الجيولوجيا العامة
الوحدة الحادية عشرة

الخرائط الجيولوجية

لطلاب المرحلة الأولى

العام الدراسي

2019 - 2020

8. المقياس:
هو نسبة الطول على الرسم إلى الطول الحقيقي.
9. خطوط الكنتور المتوسطة:
وهي خطوط تربط بين النقاط ذات الارتفاعات المتساوية.
10. الفاصل الرأسي "الفاصل الكنتوري" :
- عبارة عن الفرق في الارتفاع بين كل خط كنتور وآخر.
- الفرق بين قمة ارتفاع النقطة الأولى والنقطة الثانية المراد معرفة معدل الإنحدار بينهما.
11. المسافة الأفقية:
هي المسافة المقاسة بالمسطرة بين نفس النقطتين مضروبةفي مقياس رسم الخريطة.
12. درجة الانحدار:
هي الزاوية المحصورة بين السطح المنحدر والسطح المستوي "السطح الأفقي".
13. معدل الإنحدار "نسبة الانحدار" :
هي نسبة بين الفاصل الكنتوري "المسافة الرأسية" و المسافة الأفقية

العوامل المؤثرة في حدوث الانهيارات الأرضية

العوامل الجيولوجية :

1- انتشار الصخور المتأثرة بفعل الاجهادات (فواصل ـ فوالق ـ شقوق).
2- توفر الانقطاعات (اسطح التطبق ، التورق، اسطح التلامس).
3- النفاذية في الصخور.
4- التجوية التفاضلية للصخور والتعرية .
5- التمدد والانكماش في الصخور.
6- العمليات التكتونيةالزلزالية.

العوامل الطبوغرافية والمناخية:

1- التباين التضاريسي في الارتفاعات للمنحدرات وشدة الانحدار.
2- تنوع المظاهر التضاريسية من حافات انكسارية وكويستا وغيرها.
3- الأمطار والتغاير المناخي.
4- السيول والفيضانات.

العوامل البشرية :

1- القطع على المنحدرات لأغراض البناء او شق الطرقات وغيره.
2- خزن المياه أعالي المنحدرات وتتمثل في حفر البرك. دون صيانتها من تسرب المياه الى المنحدرات.
3- إزالة الغطاء النباتي بالاحتطاب في منحدرات التربة.
4- الاستغلال الجائر للمياه الجوفية.
5-الحفر والتفجير.
6- الارتجاج الناتج عن حركة المركبات.

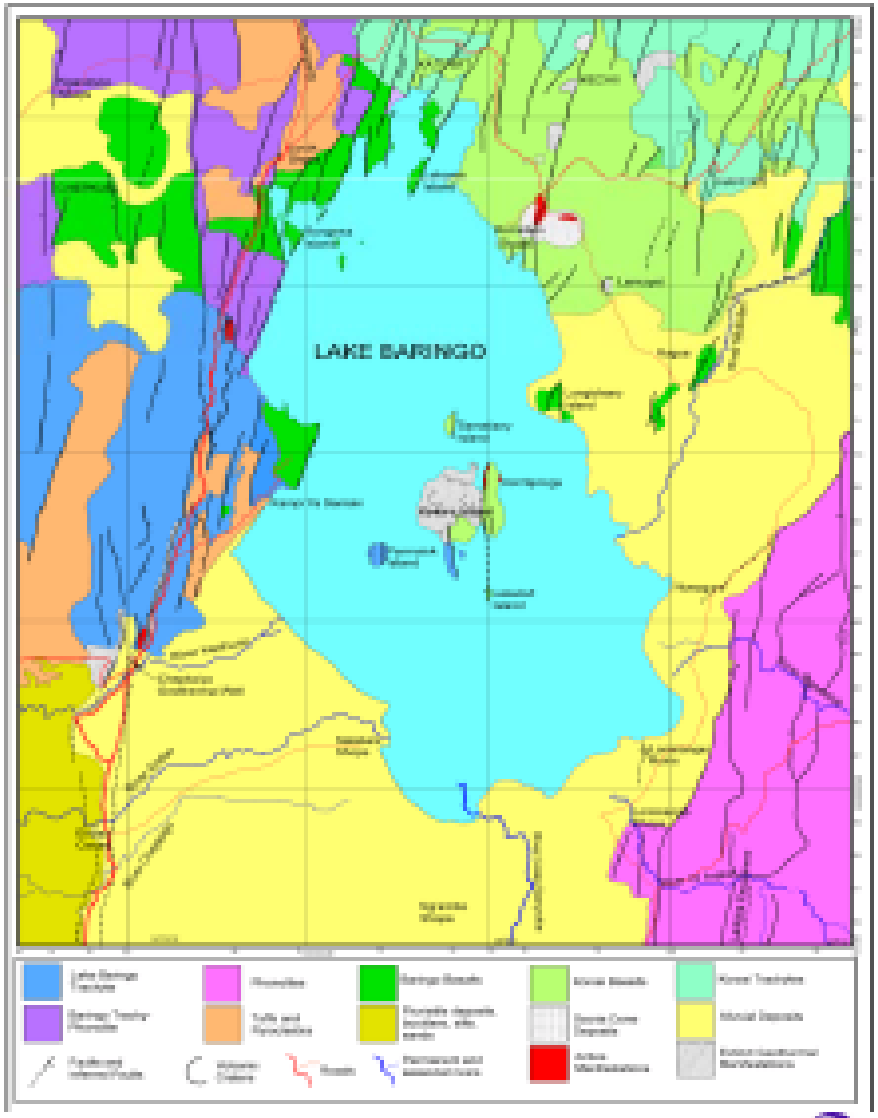
الخرائط الجيولوجية

Satellite image of a richat structure in the Sahara desert of Mauritania. This structure is almost 50 kilometers (30 miles) across and was originally interpreted as a meteorite impact structure because of its high degree of circularity. Now it is thought to be a symmetrical uplift (circular anticline) that has been laid bare by erosion. Paleozoic quartzites form the resistant beds outlining the structure. Credit: *Photographer:* ASTER Advanced Spaceborne Thermal Emission and Reflection. Image courtesy Earth Science World Image Bank http://www.earthscienceworld.org/images.

Geologic Mapping

Geologic mapping is a means of discovering geologic features that include rock types, contacts, age relations, and structural patterns, and seeing the features in three dimensions.

Geologic mapping results in the preparation of a geologic map and the development of a geologic history for an area.

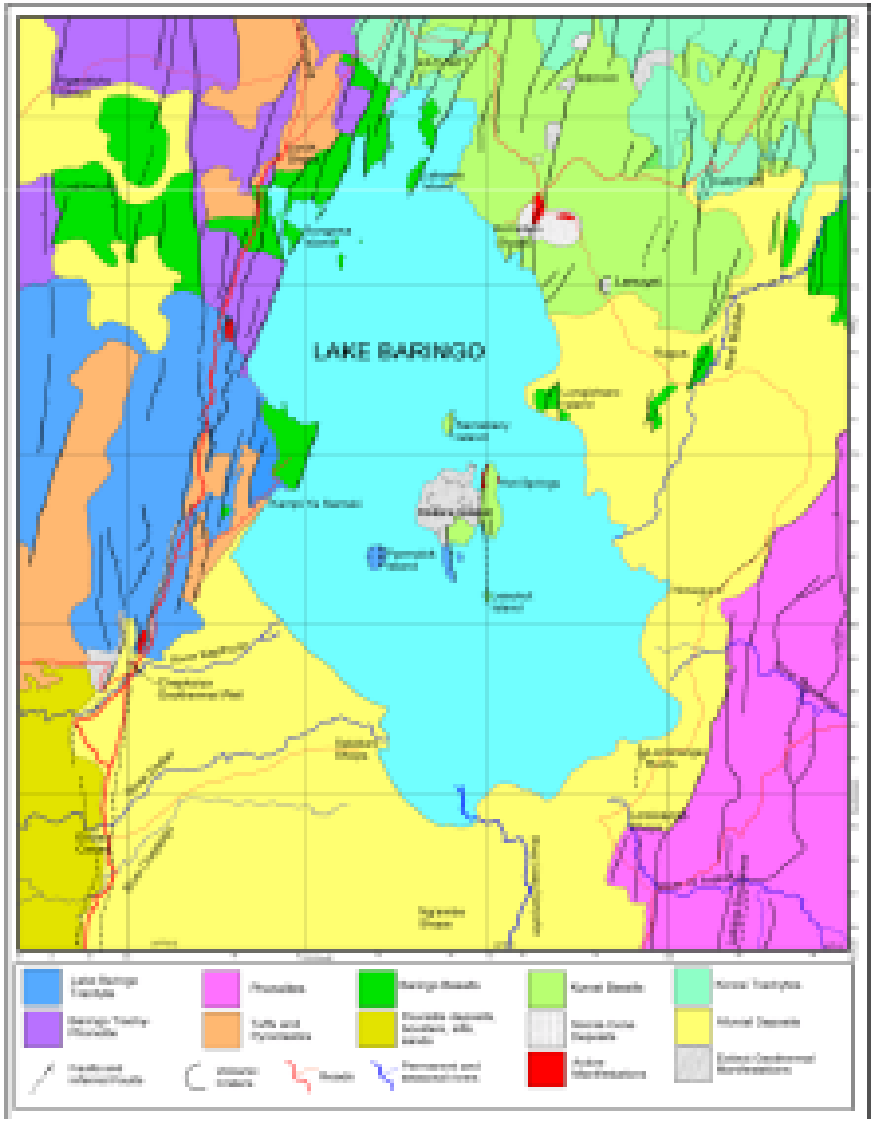


KenGen

Geological Map

A geological map is a precisely oriented scaled down diagram of the earth's surface. Its position on earth is shown by lines of latitude and longitude or geographic boundaries.

Sizes, orientation, and positions of geologic features can be compared exactly with those of other maps (Compton, 1985).

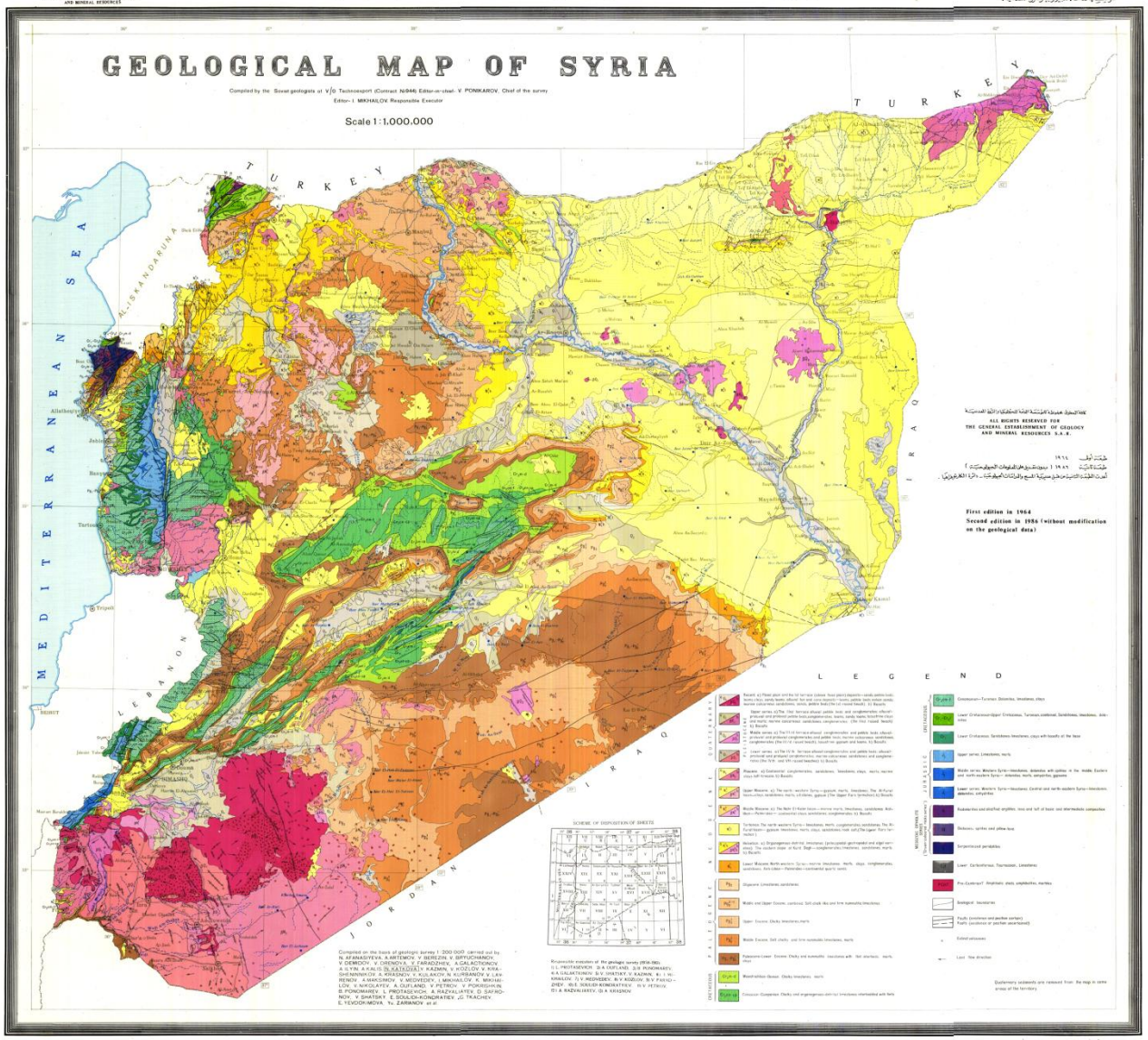


KenGen

SYRIAN ARAB REPUBLIC
MINISTRY OF PETROLEUM
AND MINERAL RESOURCES
THE GENERAL ESTABLISHMENT OF GEOLOGY
AND MINERAL RESOURCES

خريطة سورية الجيولوجية

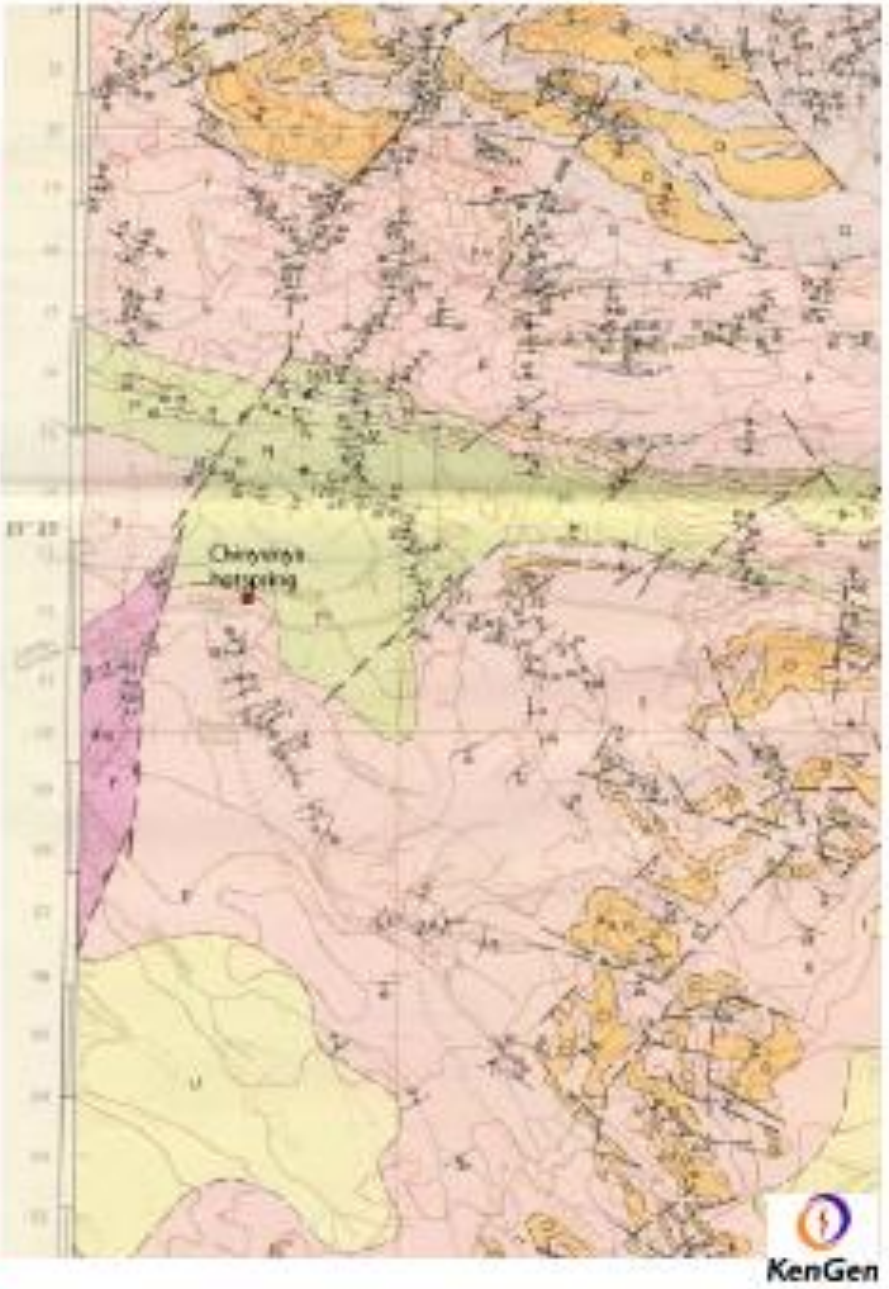
الجمهورية العربية السورية
وزارة النفط والثروة المعدنية
المؤسسة العامة للجيولوجيا والثروة المعدنية



Geological Map

A geologic map thus shows the following:

- Distribution of rocks at the surface
- Geologic structures
- Cross section in distribution of rocks in the subsurface
- Age relations

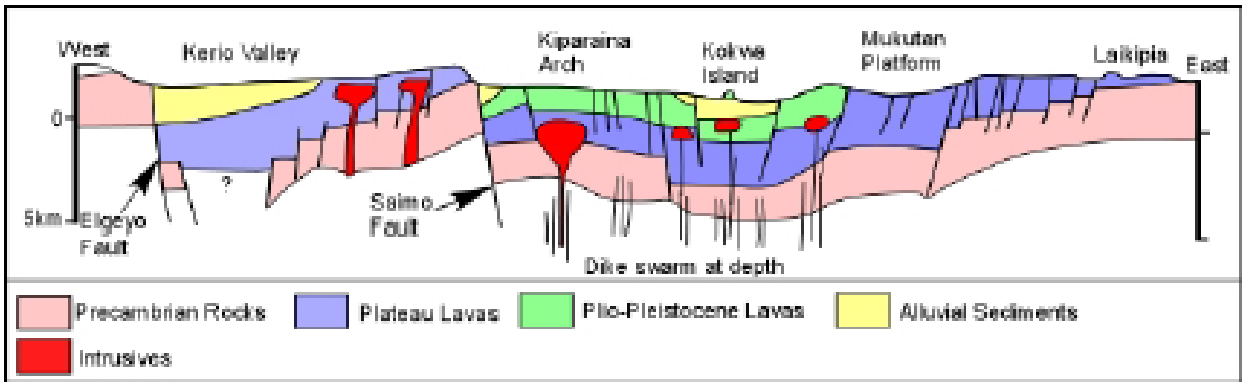


Geologic Cross-Sections

A geologic cross-section is a sideways view of a slice of the earth. It shows how the different types of rock are layered or otherwise configured, and it portrays geologic structures beneath the earth's surface, such as faults and folds. Geologic cross-sections are constructed on the basis of the geology mapped at the surface combined with an understanding of rocks in terms of physical behavior and three-dimensional structures.

Geologic cross section

- A case example of geologic cross section of Lake Baringo area



Geologic Problems

- Geologic problems that may require mapping include the following:
  - Geothermal Resources
  - Mineral resources (metallic and non metallic)
  - Petroleum
  - Water resources (surface and ground water)
  - Geo-hazard assessment (volcanic, seismic)
  - Engineering foundation design (geotechnical)
  - Environmental issues
  - Chemical depositories, etc.

Geologic Mapping steps

1. Reconnaissance:

- To make sure the area is suitable for the planned study
- To enable proper planning of the field campaign in light of time and funds available.

KenGen

Results of reconnaissance

- Reconnaissance will result in:
  - the assessment of the road network and accessibility,
  - land ownership,
  - Accommodation or camping,
  - terrain, and
  - general strategy on how and when to commence the study.

KenGen

2. Field Work/Geological mapping

Equipment Required:

- Base maps (topographic or planimetric),
- Air photos and or satellite imageries,
- Notebooks, pencils,
- Compass with clinometers and GPS,
- Hand lens, camera, dilute HCl acid and
- Geologic hammer, chisel, etc.

KenGen

Photos of field equipment

Geological mapping

- As rock units and other features are encountered, their exact positions and structural features are marked on the map.
- The localities are numbered to relate them to the notebook notes.

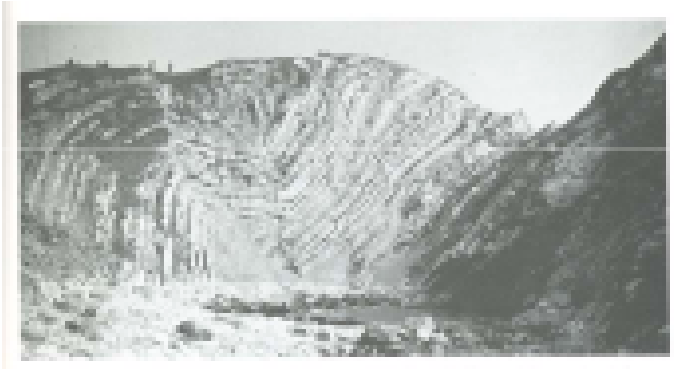
KenGen

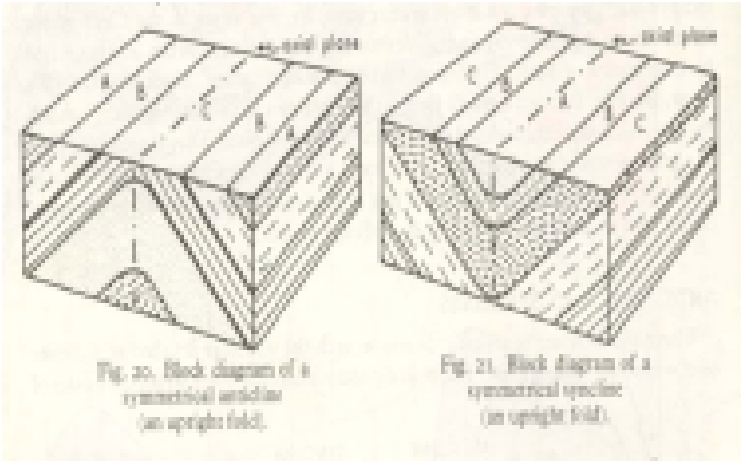
What to map:

- Rock types and their contacts
- Shape of the rock bodies
- Note the sequence and relative ages
- Note primary porosity and permeability
- Note the weathering and their patterns
- Note depositional or magmatic flow features
- Geologic Structures
- Geothermal manifestations

KenGen

What to map continued…





- Folding - dip, strike, deformation, orientation of grains
- Joints – attitude, size, open or closed
- Faults – look for slickensides, fault gouge, breccia and visible displacements
- Alignment of geothermal manifestation

KenGen

Mapping rock outcrops: Sedimentary rocks

- Note the following:
  - Depositional structures,
  - Grain types and sizes
  - Fossil contents
  - All the features listed in earlier slides must be checked and care should be taken that only 'in situ' rocks are mapped.

KenGen

Mapping rock outcrops: Volcanic rocks

- **Note the following:**
  - Lava flow surface patterns to determine provenance
  - Colour and mineral composition
  - Nature of the lava flow and thickness
  - Presence of dikes, sills or any other intrusions
  - For pyroclastic rocks, composition and size of the clasts should be noted; thickness of the beds should also be recorded.

KenGen

Mapping rock outcrops: Volcanic rocks contd..

- **Note the following:**
  - Note degree of compaction of the pyroclastic beds and any cementation if present
  - Record occurrence, orientation and nature of explosion vents (craters, caldera, vents etc)
  - Note any association between volcanic vents and local structures

KenGen

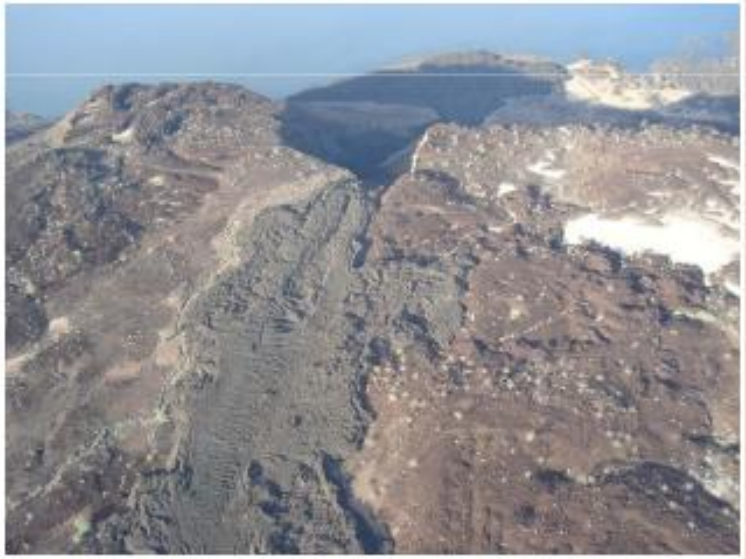
Faults…

- Alignment of volcanoes

Difficulty of mapping volcanic rocks

- Few fossil if any making correlation difficult
- Rapid lateral changes of the rock types often occur
- Different outcrops may consist of rocks of similar appearance
- Faulting is common which causes offsets of bodies

Volcanic rocks



- Many volcanic rocks are deposited on slopes resulting in variable thickness and extent

Geologic sampling

- The following should be considered:
  - only samples rocks that are 'in situ'
  - fresh, un-weathered rocks preferable
  - hydrothermal alteration products
  - Minerals
  - Soils at particular levels
  - stream sediments

What to do with samples

- Samples should be collected for the following laboratory analyses:
  - Petrography
  - Petrochemistry
  - XRD analysis
  - Grain size tests
  - Radiometric dating