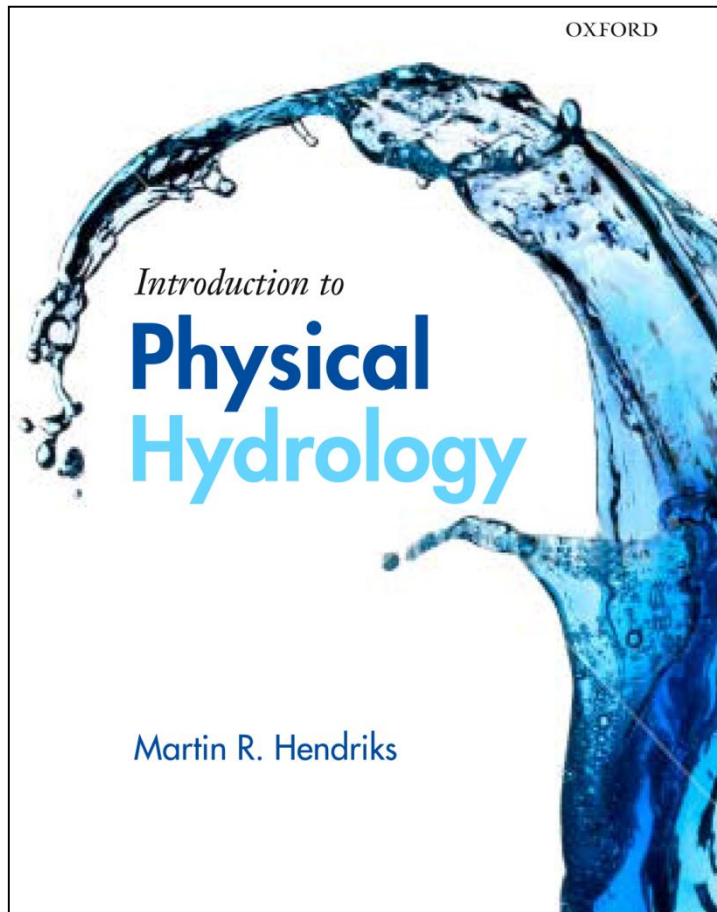


Groundwater



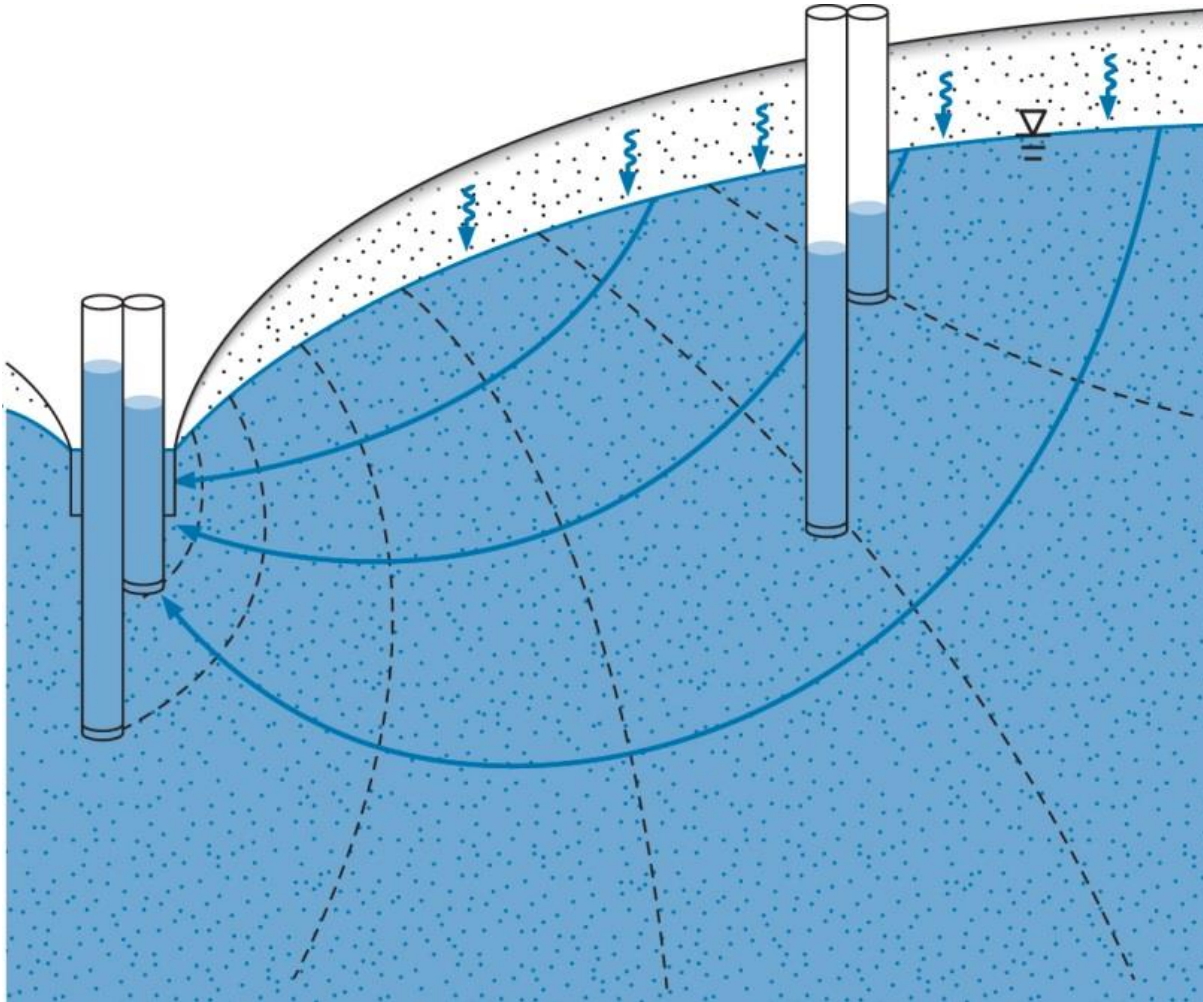
Paperback | 351 pages

Follow the book's didactic concept!

- Hydrological cycle
 - Drainage basin
 - Water balance
-
- Energy equation
 - Flow equation
 - Continuity equation
-
1. Introduction
 2. Atmospheric water
 3. **Groundwater**
 4. Soil water
 5. Surface water

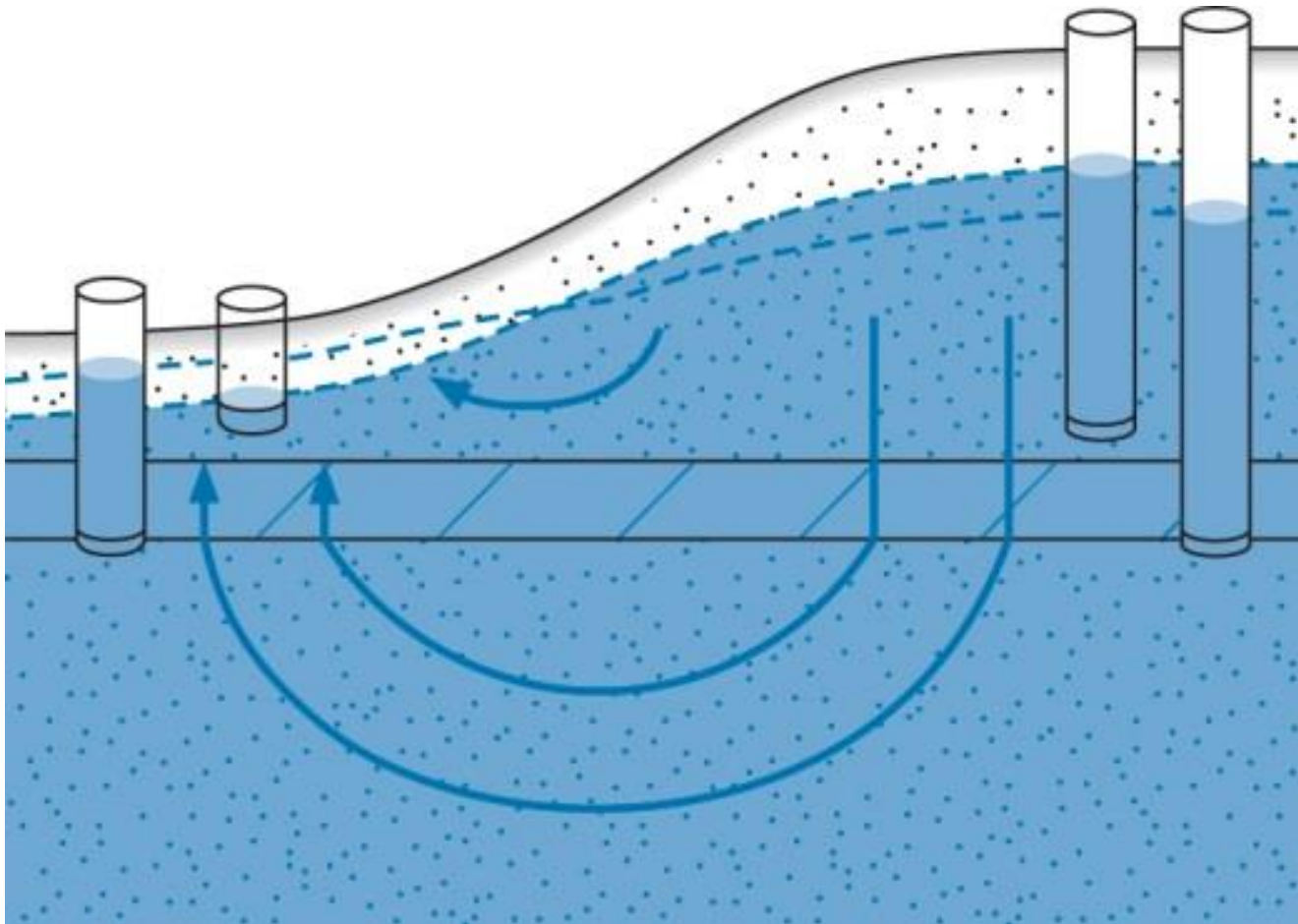
Exercises

Unconfined groundwater

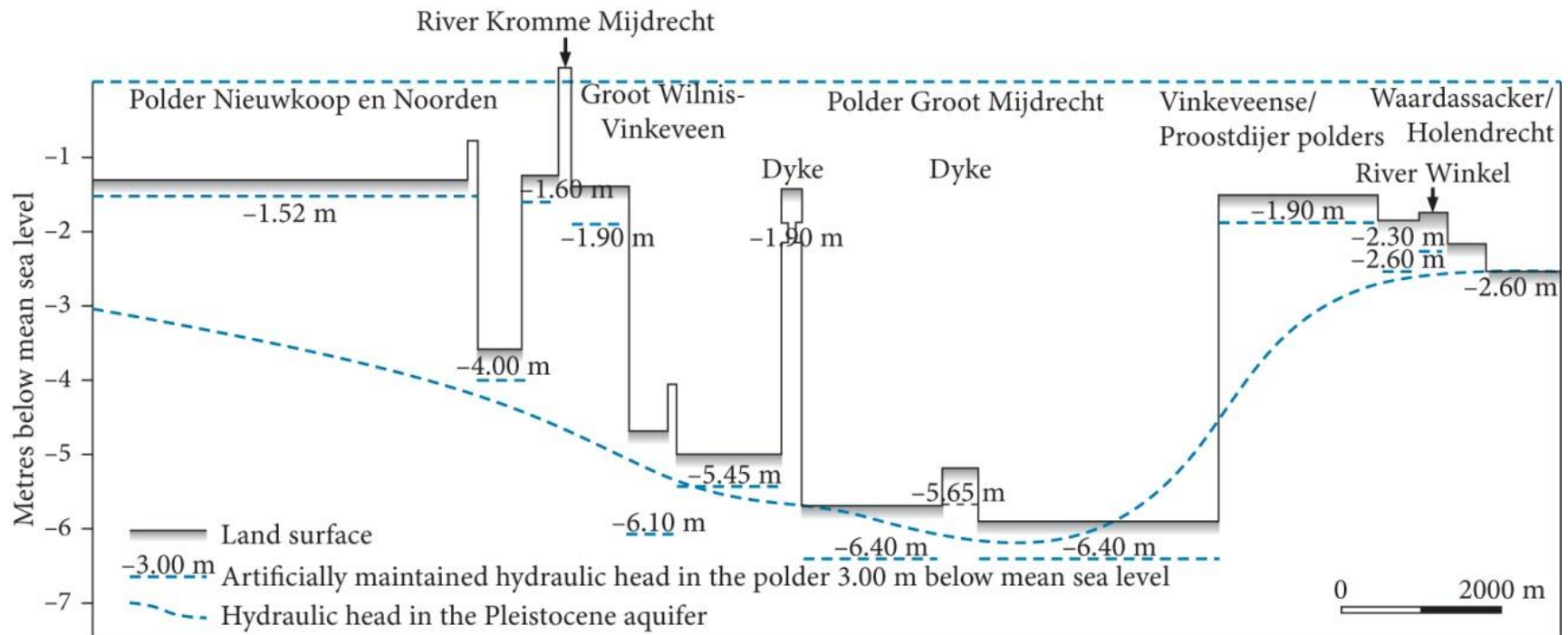


Pennink (1853-1936)

Recharge and seepage area

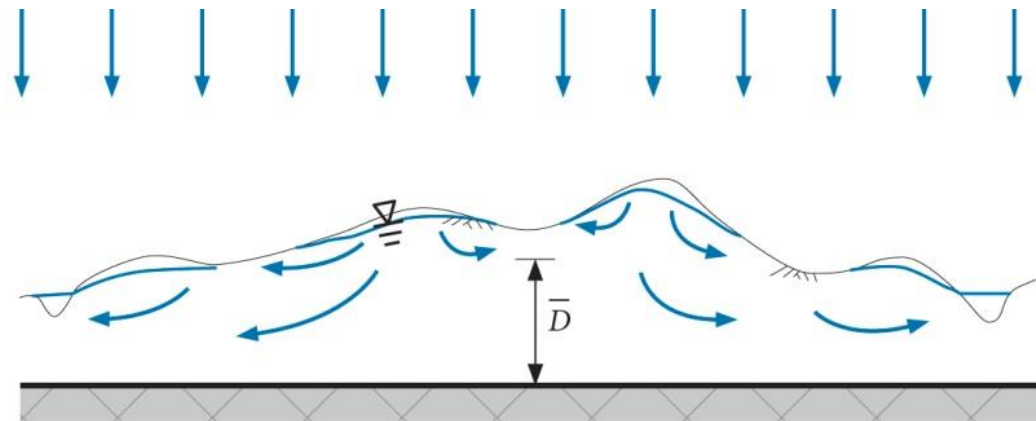


Polder Groot Mijdrecht



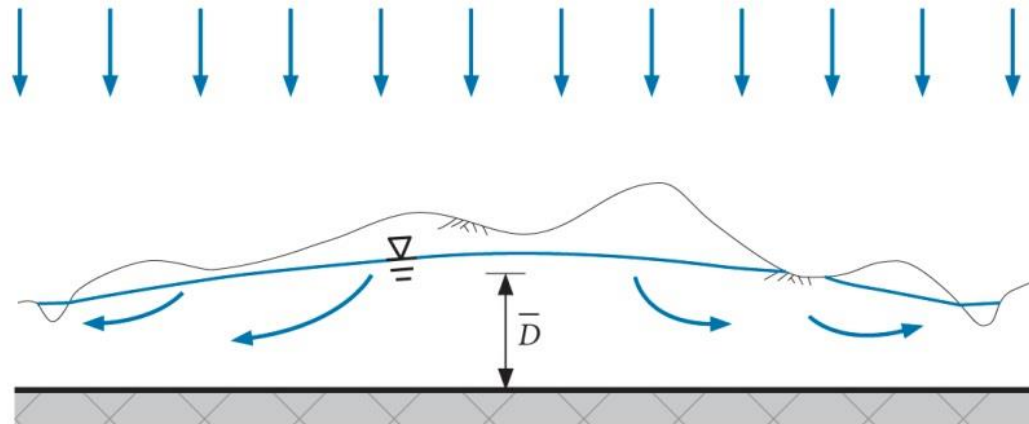
After De Vries (1980)

Recharge/transmissivity ratio



(a)

topography-controlled water table

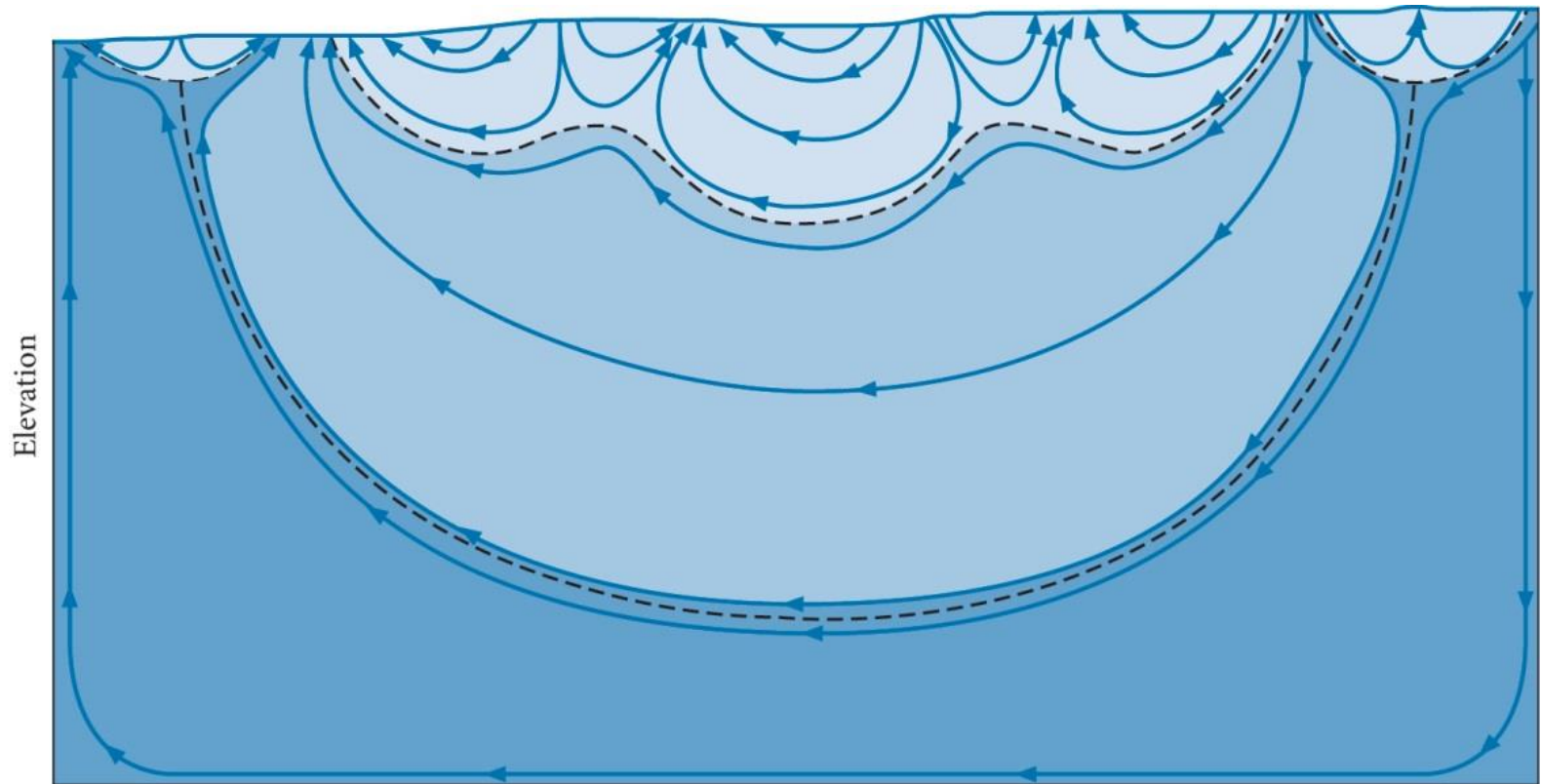


(b)

recharge-controlled water table

Adapted from Haitjema (1995)

Groundwater flow systems



Groundwater flow systems:



Regional



Intermediate



Local

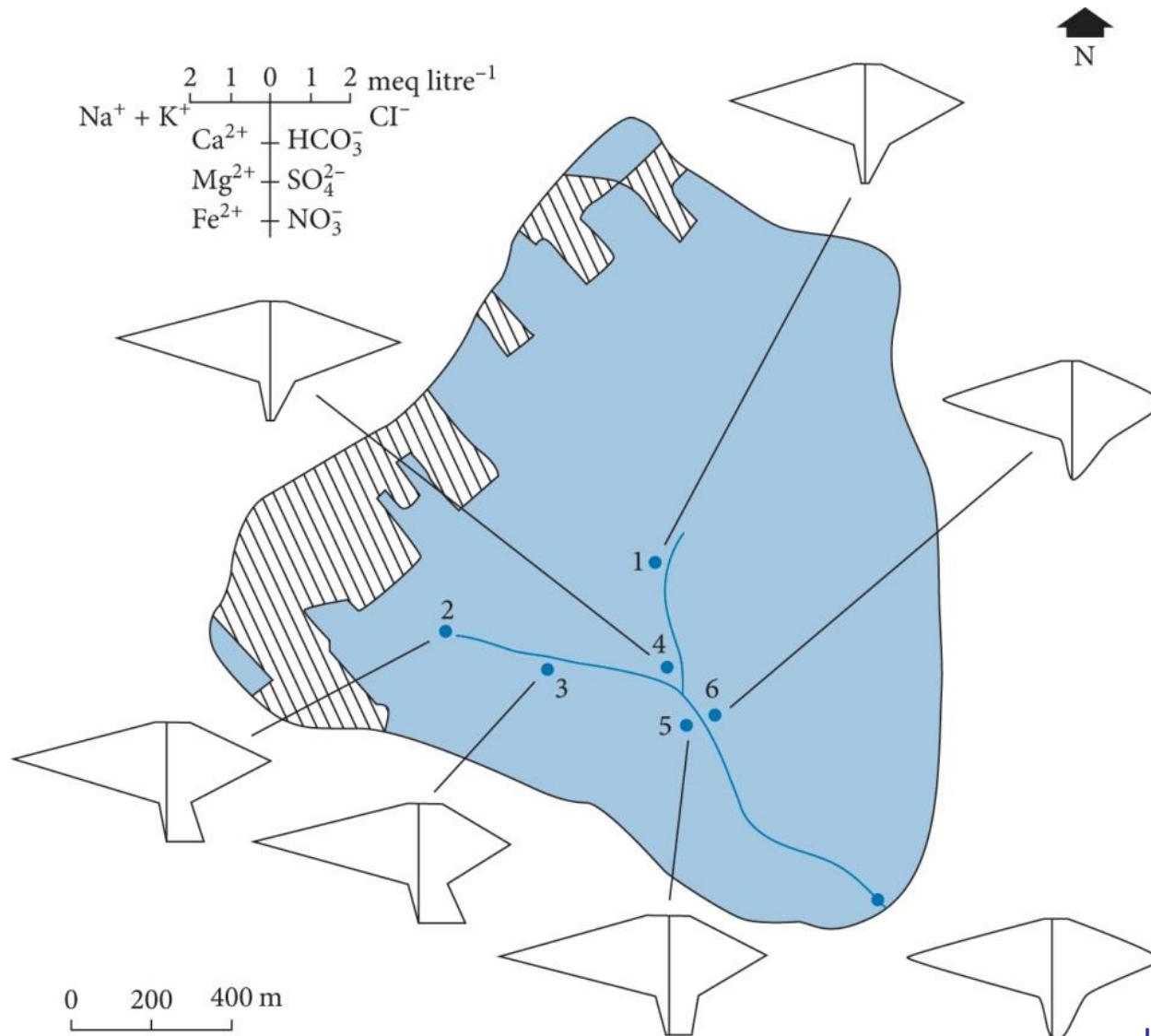


Direction of flow

--- Boundary between different groundwater flow systems

After Tóth (1963)

Adapted Stiff diagrams

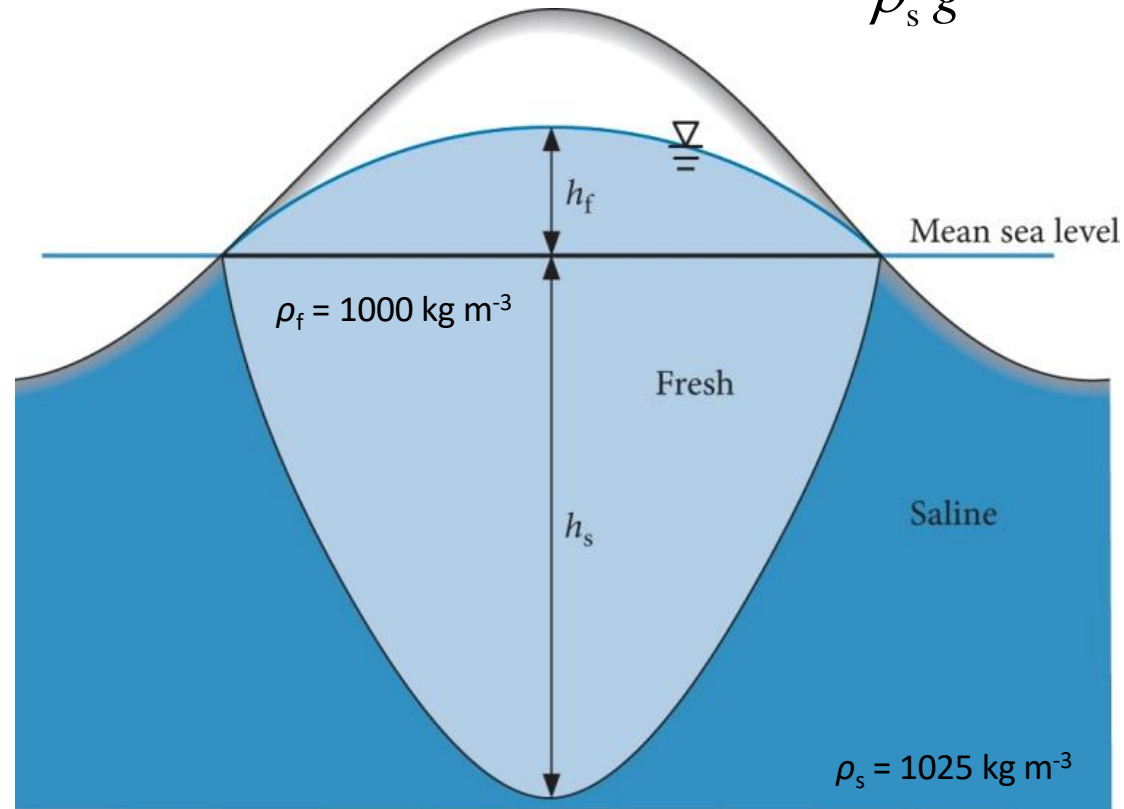


Hendriks (1990)

Ghijben-Herzberg relation

$$h_s + h_f = \frac{p}{\rho_f g} \Rightarrow p = \rho_f g (h_s + h_f)$$

$$h_s = \frac{p}{\rho_s g} \Rightarrow p = \rho_s g h_s$$

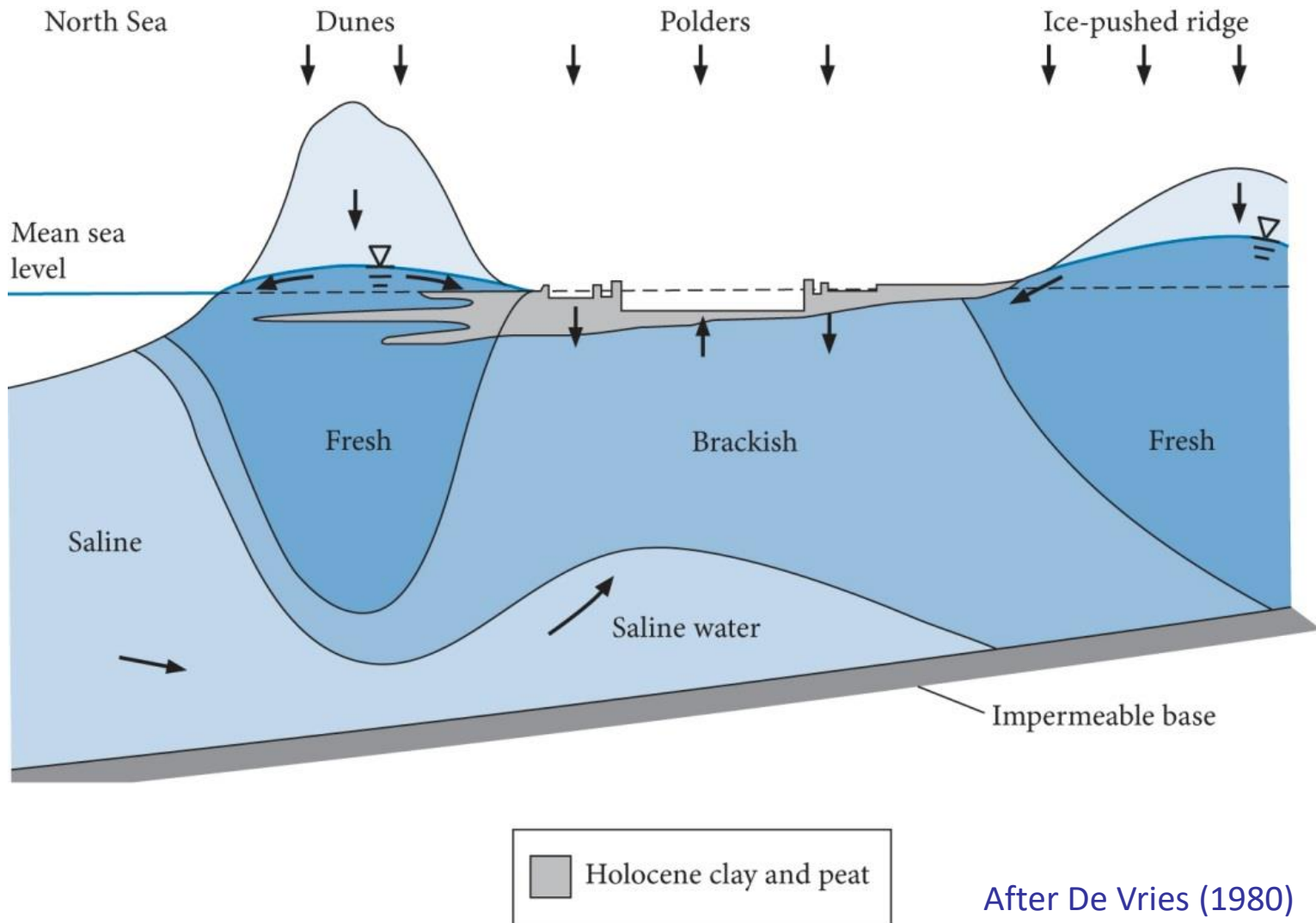


$$h_s = \frac{\rho_f}{\rho_s - \rho_f} h_f$$

$$h_s \approx 40h_f \Rightarrow h_s + h_f \approx 41h_f$$

h_f = convexity = differential head

Holland

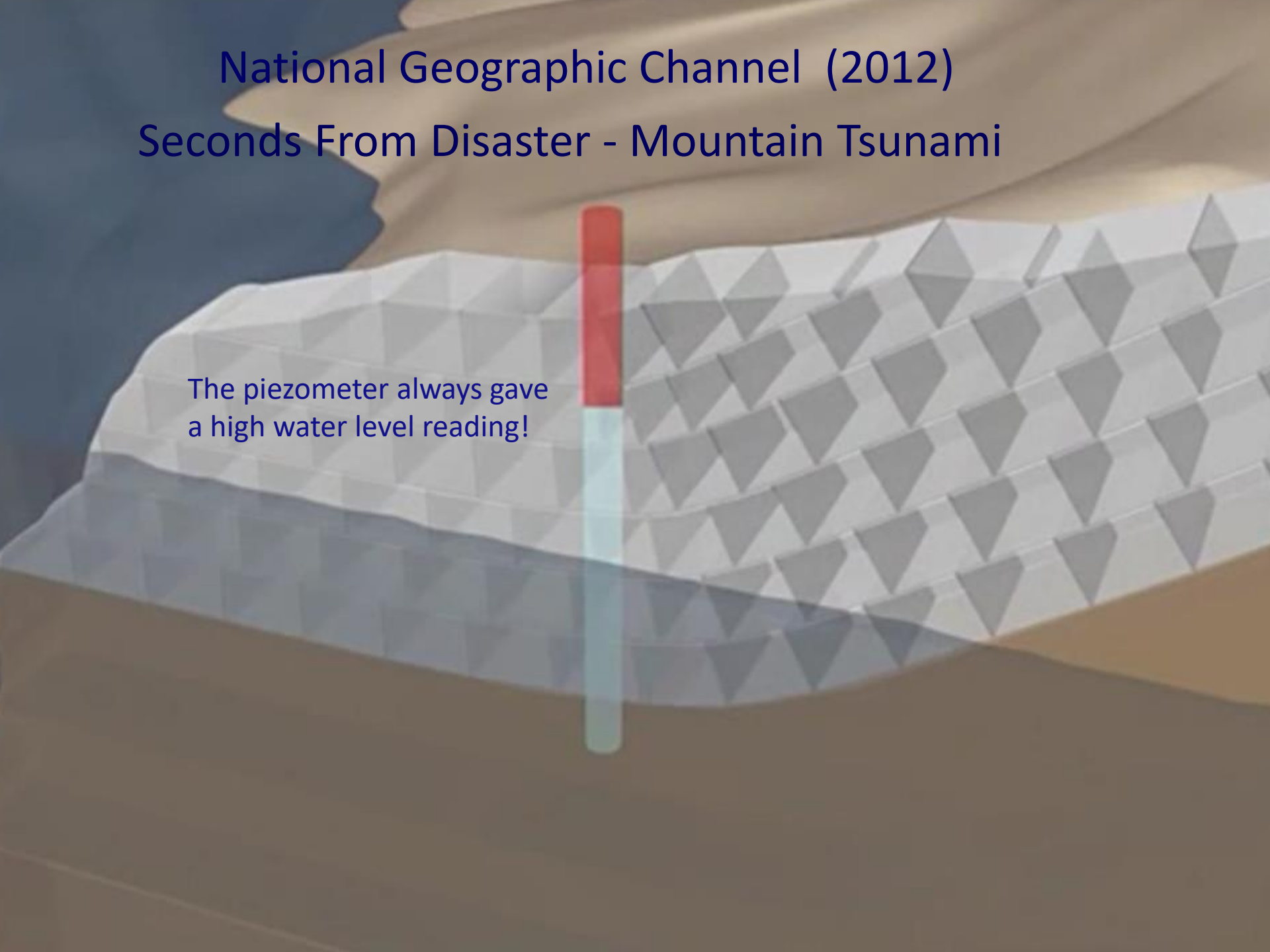


After De Vries (1980)

National Geographic Channel (2012)

Seconds From Disaster - Mountain Tsunami

The piezometer always gave
a high water level reading!





References

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Hendriks, M.R. (1990), Regionalisation of hydrological data: effects of lithology and land use on storm runoff in east Luxembourg. PhD thesis, VU University Amsterdam, The Netherlands. Also available as Netherlands Geographical Studies 114, Royal Dutch Geographical Society (KNAG), Utrecht.

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