

Exam "Dynamics of Basins and Orogens" (AW-4018)

Friday, January 30, 2004

Note. Read the questions well. Formulate your answers in a concise way; make drawings whenever you think this will clarify your explanation. **Write your name + student number on each sheet you hand in.**

Let op. Het is toegestaan de vragen in het Nederlands te beantwoorden.

Question 1. During this course we discussed mainly two types of sedimentary basins: extensional basins and flexural basins.

(1a) Describe the sedimentary sequence typically associated with each of these two basin types and explain how the different units of each sequence relate to the evolution of the basin.

(1b) In order to reconstruct the history of subsidence of a given basin one can make use of the technique named "backstripping". Is this method equally well applicable to both types of basins? Explain your answer.

Question 2. Most orogenic belts reveal rocks that underwent metamorphism due to exposure to elevated temperature and pressure. Discuss how metamorphic petrology, structural geology, and numerical modelling can be combined in order to gain insight into the causes of metamorphism.

Question 3. One of the important theoretical concepts that has been developed in the study of both basins and orogens is that of gravitational potential energy.

(3a) Explain what is meant with the term "gravitational potential energy" (in the context of lithosphere dynamics) and explain how it is quantified.

(3b) Discuss how the concept of gravitational potential energy can be applied to the formation of an orogenic belt by shortening and its subsequent destruction through extension.

(3c) Explain how the presence of a subduction zone, adjacent to and with the slab dipping below, a shortened and thickened overriding continental margin, may be related to the switch from shortening to extension of that margin (i.e., "orogenic collapse").