

## 自然領域教學單元案例

領域	自然科學領域		設計者	林怡伶、陳美卿、林雨慶
實施年級	六年級		總節數	5
單元名稱	第一單元活動 2 天氣圖與天氣變化		教材來源	南一版
<b>教學內容</b>				
第一節	認識衛星雲圖			
第二節	認識地面天氣圖			
第三節~第五節	鋒面與天氣變化			
<b>設計依據</b>				
學習重點 Learning focus	學習內容 Learning content	INd-III-7 天氣圖上用高、低氣壓、鋒面、颱風等符號來表示天氣現象，並認識其天氣變化。	核心素養 Essential literacy	自-E-B1 能分析比較、製作圖表、運用簡單數學等方法，整理已有的自然科學資訊或數據，並利用較簡單形式的口語、文字、影像、繪圖或實物、科學名詞、數學公式、模型等，表達探究之過程、發現或成果。
	學習表現 Learning behavior	pa-III-1 能分析比較、製作圖表、運用簡單數學等方法，整理已有的資訊或數據。		
跨域連結	英文領域			
學習目標 Learning objectives	<p>By the end of the course, students will be able to</p> <p>2-1 能閱讀衛星雲圖。 Read and understand satellite cloud image</p> <p>2-2 能說明天氣圖上的氣象符號。 Introduce weather/meteorological symbols on weather chart.</p> <p>2-3 能藉由地面天氣圖和衛星雲圖解釋天氣變化的原因 Observe and compare satellite cloud image and surface weather chart in order to find out the causes of weather changes</p>			
教學設備 / 資源 Teaching aids / sources	衛星雲圖 Weather satellite、鋒面圖 frontal surface、地面天氣圖 surface weather chart、影片 videos			
語言學習目標	Language of learning			
	氣象衛星(meteorological/weather satellite)、觀測(observe)、人工的(artificial)、接收站/氣象站(weather station)、衛星雲圖(satellite cloud image)、氣團(air mas)、冷氣團(cold mass)、暖氣團(warm mass)、交界面(interface)、風向(wind direction)、狹長雲帶(cloud band)、鋒面(frontal surface)、等壓線(isobar)、氣壓值(atmospheric pressure)、低氣壓中心(low air pressure)、高氣壓中心(high air pressure)、冷鋒(cold front)、暖鋒(warm front)、風速(wind speed)、滯留鋒(stationary front)、梅雨 Palm rain / Mei-yu			

	Language <i>for</i> learning
	1. The weather of a high/low pressure center is sunny/cloudy. 2. The weather condition(狀況) of a stationary front is rainy. 3. Weather forecast for today is _____.

教學活動設計 Teaching activities design			
教學目標 Teaching objectives	主要問題與引導 Main questions and guides	時間 time	評量重點 Evaluation points
	<b>【 First class 】</b>		
	<b>2-1 認識衛星雲圖 knowing about satellite cloud image</b>		
	<b>【 Engage 參與 】</b>	<b>5</b>	
	<ul style="list-style-type: none"> <li>◇ 衛星雲圖是一張由氣象衛星觀測並拍攝的照片，因此上面沒有人工繪製的符號。 satellite cloud image is a picture which is observed and shot by weather satellite, so there's no artificial drawing symbol on it.</li> </ul>	5	
	<b>【 Explore 探索 】</b>		
	<ul style="list-style-type: none"> <li>◇ 從衛星雲圖可以看出雲在哪裡?各地的雲量都相同嗎? Can we know where's the cloud by seeing satellite cloud image? Is the amount of the cloud all the same from everywhere?</li> </ul>	5	
	<ul style="list-style-type: none"> <li>◇ 在衛星雲圖上，不同顏色各代表不同事物：綠色代表陸地，藍色代表海洋，白色代表雲層 On satellite cloud image, different colors mean different things: green represents land, blue represents ocean, white represents cloud layer.</li> </ul>	5	Ss could read and understand the symbols' meanings on satellite cloud image
Ss understand that each colors' representation on satellite cloud image.	<ul style="list-style-type: none"> <li>◇ 衛星雲圖 satellite cloud image 太空中的氣象衛星拍攝地球雲層 →地面接收站接收氣象衛星的資料 →電腦分析資料及專家處理分析 →繪製並播報氣象 In space, weather satellite shoots the cloud layer of Earth → weather station receives the information from weather satellite →computer analyzes the information then the experts process and analyze it →drawing the image and broadcasting the weather</li> </ul>	10	Ss could explain the steps of making satellite cloud image
Ss know the processes of making satellite cloud image	<ul style="list-style-type: none"> <li>◇ 氣象人員可以從衛星雲圖上各種雲的外型和顏色等變化來判斷，並預測未來天氣的演變。 較亮的白色雲區，表示當地的雲層深厚，可能會下雨</li> </ul>		
	<b>【 Explain 解釋 】</b>		

<p>Ss can understand the meaning and differences of each definition of weather situation</p>	<p>Meteorologist can judge and predict the changes of weather in the future by the changes like appearance and colors of clouds on satellite cloud image</p> <p><b>【 Evaluate 評量】</b></p> <ol style="list-style-type: none"> <li>從衛星雲圖上可以看出雲在哪裡？各地的雲量都相同嗎？ 衛星雲圖的白色部分就是雲的地方，各地雲量不同。 1.Can you tell where the cloud is from the satellite cloud image? Is the cloud amount the same everywhere?</li> </ol> <p>The white part of the satellite cloud picture is where the cloud is, and the cloud amount varies from place to place.</p> <ol style="list-style-type: none"> <li>不同時間，臺灣上空的雲量分布相同嗎？ 不同時間，雲分布的地方不同。 2. Is the distribution of cloud cover the same over Taiwan at different times? Clouds are distributed in different places at different times.</li> </ol> <p><b>Weather satellite</b> Super Typhoon Haiyan Satellite Image Time Lapse 12th November 2013</p>  <p>Check Out the Satellites! <a href="https://www.youtube.com/watch?v=03pZdYVacaM">https://www.youtube.com/watch?v=03pZdYVacaM</a></p>  <p><b>【 Second class】</b></p>	<p>10</p>	<p>Ss could explain the meaning of different weather situation to others clearly in their words</p>
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	<p><b>2-2 地面天氣圖 surface weather chart</b></p> <p><b>【Engage 參與】</b></p> <p>◇ 地面天氣圖：主要是依據地面觀測資料繪製而成的有那些符號？他們分別代表什麼意義？  surface weather chart is drafted according to surface observation information.  What symbols are there on surface weather chart?  What are their meaning separately/individually?</p> <p><b>【Explore 探索】</b></p> <p>◇ 氣團 air mass  大範圍的空氣在一個廣大、平坦的地面或海面停留相當長的時間後，使空氣的溫度、溼度等性質變得很相近或一致時，我們就把這大範圍的空氣體稱為「氣團」  After large-scale air stay at a vast, flat ground or sea surface for a very long time, the properties like temperature and humidity become very close or the same. This large-scale air is called "air mass".</p> <p>◇ 鋒面 frontal surface  當冷氣團和暖氣團相遇，在交界面形成一條溫度、濕度、風向顯著變化的狹長雲帶，稱為「鋒面」  When cold air mass and warm air mass meet, there will form a cloud band which has obvious changes of temperature, humidity and wind direction, and be called as frontal surface.</p> <p>◇ 等壓線 isobar  將天氣圖上氣壓值相同的地點連起來，形成一條條封閉的曲線，同一等壓線上的氣壓值相同  等壓線多而密，表示該處氣壓差距大，風很強  The closed lines which are made by connecting the places which have the same atmospheric pressure on weather map is called isobar. On the same isobar, the atmospheric pressures are the same.  If there are many isobars be dense, it means at that place the atmospheric pressure have huge differences and it has strong wind.</p> <p>◇ 低氣壓中心 low air pressure  此處的氣壓比四周低，以紅色的 L 表示  常伴隨陰雨的天氣  The place has lower atmospheric pressure than around, and is marked with a red L as representation.  It often has cloudy and rainy weather</p> <p>◇ 高氣壓中心 high air pressure  此處的氣壓比四周高，以藍色的 H 表示</p>	<p>5</p> <p>5</p> <p>5</p> <p>5</p> <p>5</p> <p>5</p> <p>5</p>	
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<p>Ss understand they can observe satellite cloud image and surface weather chart together and then find out the frontal surfaces and cloud bands can be compare form these pictures</p>	<p>常帶來晴朗的天氣 The place has higher atmospheric pressure than around, and is marked with a blue H as representation It often has sunny day.</p> <p>◇ 冷鋒 cold front 鋒面移動由冷氣團推向暖氣團，且地面暖氣團逐漸被冷氣團取代，則稱為「冷鋒」 在天氣圖上以藍色的三角形線表示。三角形尖端為冷鋒的移動方向 冷風的強度在冬季時最強，帶來的冷空氣常造成寒冷、陰雨的天氣。當冷風通過時，風向及風速改變，通過後氣溫開始下降 The movement is caused by that cold air mass push warm air mass and on the ground warm air mass is replacing by cold air mass gradually, we call it as “cold front” On surface weather chart, blue triangle line represents cold front. The direction of triangle’s tip-top is cold front’s moving direction. The cold wind has the strongest strength in winter. The cold air which is brought by cold front often cause overcast, cloudy and rainy days. When the cold wind pass, wind direction and wind speed will change. After it pass, the temperature will start to decline.</p> <p>◇ 暖鋒 warm front 鋒面移動由暖氣團推向冷氣團，且地面冷氣團區域由暖氣團取代，則稱為「暖鋒」 在天氣圖上以紅色的半圓形線表示。半圓形的凸起為暖鋒的移動方向 雨勢較小的連續性降雨為主，台灣地區很少有暖鋒過境 The movement is caused by that warm air mass push cold air mass and on the ground the area of cold air mass is replacing by warm air mass gradually, we call it as “warm front” On surface weather chart, red semi-circular line represents warm front. The direction of semi-circular’s convex is warm front’s moving direction. Warm front usually brings continuous small rain. There’re little warm fronts pass Taiwan’s area.</p> <p>◇ 滯留鋒 stationary front 若冷暖氣團勢力相等，使鋒面幾乎停留不動，就形成了「滯留鋒」 在天氣圖上會以紅色半圓形、藍色三角形相間的表示常出現在每年五月、六月，造成台灣地區連續不斷的陰雨天氣，稱為梅雨</p>	<p>10</p>	<p>Ss could observe and compare satellite cloud image and surface weather chart in order to find out the situation and the cause of weather changes</p>
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If cold front and warm front has equal influence to each other and they make the frontal surface almost stop over, it is stationary front  
 On surface weather chart, it is representing by alternate red semi-circular and blue triangle  
 Stationary front usually appears in May and June, causing continuous overcast and rainy days in Taiwan area, which is called Palm rain / Mei-yu.

## synoptic weather chart

How to read a synoptic weather chart

<https://www.youtube.com/watch?v=g4RGTrHochg>



### 【 Third~Fifth class 】

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### 2-3 鋒面與天氣變化

#### frontal surface and weather changes

##### 【Engage 參與】

- ◇ 觀察衛星雲圖和地面天氣圖，有什麼關係？  
 (由課本的圖可以發現)在同一時間衛星雲圖和地面天氣圖出現的鋒面和雲帶是可互相對應的。  
 比較不同時間會發現地面天氣圖和衛星圖上的鋒面和雲帶會移動。

By observing satellite cloud image and surface weather chart, what relationship (of them) do you notice?

At the same time, the frontal surfaces and cloud bands on satellite cloud image and surface weather chart could be corresponding to each other.

Comparing to different time, you can notice that the frontal surfaces and cloud bands will move on surface weather chart and satellite cloud image.

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##### 【Explore 探索】

- ◇ 氣象報告時，常呈現同一地區、相同時刻的地面天氣圖和衛星雲圖。把地面天氣圖和衛星雲圖合併時，你發現了什麼？

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Weather report/ meteorological report usually presents surface weather chart and satellite cloud image of the same area and time. What do you find when you combine surface weather chart and satellite cloud image?

**【 Explain 解釋】**

同一時間會出現可互相對應的地面天氣圖和衛星雲圖。

At the same time, there're surface weather chart and satellite cloud image which can be corresponding to each other.

◇ 當滯留鋒通過時，會帶來陰雨綿綿的天氣。

When stationary front pass, it brings the weather of raining lightly.

**【 Evaluate 評量】**

根據衛星雲圖資料：

1. 鋒面的位置和雲量的分佈有甚麼關係？

鋒面在地面天氣圖上的分布位置和衛星雲圖上的雲帶位置相同。

1. What is the relationship between the position of the front and the distribution of cloud cover?

The distribution position of the front on the ground weather chart is the same as the cloud belt position on the satellite cloud picture.

2. 此時臺灣可能的天氣狀況是怎樣呢？

臺灣上空有滯留鋒且雲層很厚，表示臺灣的天氣可能是陰雨綿綿。

2. What are the possible weather conditions in Taiwan at this time?

There are stagnant fronts and thick clouds over Taiwan, indicating that the weather in Taiwan may be cloudy and rainy.

## weather change

How to Read Weather Maps

<https://www.youtube.com/watch?v=bd7DcVnrSL8>



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