HID 362
MESLEKİ İNGİLİZCE 2

Hafta 6

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2020-2021 Bahar Dönemi #evdekal

GW Flow Models

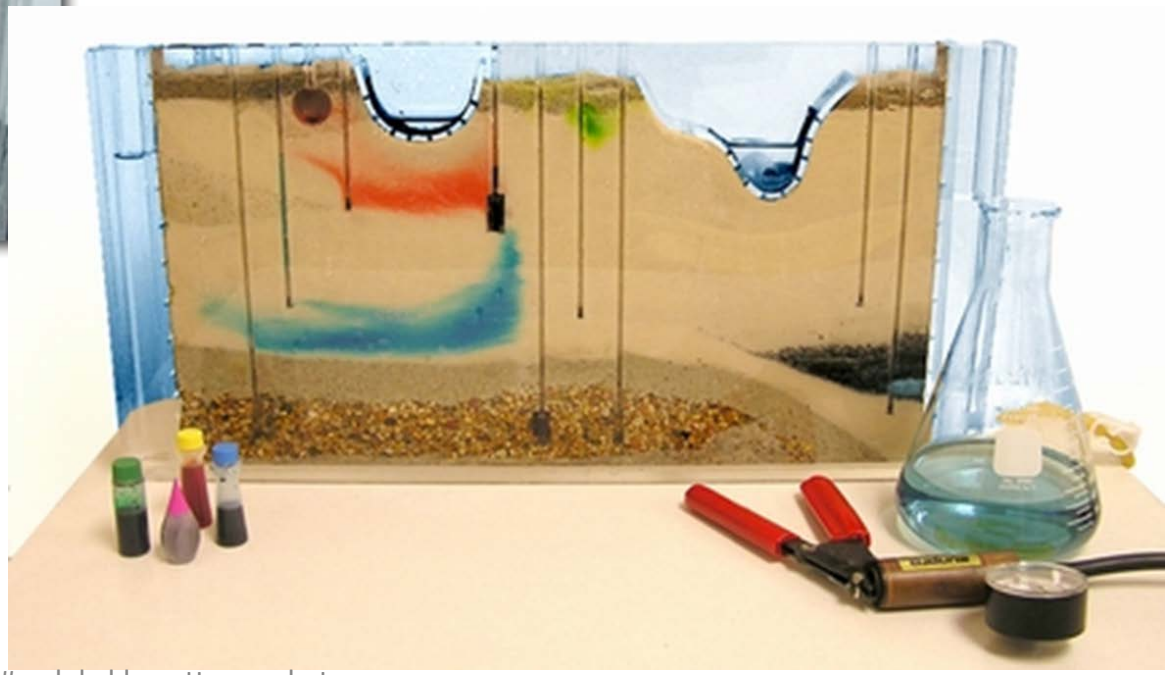
model - a simplified description of a system or process that can be used as an aide in analysis or design.

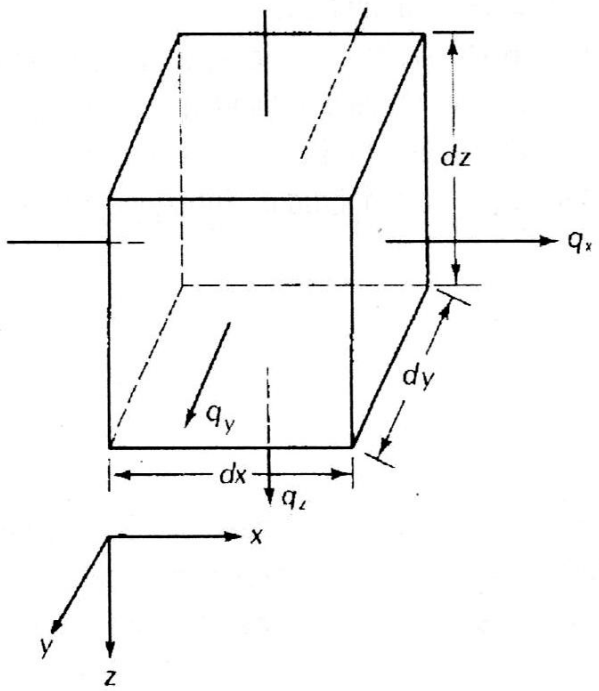
conceptual model - a clear, qualitative physical description of how a hydrogeological system behaves.

physical model-

numerical model-

PHYSICAL MODEL





GW flow equation for confined aquifers

$$\frac{\partial^2 h}{\partial x^2}+\frac{\partial^2 h}{\partial y^2}+\frac{\partial^2 h}{\partial z^2}=\frac{S}{T}\frac{\partial h}{\partial t}$$

GW flow equation for unconfined aquifers

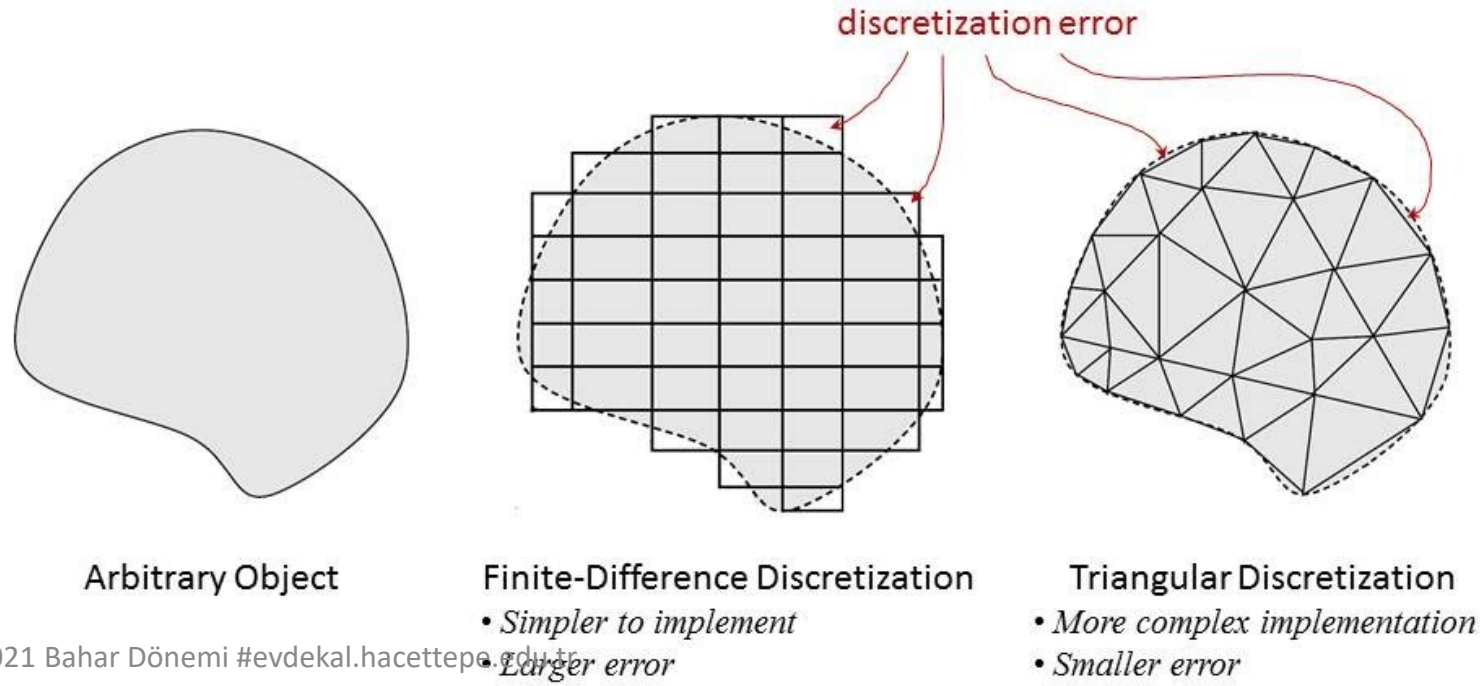
$$\frac{\partial^2 h}{\partial x^2}+\frac{\partial^2 h}{\partial y^2}=\frac{S_y}{Kb}\frac{\partial h}{\partial t}$$

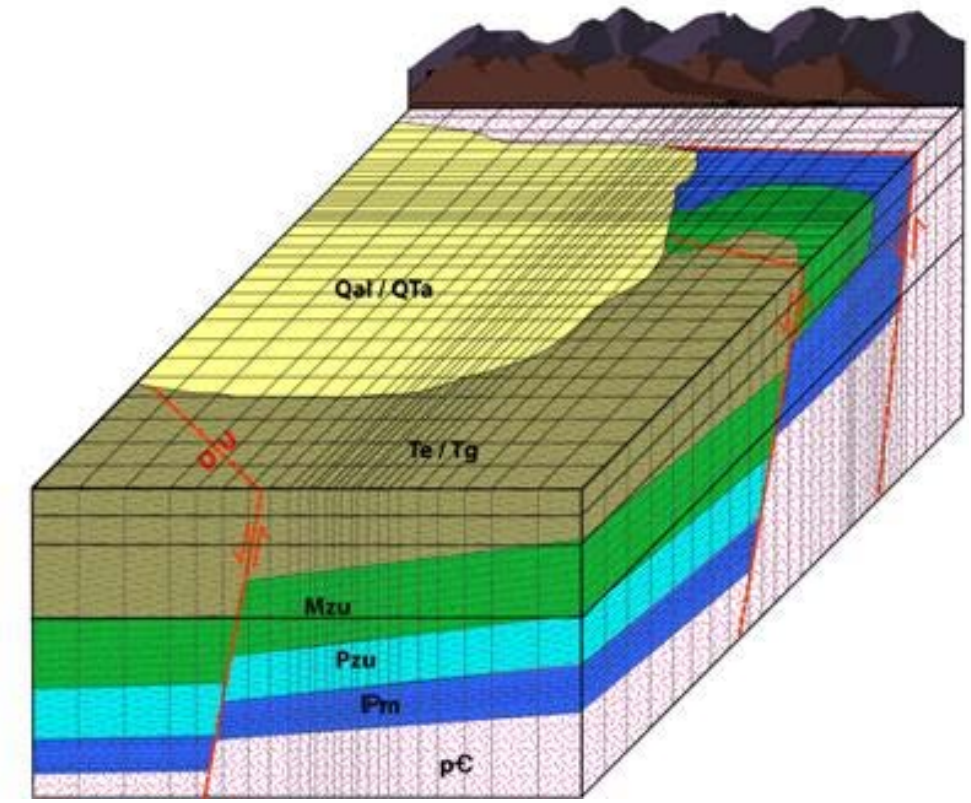
GROUNDWATER FLOW MODEL

finite-difference model - a computer approximation of a continuous (groundwater flow) system as a grid of finite, discrete cells.

finite-element model

The finite element mesh offers minimal discretization error.




Qal / QTa
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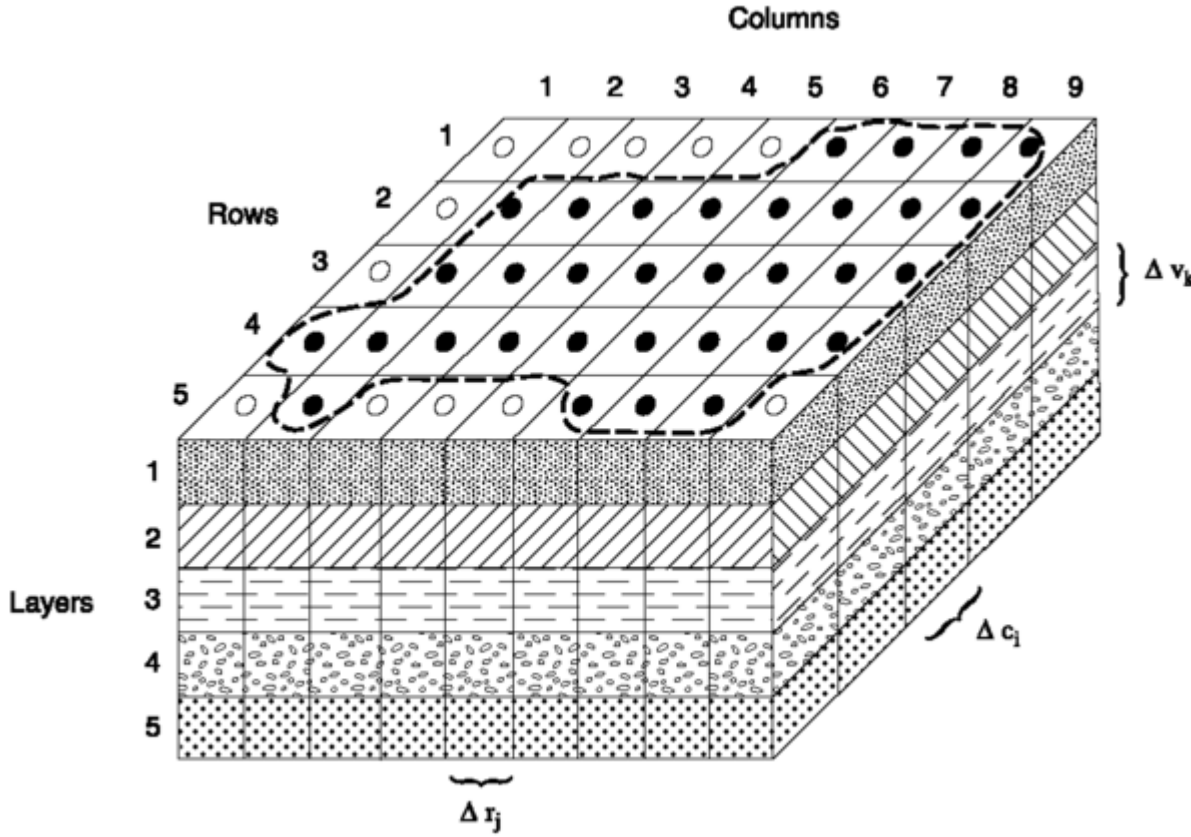
Columns
1 2 3 4 5 6 7 8 9
Rows
1 2 3 4 5
Layers
1 2 3 4 5
Δ r_j
Δ c_i

Required Data for GW Flow Models

- Tüm akifer ve geçirimsiz birimlerim alansal yayılımları, kalınlıkları
- Yüzey su kütleleri ve akarsuların alansal olarak konumları
- Akiferlerin iletimlilik ve depolama katsayıları
- Geçirimsiz birimlerin iletimlilikleri
- Akifer ile yüzey su kütleleri arasındaki hidrolik bağlantılar
- Akiferlere ait hidrolik yük dağılımları
- Akiferlerin doğal ve beslenim ve boşalım bölgeleri
- Beslenimi oluşturan yağış verisi ve alansal dağılımı
- Buharlaşma kayıpları
- Üretim kuyularının konumları ve çekim miktarları

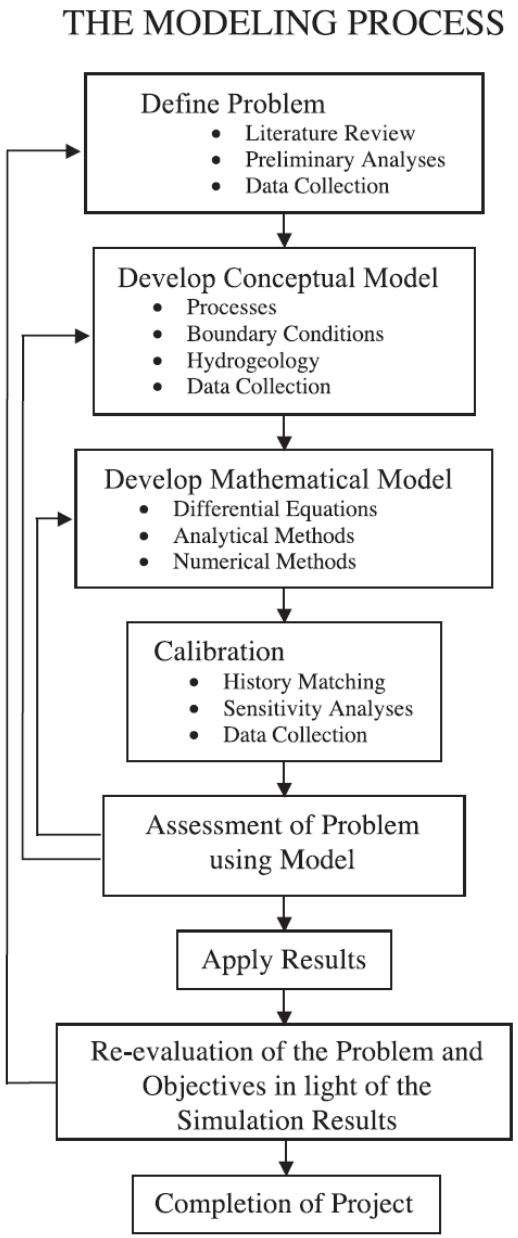

Figure 12. Flow chart of the ground-water flow modeling process. (From Reilly, 2001.)

STEPS of GROUNDWATER FLOW MODELING

- **Setup model with available data**
- **calibration -** (1) the establishment of an analytical curve relating instrument response to analyte amount or concentration; (2) the adjusting of parameters of numerical model input data until model output matches a set of field observations with some degree of accuracy.
- **validation**

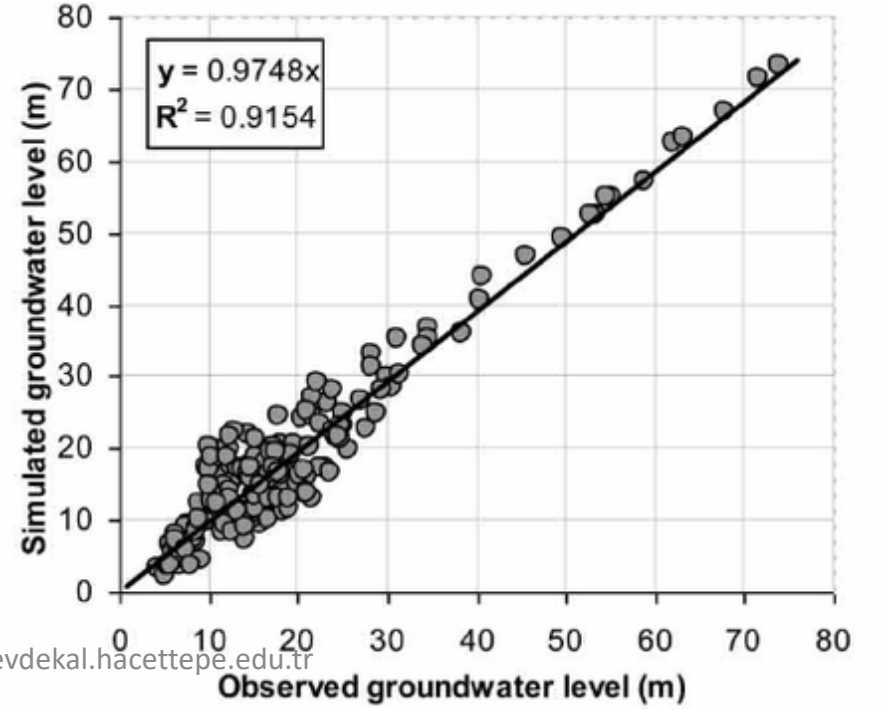

Table 1. Types of problems that may initiate a hydrologic study involving a ground-water flow model.

Problem Type	Reason for Undertaking Study	Approach to Model the Problem
Basic Understanding of Ground-Water System	Investigation of hydrologic processes	• Hypothetical system model • Superposition • Particle Tracking
	Determination of effective data collection network	• Calibrated model • Hypothetical system model • Superposition • Sensitivity analysis
	Preliminary model to determine current level of understanding	• Calibrated model • Hypothetical system model • Superposition • Sensitivity analysis
Estimation of Aquifer Properties	Aquifer test analysis	• Calibrated model • Superposition
	Determination of aquifer properties	• Calibrated model
Understanding the Past	Understanding historical development of an aquifer system	• Calibrated model
	Estimation of predevelopment conditions	• Calibrated model
Understanding the Present	Determination of the effect of ground-water pumpage on surface-water bodies	• Calibrated model • Superposition • Particle Tracking
	Determination of sources of water to wells	• Calibrated model • Particle Tracking
	Determination of responsible parties causing impacts on the system	• Calibrated model • Particle Tracking
Forecasting the Future	Management of a system	• Calibrated model • Superposition • Particle Tracking

Guidelines for Evaluating Ground-Water Flow Models

By Thomas E. Reilly and Arlen W. Harbaugh

https://pubs.usgs.gov/sir/2004/5038/PDF/SIR20045038part2.pdf

MODFLOW - a finite-difference numerical model for groundwater flow which as developed by the U.S. Geological Survey.

decision support system - an interactive computer model that incorporates all available data relative to a water resource problem and through programmable analyses assists with formulation and selection of appropriate management decisions.

https://www.youtube.com/watch?v=GhEcWhWTHcs

Geographic Information System (GIS)

Geographic Information Systems is a computer-based tool that analyzes, stores, manipulates and visualizes geographic information, usually in a map.

Geographic Information Systems really comes down to just 4 simple ideas:

- ***Create*** geographic data
- ***Manage*** it.
- ***Analyze*** it and…
- ***Display*** it on a map