



PHYSICAL ENVIRONMENT OF CHEUNG CHAU



- Name: _____
- Group number: _____
- Course Date: _____

COURSE OBJECTIVES:

- Knowledge:**
- To observe the geology in Cheung Chau
 - To understand the physical landscapes along Little Great Wall to Nam Tum in Cheung Chau in relation to internal and external processes (weathering, erosion and mass wasting)
- Skill:**
- To practise geological fieldwork techniques
 - To measure the weather conditions by field equipment
- Value:**
- To appreciate and cherish the invaluable geological resources



RELEVANCE TO DSE GEOGRAPHY CURRICULUM

- Dynamic Earth: The building of Hong Kong
- Managing coastal environments: A continuing challenge

EQUIPMENT & MATERIALS

FIELDWORK

Equipment/ Materials	Quantity (for each group)	Check-in	Check-out
1. anemometer	1		
2. thermo-hygrometer	1		
3. compass	1		
4. steel screw	1		
5. magnifier	2		
6. field scale card	1		
7. gloves	as needed		

ROUTE

- Site 1: Nam Tum
- Site 2: Outside Lover's Cave
- Site 3: Human Head Rock



Geology + Environment → Landscape

- What is the geology of the study area?
- What are the properties of this geology?
- How do the environmental condition affect the landscape of study area?



PLANNING & PREPARATION

1. When to collect data?

Date: _____	Time: _____ to _____
Current Tidal level: _____ m (Time: _____)	

2. Where to collect data?

Site		Locational characteristics	Dominant external processes* (may choose more than one)
Nam Tum (p.4)	Point A		
	Point B		
	Point C		
Outside Lover's Cave (p.11)			
Human Head Rock (p.11)			

*

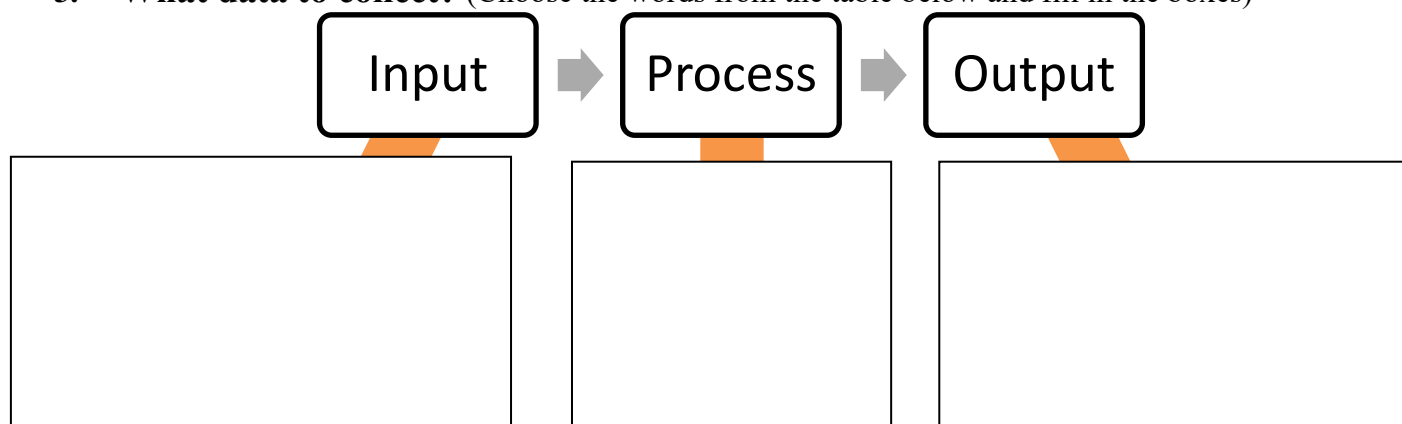
A1 mechanical (physical) weathering; A2 chemical weathering; A3 biological weathering

B1 differential weathering; B2 honeycomb weathering; B3 insolation weathering; B4 spheroidal weathering

C1 river erosion; C2 wind erosion; C3 glacial erosion; C4 wave erosion

D1 mass wasting; D2 deposition E other (please specify)

3. What data to collect? (Choose the words from the table below and fill in the boxes)



landform	weathered material	weathering	erosion	mass wasting
solar radiation	precipitation	vegetation	parent rock	time

DATA COLLECTION



Site 1 - Nam Tum

Measure the weather condition and fill in Table 1.

Weather condition	Air temperature:	Relative humidity:	Aspect:
	Wind direction:	Wind speed:	Altitude:
Other locational characteristics (if any):			
Tidal level	Time of fieldwork (1): _____	Time of fieldwork (2): _____	
	Level: _____ (high/ average/ low)	Level: _____ (high/ average/ low)	

Table 1

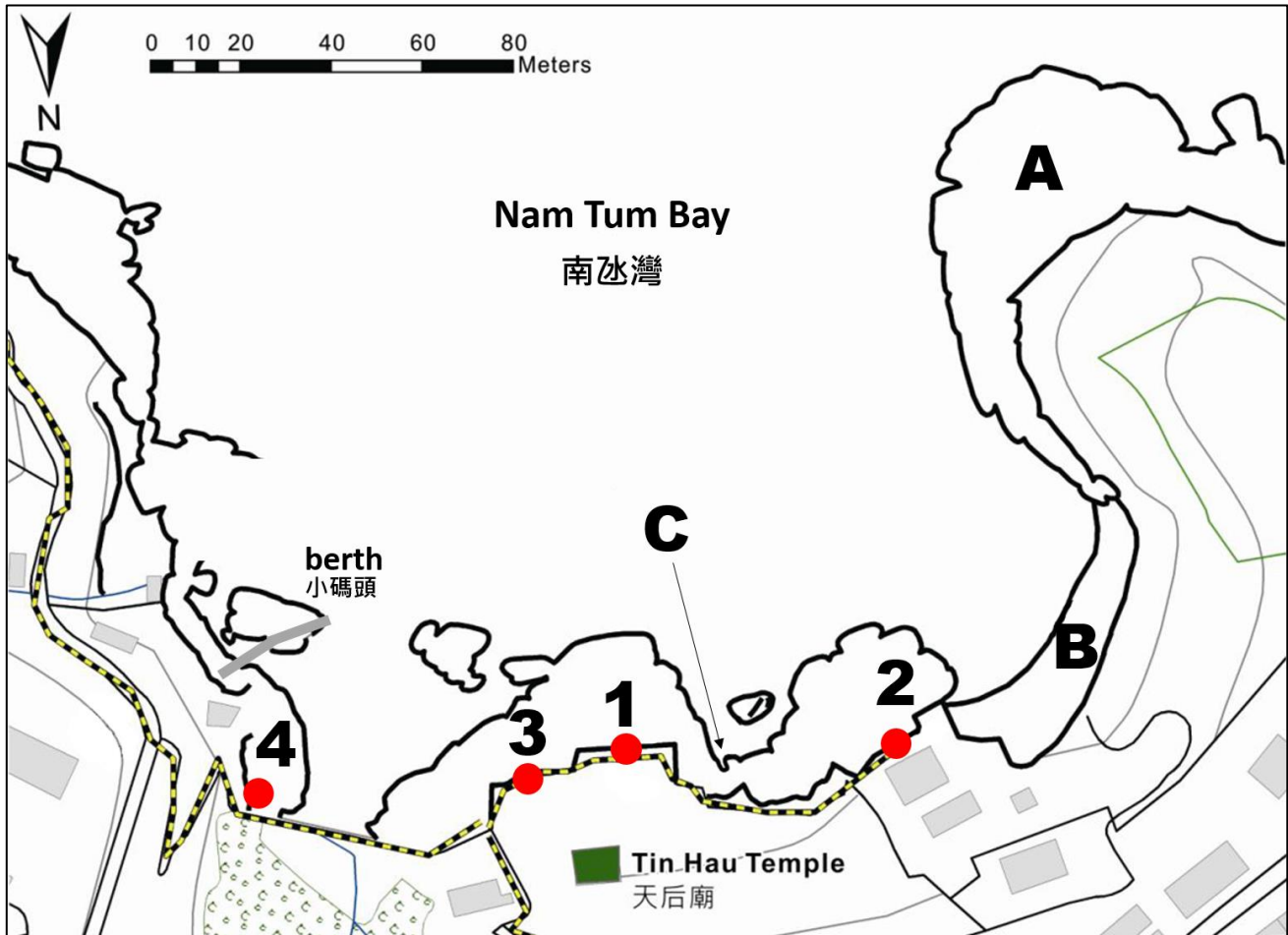


Figure 1: Sketch map of Nam Tum

STOP 1

a) Observe A, B and C, fill in the table below.

Location	A	B	C
What are the coastal landforms?			
What is the major coastal process responsible for the formation of respective landform?	Erosion/ Deposition	Erosion / Deposition	Erosion/ Deposition
Is the coastal landform still developing?			

- b) Face **SOUTH** and observe the rocky shore.
Fissures of different arrangements appear on the rocks. What are they called? How did they occur on the rocks?
-
-

 **STOP 2**

- a) Observe the designated boulder.
- i. Two contrasting sizes of mineral grains are observed on the rock surface. Use the field scale card to measure the size of these mineral grains.
(grains on the left) _____
(grains on the right) _____
 - ii. Draw the boundary of the two contrasting sizes of mineral grains on Figure 2.
 - iii. Why the boundary occur on the rock?

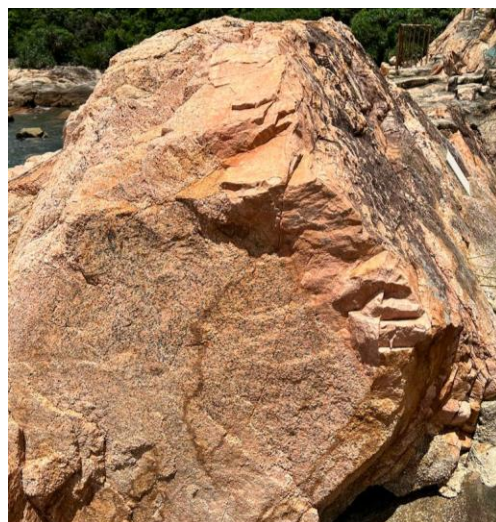


Figure 2

- b) Observe the rock surface (Figure 3).
- i. What is the colour of the rock surface? _____
 - ii. Describe the distribution that colour: _____
 - iii. What is it? How will it favour the weathering of rock?



Figure 3

 **STOP 3**

- a) Observe the white lines on rock (Figure 4).
- i. Refer to Mohs' Scale of Mineral Hardness, what kind of mineral do these white lines belong to?
(Hints: Talc 滑石/ Calcite 方解石/ Fluorite 螢石/ Quartz 石英)
 - ii. Therefore, the white lines formed by this process are called talc vein / calcite vein / fluorite vein / quartz vein.
 - iii. Comparing the rock with this mineral, which one is more resistant? _____
 - iv. These white minerals are in liquid state during the formation. Think about the processes of how the lines changed from liquid to solid state. (Hints: Melting point of this substance is 500-600°C)

Mohs Hardness Scale 莫氏硬度表

Mineral Name 礦物名稱	Scale Number 硬度	Common Object 比較物
Diamond 鑽石	10	
Corundum 剛玉	9	8.5 Masonry drill bit 電鑽
Topaz 黃玉	8	
Quartz 石英	7	6.5 Steel Nail 鋼釘
Orthoclase 正長石	6	5.5 Knife 刀
Apatite 磷灰石	5	
Fluorite 螢石	4	3.5 Copper Penny 硬幣
Calcite 方解石	3	2.5 Fingernail 手指甲
Gypsum 石膏	2	
Talc 滑石	1	

Increasing hardness 硬度增加

Table 2



Figure 4

v. The structure looks similar to that of Figure 4, what is it?

vi. Use a compass and measure the trend of this structure.

STOP 4

a) Find out and observe the structure on Figure 4, what is similar and different to that at Point 3?



Site 2 – Outside Lover’s Cave

Measure the weather condition and fill in table below.

Weather condition	Air temperature:	Relative humidity:	Aspect:
	Wind direction:	Wind speed:	Altitude:
Other locational characteristics (if any):			

a) Grab the grains from the bottom of the rock wall and answer the followings.

- i. What kind of minerals can you find? _____
- ii. Where are the minerals from? _____
- iii. What kind of weathering process has been taking place? _____
- iv. Which kind of minerals has the largest proportion? Why?

b) Observe the figure below.



Figure 5 Round boulder outside Love’s Cave

- i. On the rock wall outside Lover’s Cave, can you find the boulder as shown in Figure 5?
The boulder is called _____.
- ii. Thus, what kind of weathering has been taking place? _____
- iii. Referring to Figure 6 and evidences from the rock wall, draw annotated diagrams to show the **past appearance** and predict the **future appearance** of the boulder.

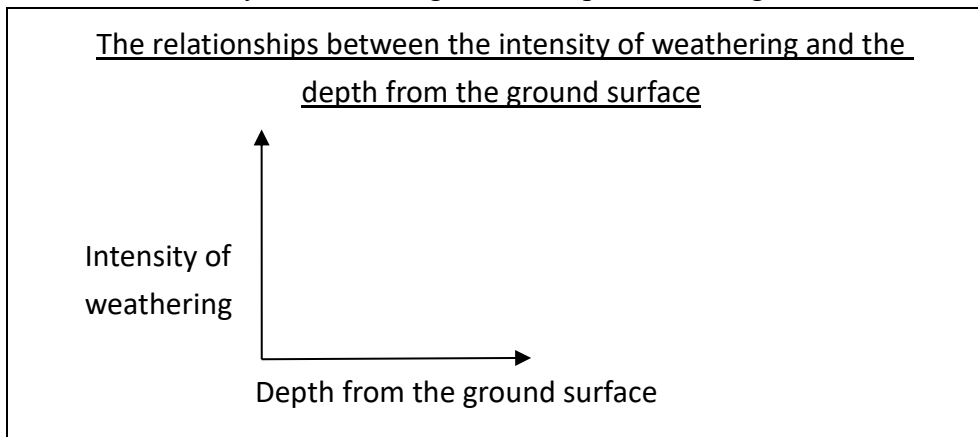


Figure 6 Present appearance



<p style="text-align: center;">Past appearance</p> <p style="text-align: center;">(Hints: Observe the bottom part of the rock wall.)</p>	<p style="text-align: center;">Future appearance</p> <p style="text-align: center;">(Hints: Observe the top of the rock wall.)</p>

- iv. From Figure 6 and field observation, complete the graph below to show the relationships between the intensity of weathering and the depth from the ground surface.



- v. The likelihood of mass wasting in this slope is uncommon / common / very common.
- vi. What kind of mass wasting is likely to take place if intense weathering continues affecting the boulder? _____
- c) Observe the path you passed through.
- i. It is a physical landscape called valley / rapid / badland / gully which is caused by erosion.
 - ii. List **THREE** conditions which leading to the formation of this landscape.

①

②

③



Site 3 - Human Head Rock

Measure the weather condition and fill in table below.

Weather conditions	Air temperature:	Relative humidity:	Aspect:
	Wind direction:	Wind speed:	Altitude:
Other locational characteristics (if any):			

a) Observe the rock near the cliff and fill in the table below.

Location	Human Head Rock
What directions are the tafoni concentrated?	
How do the living organisms facilitate weathering on the rock?	
Is it a kind of physical or chemical action?	Physical / Chemical

a) Are the tafoni evenly distributed on the Human Head Rock? Yes / No Why?

b) Observe the Human Head Rock.

i. What kinds of weathering has been taking place on this rock?

ii. Infer how weathering processes lead to the formation of tafoni.

iii. What are the favourable factors for the above weathering processes?



DATA PROCESSING, PRESENTATION AND ANALYSIS

Complete the observation summary below.

		Landforms/ structures	Major weathering or erosion agents	Locations	Environmental factors
Evidences of external processes	Types of weathering				
				Outside Lover's Cave	
				Human Head Rock	
	Landforms formed by erosion	Geo			
		Wave-cut platform			
		Sea cliff			
	Rainsplash				
	Tafoni		Human Head Rock		
Evidences of internal processes					

DISCUSSION QUESTIONS

1. With reference to the field evidences, what are the factors affecting the intensity of weathering of landforms in Cheung Chau?
2. Comparing different types of weathering / erosion agents, which one has the greatest impact on the development of erosional landforms in Cheung Chau?
3. 'Volcanism was common in Cheung Chau in the past.' Discuss the validity of this statement with reference to the field evidences.

