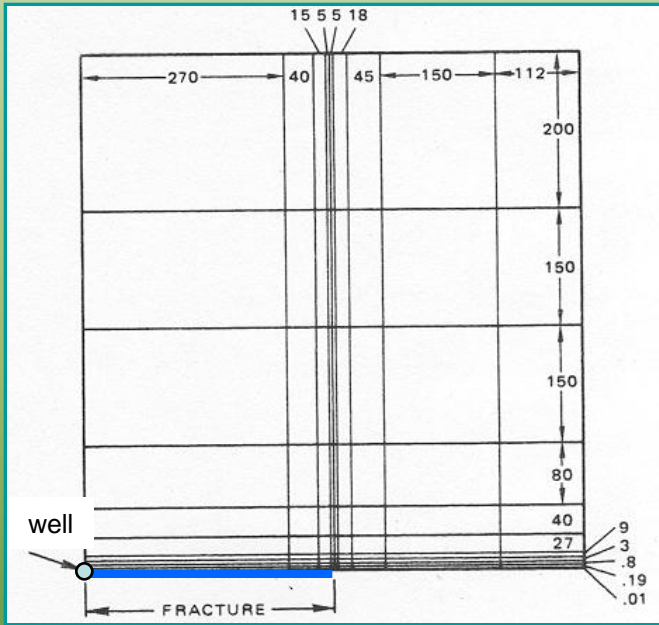


Model Design

- Conceptual vs actual
- Scope of model: Individual well, pattern or full-field model?
- Radial or cartesian coordinates? Model dimensions?
- Reservoir type?
- Type of reservoir fluid?
- Type of process to model?
- Quality of geologic and petrophysical data?
- Time and cost constraints?

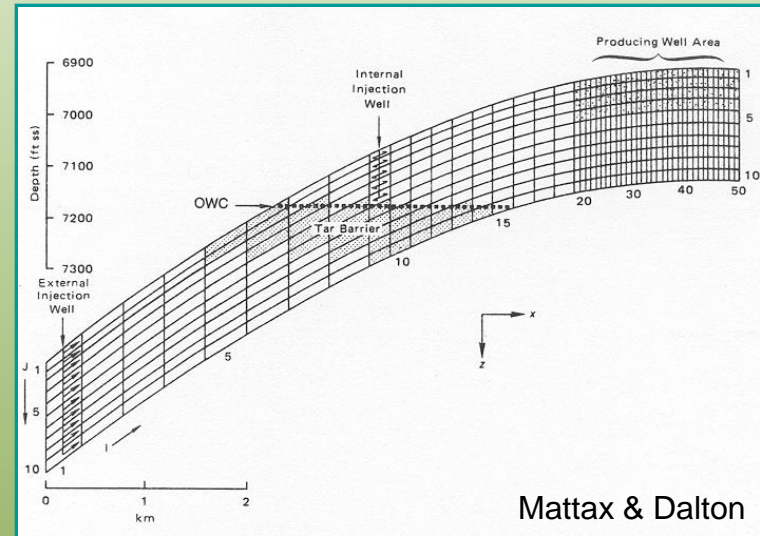
Model Design

Scope of model



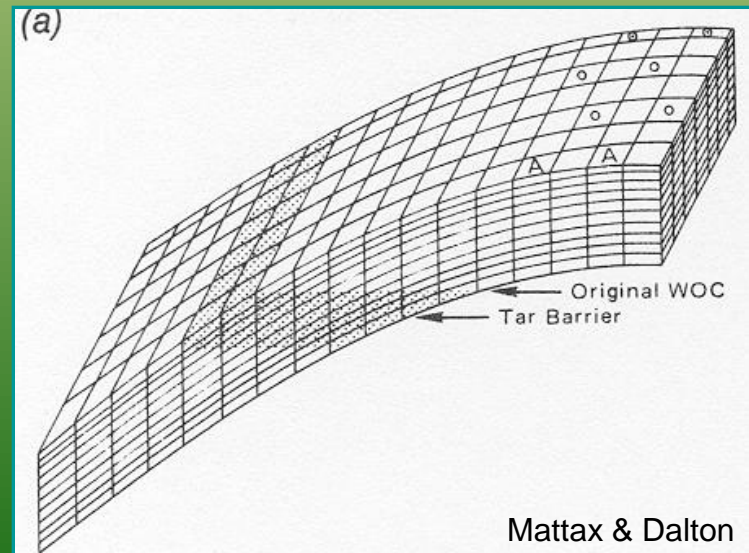
Single well - fracture

2D – Cross-section



Mattax & Dalton

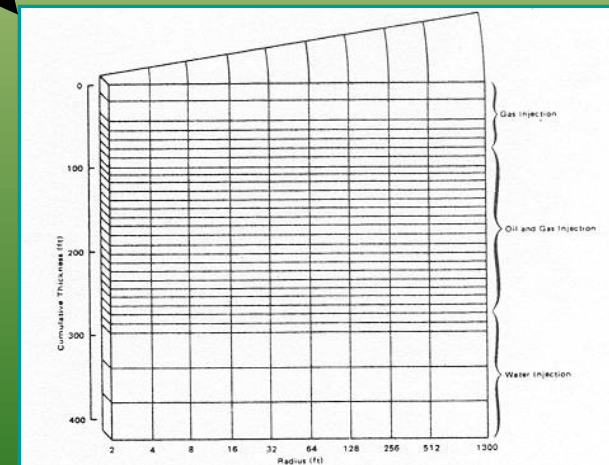
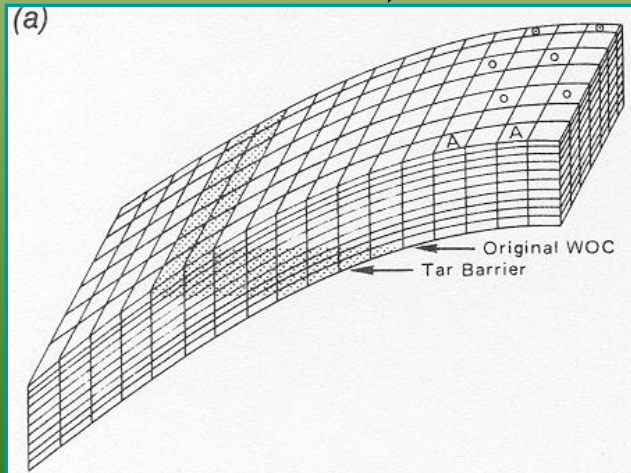
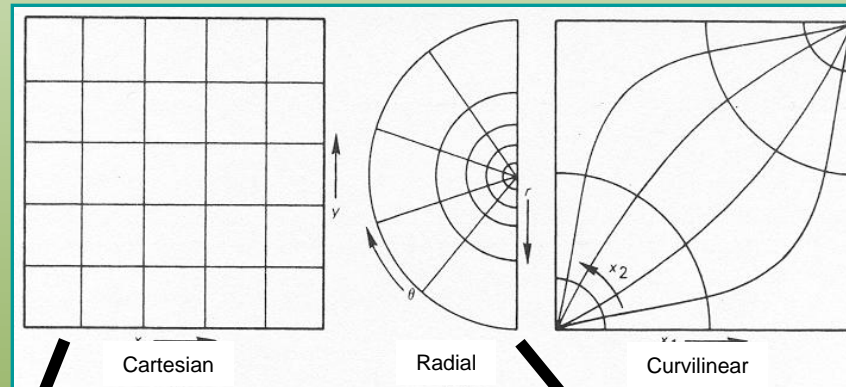
Multiwell-3D-Cartesian



Mattax & Dalton

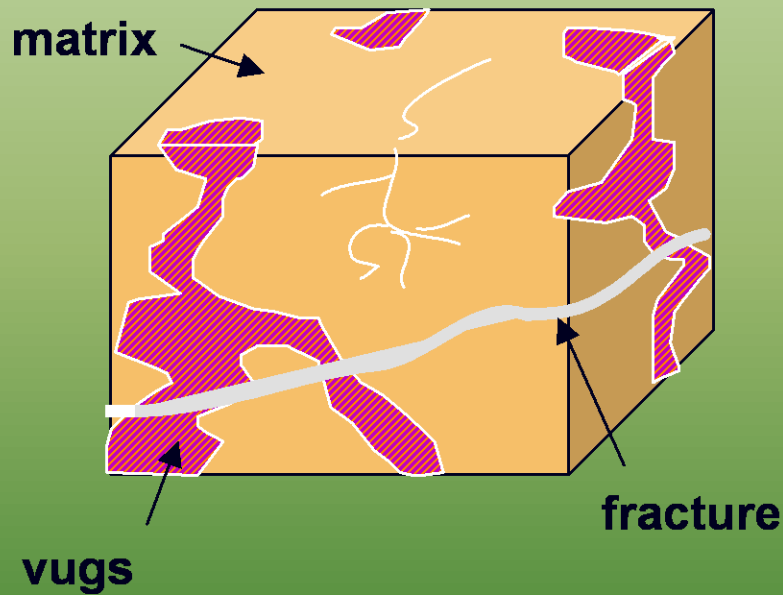
Model Design

Coordinate system?

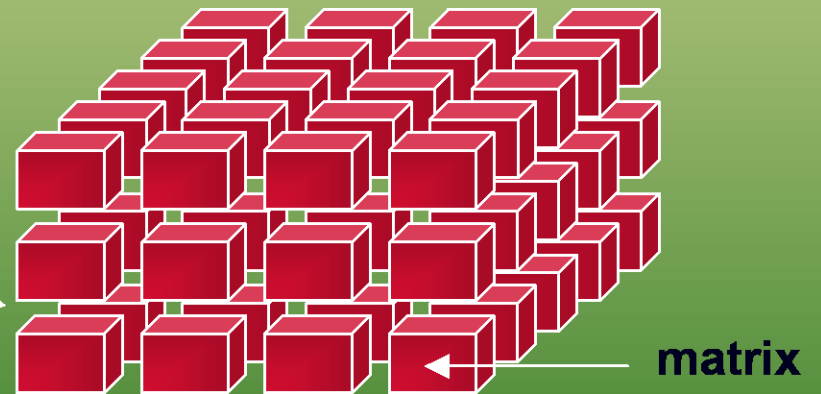
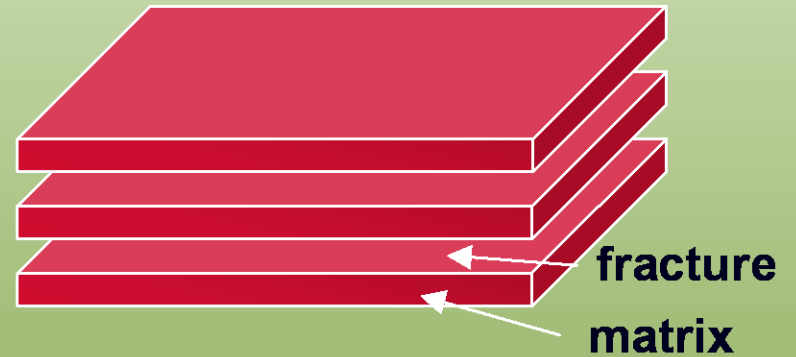


Model Design

Type of reservoir



Actual reservoir



Idealized Models

Model Design

Type of reservoir fluid

- **Black oil**

- insensitive to compositional changes in the reservoir
- Mass transfer is strictly pressure dependent

- **Compositional**

- recovery processes sensitive to compositional changes
- Requires cubic EOS for PVT behavior

Model Design

Type of reservoir fluid

Black oil

Applicable to:

1. Primary oil recovery processes
2. Secondary recovery mechanisms

Compositional

Applicable to:

1. Volatile oil and gas condensate reservoirs
2. Miscible processes

Model Design

Type of process to model

- Primary depletion
- Secondary recovery
 - Gas or water injection
- EOR Processes
 - Miscible, chemical, thermal

Model Design

Quality/Quantity of geologic and petrophysical data

- Assignment of grid cell properties
 - Single constant value
 - For each layer
 - Distributed from geologic model
- Assignment of rock/fluid interaction properties
 - Pseudofunctions
- Assignment of well properties to grid cells

Model Design

Design issues:

- a. Number of space dimensions
- b. Representation of the reservoir rock and fluids
- c. Coupling of the well with the reservoir

Model Design

Influential factors:

- a. Type and complexity of the problem (system geometry, heterogeneity, types of fluids, type of depletion process)
- b. Quality of answer needed for reservoir management decisions
- c. Time available to complete the reservoir study
- d. Economics
- e. Availability and quality of data

Model Design

Summary

Selection of simulator

- a. Define the objectives of the study
- b. Review the available data
- c. Select the model configuration that will best represent the fluid dynamics of the reservoir, e.g., 1D, 2D(areal or x-section?), 3D; radial or cartesian
- d. Simplify the model configuration...pseudofunctions, upscaling
- e. Select the gridblock dimensions
- f. Select the PVT model
- g. Select the number of phases
- h. Define the initial and boundary conditions, also heterogeneity and anisotropy
- i. Define how wells are treated in the simulator
- j. Select the simulator