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ENGINEERING GEOLOGY & GEOTECHNICAL MODELS

ENGINEERING GEOLOGY

Introduction – Alpine Movements

ENGINEERING GEOLOGY & GEOTECHNICAL MODELS

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ENGINEERING GEOLOGY

BASIC PRINCIPLES

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Engineering Geology - Definition

Engineering Geology may be defined as:

"*The application of the geologic sciences to engineering practice for the purpose of assuring that the geologic factors affecting the location, design, construction, operation an maintenance of engineering works are recognized and adequately provided for*."

Wikipedia

History of Engineering Geology in Australia

- Prior to Snowy Mountains Authority all geological work was done by the Geological Survey in each state
- Geologists did mapping and drilling as part of a separate team to the engineers
- Laboratory testing was a third team working independently of the geologists and engineers
- The Snowy changed all this – mainly because of the efforts of one man – Daniel Moye who, by demonstrating that geology could be useful in engineering – set up in the initial days of the Snowy a group of geologists referred to as Engineering Geologists working in the Scientific Services Department.

History – *Principles Established by D.G. Moye*

D. G. Moye

- Communication with Engineers
- Fact and Inference
- Quantification
- Weathering Classification
- Geomorphology
- Teacher and Mentor
- Report Writing

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Engineering Geology – Alternative Definition

Engineering Geology may also be defined as:

"Geology that is useful in engineering"

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History – *Principles Established by David Stapledon*

David Stapledon

- Logging as an art-form
- Geo-”logic”
- Modelling
- Understanding of Processes

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History – *Principles Established by David Coffey*

David Coffey

- Was an acquaintance of `D.G. Moye and understood role of geologists in a private consultancy
- Engaged David Stapledon who brought the Snowy experience with him to Coffey
- Was a highly respected and professional engineer, teacher and mentor
- Engaged staff who reflected those skills
- Treated engineers and geologists equally thus blurring the distinction between the limits of each discipline
- These staff left to set up their own consultancies thereby disseminating the skills learnt from the grass root approach to engineering geology

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Geomorphology – The Hidden Tool of the Geologist

The best way to approach geology is through the mountains and valleys of the great landforms:

- New Zealand
- European Alps
- The Great Rift valley – Africa and Jordan
- The Great Barrier Reef
- The Central Pacific Hot Spot
- The Ring of Fire
- The older mountain ranges of Australia

Active geology is exciting

Voyage of discovery that geology is not hard

- Let us consider each of these environments and how sediments change and develop in each of these environments and how these lead us onto our goal of Understanding Geology and hopefully you will say at the end of this course –

  “Geology is not only not hard but it is interesting and I cannot get along without it”:

NZ Alps

Mt Cook –

A great place to start.

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Voyage of Sediment

- Geology is ever never stable – just some parts are moving faster than others.
- NZ Alps and European Alps confront you with movement – and I have chosen this movement as the starting point for our voyage.
- Landslides. Glaciated valleys, active glaciers and wild rivers are only a part of the beauty of NZ to a geologist.
- Plate tectonics and volcanism on a grand scale tells you that that not only is the the place beautiful but also active.

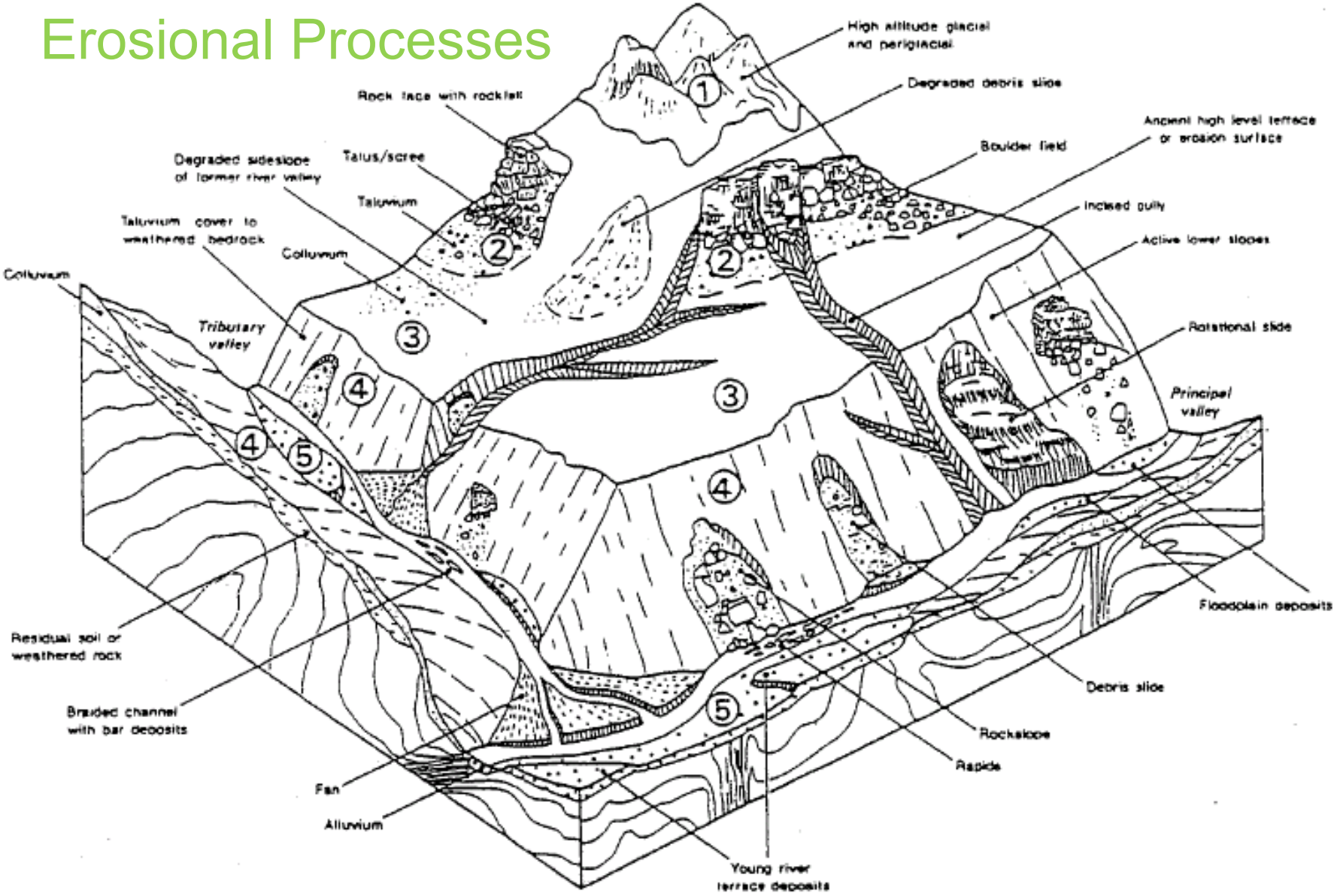
European Alps

- The balcony of the Geology Institute Dolomieu overlooks Grenoble in SE France.
- From the balcony you can see in front of you a deep infilled glaciated valley and the crystalline granite basement rock of the Massif of Vercors where the Winter Olympics of 1968 were held,
- To the right of you the overturned limestone rocks of the recumbent Nappes where the Ski Jump was held in the 1968 Olympics
- To the left and beneath your feet the folded rocks of the Jura Mountains.
- THE GEOLOGY OF MY TEXT BOOKS WAS SPREAD OUT BEFORE ME

Glacial Geomorphology

- Glaciers, are effective agents of landscape change.
- The movement of ice down a valley causes abrasion and plucking of the underlying rock.
- Abrasion produces fine sediment,
- Glacial erosion is responsible for U-shaped valleys, as opposed to the V-shaped valleys of fluvial origin.

Erosional Processes



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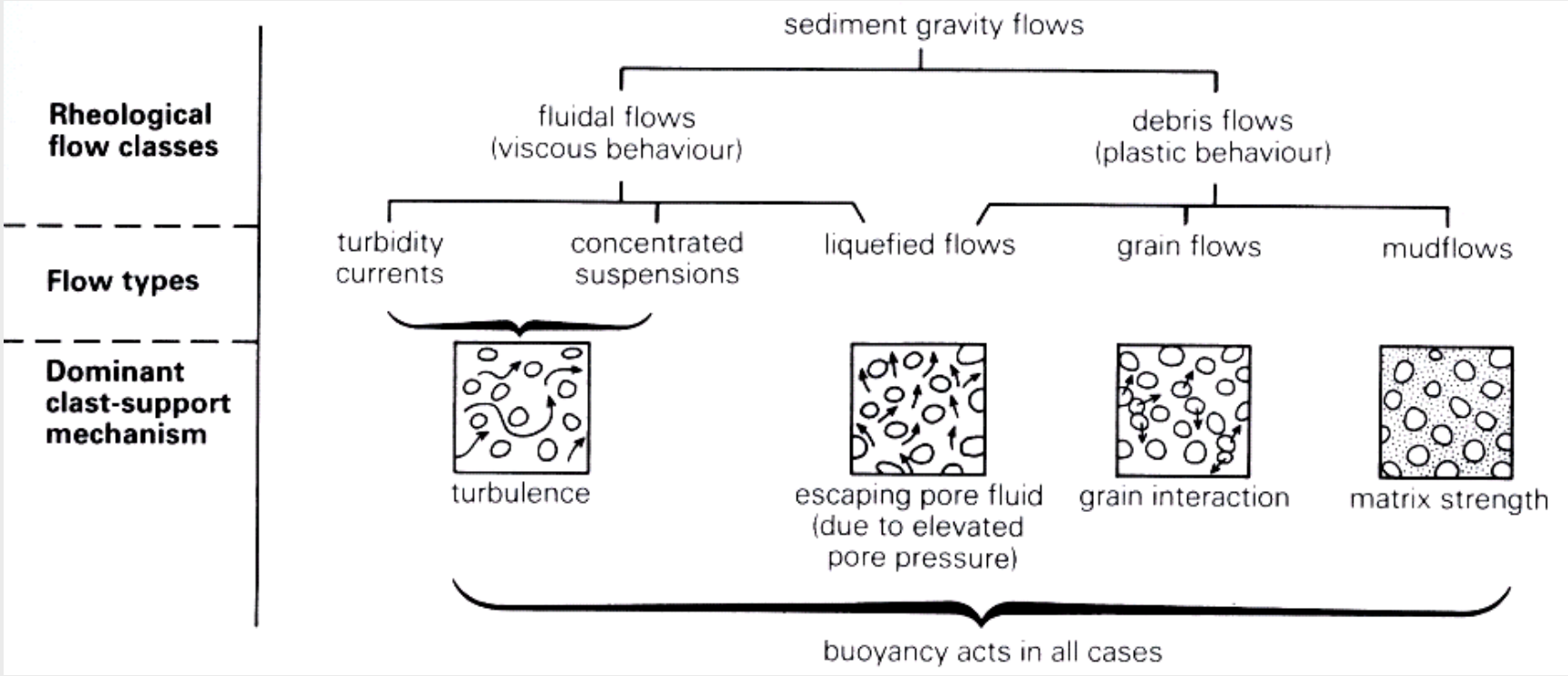
Landforms of the Alps – Types of Gravity Flow



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