CZECH REPUBLIC
DEVELOPMENT COOPERATION

Preliminary results from mapping of volcanic risks in Hosaina - Awassa area

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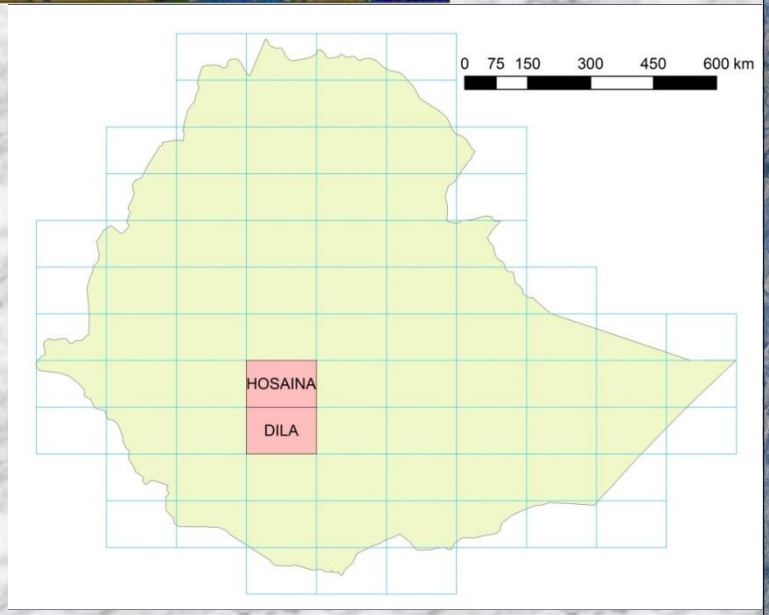
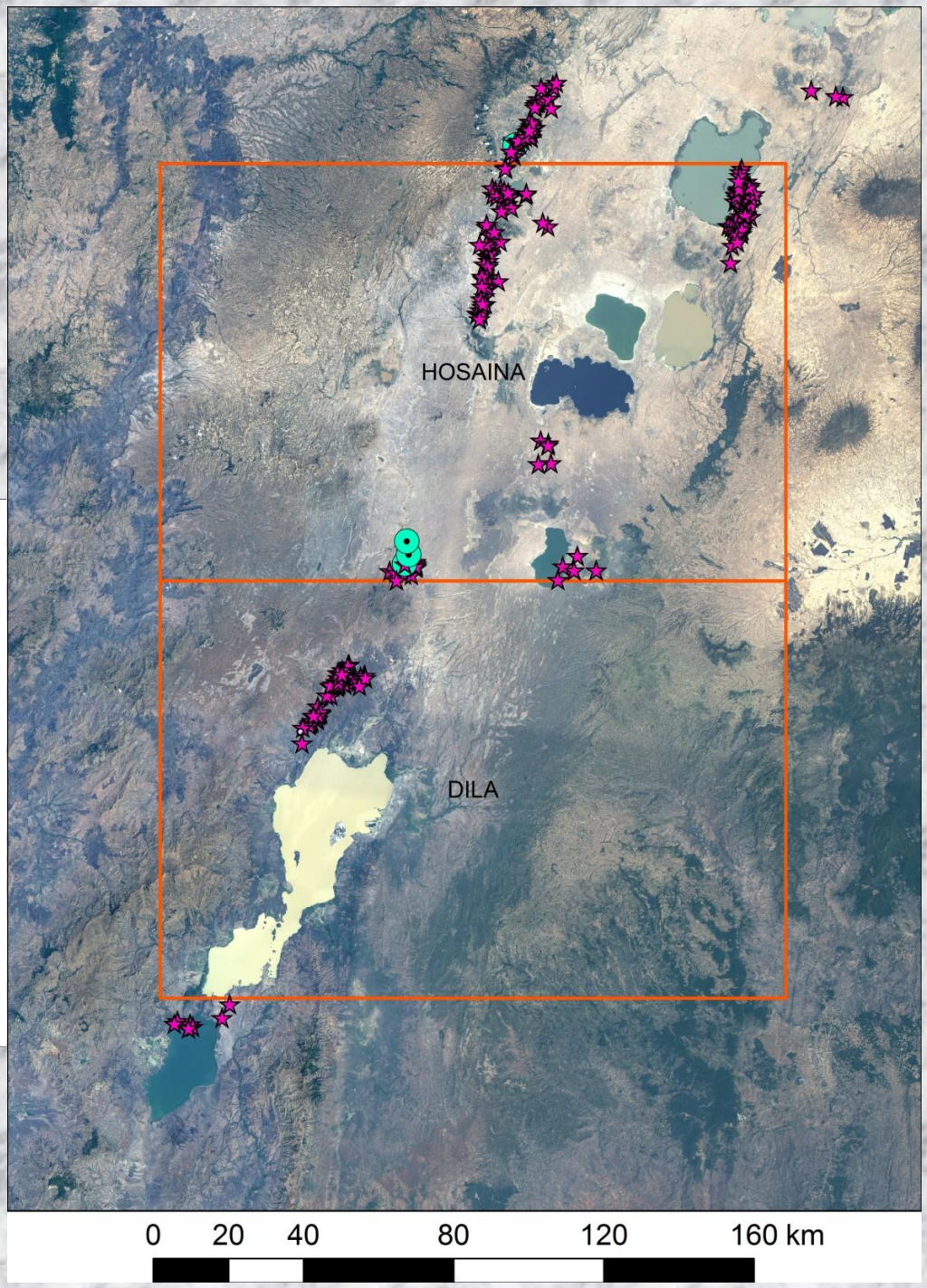




The area of interest, violet stars = monogenetic volcanoes

OBJECTIVES:

- Mapping for location and extent of the volcanic system
- Type of volcano
- Character, style and volume of past eruptions
- Composition and evolution of magmatic system
- Time since last eruption
- Eruption frequency

Principles of physical volcanology

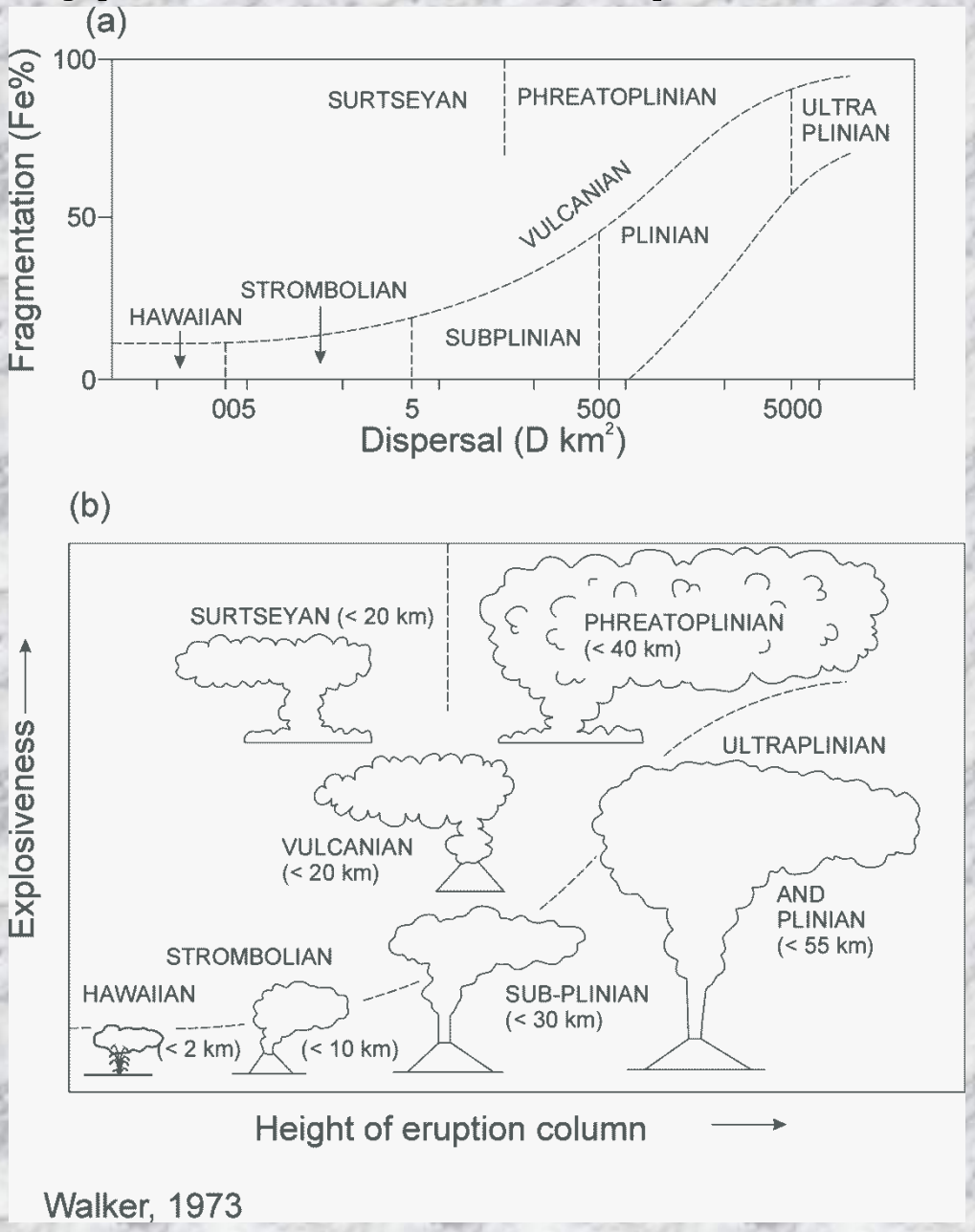
Style of fragmentation:

- **Pyroclastic (during eruption)**
- **(Hydroclastic) – phreatomagmatic eruptions**
- **Autoclastic (mechanic fragmentation of lava)**
- **Hyaloclastic (quench fragmentation on contact of lava with water)**
- **Epiclastic (weathering, erosion)**

Deposition of pyroclastic material:

- **Fall**
- **Flow**
- **Surge**

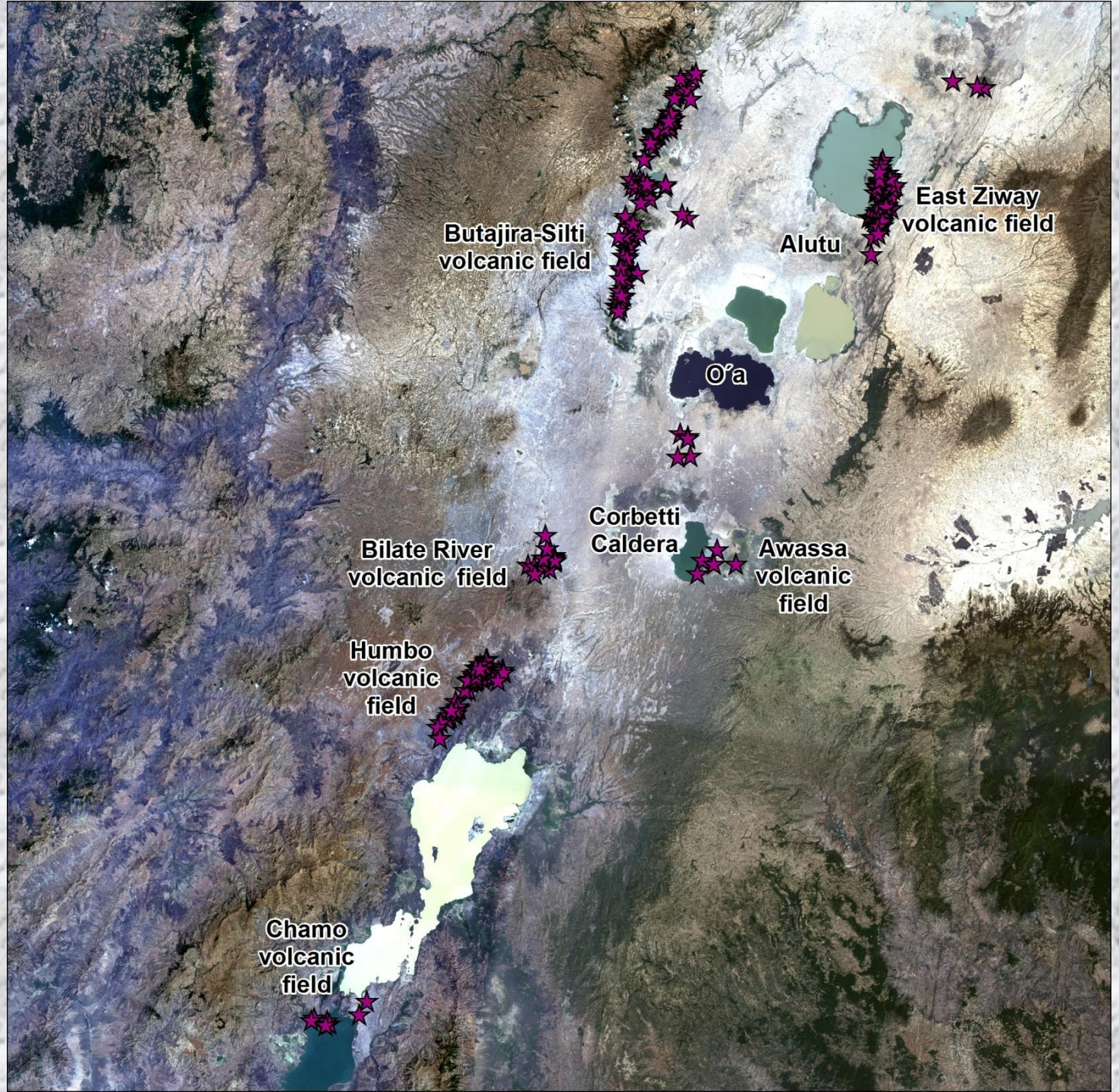
Types of volcanic eruptions

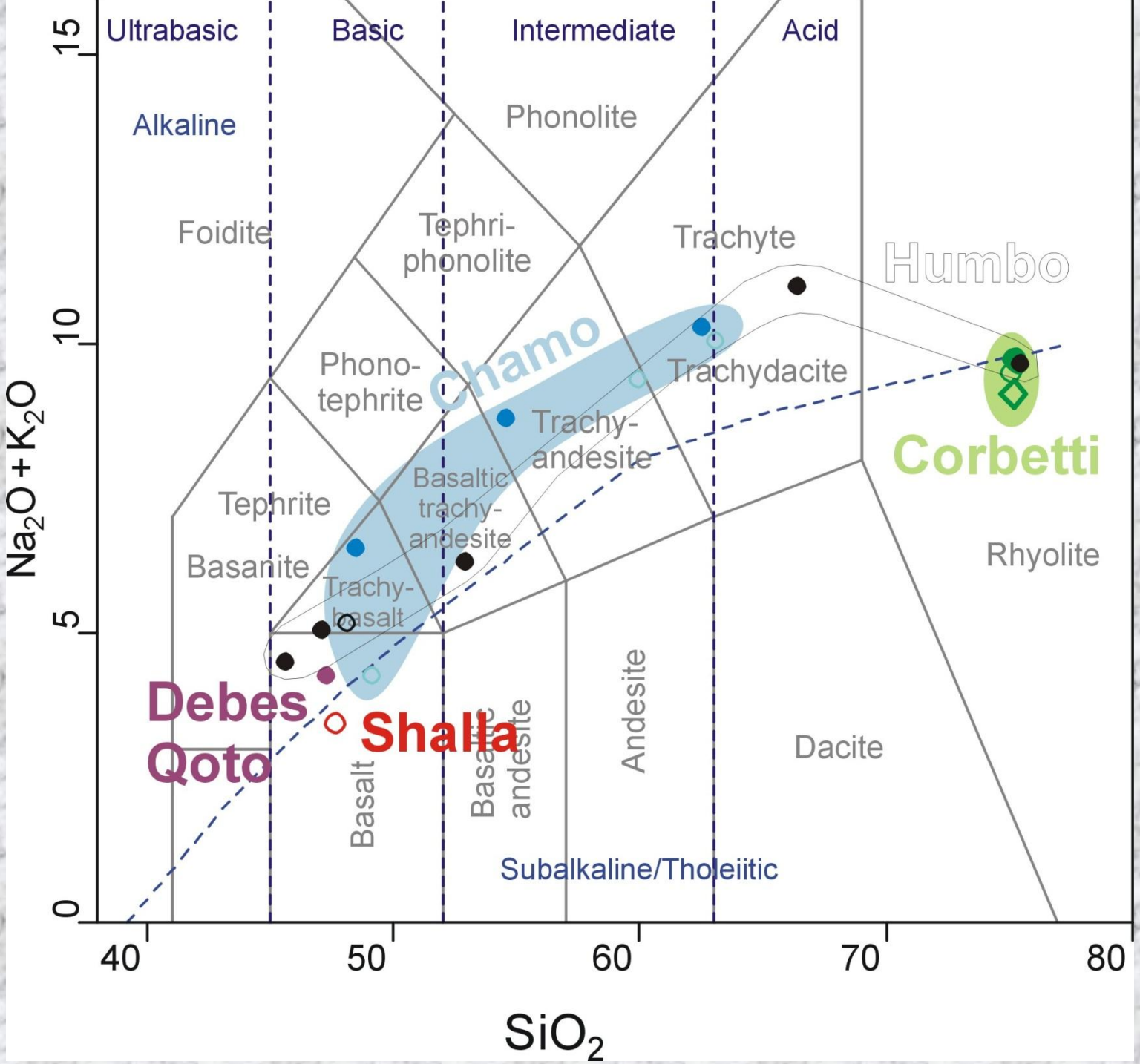


Walker, 1973

Types of observed volcanoes

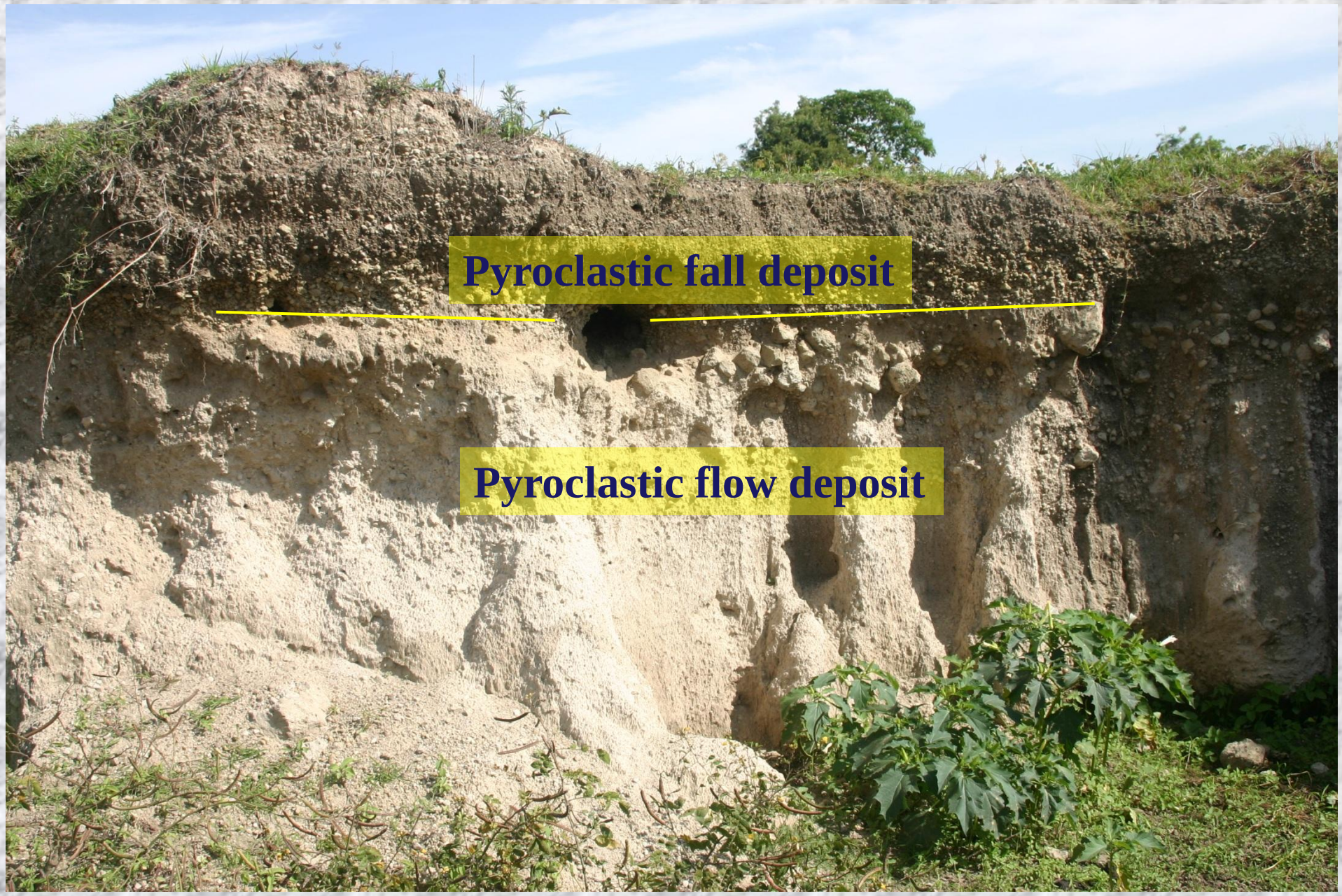
- **Polygenetic volcanoes**
  - **a. Caldera**
  - **b. Stratovolcano**
- **Monogenetic volcanoes**
  - **a. Scoria cone**
  - **b. Tuff cone**
  - **c. Maar**
  - **d. Lava dome (-complex)**


Butajira-Silti
volcanic field
East Ziway
volcanic field
Alutu
O´a
Corbetti
Caldera
Awassa
volcanic
field
Bilate River
volcanic field
Humbo
volcanic
field
Chamo
volcanic
field


Ultrabasic
Basic
Intermediate
Acid
Alkaline
Phonolite
Foidite
Tephri-
phonolite
Trachyte
Humbo
Phono-
tephrite
Chamo
Trachydacite
Trachy-
andesite
Corbetti
Basaltic
trachy-
andesite
Tephrite
Basanite
Trachy-
basalt
Rhyolite
Debes
Qoto
Shalla
Basalt
Basaltic
andesite
Andesite
Dacite
Subalkaline/Tholeiitic
0
5
10
15
40
50
60
70
80
$Na_2O + K_2O$
SiO_2

Corbetti caldera

- Huge eruptions (vulcanian, plinian): thick widespread deposits of pumice


Pyroclastic fall deposit
Pyroclastic flow deposit

CHEBI - obsidian shield volcano inside the Corbetti Caldera

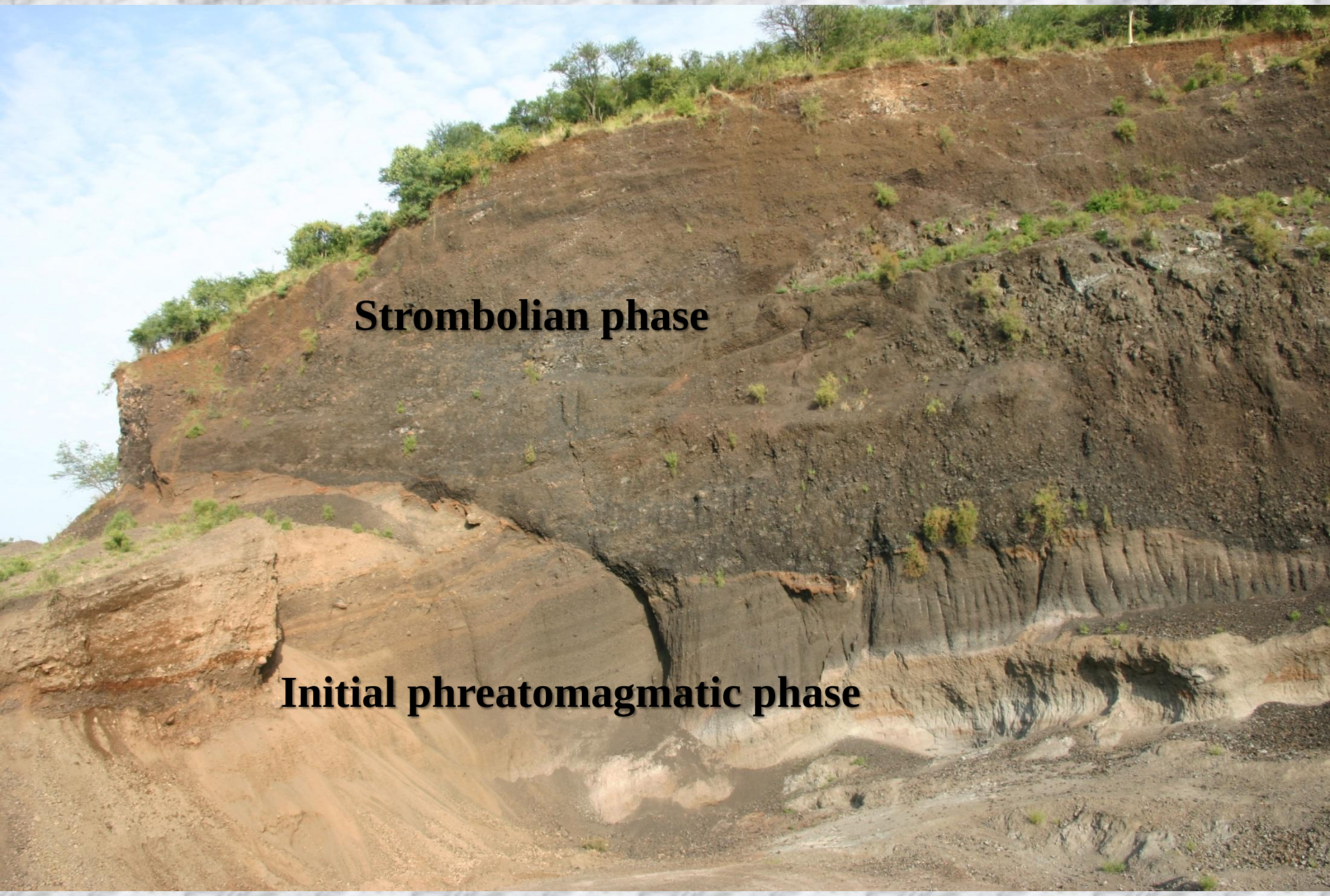
- **Obsidian lavas:**
  - **Seem relativelly frequent**
  - **Large amounts – hazard for property**
  - **Slow emplacement – low hazard for lifes**

- **Pumice eruptions:**
  - **Seem unfrequent**
  - **Large areas, rapid emplacement (namely pyroclastic flows) – high hazard for property and lifes**
  - **High fluorine content – water contamination**

Scoria cones

- Very abundant
- Usually in cone-rows
- Several zones in studied area

- Frequent eruptions
- Associated lavas
- Low-energy eruptions affect small area


Strombolian phase
Initial phreatomagmatic phase

Tuff cones

- When magma interacts with surface water
- Small eruptions with high explosivity

Maar craters

- Magma interacts with subsurface water
- Explosive eruptions, relativelly small scale

Obsidian domes (complexes)

Available geochronological methods

- Eye-witnesses, chronicles

applicable only where monasteries

- ^{14}C (cosmogenic carbon)

pieces of organic material covered by volcanic rock

- Cosmogenic radionuclides (He, Be, Ne)

exposure time, original surface needed (ropy lava), Q or ol crystals near surface

- K-Ar

not for holocene rocks

Available geochronological methods

- U-series dissequilibria

daughter nuclides with short decay half-life, applicable for very young samples, pairs of separated minerals
very expensive!

- termoluminiscence

doubtful method