



Forecasters at HKO monitor weather in the region 24 hours a day, 365 days a year

**Hong Kong's Tropical Cyclone Warning Signals**

<b>1</b> T Standby	<b>8</b> NE ⬆️ NE'LY Gale or Storm
<b>3</b> L Strong Wind	<b>8</b> SE ⬆️ SE'LY Gale or Storm
<b>8</b> NW ⬆️ NW'LY Gale or Storm	<b>9</b> X Increasing Gale or Storm
<b>8</b> SW ⬆️ SW'LY Gale or Storm	<b>10</b> + Hurricane

# Eyeing the Storm

*With predictions that this year's typhoon season could bring an above-average six to nine storms, HIT News went to the HKO offices to find out just what goes into predicting storm movements*

Two forecasters look at cloud, rain, lightning and other weather patterns on a bank of monitors lining a wall in the control room at the Hong Kong Observatory (HKO).

This quiet room is the nerve-centre from which tropical cyclones are monitored and from where the important decision to raise or lower tropical cyclone warning signals number 1 (standby) through 10 (hurricane) is decided.

Located in a colonial-era building dating back to 1883 this control room, one of two forecasting offices run by the HKO, is responsible for local and marine forecasting. The other office located at the airport oversees aviation forecasting. The HKO has a staff count of about 300,



Mrs Hilda Lam, Assistant Director of HKO

most of them working regular hours, but the forecasting offices operate 24 hours a day, 365 days a year.

"We always monitor the northwest Pacific area for possible tropical cyclone development," said Hilda Lam, Assistant Director at the HKO. "If the tropical cyclone is outside our warning area we still analyse its intensity, forecast its movement, and put out a forecast track twice a day on our website."

The HKO's warning area covers most of the South China Sea and extends to the longitude line 125 degrees east. "As soon as a tropical cyclone enters 125 degrees east we start our shipping warning, which is issued every three hours. It gives ships a three-day forecast, the position

and intensity of the storm, as well as the radii of its influence in terms of wave and winds," Lam said.

At this early stage there are still many factors that can affect the strength and direction of a storm, but if it continues towards Hong Kong and enters within 800km of the territory, the HKO intensifies its monitoring and gradually adds staff to the forecasting office. The forecasting office is typically manned by two forecasters, three supporting staff, and a senior officer, but during a typhoon the number of staff is almost doubled and the Observatory director is also present.

Still, the decision to hoist signals number one, and subsequent signals is not automatic. "We don't necessarily put up signal number one when the storm comes within 800km, it depends on where it is heading. We may not even raise the signal, if it is not expected to affect Hong Kong," said Lam.

Every year around March the HKO issues an outlook for the year with the number of tropical cyclones expected to come within 500km of the city. "We arrive at these numbers using the computer to calculate the general weather patterns all through the summer and relating them to occurrence of tropical cyclones through statistical methods," said Lam. Using these techniques, the HKO predicted an early typhoon season with six to nine storms for 2011.

"The way that we forecast the start of the typhoon season is by looking at our climate records and analysing them against the phenomenon of El Niño and La Niña. During El Niño years the tropical cyclone season is going to start late, like last year, but for La Niña years it can start early. We are now still in the La Niña stage, though weakening."



Hong Kong Observatory webpage and smartphone applications

The HKO prepares for each year's typhoon season with seminars and drills, bringing various groups such as the Education and Transport departments up-to-date with the latest operational procedures. HIT participates in HKO seminars, as well as communications tests, to ensure that in the event of a typhoon there is a smooth flow of information.

Lam noted that providing weather information for the public and for

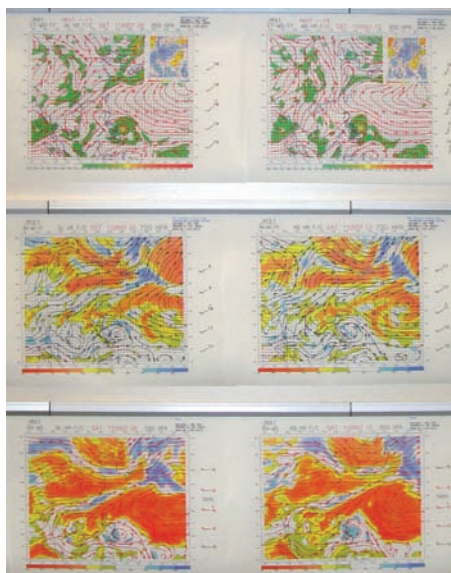
industry bodies, such as HIT, follows the same general principles of giving timely and accurate information for the sake of safety. One noticeable difference she pointed to is the general public has diversified needs, but a company such as HIT has quite specific requirements.

Compare, for example, the HKO website and online/mobile applications, with the Gust Alarm developed by the HKO together with HIT and other terminal operators.

The HKO website is a comprehensive database of weather information, catering to users who want simple bulletins as well as those who have a more sophisticated understanding of weather systems and want to view raw data. The HKO uses Twitter, Weibo, YouTube, and recently launched the smartphone application MyObservatory. The HKO also runs two international weather websites: World Weather Information Service and Severe Weather Information Centre.

In contrast, the Gust Alarm, with its wind sensors stationed around the terminal, has the specific purpose of helping HIT to keep track of strong winds in the area that may affect operations.

The two main tools used by the HKO to track tropical cyclones and forecast their movements are satellite, which looks at cloud patterns, and radar, which monitors rain.

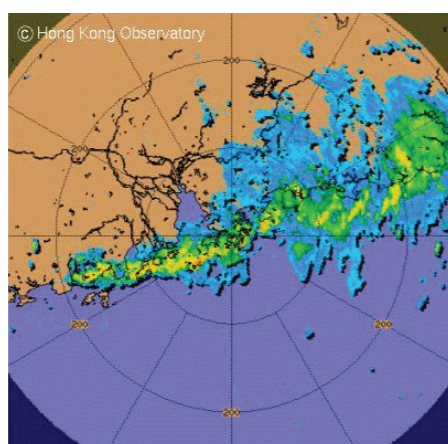


The HKO uses a variety of methods to monitor the weather



Aerial photograph of a tropical cyclone

Lam said the satellite image is the first thing forecasters look at because it provides a large coverage spanning one whole hemisphere and the weather system can be clearly seen. Once a typhoon has developed and is within the Observatory's 256km radar range, they rely on radar to monitor the storm.



Radar image

However, the HKO also uses long-time methods to determine the impact of an incoming storm, such as asking ships in the area of the storm to collect and send information. The Observatory has been gathering information in this way since before 1900 and the method is still particularly useful if a storm system is weak and its centre is harder to locate from satellite imageries.

information with centres in mainland China, Japan, Malaysia, the Philippines, Thailand, Vietnam and North and South Korea, to name a few.

"To forecast the movement of a tropical cyclone, we rely on numerical prediction models. Sometimes one model is not enough. To achieve greater accuracy, we normally use a combination of the output from several models – what we call a multi-model ensemble system," Lam said.

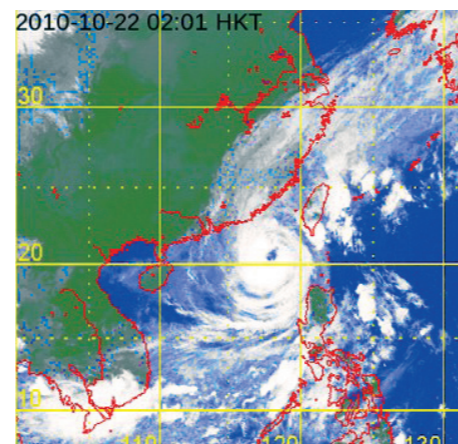
This co-operation has even extended to setting up lightning network in Guangdong and Macau to improve the detection of both incoming thunderstorms and lightning across the region.

Over the past 30 years, the HKO has seen approximately a 50 per cent increase in the accuracy of both 24- and 48-hour tropical cyclone forecasts.

"I think the good thing about the meteorological community is that there is co-operation and communication, we exchange our data regularly, even on an hourly basis. We are also very co-operative in sharing our experiences," Lam said.

The HKO has also improved its forecasting abilities through increased cooperation with other observatories in the region, and regularly exchanges

The HKO's forecasting capabilities also include what is called nowcasting. The nowcasting technique developed by the Observatory combines a dense rain



Satellite image

gauge network and radar capabilities to predict local rainstorms and associated impacts such as lightning and severe gusts, in the next couple of hours.

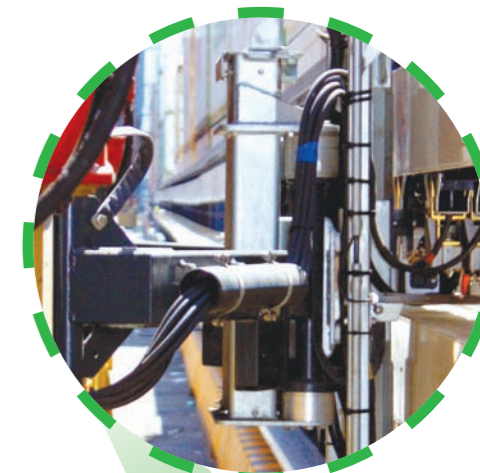
"We combine what the radar is seeing from above and what our rain gauge is collecting from the ground and we merge the two sets of data and use extrapolation. We have a new radar image produced every six minutes and by capturing this information so frequently we can track the systems and project what it will be like in the near future. We have been using this system for about ten years and it has helped us a lot."

But as Lam pointed out, forecasting the weather is a mixture of scientific method and educated guesswork and as such, "we should always be prepared for the rain and typhoon season."



# HIT's Green Drive Continues Unabated

*HIT News speaks to Simon Wong, the man behind HIT's many environmental initiatives, and finds out what he has up his "green" sleeves.*



Back in 2007, HIT introduced its Green RTGC programme, converting the diesel-driven machines to electric or hybrid ones.

Currently there are 126 RTGCs in the yard of which 53 are electric and 39 are hybrid.

"We are continuing the process of changing our existing diesel-driven RTGCs to hybrid RTGCs, and converting RTGC blocks to electric blocks. We are very pleased with the progress so far and target to complete the conversion by 2012," said Simon Wong, General Manager, Terminal Planning and Engineering, HIT.

Simon believes a good balance can be achieved with a 60/40 ratio of electric to hybrid cranes. He added that HIT has recently purchased ten hybrid RTGCs that are scheduled for delivery this September.

Explaining the time it takes to convert the cranes to hybrid machines, Simon said, "The conversion to a hybrid RTGC takes up to two weeks and involves removing the existing diesel engine and putting in a smaller engine and the hybrid system, which includes the battery."

HIT recently completed the conversion of an electric RTGC block in the yard of Terminal 4, making room for the new hybrid RTGCs that will arrive in the fall.



The conductor bar supplying power to the eRTGC and plugging mechanism (inset)

"The conversion of an electric block takes longer to implement," Simon explained, "because the electricity conductor bar has to be installed in the RTGC block and connected to the electricity supply from the substation which involves the civil work of digging up the ground, laying the cables, and installing the switchgears."

HIT is currently working with the electricity conductor bar suppliers on an automatic plugging/unplugging system, aiming to shorten the time it takes for the eRTGCs to move between blocks as well as saving manpower.

Apart from equipment, HIT's green initiatives have been applied to some of the lights in the yard, which have been installed with electric ballasts for greater energy efficiency. The same ballasts were also installed in the office buildings. The electric ballasts are more efficient

and emit less heat than other types of ballasts, and as a result the need for air conditioning power to lower the office temperature is reduced.

"We are exploring the use of LED lighting in the yard and on the cranes because it is even more energy efficient. We are working with our suppliers on this," Simon said.

Simon is working on other green initiatives as well, and eagerly shared his latest project with *HIT News*, "There are always 'green' projects in the pipeline. We are currently looking into hybrid buses to replace our intra-terminal shuttle buses. Hybrid buses will work very well in our operations given the frequency and duration of the scheduled bus runs around the terminals. We are studying hybrid buses from around the world and looking at those countries where they are already running on public roads."