

Remote sensing and GIS applications to Landslides

Term project Presentation by :

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CRP 514: city and regional planning

Section 2

Term 122

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The papers:

- **Case Study 1:** Remote sensing applications to geological problems in Egypt: case study, slope instability investigation, Sharm El-Sheikh/Ras-Nasrani Area, Southern Sinai.
- **By:** Ahmed M. Youssef . Norbert H. Maerz . Abdallah Mohamed Hassan.
- **Case Study 2:** Landslide hazard analysis for Hong-Kong using landslide inventory and GIS.
- **By:** K.T. Chau*, Y.L. Sze, M.K. Fung, W.Y. Wong, E.L. Fong, L.C.P. Chan

Outlines:

- Introduction
 - Landslide definition .
 - The common types of landslide .
- History cases of landslides.
- Case study 1.
- Case study 2.
- Conclusion .
- Recommendations.



Introduction:

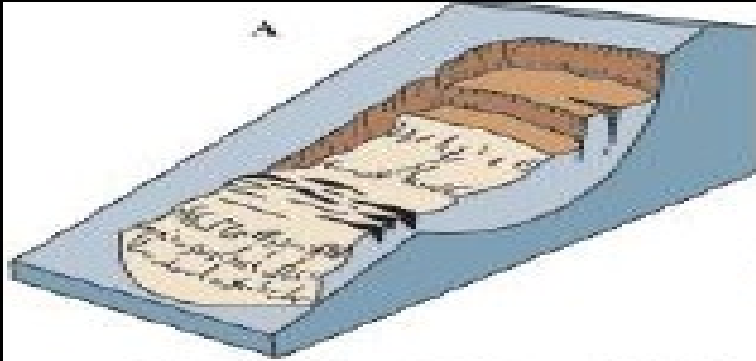
- **Landslide definition:**

A **landslide** or **landslip** is a geological phenomenon which includes a wide range of ground movement, such as rock-falls, deep failure of slopes and shallow debris flows. .(<http://en.wikipedia.org/wiki/Landslide>).

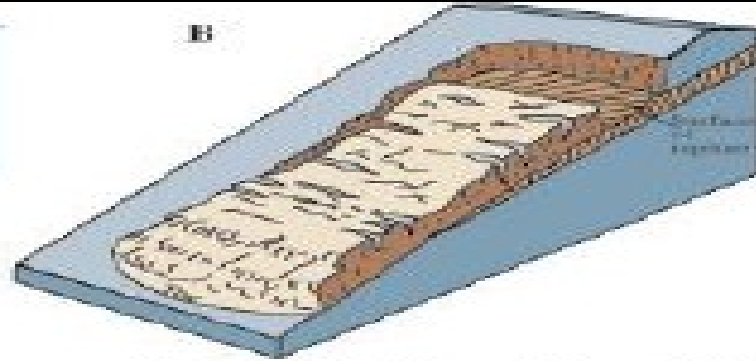
- **Type of landslides:**

According to Varnes (1978).

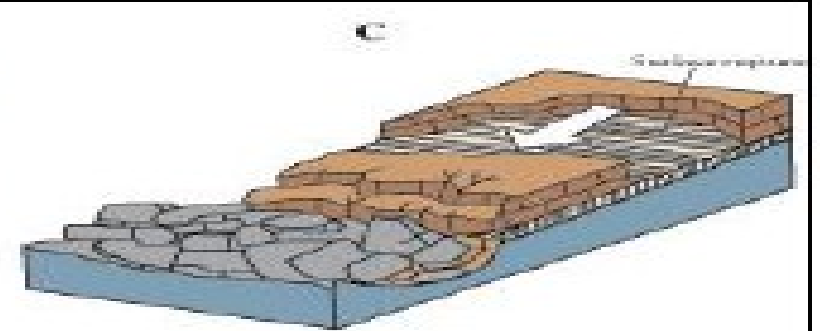




Rotational landslide



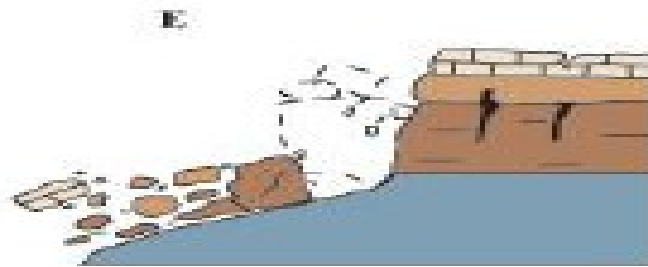
Translational landslide



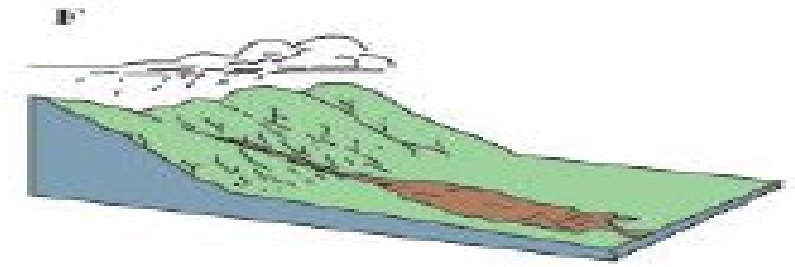
Block slide



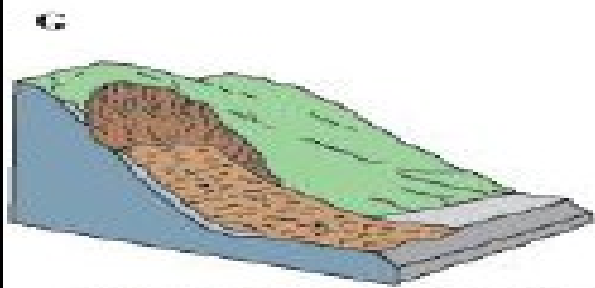
Rockfall



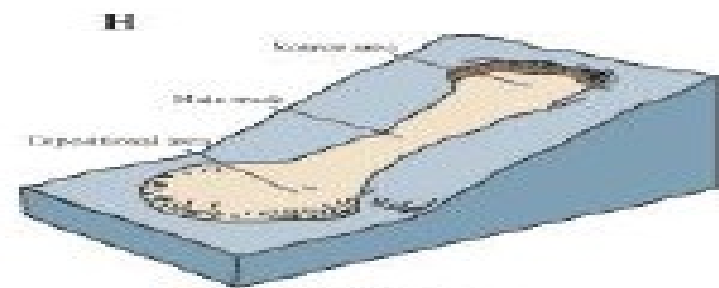
Topple



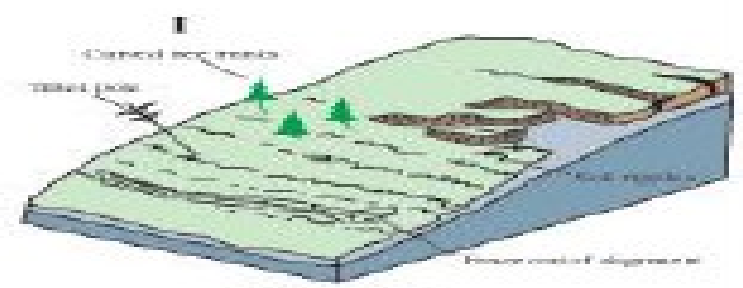
Debris flow



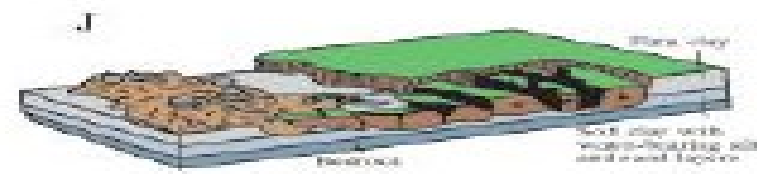
Debris avalanche



Earthflow

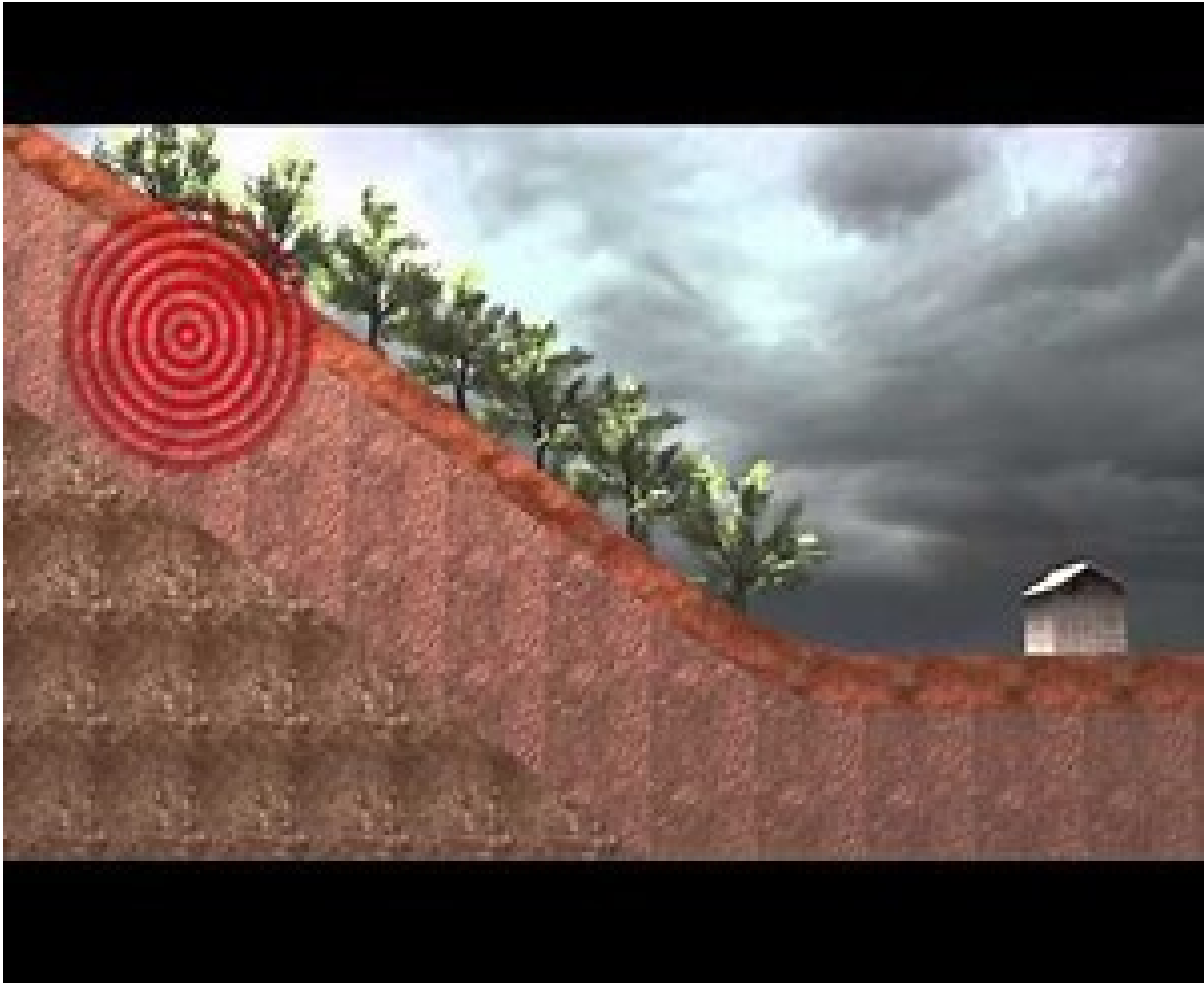


Creep



Lateral spread

Varnes (1978).



History cases of landslides:

- 1-Whidbey Island, Washington State, March 2013.
- No injuries.
- 1 house destroyed





2-East Cairo landslide

- **119 have been killed.**
- Fifty-eight people were injured.
- Many houses are destroyed



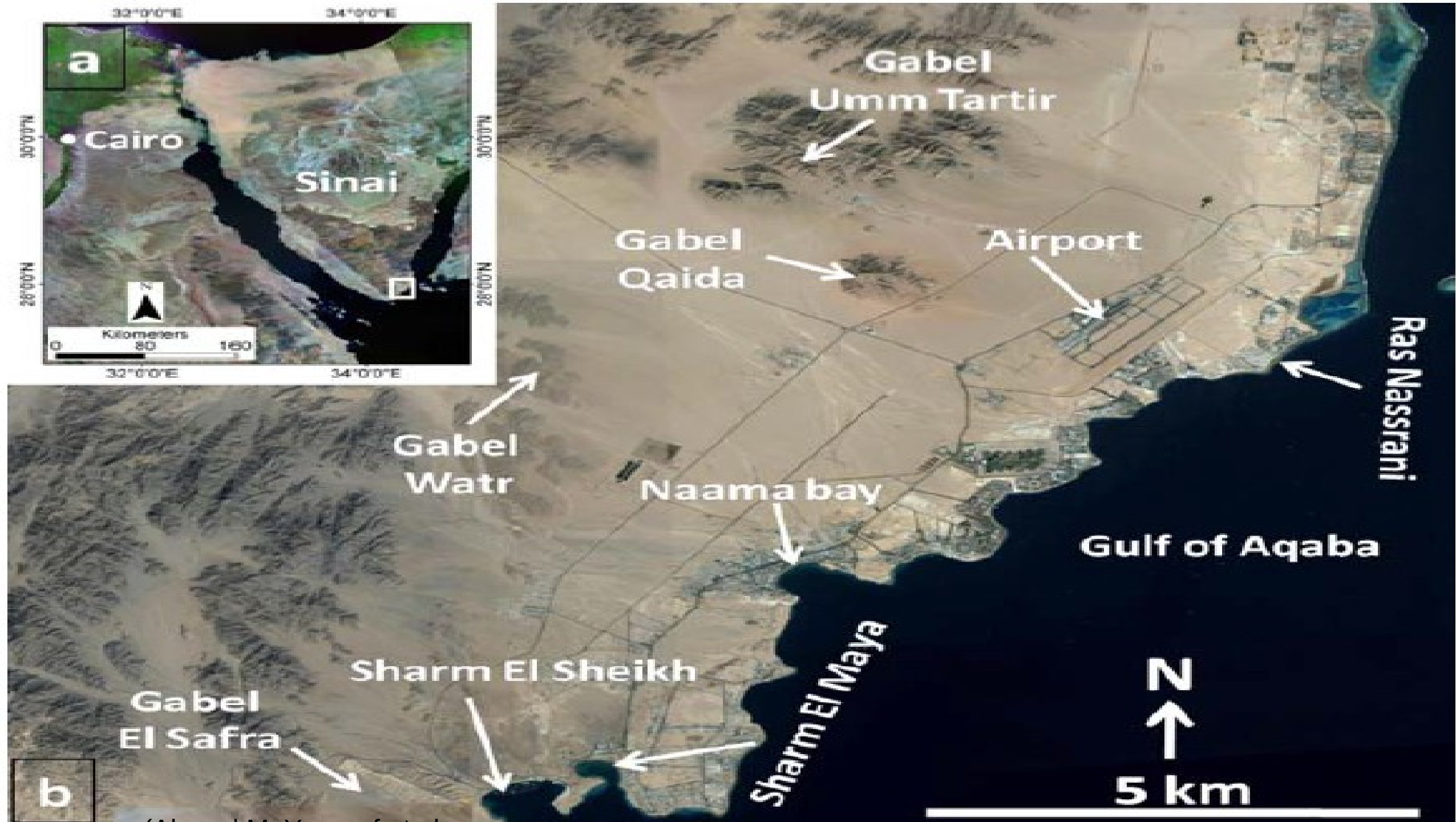


Case study 1:

- Introduction:

the study are located between Ras-Nasrani and Sharm El-Sheikh which considered one of the most attractive areas for tourist activities in Egypt.

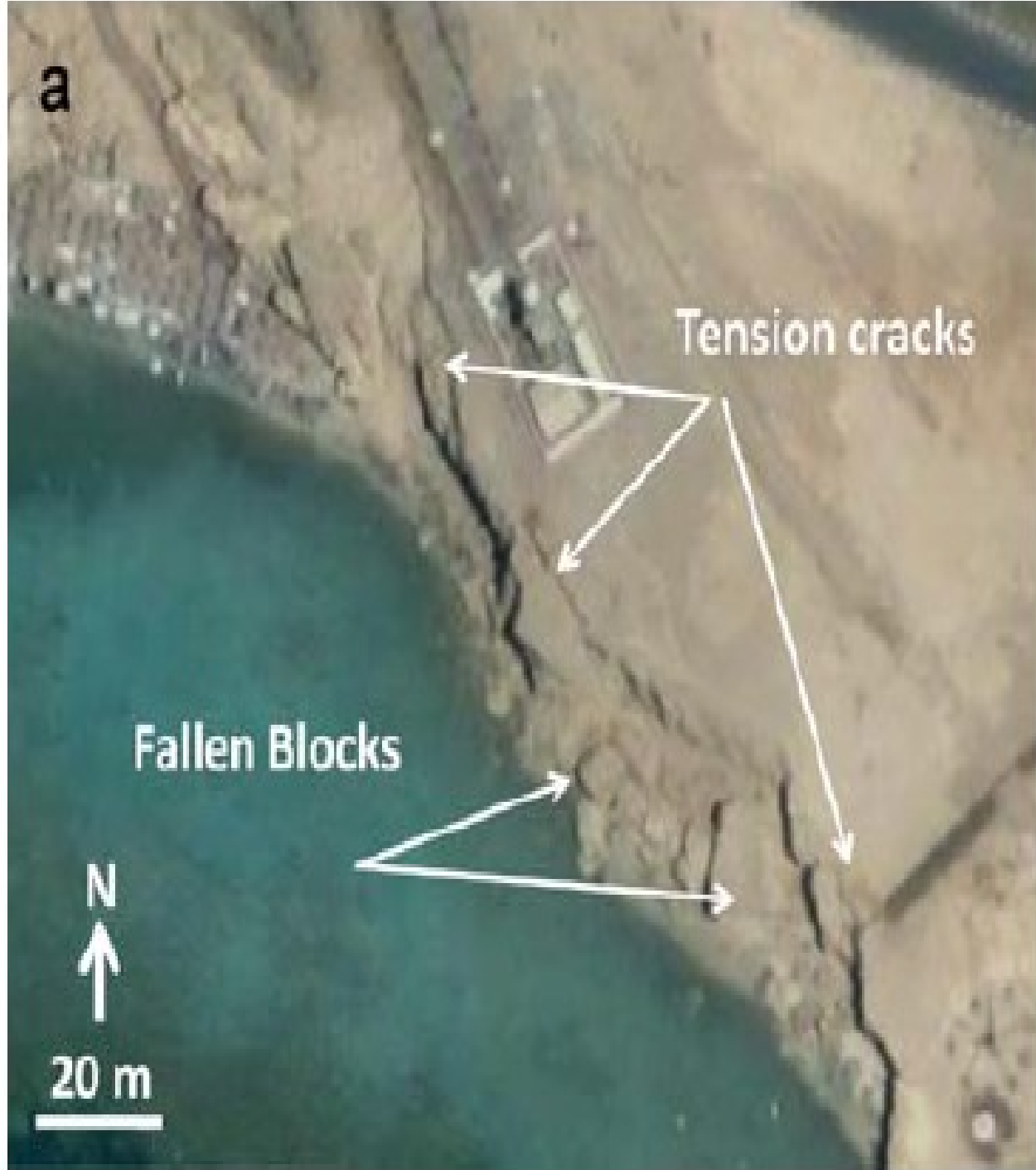


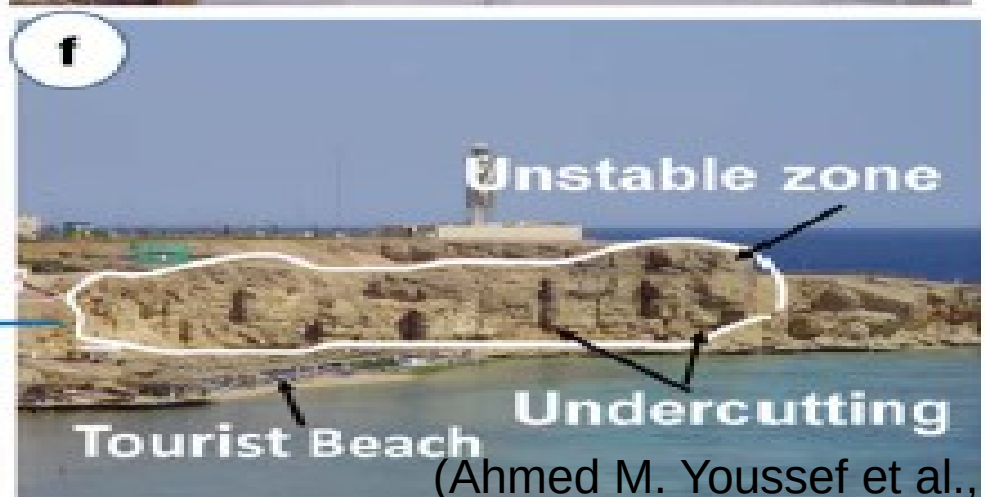
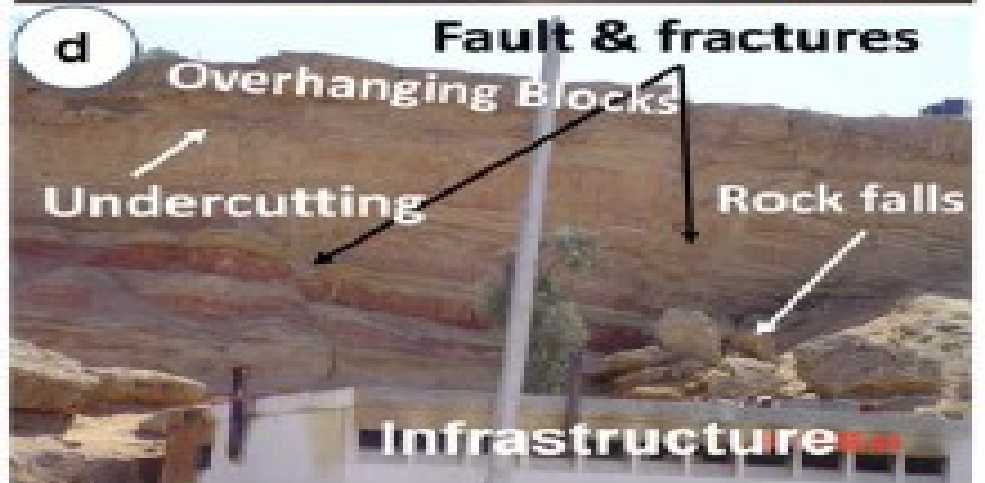


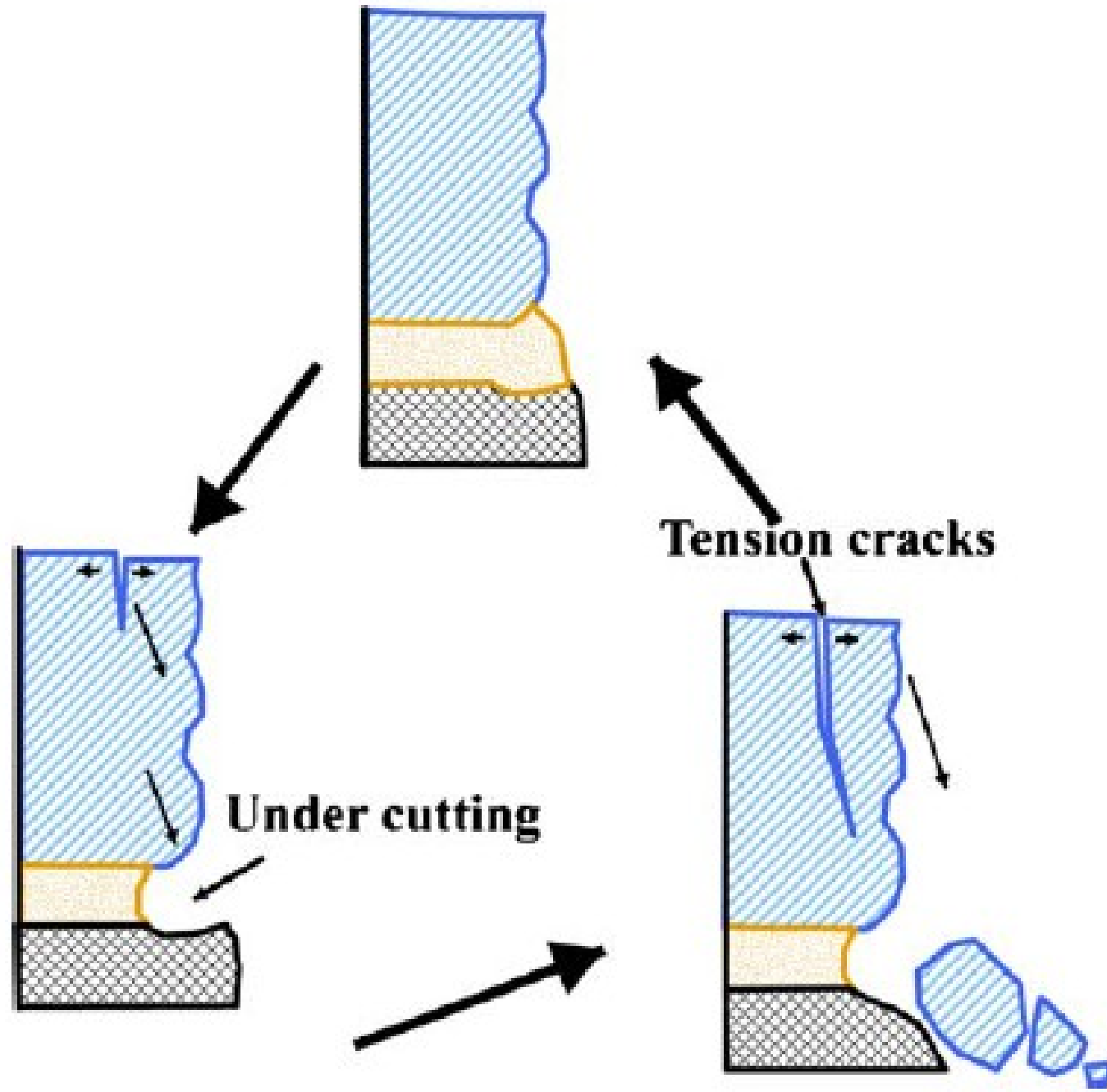
Methodology and result :

- High Spatial resolution Satellite (meter to sub-meter) have been used in this study to collected corrected image of **QuickBird**. The Multi-spectral and Panchromatic images of QuickBird have been acquired on the **second of June 2007** and those images integrated with **(Enhanced Thematic mapper plus (ETM+)** data dated to 2001.
- The result synchronized and approved by field work.

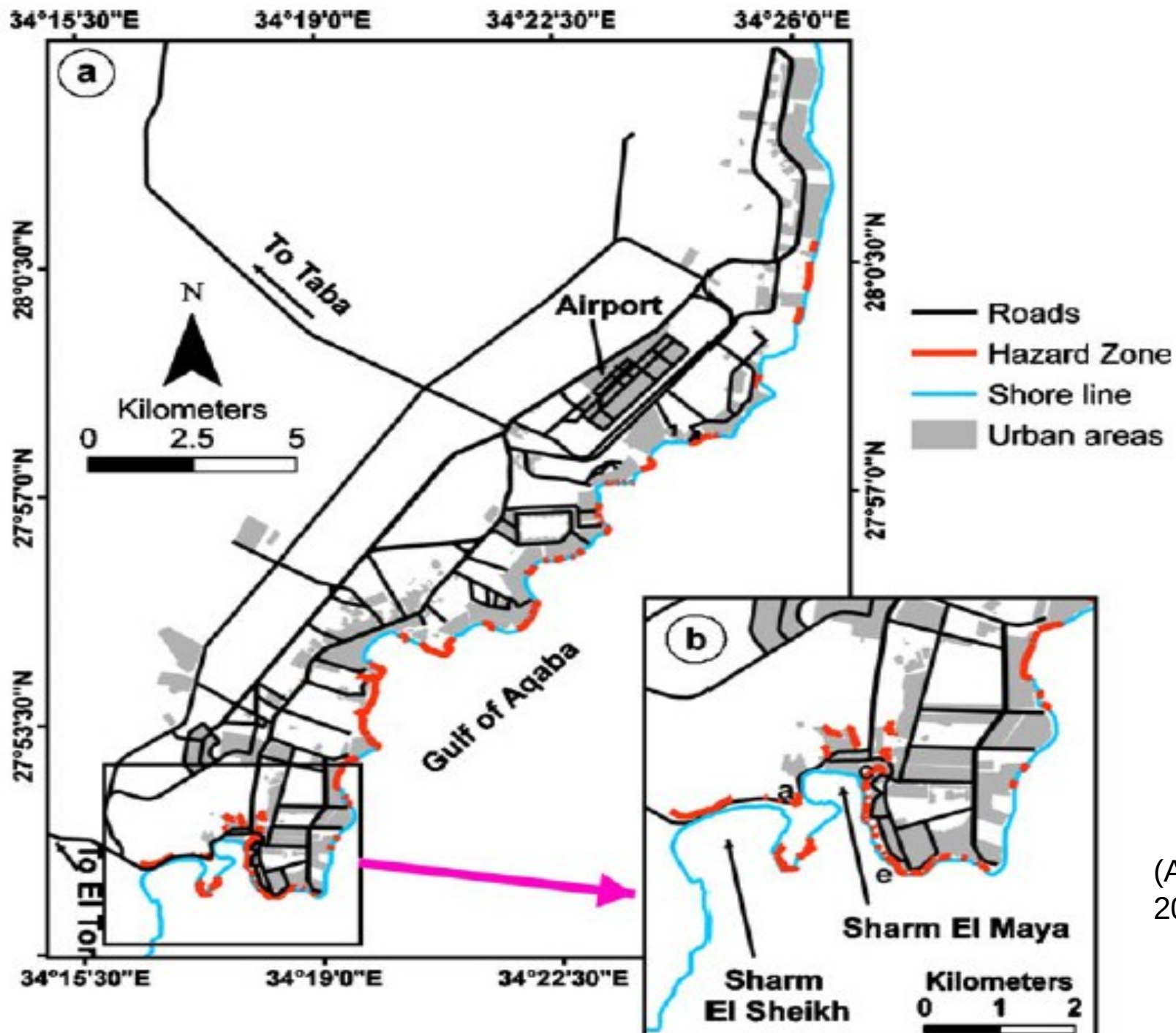








(Ahmed M. Youssef et al.,
2009)



(Ahmed M. Youssef et al., 2009)

Case study 2 :

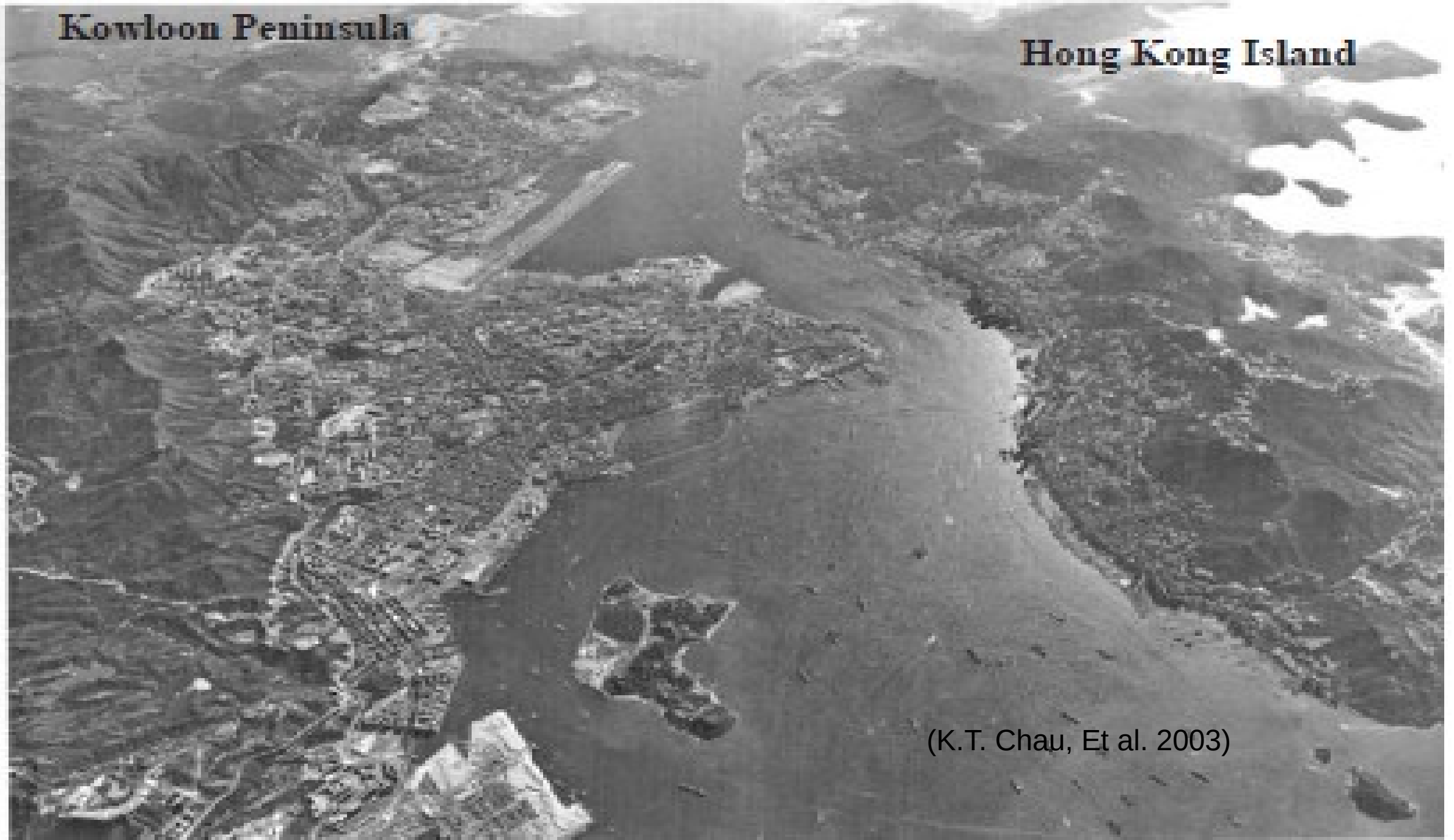
- Introduction:

The study area is Lantau Island close to Hong Kong Island where the high building and the main infrastructure are there.

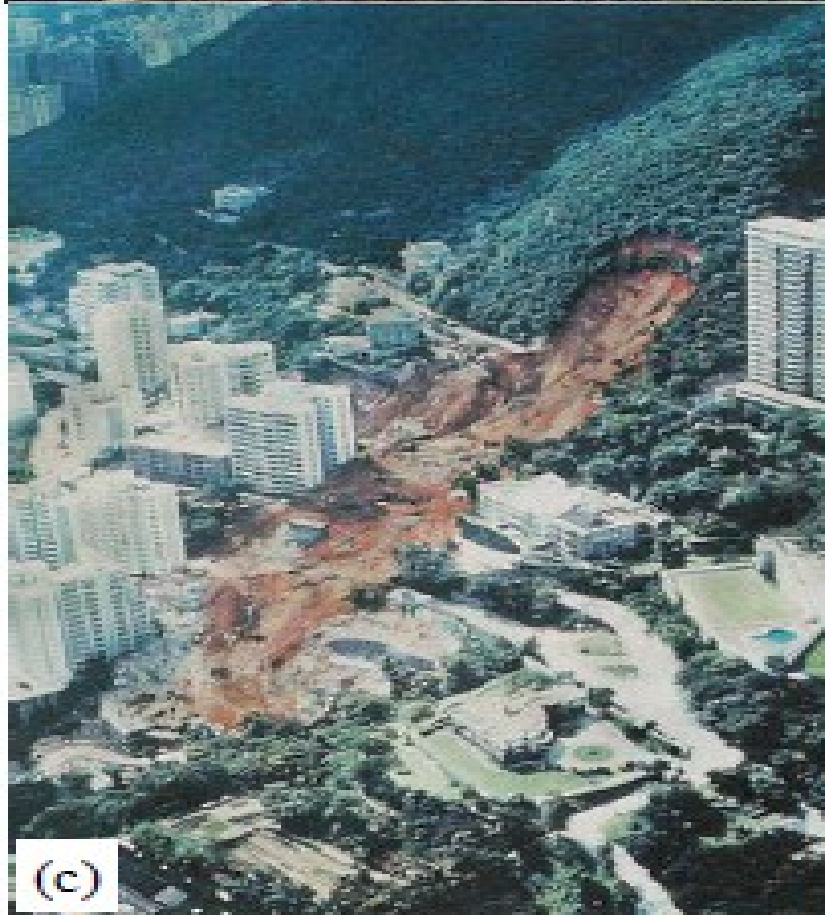


Kowloon Peninsula

Hong Kong Island



(K.T. Chau, Et al. 2003)

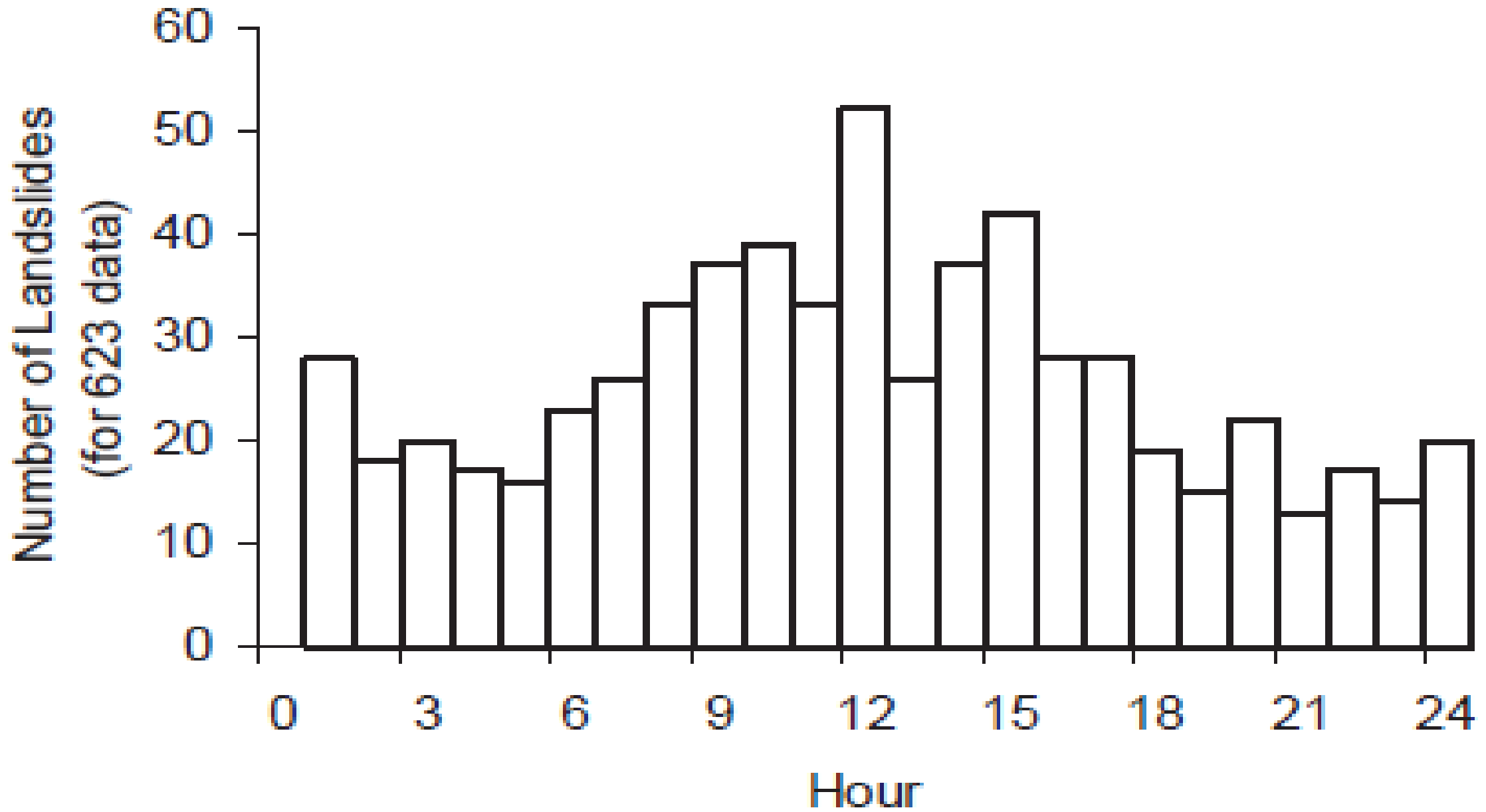


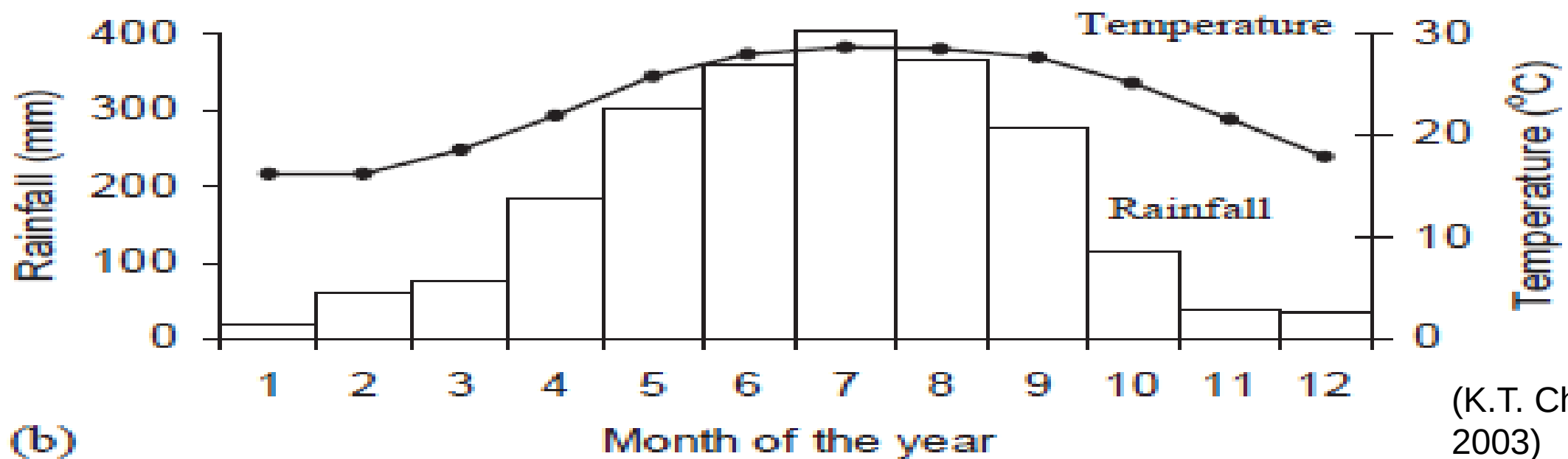
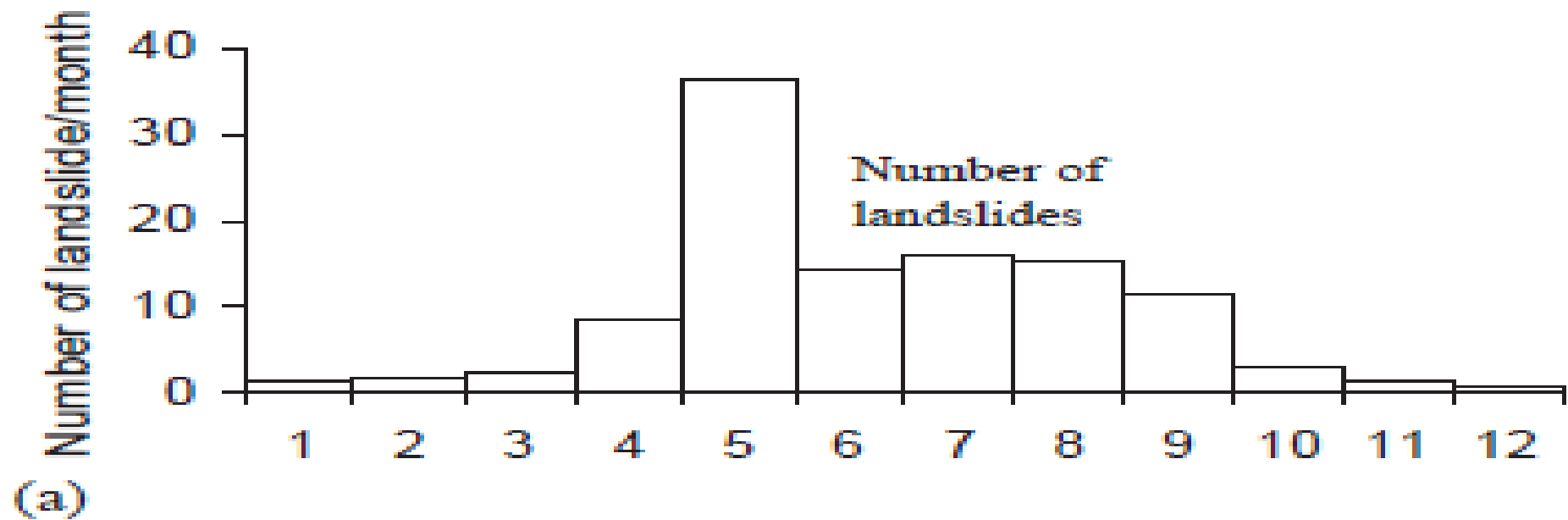
(K.T. Chau, Et al. 2003)

Methodology and results:

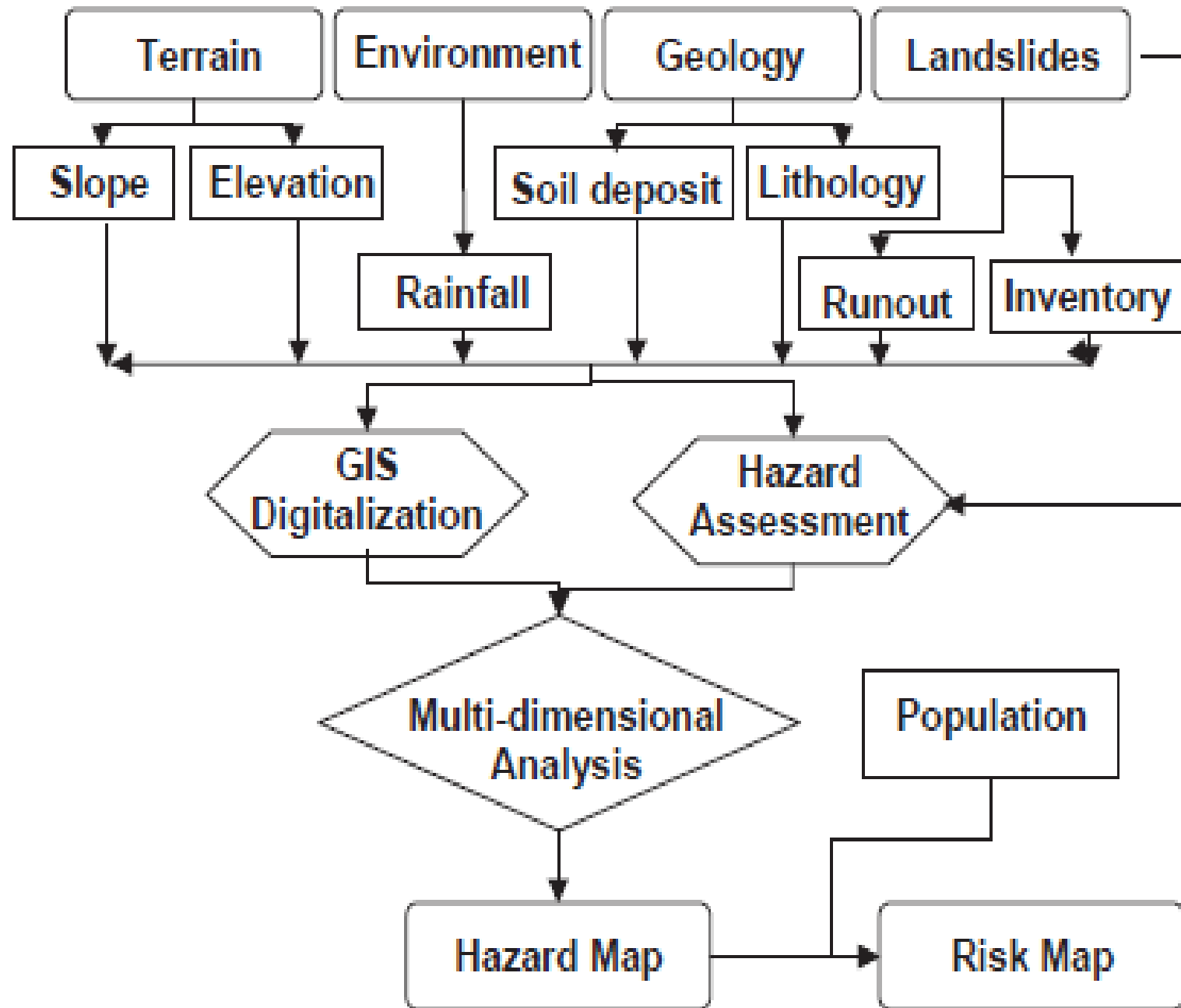
- the main objective of this study integration historical data of landslide with GIS and supported by the geological information .
- Diurnal frequency of rock fall have been established for Hong Kong by Chau et al. (1998) by using data form 1995-1949.







(K.T. Chau, Et al. 2003)



(K.T. Chau, Et al. 2003)

T1=elevation;

T2=slope;

E1=rainfall;

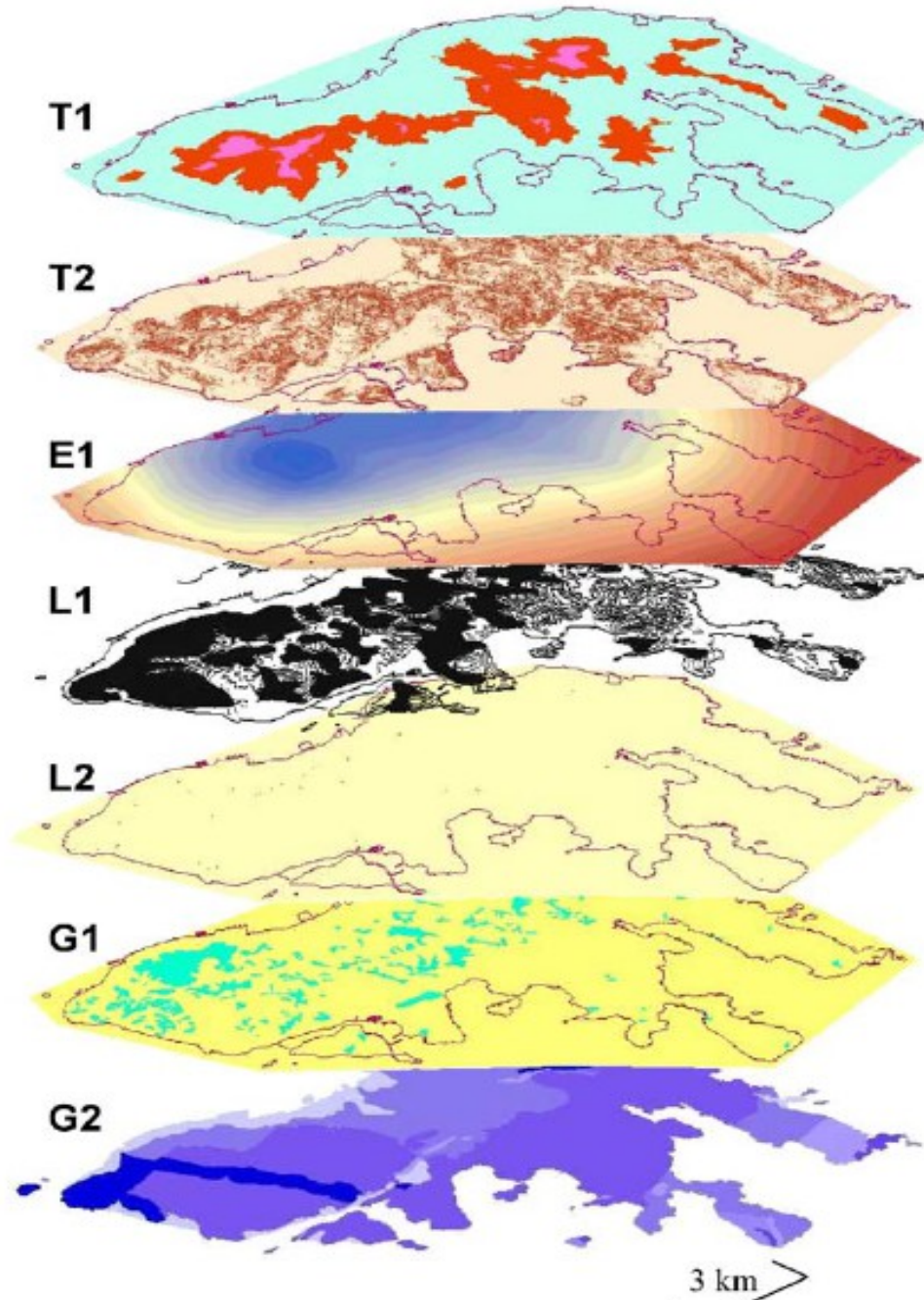
L1=potential runout

of landslides;

L2=landslide inventory

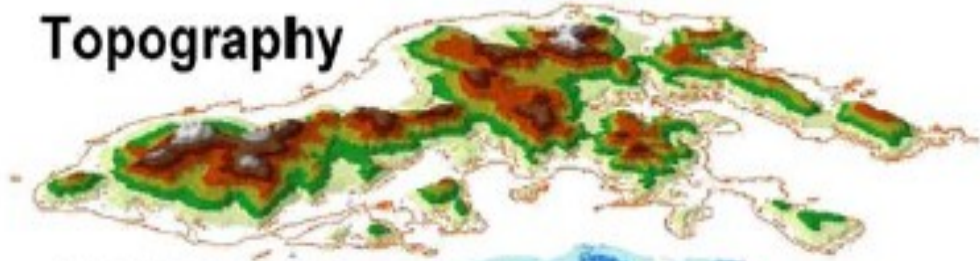
G1=soil deposition;

G2=geology.



(K.T. Chau, Et al.
2003)

Topography



Hazard Map



Population



Risk Map



3 km

(K.T. Chau, Et al. 2003)

Conclusion :

- high resolution sensors (QuickBird) images have been applied to Sharm El-Sheikh area and it proved that slope instability can be investigated using high resolution satellite images.
- integration of GIS gives a powerful tool in slope instability assessment.



Recommendations :

- In mountainous area which have high probability of sliding, remote sensing images must be used and integration of GIS to generate Hazard map which give very powerful tool to generate accurate landslide hazard map.
- Before starting construction work slope stability must be checked.



**THANK
YOU**

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