Stratigraphical record vs. geological time

- **lithostratigraphy:**
  same/similar lithology: grouped together

- **Walther’s Law:**
  units are diachronous: biostratigraphy

Figure 2.1 The differing age of the Kimmeridge Clay lithostratigraphical unit in Northern France, Southern England and the North Sea.

Figures by Coe (2003)
Sea-level change

- eustasy vs. relative sea-level; $\Delta V$

- interpretation: sequence stratigraphy model, cycles: 10ka - >50Ma
  - genetic approach, genetic units
  - packages of strata are bounded by chronostratigraphical units
    - unconformities [gaps] (relative sea-level fall)
    - flooding surfaces (relative sea-level rise)
Sediment accommodation space

- Accommodation space (non-marine)
- Accommodation space (marine)
- Eustasy
- Current sea-level
- Previous sea-level
- Tectonic uplift
- Tectonic subsidence
- Siliciclastic sediment supply from rivers

Beach zones:
- Backshore zone
- Supratidal area
- Foreshore zone
- Intertidal area
- Shoreface zone

Subtidal areas:
- Offshore transition zone
- Offshore zone

Continental shelf

Oceanographic features:
- Sea-level at mean high tide
- Sea-level at mean low tide
- Fairweather wave-base
- Storm wave-base
Development of parasequences

- sea-level + accommodation space + sediment supply
  - variations over a number of different time-scales
- small-scale units: balance between sediment supply and accommodation space

**Key**
- Alluvial and coastal plain sediments
- Shallow-marine sediments
- Offshore-marine sediments
Sequences and systems tracts

- **depositional sequence:**
  succession of parasequence sets

- **each sequence:**
  - one cycle: balance between accom. space & sediment
  - built up by up to 4 **systems tracts**, each st.: at least one parasequence set
erosion, incised valleys

Wendepunkte!
HST

exercise: shelf break
shelf break
FSST: falling stage systems tract

- lost of accommodation space
LOWSTAND SYSTEMS TRACT (LST)

KEY to LST sediments
- alluvial and coastal plain sediments
- shallow-marine sediments
- offshore-marine sediments
- submarine fan sediments

(a) Lowstand systems tract (LST) model showing relative sea-level changes over time.

(b) Diagram illustrating the top of FSST deposits and sea-level changes.

(c) Progradation of shoreline sediments in low gradient areas over the top of the slope fans.

(d) Rivers cease to incise and water level starts to rise in the incised valleys.

Legend:

- $t_1$: Initial lowstand
- $t_2$: Terminal lowstand
- $t_3$: Intermediate lowstand
Transgressive Surface

- creation of accommodation space > rate of sediment supply
erosion, incised valleys
Ü7: Sequenz stratigraphie

(1) Zeit-Distanz-Diagramm mit Fazies erstellen (Zeitlinien 1-29)
(2) Zeitabschnitte für Progradation und Regression bestimmen
(3) Sequenzgrenzen und Flächen der maximalen Überflutung herausfinden
(4) Markierung der Systemzüge (system tracts: HST, FSST, LST, TST)