




暑熱壓力指數 測量系統

在馬術比賽當中，持續高企的濕度和溫度，往往影響了馬匹的表現。因此國際馬術聯會於1995年引入了濕球黑球溫度系統，以顯示馬匹實際感受到的暑熱壓力，有了這些數據，他們可以找出最適合馬匹比賽的時間，或者對賽程作出適當的調整。正因如此，濕球黑球溫度又稱為暑熱壓力指數。

展櫃中的儀器可分為三個部分：

-  自然濕球—溫度計被濕布包裹着，量度的溫度與太陽輻射、風力及濕度有關 (t_{nw})
-  黑球—溫度計藏於黑色密封金屬球內，量度的溫度與太陽輻射及風力有關 (t_g)
-  乾球—溫度計藏於白色透氣輻射保護罩內，量度一般氣溫 (t_a)



濕球黑球溫度其實是由以上三個溫度，經過不同比重的渾算而得出的結果，即：

$$\text{濕球黑球溫度} = 0.7 t_{nw} + 0.2 t_g + 0.1 t_a$$






從這條方程式所見，自然濕球所佔的比重最大，由此可知濕度的高低支配了暑熱壓力的轉變。

Heat Stress Index Measuring System

During equestrian events, continual high humidity and temperature always affect the performance of horses. In 1995, Fédération Equestre Internationale introduced the Wet Bulb Globe Temperature (WBGT) system to indicate how much heat stress that horses actually underwent. Having such data, they can figure out the most suitable time for horses to compete or even amend the schedule. That is why WBGT is also known as the Heat Stress Index.


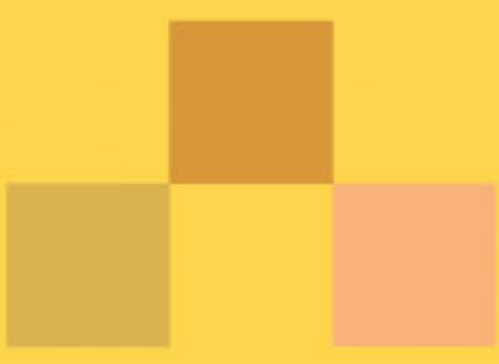
The equipment inside the showcase is divided into three parts:

-  Natural wet bulb - thermometer being wrapped by wet cloth. The temperature (t_{nw}) is related to solar radiation, wind and atmospheric humidity.
-  Globe - thermometer being hidden inside a black airtight metal globe. The temperature (t_g) is related to solar radiation and wind.
-  Dry bulb - thermometer being hidden inside a white ventilated radiation shell. It takes the common temperature (t_a).

WBGT is actually calculated from the above figures at different ratios, i.e.

$$\text{WBGT} = 0.7 t_{nw} + 0.2 t_g + 0.1 t_a$$

From the formula, natural wet bulb takes the highest ratio. This implies that humidity dominates the changes of Heat Stress.



「暑熱壓力指數」對於2008年8月舉行的奧運馬術比賽，將會擔當一個非常重要的角色。由於8月正好是香港全年平均溫度最高的一個月份，馬匹在這期間比賽，往往會因為炎熱的天氣而影響到比賽的表現。為了讓馬匹能夠在最舒適的氣溫之下作賽，香港天文台特別研發了這套24小時運作的測量系統，不停提供最快和最準確的天氣數據，以便賽會按情況需要，更改賽程，使馬匹能發揮最佳的表現。

相對於市面售賣的產品，這系統擁有下列的優點：

1. 符合 ISO 7243 標準，準確度較高；
2. 無須頻密補充資源，例如清水和電力，適合長期戶外使用；
3. 實時資料可作遙距傳送，方便監察及維修；
4. 造價便宜，可大量生產。



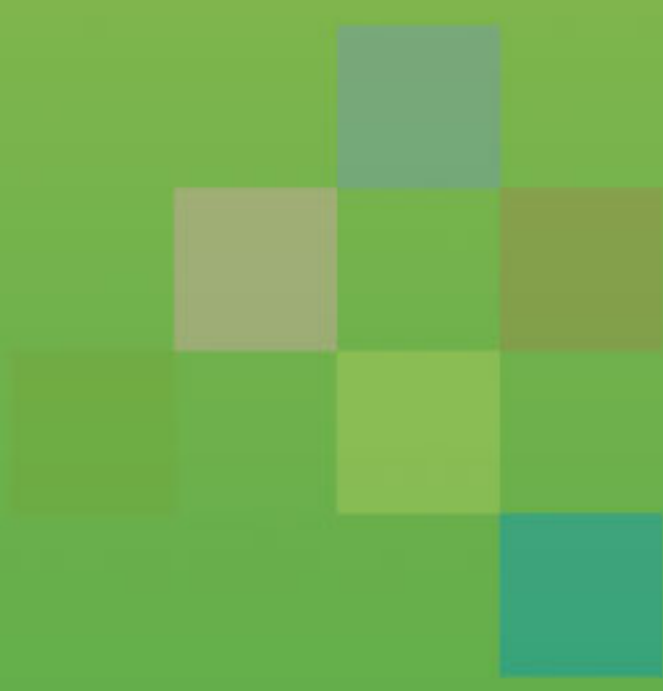

這系統已於2006年中旬在四個不同地點進行測試，收集了不少有用的數據，為奧運馬術比賽的舉行做好了準備。

" Heat Stress Index " will be playing a very important role in the 2008 Olympic Equestrian Events to be held in August. Since August records the highest annual average temperature, its hot weather will certainly affect the equine performance. In order to let the horses to compete under the most comfortable temperature, Hong Kong Observatory developed this measuring system that runs 24 hours a day. With the most updated and accurate weather information, the competition authority is able to amend the schedule so that horses can perform their best.

Compared to existing market products, this system has the following advantages:

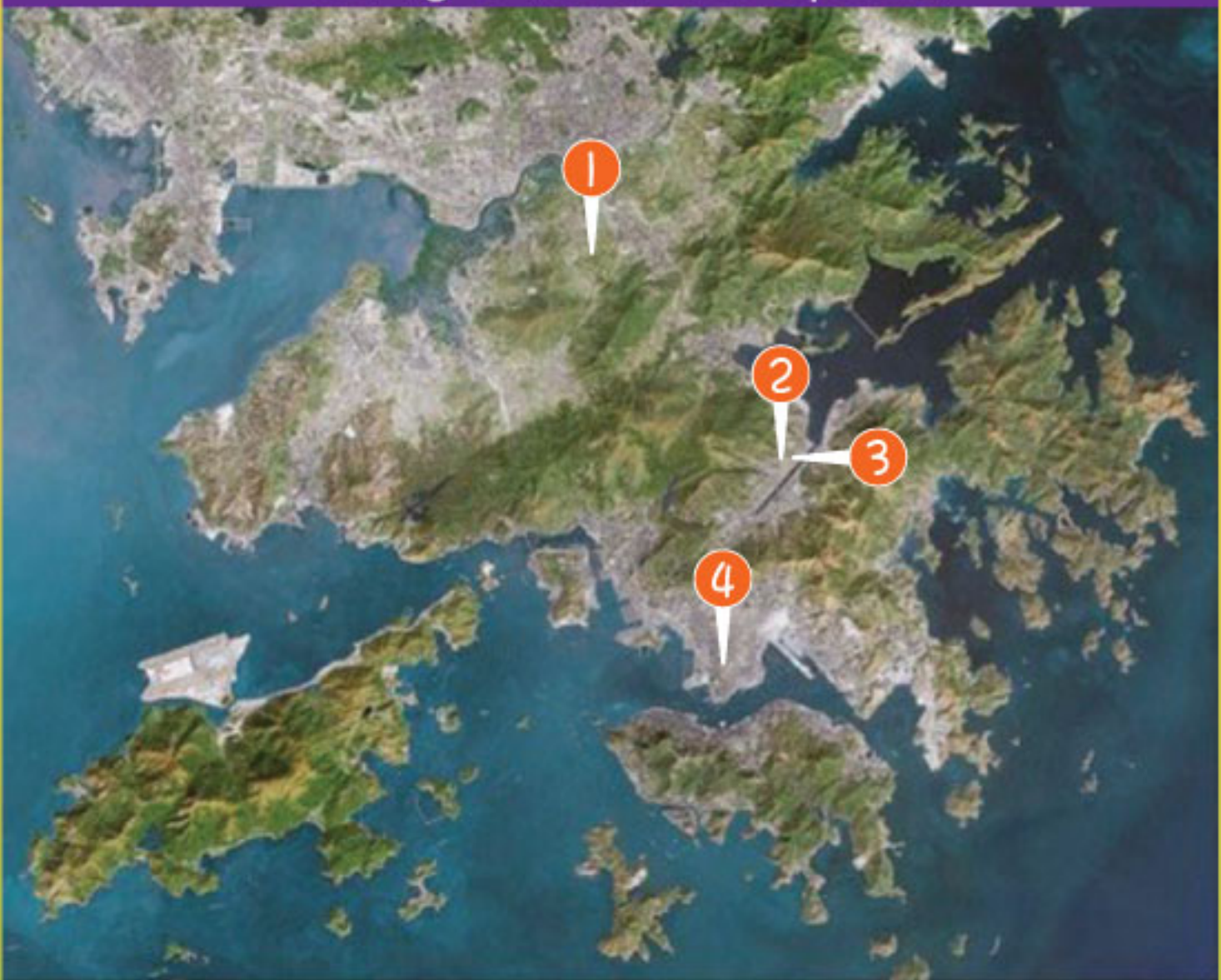
1. complies with the ISO 7243 standard, hence displaying higher accuracy;
2. no need to refill resources frequently, for example water and electricity, and is suitable for long-term outdoor purposes;
3. real-time data are remote transferable and the system is easy for monitoring and maintenance; and
4. low cost for mass production.

The system has been tested in four different locations. Valuable data have been obtained to prepare for the Olympic Equestrian Events.





系統測試分布圖
Testing Sites of the System



1 雙魚河騎術學校
Beas River Riding School



2 香港體育學院
Hong Kong Sports Institute



3 沙田馬場
Shatin Racecourse



4 京士柏氣象站
King's Park Meteorological Station

