

THE CHINESE UNIVERSITY OF HONG KONG

Courseware Development Grant (2018-19)

Final Report

Report due 31 May 2019

Please return by email to CUHK cdgs@cuhk.edu.hk

PART I

Project title: Development of online courses and Virtual Reality materials for virtual geological field studies

Principal supervisor: Dr. TAM Pui Yuk, Tammy¹

Co-supervisor(s): Prof. WONG Teng Fong¹, Prof. LIU Lin¹, Mr KWOK Chi Fai Eddie²

Department / Unit: Earth System Science Programme¹ & Centre for eLearning Innovation and Technology²

Project duration: From September 2018 to May 2019

Date report submitted: 31 May 2019

1. Project objectives

Is the project on track to meet its objectives?

Have the objectives been changed as a result of the experience of working on your CDG project?

The key purpose of the project is to help ESSC students getting sufficient preparation for field study with supplementary e-learning materials, including:

- (A) further polishing the current e-learning materials and transform them into interactive on-line courses; and
- (B) incorporating part of the current e-learning materials into Virtual Reality (VR) for students to obtain practical experience and knowledge for geological field study.

Despite that the e-learning materials are a bit different from the original plan, our project is considered to be a great success and meet its objectives with the following production:

- refining 14 online supplementary videos for two local geological study areas (Tung Ping Chau and Bluff Head),
- refining 7 online supplementary videos for Taiwan field study,
- producing 4 new online videos (Lai Chi Chong),
- setting up two KEEP courses,
- making a selection quiz,
- incorporating part of the current e-learning materials into online VR 360 videos, aerial videos and 2 Android mobile applications (VR Tour 360) – viewing with VR device

2. Process, outcomes or deliverables

Please specify the number of different types of deliverables produced, and the course(s) (with course codes and titles) that have used the deliverables in Part IV, and provide more detailed descriptions here.

Has the nature of the deliverables been changed?

Have you adjusted your timeline?

Overall, was the project completed satisfactorily?

To start our project, a team of 8 members held several pre-production meetings to discuss the contents and practical procedures for the project. It was realized that students would benefit more if we produce a few more videos for a new geological study area (Lai Chi Chong) and polish current supplementary videos with more animations and illustrations for both Hong Kong and Taiwan field studies. Besides, making an online version of VR360 videos in our YouTube Channel could provide a faster trial product for students and enrich the contents of the final product in VR device. Regarding the selection quiz, it would be more practical to set it as a written test because registered students were required to draw their answers for some questions.

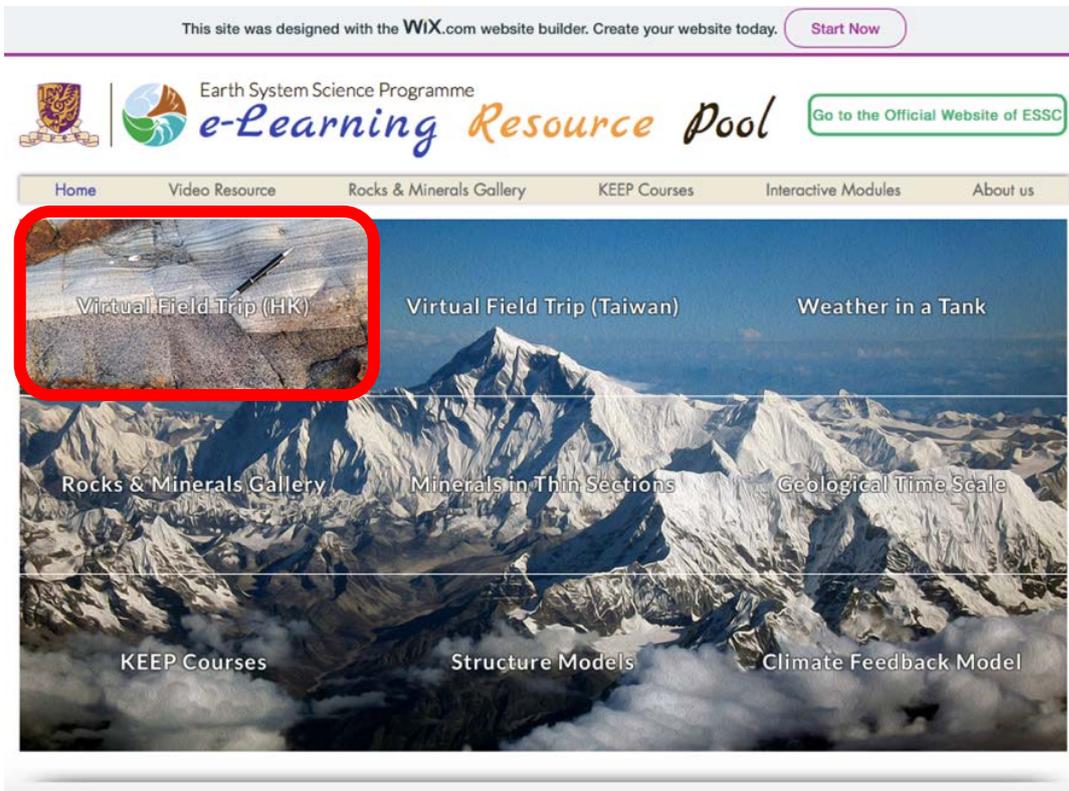
With the above consideration, our team readjusted the project plan a bit and decided to:

- i. organize 1 full-day field shooting for:
 - a. getting 360° view of Tung Ping Chau geological features
 - b. illustrating how to get field data with a geological compass
 - c. explaining in-situ geological features in addition to previous ones;
- ii. polish 7 supplementary field-study videos for Tung Ping Chau, 7 videos for Bluff Head and 7 videos for Taiwan;
- iii. incorporate part of the Tung Ping Chau e-learning materials into online VR360 videos, Aerial videos and 2 Android mobile Apps (360 VR Tour) - viewing with VR device
- iv. create 2 KEEP courses, one for Tung Ping Chau and one for Bluff Head; and
- v. set up 1 written Selection Quiz.

All the products are arranged to serve ESSC students in courses of ESSC2010 Solid Earth Dynamics, ESSC2120 Integrated Geoscience Field Study and ESSC3100 Structural Geology, with the details below:

- (I) To help students preparing and revising the field study in Tung Ping Chau, 7 supplementary videos were polished, online VR360 of two locations, 2 aerial videos, 2 Android mobile Apps (360 VR Tour) - viewing with VR device and 1 KEEP course were newly generated:**

Videos can be found in ESSC e-learning website:
<https://cuhkesscelearn.wixsite.com/home>



This site was designed with the Wix.com website builder. Create your website today. [Start Now](#)

2. Tropical Circulation & Trade Winds In our atmosphere, there are general circulations which are mainly constrained by two factors - the rotation of the Earth, and the temperature difference at different latitudes. We are going to see how these factors contribute to the tropical circulation and generate trade winds.

3. General Circulation & Global Heat Regulation After studying atmospheric circulation patterns at low-latitudes, we are going to see how the temperature gradient and the rotation of Earth contribute to the general circulation and the global heat regulation at mid-latitudes.

4. Ekman Layers When wind blows in the atmosphere, air near the surface rubs against the Earth's surface. Friction then plays an important role in the balance of forces. As a result, there will be layers in between the lower air near the surface and the free atmosphere above. We are going to examine these boundary layers in rotating fluid, which is an analogue of layers in the atmosphere. These layers are known as the Ekman layers.

5. Wind Driven Circulation (Ekman Transport) When wind blows across the ocean, it produces waves and currents. In larger scale, it is the ocean circulation. We are going to study how wind drives ocean circulation. You are going to see the Ekman layers in the ocean and learn about the Ekman transport.

6. Taylor Columns According to the Taylor Proudman Theorem, fluid will move in two dimensions under the fast rotation of the earth. When an incompressible fluid is under geostrophic balance, change of velocity of the fluid with the change of height will be 0, which means the velocity of fluid in vertical

- [1.6 Unloading joints](#)

Episode 2 Bluff Head

- [2.1 Background](#)
- [2.2 Vertical Bedding](#)
- [2.3 Devil's Fist](#)
- [2.4 Cross Bedding](#)
- [2.5 Overturned Layers](#)
- [2.6 Slickenside](#)
- [2.7 Fold](#)

Episode 3 Tung Ping Chau

- [3.1 Introduction](#)
- [3.2 Siltstone](#)
- [3.3 Cherty Layer](#)
- [3.4 Fault-developed valley](#)
- [3.5 Tilted Bedding](#)
- [3.6 Coastal Landform](#)
- [3.7 Rock pool](#)

VR360 and Aerial videos

- [Kang Lau Shek \(VR360\)](#)
- [Cham Keng Chau \(VR360\)](#)
- [Lung Lok Shui \(Aerial\)](#)
- [Cham Keng Chau \(Aerial\)](#)

Episode 4 High Island

- [4.1 Introduction](#)
- [4.2 Hexagonal column](#)
- [4.3 Lithology](#)
- [4.4 Tilted column](#)
- [4.5 Dyke](#)
- [4.6 Fault Breccia](#)
- [4.7 Sea cave](#)

Episode 5 Lai Chi Chong

- [5.1 Introduction \(1\)](#)
- [5.1 Introduction \(2\)](#)
- [5.2 Load Cast](#)
- [5.3 Oxidation and Slump fold](#)

5. Shimen Mountain
 6. Xiaoyehliu
 7. Liji Badland

Or via ESSC CUHK Youtube Channel:
<https://www.youtube.com/watch?v=gq7Mcpc1ec&list=PLylaEfEhBWzbqIxrN9ShBLxQtyQFZ-gLg&index=14>



3.1 Tung Ping Chau - Introduction

81 次观看

👍 0 🗨️ 0 ➦ 分享 📌 保存 ...

 **ESSC CUHK**
2019年3月12日发布
类别 教育

已订阅 89 🔔



3.2 Tung Ping Chau - Siltstone

61 次观看

👍 0 🗨️ 0 ➦ 分享 📌 保存 ...

 **ESSC CUHK**
2019年3月12日发布

已订阅 89 🔔



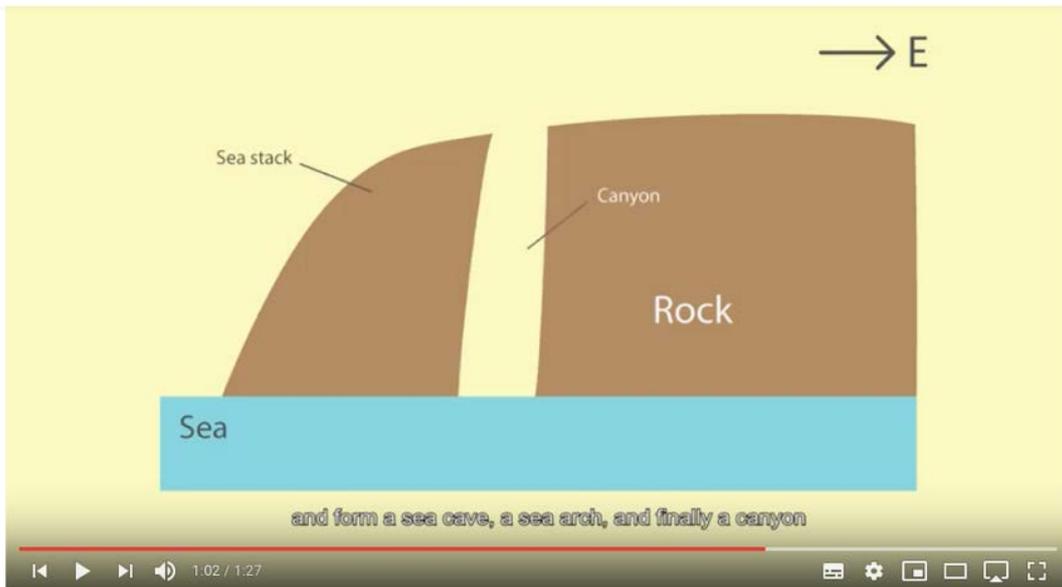
3.3 Tung Ping Chau - Cherty Layer

55 次观看

0 0 分享 保存

ESSC CUHK
2019年3月12日发布

已订阅 89



3.4 Tung Ping Chau - Fault-developed Valley

51 次观看

0 0 分享 保存

ESSC CUHK
2019年3月12日发布

已订阅 89



3.5 Tung Ping Chau - Tilted Bedding

77 次观看

👍 2 🗨️ 0 ➔ 分享 📌 保存 ...

 **ESSC CUHK**
2019年3月12日发布

已订阅 89 🔔



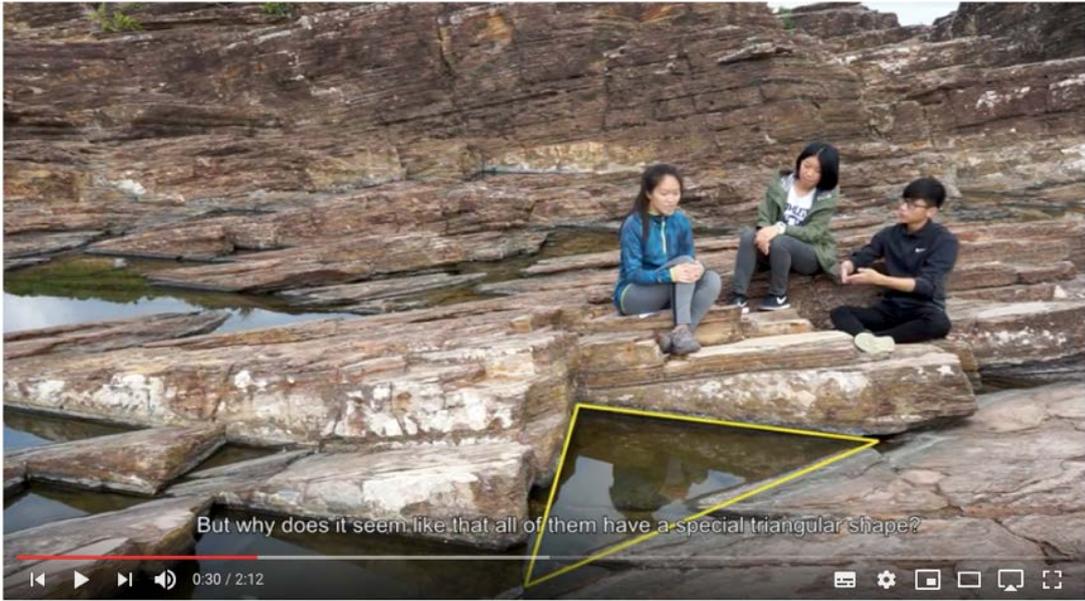
3.6 Tung Ping Chau - Coastal Landform

59 次观看

👍 0 🗨️ 0 ➔ 分享 📌 保存 ...

 **ESSC CUHK**
2019年3月12日发布

已订阅 89 🔔



But why does it seem like that all of them have a special triangular shape?

3.7 Tung Ping Chau - Rock pool

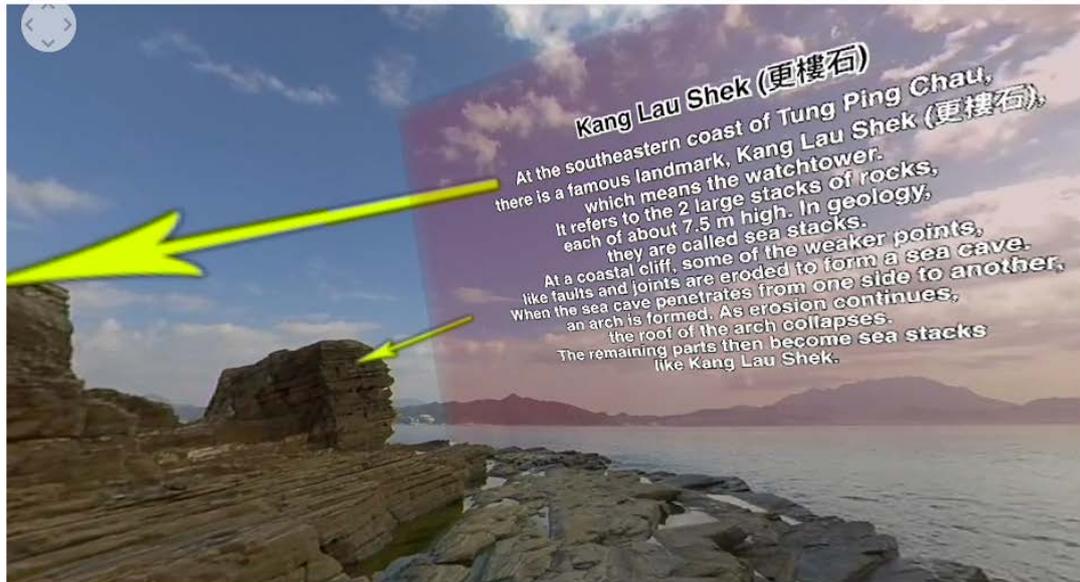
58 次观看

0 0 分享 保存 ...



已订阅 89

Online VR360 of Kang Lau Shek video:
<https://www.youtube.com/watch?v=QeNzafxoNiQ>



Kang Lau Shek (更樓石)

At the southeastern coast of Tung Ping Chau, there is a famous landmark, Kang Lau Shek (更樓石), which means the watchtower. It refers to the 2 large stacks of rocks, each of about 7.5 m high. In geology, they are called sea stacks. At a coastal cliff, some of the weaker points, like faults and joints are eroded to form a sea cave. When the sea cave penetrates from one side to another, an arch is formed. As erosion continues, the roof of the arch collapses. The remaining parts then become sea stacks like Kang Lau Shek.

Tung Ping Chau - Kang Lau Shek (VR360)

38 次观看

0 0 分享 保存 ...

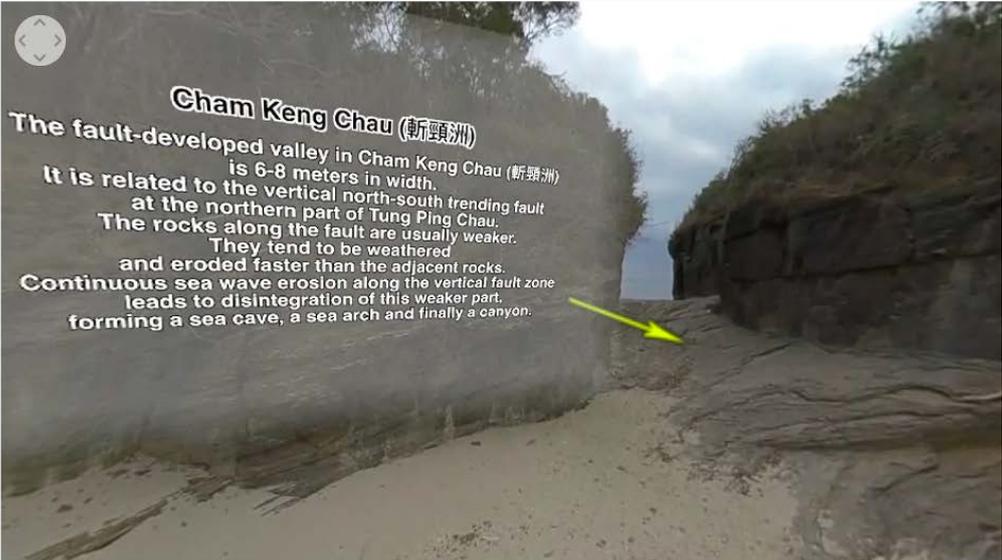


已订阅 89

Online VR360 Cham King Chau video:

<https://www.youtube.com/watch?v=p9HuC7ewLY4>

☰ YouTube^{HK} 搜索



Cham Keng Chau (斬頸洲)
The fault-developed valley in Cham Keng Chau (斬頸洲) is 6-8 meters in width. It is related to the vertical north-south trending fault at the northern part of Tung Ping Chau. The rocks along the fault are usually weaker. They tend to be weathered and eroded faster than the adjacent rocks. Continuous sea wave erosion along the vertical fault zone leads to disintegration of this weaker part, forming a sea cave, a sea arch and finally a canyon.

Tung Ping Chau - Cham Keng Chau (VR360)
27 次观看

👍 0 🗨️ 0 ➦ 分享 📁 保存 ...



已订阅 89

Aerial video of Cham King Chau:

<https://www.youtube.com/watch?v=8JkftFnRH-M>

☰ YouTube^{HK} 搜索



Cham Keng Chau / Tung Ping Chau

Tung Ping Chau - Cham Keng Chau (Aerial)
20 次观看

👍 0 🗨️ 0 ➦ 分享 📁 保存 ...

ESSC CUHK
2019年3月12日发布

已订阅 89

Aerial video of Lung Lok Shui: <https://www.youtube.com/watch?v=ID7QevQe0Z0>

☰ YouTube^{HK} 搜索 🔍



Lung Lok Shui (龍落水)

An unique and interesting geological feature is found in Lung Lok Shui (龍落水) of Tung Ping Chau. The feature is composed of two contrasting layers, with the upper layer standing out from the lower layers. The protruding upper part is the cherty layer while the lower part is the siltstone bed.

Chert is composed of mostly quartz, which is a mineral with Mohs hardness of 7, while siltstone is a clastic sedimentary rock composed of fine grained silt-sized materials. With quartz as the dominate rock composition, the cherty layer is harder and more resistant to weathering compared to the siltstone bed. Under continuous coastal erosion and weathering processes in Tung Ping Chau, differential weathering took place. The siltstone layer was eroded faster than the cherty layer. As a result, the cherty layer is exposed, forming a structure that is morphologically similar to a dragon's tail dipping into water, known as Lung Lok Shui.

播放 (k) 0:23 / 0:46

Tung Ping Chau - Lung Lok Shui (Aerial)

17 次观看

👍 0 🗨️ 0 ➦ 分享 📌 保存 ...

ESSC CUHK
2019年3月12日发布

已订阅 89 🔔

1 KEEP course ESSC1000 Hong Kong Geology in which new questions were set for Tung Ping Chau field study in ESSC2010 Solid Earth Dynamics:

KEEPCourse ESSC1000: Hong Kong Geology Help

View this course as: Learner

Home Course Discussion Wiki Progress

Course > Field Trips in Hong Kong > Tung Ping Chau > Tilted Bedding

Previous [] [] [] [] [] [] [] Next >

Tilted Bedding

Bookmark this page

Video



By the right hand rule, we will take this reading which is 250°

Speed 1.0x HD

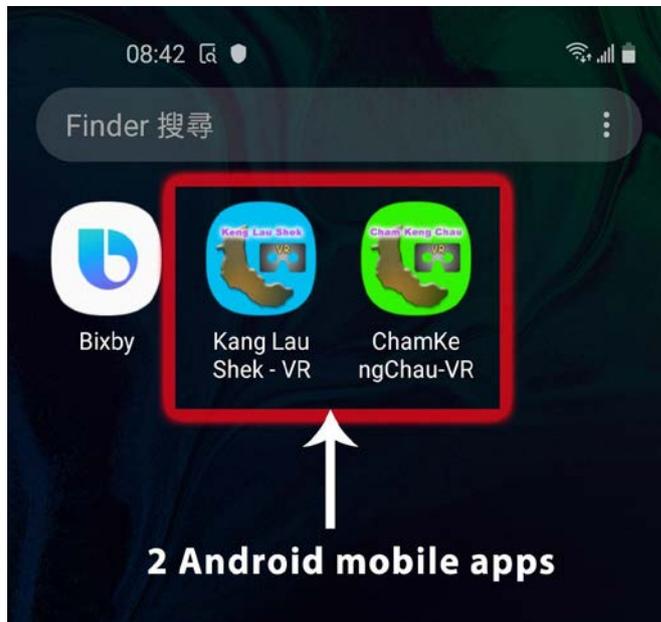
Multiple Choice

2 points possible (ungraded)

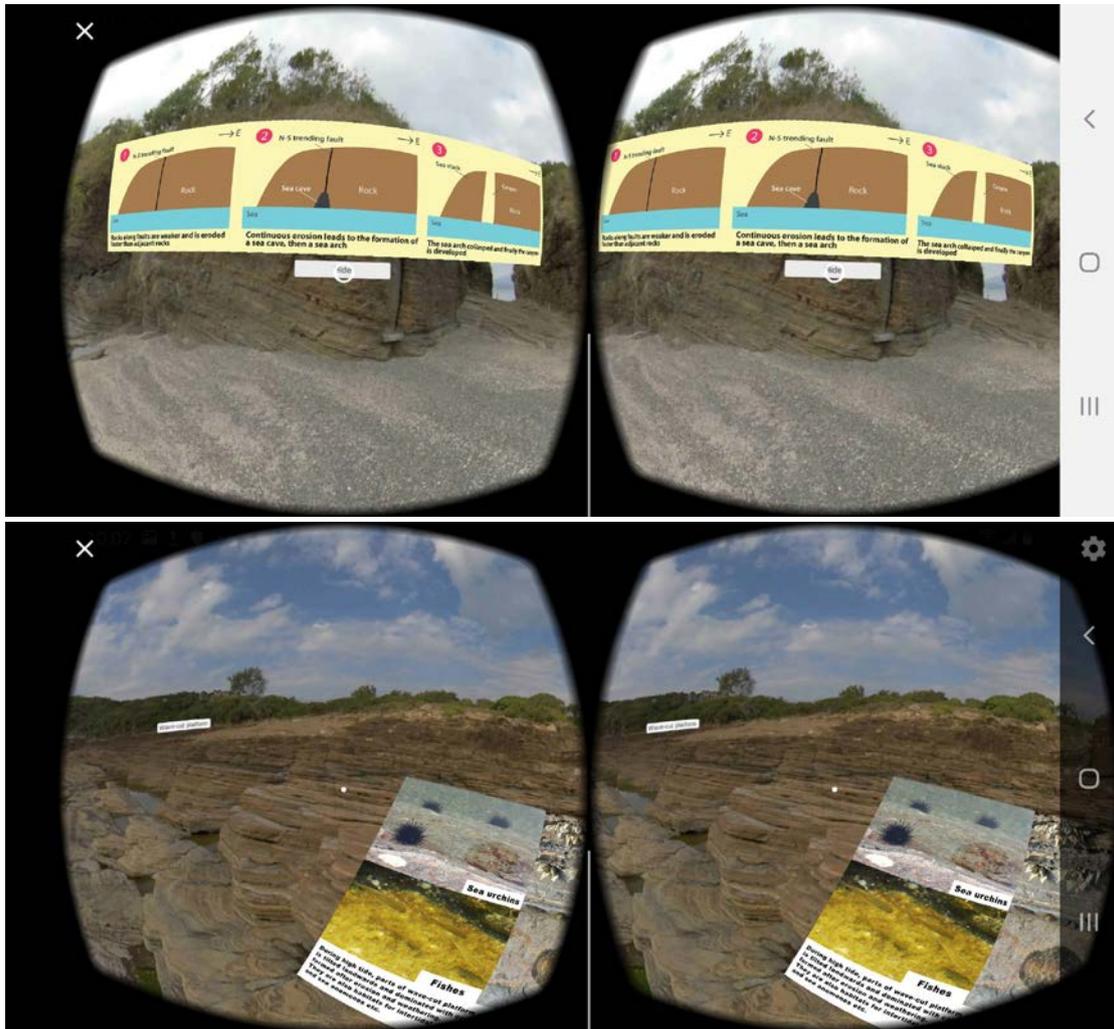
Q1. What is the correct procedure of using the compass to measure the strike of a bedding plane as indicated in the video?

- (1) Observe the strike direction from the reading at the index line
- (2) Use left/right hand rule to decide which reading to take
- (3) Rotate the compass dial so that the red arrow is aligned to the true north

2 Android mobile Apps (360 VR Tour) can be downloaded and install to students' mobile phone. Students may viewing the VR Tour 360 with VR device.



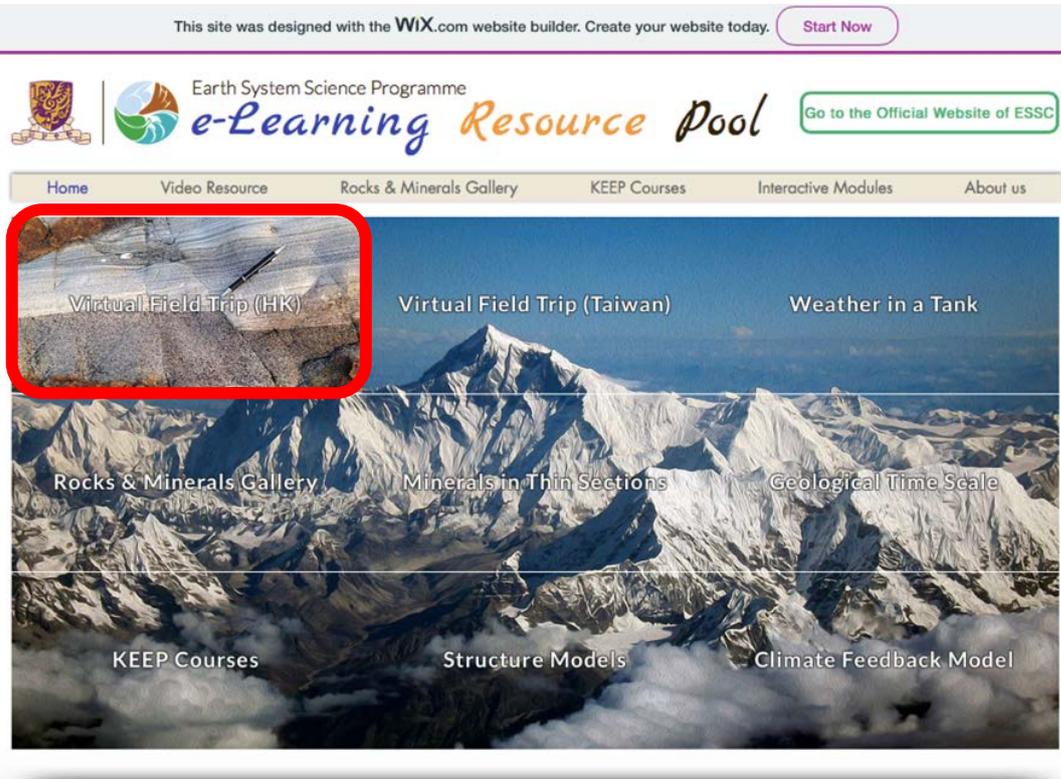
The two VR Tour 360 apps can be installed to most of the mobile phones (Android system) including Samsung, HTC, Huawei etc.



The stereo 360 images of the two VR apps shown on mobile phone

(II) To help students preparing and revising the field study in Bluff Head, 7 supplementary videos were polished and 1 KEEP course was produced:

Videos can be found in our ESSC e-learning website:
<https://cuhkesscelearn.wixsite.com/home>



Winds In our atmosphere, there are general circulations which are mainly constrained by two factors - the rotation of the Earth, and the temperature difference at different latitudes. We are going to see how these factors contribute to the tropical circulation and generate trade winds.

3. **General Circulation & Global Heat Regulation** After studying atmospheric circulation patterns at low-latitudes, we are going to see how the temperature gradient and the rotation of Earth contribute to the general circulation and the global heat regulation at mid-latitudes.

4. **Ekman Layers** When wind blows in the atmosphere, air near the surface rubs against the Earth's surface. Friction then plays an important role in the balance of forces. As a result, there will be layers in between the lower air near the surface and the free atmosphere above. We are going to examine these boundary layers in rotating fluid, which is an analogue of layers in the atmosphere. These layers are known as the Ekman layers.

5. **Wind Driven Circulation (Ekman Transport)** When wind blows across the ocean, it produces waves and currents. In larger scale, it is the ocean circulation. We are going to study how wind drives ocean circulation. You are going to see the Ekman layers in the ocean and learn about the Ekman transport.

6. **Taylor Columns** According to the Taylor Proudman Theorem, fluid will move in two dimensions under the fast rotation of the earth. When an incompressible fluid is under geostrophic balance, change of velocity of the fluid with the change of height will be 0, which means the velocity of fluid in vertical

- Episode 2 Bluff Head**
- [2.1 Background](#)
 - [2.2 Vertical Bedding](#)
 - [2.3 Devil's Fist](#)
 - [2.4 Cross Bedding](#)
 - [2.5 Overturned Layers](#)
 - [2.6 Slickenside](#)
 - [2.7 Fold](#)
- Episode 3 Tung Ping Chau**
- [3.1 Introduction](#)
 - [3.2 Siltstone](#)
 - [3.3 Cherty Layer](#)
 - [3.4 Fault-developed valley](#)
 - [3.5 Tilted Bedding](#)
 - [3.6 Coastal Landform](#)
 - [3.7 Rock pool](#)
- VR360 and Aerial videos**
- [Kang Lau Shek \(VR360\)](#)
 - [Cham Keng Chau \(VR360\)](#)
 - [Lung Lok Shui \(Aerial\)](#)
 - [Cham Keng Chau \(Aerial\)](#)
- Episode 4 High Island**
- [4.1 Introduction](#)
 - [4.2 Hexagonal column](#)
 - [4.3 Lithology](#)
 - [4.4 Tilted column](#)
 - [4.5 Dyke](#)
 - [4.6 Fault Breccia](#)
 - [4.7 Sea cave](#)
- Episode 5 Lai Chi Chong**
- [5.1 Introduction \(1\)](#)
 - [5.1 Introduction \(2\)](#)
 - [5.2 Load Cast](#)
 - [5.3 Oxidation and Slump fold](#)

- 5. Shimen Mountain
- 6. Xiaoyehliu
- 7. Liji Badland

Or via our Youtube Channel:
<https://www.youtube.com/watch?v=u5juuaTEYbw&list=PLylaEfEhBWzbqIxrN9ShBLxQtyQFZ-gLg&index=7>



2.1 Bluff Head - Background

47 次观看

0 0 分享 保存 ...



2.2 Bluff Head - Vertical Bedding

47 次观看

0 0 分享 保存 ...

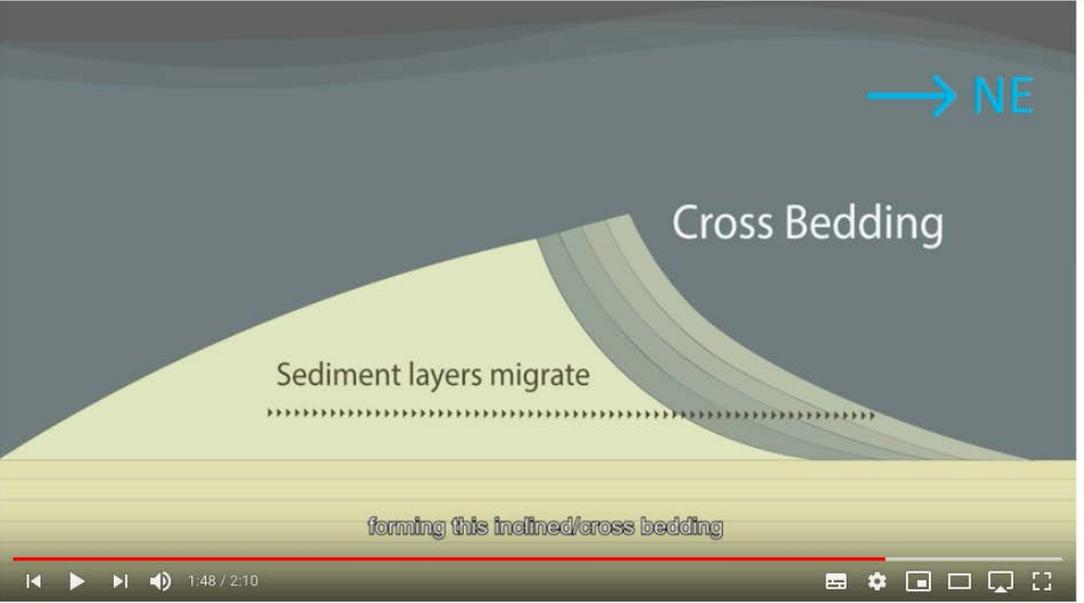
ESSC CUHK
2019年2月1日发布

已订阅 89



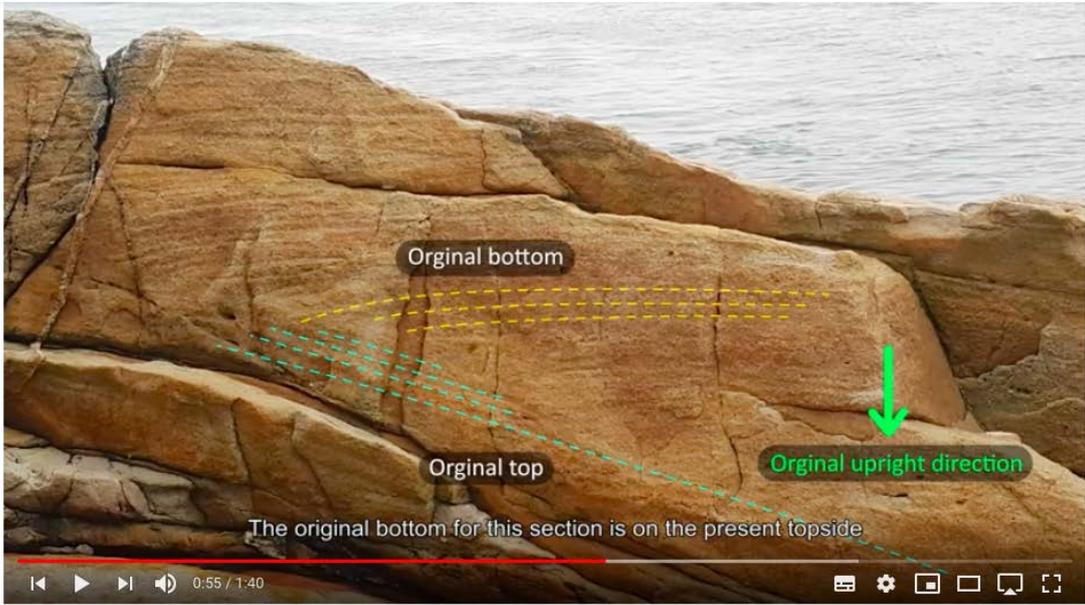
2.3 Bluff Head - Devil's Fist
51 次观看
0 0 分享 保存 ...

ESSC CUHK 2019年2月1日发布 已订阅 89



2.4 Bluff Head - Cross Bedding
59 次观看
0 0 分享 保存 ...

ESSC CUHK 2019年2月1日发布 已订阅 89



2.5 Bluff Head - Overturned Layers

51 次观看

0 0 分享 保存

ESSC CUHK
2019年2月1日发布

已订阅 89



2.7 Bluff Head - Fold

54 次观看

1 0 分享 保存

ESSC CUHK
2019年2月1日发布

已订阅 89

1 KEEP course with new questions designed in ESSC1000 Hong Kong Geology for students studying Bluff Head in ESSC3100 Structural Geology:

KEEP Course ESSC1000: Hong Kong Geology Help

View this course as: Learner

Home Course Discussion Wiki Progress

Course > Field Trips in Hong Kong > Bluff Head > Devil's Fist

< Previous [] [] [] [] [] [] [] [] Next >

Devil's Fist

[Bookmark this page](#)

Video



0:35 / 1:12 Speed 1.0x HD

Multiple Choice

2/2 points (ungraded)

Q1. Which of the following features can be observed at the Devil's Fist?

- (1) Tilted bedding
- (2) Tight fold
- (3) Vertical Bedding

(III) **7 supplementary videos about Taiwan geology were polished and 1 Selection Quiz** was made to ensure students acquiring sufficient background for the intense field study in ESSC2120. All these materials are used again in the pre-trip lectures to elaborate the key concepts and enhance student's learning effectiveness.

Videos can be found in our e-learning website:
<https://cuhkesscelearn.wixsite.com/home>

This site was designed with the **WIX.com** website builder. Create your website today. [Start Now](#)



 Earth System Science Programme
e-Learning Resource Pool
[Go to the Official Website of ESSC](#)

[Home](#)
[Video Resource](#)
[Rocks & Minerals Gallery](#)
[KEEP Courses](#)
[Interactive Modules](#)
[About us](#)



[Virtual Field Trip \(HK\)](#)
[Virtual Field Trip \(Taiwan\)](#)
[Weather in a Tank](#)

[Rocks & Minerals Gallery](#)
[Minerals in Thin Sections](#)
[Geological Time Scale](#)

[KEEP Courses](#)
[Structure Models](#)
[Climate Feedback Model](#)



Weather in a Tank



Virtual Geological Field Trip (Hong Kong)



Virtual Geological Field Trip (Taiwan)

- 1. Thermal Fronts & Jet Streams** In the atmosphere, air at different latitudes have different temperature. When cold polar air and warm tropical air meet at mid-latitudes, the transition is not gradual, but often abruptly. In this experiment, we are going to study this sharp temperature gradient, known as the polar front.
- 2. Tropical Circulation & Trade Winds** In our atmosphere, there are general circulations which are mainly constrained by two factors - the rotation of the Earth, and the temperature difference at different latitudes. We are going to see how these factors contribute to the tropical circulation and generate trade

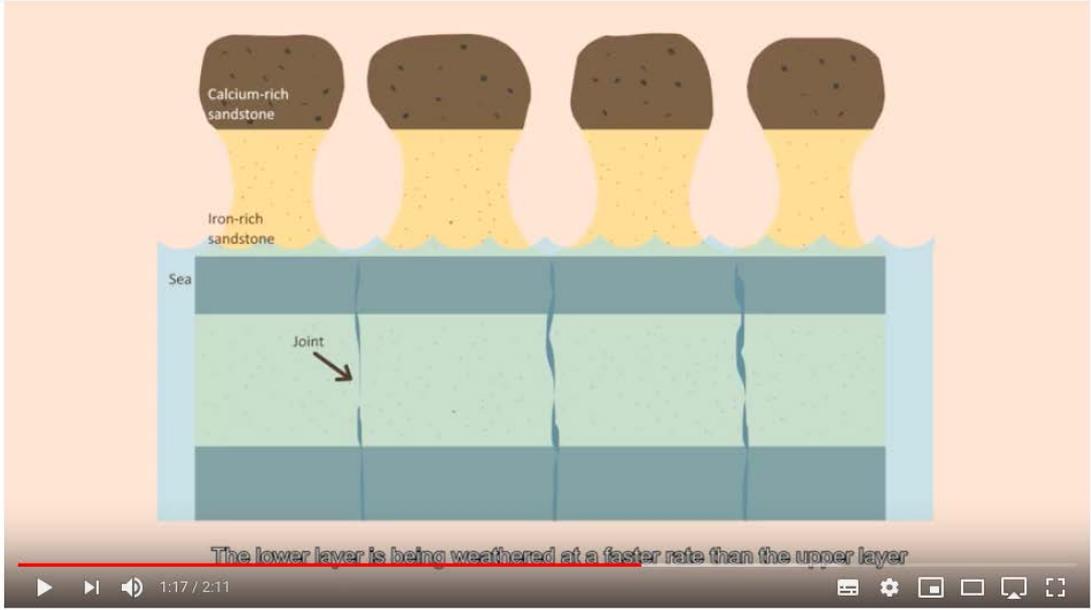
Episode 1 Po Toi Island

- 1.1 Introduction
- 1.2 Minerals in granite
- 1.3 Pegmatite
- 1.4 Weathering of granite
- 1.5 Cross-cutting rock units
- 1.6 Unloading joints

Episode 2 Bluff Head

- 2.1 Background
- 2.2 Vertical Bedding
- 2.3 Devil's Fist
- 2.4 Cross Bedding

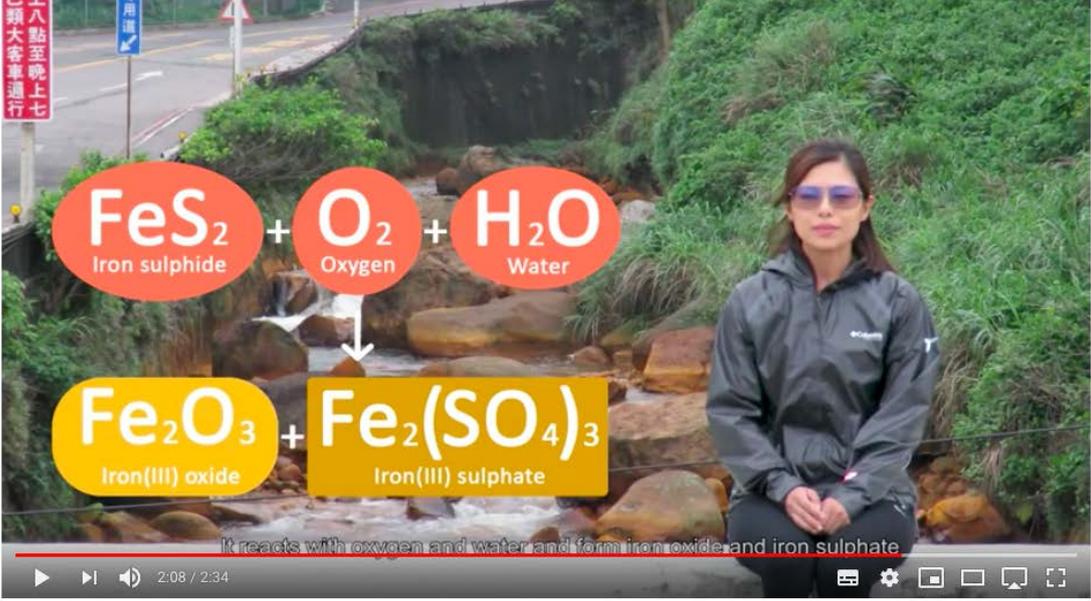
1. Yehliu Geopark
2. Jinguashi
3. Yanzikou
4. Zhihui Bridge & Song Syue Lodge
5. Shimen Mountain
6. Xiaoyehliu
7. Liji Badland



野柳地質公園 Yehliu Geopark

64 次观看

1 0 分享 保存



金瓜石 Jinguashi

52 次观看

0 0 分享 保存



燕子口 Yanzikou

41 次观看

👍 0 💬 0 ➦ 分享 📌 保存 ...

 **ESSC CUHK**
2019年1月4日发布

已订阅 89 



稚暉橋 Zhihui Bridge & 松雪樓 Song Syue Lodge

95 次观看

👍 0 💬 0 ➦ 分享 📌 保存 ...

 **ESSC CUHK**
2019年1月4日发布

已订阅 89 



1. To measure the dip direction, first, align the compass hinge to the dip plane

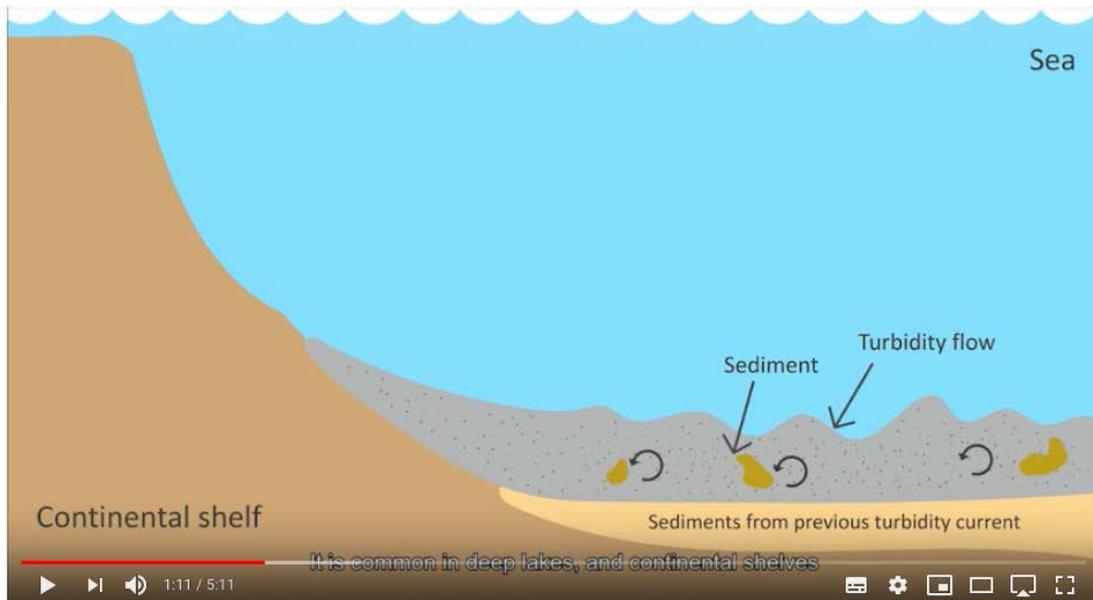
石門山 Shimen Mountain

58 次观看

0 0 分享 保存 ...

ESSC CUHK
2019年1月4日发布

已订阅 89



It is common in deep lakes, and continental shelves

小野柳 Xiaoyehliu

78 次观看

2 0 分享 保存 ...

ESSC CUHK
2019年1月4日发布

已订阅 89

YouTube HK

essc cuhk



利吉惡地 Liji Badland

61 次观看

0 0 分享 保存 ...

ESSC CUHK
2019年1月4日发布

已订阅 89

1 Selection Quiz was designed and used to select suitable students for ESSC2120 field study in Taiwan due to limited quota.

ESSC 2120 Integrated Geoscience Field Study
Selection Quiz (2018-2019)
Date: 1 March 2019
Time: 18:00 – 19:00

Name: _____ SID: _____

This quiz consists of three sections. Answer all the questions. Total mark of the quiz is 35.

Section I: ESSC2010 basic knowledge (5 points)

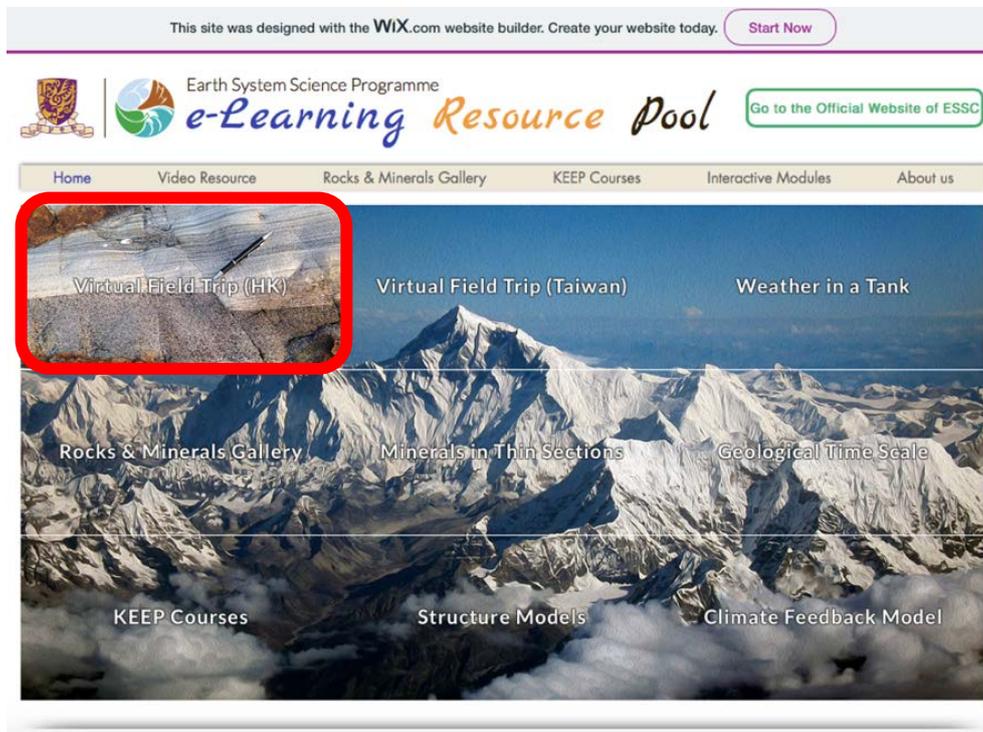
Answer all the questions. Circle the most suitable answer. More than one answer for each question will be regarded as wrong answer.

1. Which of the following statements is **correct**? (1 point)
 - A. The lithosphere is composed of the crust and upper mantle
 - B. The oceanic crust is mafic and is thicker than the continental crust
 - C. The entire mantle is liquid
 - D. The entire core of the earth is solid
2. Which of the following statements is **correct**? (1 point)
 - A. Comparing to quartz, K-feldspar is more resistant to weathering
 - B. Slate and gabbro are metamorphic rocks
 - C. Poorly-sorted breccia indicate that the sediments underwent long-distance transportation
 - D. Magma starts with basaltic composition in deeper crust and the evolved magma becomes more felsic
3. Which of the following statements is **INCORRECT**? (1 point)
 - A. When a continental plate and an oceanic plate collide, the oceanic plate will be the subducting plate
 - B. Basalt is commonly found at mid-ocean ridges
 - C. The area of earth crust surface is increasing due to seafloor spreading
 - D. Accretionary prisms could be found at subduction zone
4. Which of the following minerals is **NOT** commonly found in granite? (1 point)
 - A. Plagioclase
 - B. Biotite
 - C. Olivine
 - D. Amphibole



- (IV) To enhance the field learning of students in intermediate course ESSC3100, **4 new videos** of one extra geological location, **Lai Chi Chong** were made to help them prepare and revise the contents there.

Videos can be found in ESSC e-learning website:
<https://cuhkesscelearn.wixsite.com/home>



This site was designed with the WIX.com website builder. Create your website today. [Start Now](#)

2. **Tropical Circulation & Trade Winds** In our atmosphere, there are general circulations which are mainly constrained by two factors - the rotation of the Earth, and the temperature difference at different latitudes. We are going to see how these factors contribute to the tropical circulation and generate trade winds.

3. **General Circulation & Global Heat Regulation** After studying atmospheric circulation patterns at low-latitudes, we are going to see how the temperature gradient and the rotation of Earth contribute to the general circulation and the global heat regulation at mid-latitudes.

4. **Ekman Layers** When wind blows in the atmosphere, air near the surface rubs against the Earth's surface. Friction then plays an important role in the balance of forces. As a result, there will be layers in between the lower air near the surface and the free atmosphere above. We are going to examine these boundary layers in rotating fluid, which is an analogue of layers in the atmosphere. These layers are known as the Ekman layers.

5. **Wind Driven Circulation (Ekman Transport)** When wind blows across the ocean, it produces waves and currents. In larger scale, it is the ocean circulation. We are going to study how wind drives ocean circulation. You are going to see the Ekman layers in the ocean and learn about the Ekman transport.

6. **Taylor Columns** According to the Taylor Proudman Theorem, fluid will move in two dimensions under the fast rotation of the earth. When an incompressible fluid is under geostrophic balance, change of velocity of the fluid with the change of height will be 0, which means the velocity of fluid in vertical

- [1.6 Unloading joints](#)

Episode 2 Bluff Head

- [2.1 Background](#)
- [2.2 Vertical Bedding](#)
- [2.3 Devil's Fist](#)
- [2.4 Cross Bedding](#)
- [2.5 Overturned Layers](#)
- [2.6 Slickenside](#)
- [2.7 Fold](#)

Episode 3 Tung Ping Chau

- [3.1 Introduction](#)
- [3.2 Siltstone](#)
- [3.3 Cherty Layer](#)
- [3.4 Fault-developed valley](#)
- [3.5 Tilted Bedding](#)
- [3.6 Coastal Landform](#)
- [3.7 Rock pool](#)

VR360 and Aerial videos

- [Kang Lau Shek \(VR360\)](#)
- [Cham Keng Chau \(VR360\)](#)
- [Lung Lok Shui \(Aerial\)](#)
- [Cham Keng Chau \(Aerial\)](#)

Episode 4 High Island

- [4.1 Introduction](#)
- [4.2 Hexagonal column](#)
- [4.3 Lithology](#)
- [4.4 Tilted column](#)
- [4.5 Dyke](#)
- [4.6 Fault Breccia](#)

Episode 5 Lai Chi Chong

- [5.1 Introduction \(1\)](#)
- [5.1 Introduction \(2\)](#)
- [5.2 Load Cast](#)
- [5.3 Oxidation and Slump fold](#)

5. Shimen Mountain

6. Xiaoyehliu

7. Liji Badland

Or via ESSC CUHK Youtube Channel: <https://www.youtube.com/watch?v=V3uXTg-jLTk&list=PLylaEfEhBWzbqIxrN9ShBLxQtyQFZ-gLg&index=28>

YouTube ^{HK} essc cuhk



both volcanic and sedimentary rocks could be found in this area

5.1 Lai Chi Chong - Introduction (1)

42 次观看

ESSC CUHK 2019年4月10日发布 已订阅 89

YouTube ^{HK} essc cuhk



is determined to be about 146 million years old

5.1 Lai Chi Chong - Introduction (2)

29 次观看

ESSC CUHK 2019年4月10日发布 已订阅 89

YouTube HK | essc cuhk | Search



5.2 Lai Chi Chong - Load Cast
37 次观看

ESSC CUHK
2019年4月10日发布

已订阅 89

YouTube HK | essc cuhk | Search



5.3 Lai Chi Chong - Oxidation and Slump Fold
41 次观看

ESSC CUHK
2019年4月10日发布

已订阅 89

The above productions serve the project’s original objectives perfectly and are regarded as a successful collaboration between ESSC and ELITE.

3. Evaluation Plan

Have you altered your evaluation plans?

What monitoring data did you collect?

Does your evaluation indicate that you have achieved your objectives?

To evaluate the effectiveness of the e-learning materials for teaching and learning, we have:

- i. **Conducted surveys** from the students taking ESSC2010 and ESSC3100 and participating in the field study with the help of the 18 Hong Kong supplementary videos and 2 KEEP courses
- ii. **Reviewed student's field performance**
- iii. Made use of the Taiwan field study videos and Selection Quiz results to **review student's understanding of the geological concepts**
- iv. **Obtained immediate feedbacks from other teachers and student helpers** who have tried the VR device

(i) **Conducting survey**

(a) Tung Ping Chau e-learning materials:

Only 19 out of 40 students participated in the survey, but 73.7% of the responded students watched the videos before the field study in Tung Ping Chau. Among those watched the videos, 71.4% agreed that the videos are useful to help them study in the field. Some pointed out that the online VR360 was very interesting but a bit short, while some suggested a longer duration of the videos. Comment concerning insufficient explanation for the use of geological compass is raised but we believed that more in-class practical session should be set up to better solve the problem. 92.9% would recommend the videos to their junior colleagues next year.

(b) Bluff Head and Lai Chi Chong e-learning materials:

44% of the students in ESSC3100 responded to the survey. 90.9% of them watched Bluff Head videos while 63.7% watched Lai Chi Chong videos. All of the responded students agreed that the videos were extremely helpful/helpful to prepare the field studies, study the geological features and finish their field assignments. 80% of those students recommended and 20% might recommend the Bluff Head videos to their junior peers. 100% of the respondents would recommend the Lai Chi Chong videos for their junior peers.

(ii) **Student's field performance:**

With the help of the supplementary videos and KEEP courses, mostly of the students learnt faster in the field than last year's students. Their field assignments generally indicated a better grade than previous years.

(iii) **Results of Selection Quiz:**

Due to limited quota, students intending to enroll ESSC2120 were recommended to watch the supplementary videos about Taiwan geology and study a few pieces of reading materials before they participated in the Selection Quiz. All the participants passed the quiz and this revealed that all of them watched the videos and understood the key concepts at minimal level. We believed that this initiated students' motivation to acquire new knowledge. Besides, the scores of the quiz

automatically indicated the most suitable students and provided an important index for selecting students to the course. It is believed that all the shortlisted students are ready for the intense study, both academically and mentally.

(iv) Acquiring immediate feedback for e-learning products in VR device:

5 ESSC staff and 2 student helpers tried the VR products with associated device. All agreed that this way of learning is very attractive and could raise student's interest in reading the geological materials before the field study. Together with small-group discussion in class, it is believed that students would be more interactive in learning with the advanced technique. The VR product in the device would be widely used in ESSC2010 next year. The participants also suggested the device to be used in Open Day, Information Day, laboratory visit and public talk to promote geology and science.

The results of the quiz and feedback from the participants reveal that the e-learning materials in the project are considered to be helpful and very helpful to enhance students' field study. They also raise student's interest in geology and motivate them to self-learn new knowledge and practice geological techniques.

4. Dissemination, diffusion and impact

Please provide examples of dissemination: website, presentations in workshops or conferences, or publications.

Please provide examples of diffusion: how the project results/process/outcomes/deliverables have been used in your unit and other parts of CUHK or other institutions?

Please provide examples of impact: how the project results can be adapted to other disciplines.

All the products are managed to enhance student's learning in and preparation for field study in ESSC2010, ESSC3100 and ESSC2120, including:

- (I) 21 polished supplementary videos** about Hong Kong and Taiwan geology can be found in the ESSC e-learning website: <https://cuhkesscelearn.wixsite.com/home/video-resource>, including:
- 7 polished supplementary field-study videos for Tung Ping Chau,
 - 7 videos for Bluff Head and
 - 7 videos for Taiwan
- (II) 2 online VR360 videos:**
- Kang Lau Shek: <https://www.youtube.com/watch?v=QeNzafxoNiQ>
 - Cham King Chau: <https://www.youtube.com/watch?v=p9HuC7ewLY4>
- (III) 2 aerial videos:**
- Cham King Chau: <https://www.youtube.com/watch?v=8JkftFnRH-M>
 - Lung Lok Shui: <https://www.youtube.com/watch?v=ID7QevQe0Z0>
- (IV) 2 Android mobile Apps (360 VR Tour) - viewing with VR device**
- (V) 2 KEEP courses** (with new questions designed and set in KEEP course ESSC1000):

- a. one KEEP course about Tung Ping Chau
- b. one KEEP course about Bluff Head

(VI) 1 Selection Quiz for ESSC2120 enrolment

For ESSC2010 students studying Tung Ping Chau, (Ia) + (II) + (III) + (IV) +(Va) are applied while (Ib) + (Vb) are for ESSC3100 students. (Ic) and (VI) are designed to selected students enrolling in ESSC2120. In addition, all CUHK students are welcome to learn from (I), (II) and (III), hoping to raise their interest in geology. (IV) is suggested to be interactive activity with general public such as secondary school students visiting our units, introductory materials in Open Day/Information Day and scientific public talks.

As the e-learning materials may covers some of the topics in other disciplines, such as GRM (Faculty of Social Science) of CUHK, students from other faculties in CUHK are welcome to view the videos and discuss with our students and teachers. It is hope that our products could enhance more interactive and interdisciplinary learning among faculties.

In addition to student’s learning, advance techniques like 360 VR Tour with interactive buttons were applied in the production. With the use of the simple and affordable 360 VR Tour interactive apps, which not only gives students immersive experience of Virtual field trip, but also helps to make learning easy. This definitely provides a new insight in teaching traditional geology.

Teachers do not only use chalk/whiteboard pens to illustrate complicated geological features, but they could also “bring” students to visualize the real features in the “virtual field trips” via videos and VR mobile applications. It is also convenient for teachers to find ELITE for rapid production of e-learning materials, and hence increasing the efficiency in generating high-tech teaching kits. With the satisfactory feedbacks, our first collaboration between ESSC and ELITE is marked as a prominent step for future education projects.

PART II

Financial data

Funds available:

Funds awarded from CDG	\$	90,000
Funds secured from other sources (please specify _____)	\$	0
Total:		\$ 90,000

Expenditure:

Item	Budget as per application	Expenditure	Balance
Teaching Assistant	86,000.00	84,784.21	11,215.79
Student helpers	1,500.00	2,194.50	(694.50)

Field shooting	2,500.00	3,000.00	(500.00)
Total:	90,000.00	89,978.71	21.79

PART III

Lessons learnt from the project

Please describe your way forward.

Please describe any of the following item(s) accordingly:

- *Key success factors, if any*
- *Difficulties encountered and remedial actions taken, if any*
- *The role of other units in providing support, if any*
- *Suggestions to CUHK, if any*
 - *Example: what should be done differently?*

Application of the polished and newly produced e-learning materials in courses and associated assignments or quiz greatly increases student's motivation to learn and prepare for the field study. With sufficient preparation, students' performance in field study shows prominent improvement when compared with previous years.

In order to generate a series of high-quality supplementary learning materials, more time is needed for polishing previous videos and new production with advanced technology. After several pre-production meetings, the team decided to reduce the number of field shooting but hire 2 more student helpers to buy more time for the editing work and production. Besides, there were also difficulties in field shooting. The boat could not berth at one of the planned shooting spots due to the windy weather. The team was unable to obtain the materials for producing VR360 videos of that spot. After discussion, the team decided to produce aerial videos as supplementary resources for students. In the VR tour 360 apps, the resolution of the 360 photos may not be in very quality due to the limitation of the equipment (Even we got the highest resolution 360 camera in the VR industry. Lack of manpower for the production team, production team member needed to work on Sunday & holidays (non-office hour) for producing VR mobile applications.

ELITE plays a very important in supporting media production. ELITE provide services not only on video production works, but also suggestion on the production of VR tour mobile applications, implementation of VR tour with interactive features which include the combination of media and Virtual Reality programming such as scripting language.

VR Tour 360 is a simulation of an existing location. We may make use of this technology to apply to some courses which have field trip study.

PART IV

Information for public access

Summary information and brief write-ups of individual projects will be uploaded to a publicly accessible CUHK CDG website. Please extract from Part I the relevant

information to facilitate the compilation of the publicly accessible website and reports.

1. Keywords

Please provide five keywords (in the order of relevance to your project) to describe your project.

- (Most relevant) Keyword 1: Virtual Reality (VR)
 Keyword 2: supplementary videos
 Keyword 3: Hong Kong Geology
 Keyword 4: Taiwan geology
- (Least relevant) Keyword 5: KEEP course

2. Summary statistics

Please provide information, if any, in the following tables, and provide the details in Part I.

Table 1: Publicly accessible online resources (if any)
<p>(a) Project website:</p> <p><i>If a publicly accessible project website has been constructed, please provide the URL</i></p> <p>https://cuhkesscelearn.wixsite.com/home/video-resource</p>
<p>(b) Webpage(s):</p> <p><i>If information of your project is summarized in a webpage (say a page in the department's or faculty's website), please provide the URL(s) in here</i></p>
<p>(c) Others (please specify):</p>

Table 2: Resource accessible to a target group of students (if any)			
<i>If resources (e.g. software) have been developed for a target group of students (e.g. in a course, in a department) to gain access through specific platforms (e.g. CU Learning Management System (Blackboard), facebook), please specify.</i>			
<u>Course Code/ Target Students</u>	<u>Term & Year of offering</u>	<u>Approximate No. of students</u>	<u>Platform</u>

ESSC	All students taking ESSC2010, ESSC3100 and registered for ESSC2120	82	-ESSC CUHK Youtube Channel -KEEP Course ESSC1000
-------------	---	-----------	---

Table 3: Presentation (if any)	
<i>Please classify each of the (oral/poster) presentations into one and only one of the following categories</i>	Number
(a) In workshop/retreat within your unit (e.g. department, faculty)	<i>Please insert no</i>
(b) In workshop/retreat organized for CUHK teachers (e.g. CLEAR workshop, workshop organized by other CUHK units)	<i>Please insert no</i>
(c) In CUHK ExPo jointly organized by CLEAR and ITSC	<i>Please insert no</i>
(d) In any other event held in HK (e.g. UGC symposium, talks delivered to units of other institutions)	<i>Please insert no</i>
(e) In international conference	<i>Please insert no</i>
(f) Others (please specify)	<i>Please insert no</i>

Table 4: Publication (if any)	
<i>Please classify each piece of publications into one and only one of the following categories</i>	Number
(a) Project CD/DVD	<i>Please insert no</i>
(b) Project leaflet	<i>Please insert no</i>
(c) Project booklet	<i>Please insert no</i>
(d) A section/chapter in a booklet/book distributed to a limited group of audience	<i>Please insert no</i>
(e) Conference proceeding	<i>Please insert no</i>
(f) A chapter in a book accessible internationally	<i>Please insert no</i>
(g) A paper in refereed journal	<i>Please insert no</i>
(h) Others (please specify)	<i>Please insert no</i>

3. A one-page brief write up

Please provide a one-page brief write-up of no more than 500 words for posting on the CDG website.

The key purpose of the project is to help ESSC students getting sufficient preparation for field study with supplementary e-learning materials by:

- (A) further polishing the current e-learning materials and transform them into interactive on-line courses; and
- (B) incorporating part of the current e-learning materials into Virtual Reality (VR) for students to obtain practical experience and knowledge for geological field study.

All the products are managed in ESSC website: <https://cuhkesscelearn.wixsite.com/home/video-resource> and they enhance student's learning in and preparation for field study in ESSC courses (ESSC2010, ESSC3100 and ESSC2120), including:

- (I) **21 polished supplementary videos** about Hong Kong and Taiwan geology:
 - a. 7 polished supplementary field-study videos for Tung Ping Chau,
 - b. 7 videos for Bluff Head and
 - c. 7 videos for Taiwan
- (II) **2 online VR360** (Kang Lau Shek and Cham King Chau)
- (III) **2 aerial videos** (Cham King Chau and Lung Lok Shui)
- (IV) **2 VR Tour 360 Android mobile Apps (Viewing with VR device)**
- (V) **2 KEEP courses** (Tung Ping Chau and Bluff Head)
- (VI) **1 Selection Quiz for ESSC2120 enrolment**

The results of the quiz and feedback from the participants reveal that the project is considered to be helpful and very helpful to enhance students' field study. They also raise student's interest in geology and motivate them to self-learn new knowledge and practice geological techniques. Moreover, it is believed that our products cover some topics in other departments such as GRM, and hence hoping to enhance more interactive and interdisciplinary learning among faculties. To a wider extent, the materials could be interactive activity for general public and introduced in Open Day/Information Day, school visits and scientific public talks. The application of advance technique in the production provides a new insight in teaching traditional geology. The satisfactory feedbacks for the project marks the first collaboration between ESSC and ELITE a prominent step for future education projects.