**Curious City 2 小岛国大发现2**

Filming date: 24/05/2023 & 30/05/2023 （TBC）

Filming time: 0800-1800 & 0700-0900 （TBC）

Host: 杨志龙（B） 郭坤耀（H） 郭慧萱（I）

Spokesperson： 何虞嘉 (YJ) & Spokesperson (S)

Location： 1) Meteorological Service Singapore (MSS)

Changi Airport T2, Level 3M （4th Storey） S819643

（Turn in to coach bay- next to carpark 2A）

2) Centre for Climate Research Singapore (CCRS)

36 Kim Chuan Rd, Singapore 537054

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| **Story: 天气预报的诞生** | | |
| **No** | **Scene /Contents** | **Scripts** |
| **2** | MSS entrance  -招牌  Meetup with Spokesperson | @ level 3M near MSS door  \*Hosts walk a few steps along the corridor  \*主持人走廊走几步  B: We’re here!  B：到了到了！就是这里！  \*Pushes open the door, and sees “Meteorological Service Singapore” written on the wall  \*推门进来，看到墙上写着- Meteorological Service Singapore  I：Meteorological Service Singapore！(\*Translates into Chinese on her own)（\*自己翻译华文）  BH：(\*BH corrects Isabelle)（\* BH纠正isabelle）  \*YJ walks towards the hosts and greets them  \*Spokesperson迎面走来，打岔  YJ: Hello! I am Yujia. I am a weather forecaster. I have been waiting for you guys!  YJ: Hello 你们好！我是气象预报员（气象学家）-何虞嘉，我已经等你们很久了哦！  H: Sorry to keep you waiting. It’s our first time at MSS, we’re excited to be here!  H：不好意思，让你久等了。第一次来气象局有点兴奋！  B: We have a lot of questions, and we are very curious about how the weather is forecast.  B：我们有很多疑问，也很好奇“天气”是如何预测出来的？  I: What does MSS forecast other than the weather?  I：还有还有，除了天气，你们（气象局）还可以预测什么？  YJ: No problem, I will share with you more about what we do at MSS! Follow me!  YJ：没问题，今天让我来带你们了解气象局的运作！跟我来~ |
| **3** | At workstation  -desk (infront of computers)  - 解释图表 | @工作台  \*YJ带主持人到工作台  @Forecasting Bench  \*YJ brings the hosts to the forecasting bench  YJ: This is where our forecasters work at!  \*Hosts react and improvise (row of computers)  YJ: 这里就是气象预报员办公的地方了！  \*主持人- 反应-自由发挥（一字排开的电脑…）  H: This looks like an office, what does your work include?  H：这里看起来像办公室，你们的工作包括哪些？  YJ: We provide 24/7 weather forecast and warning services to the general public, government agencies and specialised customers. Examples are the Civil Aviation Authority of Singapore (CAAS), Public Utilities Board (PUB), and the maritime community. The provision of our service is customised based on the customer needs and requirements. For instance, the shipping community requires the forecast of the wind and sea state, while the aviation community is more interested in the flight route and airport weather conditions for flight planning and operational purposes. The operation of civil aviation is highly sensitive to the weather conditions. The safety of flights can be compromised by severe weather, which highlights the importance of having accurate weather forecasts. During periods of inclement weather, especially when there are strong winds, or heavy rain or lightning, timely and accurate weather warnings are issued. This allows the public and relevant agencies to make informed decisions to help them reduce the damage and inconvenience caused by bad weather. .  YJ：我们的主要工作是提供天气预报和警报给公众，以及一些重要的机构，如新加坡民航局，公用事业局，航海业者等等。不同的业者有不同的需求，我们也会依据他们的要求去提供所需的服务。例如，航海业者需要海面上风和浪的预报，而民航业注重的是航线路上和机场的天气状况，因为这牵涉到飞行规划和实操流程。民航业的运行对天气状况十分敏感，恶劣的天气会对飞行的安全性造成威胁，因此准确的预报在此尤为重要。每当天气将转恶劣，如强风暴雨还有雷电来临前，我们会及时的发布天气预警，以便大众和业者能有时间采取适当的行动，以减低恶劣天气对他们造成的不便。  I: Are you able to predict the weather for the whole island just be looking at a few computer screens?  I：那你们只需要对着几台电脑，就能推算出全岛的天气吗？  YJ: It is not that easy. First, we need to familiarize ourselves with ‘meteorological language’. Meteorologists mainly use three tools to forecast the weather: Weather observations, Supercomputer system (Numerical weather models) and Expertise. In other words, we make informed forecasts based on monitoring and analyzing data from the meteorological observation network, as well as using our expertise and experience. We will use our understanding of weather patterns and the behavior of the atmosphere to forecast how weather conditions are likely to evolve. For example, do you see the colourful images on my left hand side, which is one of our key observation tools.  YJ: 没那么简单。首先我们得熟悉“气象语言”气象学家主要通过三种工具来预测天气：天气观测，超级计算机天气模型以及气象学家的专业知识和经验。也就是说，我们通过监控和分析气象观测网的数据，以及利用我们的专业知识和经验，对天气模式和大气行为的了解来做出有根据的预测。例如，你们看到我左手边的图像了吗，它就是我们重要的观测工具之一。  I: This looks familiar! We have seen it in the *Question Room*!  \*Insert *Question Room* Q1  I: 这个图很熟悉！我们在问号房里有看过！  \*Insert 问号房 Q1  YJ: This is the radar reflectivity image, which is used to monitor the development and movement of weather systems and to analyse the structure of a storm.  YJ: 这是雷达回波图，用于监测天气系统的发展和移动，并且分析风暴的结构。  B: Yeah we got the correct answer! What do the different colours on the image represent?  B: Yeah我们答对了！那图表上的颜色标记又代表什么呢？  YJ: The different colours with dBZ values represent various intensities of precipitation detected by radar. Low dBZ values (blue and green colors) indicate light precipitation, while higher values in the yellow, orange, and red colors mean heavier precipitation. [Values above about 45 dBZ signify intense precipitation and are always caused by thunderstorms. Anything above 60 dBZ generally means that the sample volume contains some hail].  YJ:图表上不同的颜色以及其相对应的反射率因子数值代表雷达探测到的各种强度的降水，蓝色和绿色代表雨势较弱，而黄色、橙色和红色表示较强的降水强度。。  H: I noticed that you also monitor the weather/climate in other countries. Why is it important to be aware of the weather/climate in other countries?  H：我发现你们也有观测邻国的气候变化，为什么需要知道邻国的天气呢？  YJWeather systems do not recognize national boundaries because they are a part of the global atmosphere, which is an interconnected and complex system. Weather patterns are influenced by many processes, including ocean currents, atmospheric circulation, and the rotation of the Earth. As a result, weather system can travel long distances and impact multiple regions and countries, regardless of national borders.  <this is abit weird, I think it is more of cos weather knows no boundaries and can ab advected to Singapore, so we keep watch of not just Singapore’s weather, but weather of our neighbouring countries and surrounding sea areas as well.  From one of Elaine’s interviews: Weather systems do not recognise national boundaries—processes that occur in one part of the world can often affect weather in other parts of the world. Therefore, to understand the state of the atmosphere over Singapore, we need observations over a much wider region beyond our island, which we obtain through international data exchange.>  YJ：气象无国界是因为天气系统是地球大气层的一部分，是一个相互联系、复杂的系统。这些气象因素受到许多不同的过程的影响，包括洋流、大气环流模式和地球自转等。因此，天气系统可以长距离移动，并影响多个地区和国家，而不受国界的限制  I: Other than analysing radar imagery, do you forecast the weather by observing the sky with naked eyes?  I：除了分析雷达图，你们会用肉眼看天预测天气吗？  YJ:Yes we do. Despite the advances in technology, reporting of certain elements of weather such as cloud type and visibility still require the inputs from human observers. That is why we still need to go to the rooftops to do observation from time to time. The cameras installed at Changi Airport and Seletar Airport also help us a lot. Sometimes we will look at the clouds around us to do forecast . For example, tall, broccoli-shaped clouds indicate potential development of thundery showers. (\*insert cctv general shots)  YJ:有啊，虽然如今科技已十分发达，但一些气象报告的元素如云的类型，还有能见度等还是须凭肉眼做出观察。所以我们会时不时的去天台做观测，同时设置在樟宜机场和实力达机场的监控器也给我们带来很多帮助。有时我们会观察周围的云朵来预测天气，如果有像花椰菜形状的积云，就代表可能会有雷电雨或暴雨降临。（\*insert cctv general shots）  \*hosts try to look at the clouds in the cctv  B: They all look the same to me (\*don’t understand). How often do you check if there are any weather changes?  \*主持人尝试看cctv的云  B: 看来看去还是一样（\*看不懂）。 你们每隔多久就得查看天气有没有变化呢？  YJ:We shall maintain a constant watch of the weather and meteorological conditions for Singapore and amend the forecast when necessary. .  <weird. The alerts could be referring to LDS. More like We are always keeping watch of the weather, and will issue alerts in case of severe weather.>  YJ：我们是持续不间断地监测和审查新加坡的天气情况，并在必要时修正预报。。  H: There are a lot of different computer images here, what weather parameter do they measure?  H：我看到其他电脑的图像都不一样，是观测什么气象呢？  YJ: The various images here are all the visualization outcomes of our meteorological observation network. . This is the wind profile, which is composed of wind barbs that provide information on the wind speed and direction at various levels of atmosphere. This is the lightning detection system, which detects and locates lightning strikes. Electromagnetic waves detected by sensors are transmitted to a central processor that determines the location. By setting the electromagnetic field strength criteria, once the value exceeds the threshold, we will need to immediately issue lightning alert to the surrounding areas. The public should stop all outdoor activities and take shelter when lightning alerts are issued.  YJ:这里的各种图片都是我们气象观测网络的可视化体现。比如，这个就是风廓线图(Wind profiling)，都是“风旗”，让各个高度层和时刻的风速风向数据一目了然。这个是我们的雷电监测预警系统，可对雷电进行实时监测和定位。通过对电磁场强度标准进行设置，一旦数值超过阈值，此时预警设备就会发出警报声，提示区域内将会出现雷电现象，我们就会马上向附近地区发布雷电警报，呼吁大家避开，停止户外活动。  (\*insert wind profiling 和lightning 图)  H: To all our viewers, when you receive lightning alerts, please take care of your safety and seek shelter at a safe place, do not loiter outdoors.  H: 观众朋友，如果看到雷电警报时，为了你们的安全，一定要到安全的地方躲避，请不要在户外逗留。  I: Other than radar imagery, I also saw satellite images on the internet. What is the function of the satellite imagery?  I: 那除了雷达（radar）的数据，我也在网上看过卫星图（satellite），卫星图的功用是什么？  **@Right side work station**  \*walking over to the computer with satellite imagery  \*走到卫星图的电脑桌  YJ: Come over here, this is the satellite imagery. We receive data from various satellites operated by different countries, such as Japan, China and United States. By tracking the development and movement of weather systems, we can monitor and predict weather patterns as well as haze situations that could impact Singapore.  <sounds like they are referring to the SIGMET coordination websites. Maybe can show them our satellite products instead, and say “We receive data from various satellites operated by different countries, such as Japan, China and the United States. We generate various satellite products so that we can monitor the weather as well as haze situation in our region.”>  YJ: 来~，这就是气象卫星图了！我们接收来自多个国家，如日本、中国和美国运行的气象卫星的数据，并且生成各种气象卫星图，通过跟踪天气系统的发展和移动，以便我们能够监测本地的天气和雾霾情况。  B: You have explained a lot to us, and we have also looked at many images, but there is still so much to learn. Indeed, we cannot understand meteorology in just one day.  B：你讲解了这么多，我们也看了各种图像，果然要看懂“气候语言”真的不是一天就能学会的。  H: This is why we need meteorologists to analyse and forecast the weather! (applause for the meteorologists~)  H：所以我们才需要这群气象学家为我们分析和预报天气！（掌声送给你们~）  YJ:The Met Service employs different specialised high-tech systems to collect accurate weather information, so that we can provide better services to the public. .  YJ：气象局通过各种高科技探测器收取更精确的数据，以便我们能够为公众提供更好的服务。。  I: How do you predict weather for more than a day in advance?  I：如果是超过1天的预测，你们是如何推算的？  YJ: We make use of Numerical Weather Prediction model products. These computer models can predict wind speed and direction, rainfall, temperature and other weather parameters, and help us to predict the weather more than x days in advance.  YJ: 我们就得靠数值预报模型的工具 (Numerical Weather Prediction NWP) 来帮我们预测天气，这个模型能分析风向、风速、雨势、气温等数据，能够帮助我们推算超过X天的气象。  I: No wonder there is advanced weather forecast, which allows us to know next week’s weather!  I: 难怪有advanced weather forecast，让我们可以提前预知一个星期后的天气！  H: Other than the weather, what do you monitor/forecast?  H：除了天气，你们还有预测什么吗？  YJ: Apart from providing weather forecast and warning services, we also monitor multi hazards due to seismic activity, tsunami, volcanic eruption, transboundary haze and radioactive release in the region, and assess the risk and impact of the hazards on Singapore. Tremors could be felt in Singapore when there are strong earthquakes nearby such as in Sumatra. When there are volcano eruptions in our surrounding region, air traffic may be impacted, and Singapore’s air quality could be affected if the volcano ash plume is blown towards us.  YJ：我们还监测亚太地区的地质灾害，如地震，海啸，火山爆发，雾霾和放射性物质，并且评估这些危害对新加坡的风险和影响。。  B: Wow! I really admire the work that you do, it’s like solving puzzles everyday and trying to guess the God’s moods. Is it your job to issue public weather forecast report as well?  B: 哇！我很佩服你们的工作，好像每天在解开谜题一样，猜测“老天爷”的心情，通常发布气象预报文告也是你们的工作吗？  YJ: Yes, we have two rounds of meeting daily, one at 9am in the morning and another at 4.30pm in the afternoon. All forecasters on duty will discuss and prepare the weather forecast, and issue the forecast to the public and various organisations.  YJ: 是的，我们每天会进行两次会议， 一次是早上9点，另一次是在下午4点半，所有的值班预报员会一起讨论每日的天气预报，然后再发布给各个单位和公众。  I: Thank you Yujia! We finally have a better understanding of how the weather is forecast.  I：谢谢虞嘉！今天我们终于了解天气是如何预测出来的。  H: Too bad we did not have the chance to look at the different types of weather observation instruments.  H：可惜我们没有机会看到各种气候探测仪。  YJ: The weather is good today, I can bring you to the rooftop, we can see the weather radar from there.  YJ：今天天气不错，我能带你们上屋顶（天台）去看看，那里可以看到远处的气象雷达。  BHI: Really? That’s great! Let’s go!  BHI：真的吗？太好了！我们马上去！ |
| **4.** | Rooftop  MSS – At work desk (infront of computers)  - 解释如何索取图表 | @Rooftop  \*YJ points to the radar in the distance  @屋顶  \*YJ 指着远处的雷达仪  YJ: Look, that round thing in the distance .  YJ：你们看，那个圆圆的就是其中一个多普勒天气雷达！  \*Hosts improvise and react  \*主持人反应- 自由发挥  I: We still have not seen the instrument that we saw in the Question Room. Do you know what this is?  (\*shows image)  I：我们没有看到问号房的仪器。请问这是什么？（\*show 图片）    YJ: This is one of our automatic weather stations. They allow for real-time monitoring of weather parameters such as rainfall, temperature, relative humidity, air pressure and wind speed and direction. And at the meantime, they will transmit the all the observation data to our systems.. Do you know where these instruments can be found?  YJ: 这个是其中一个自动气象站，它们的主要功能是实时监测新加坡各个地区的天气资料，例如降水量，气温，空气湿度，气压和风速风向等。同时，它们会自动将所有的观测数据传输到我们的系统中。你们知道在哪能找到这些自动气象站吗？  BHI: (\*guess)  BHI：（\*猜~）  YJ: There are more than 60 AWSs installed across the island, some on rooftops, some along the roads and some near coastal areas. Singapore also has five manned observation stations, with observers stationed on site to monitor the weather.  YJ：目前一共有60？多个自动气象站设置在全岛各地，有些在天台，有些在路旁，有些在靠海的地方。新加坡全岛还设有5个观测站(manned observation stations)，有我们的工作人员驻扎在现场监测天气。  H: The weather forecast that we use only a minute to check is the result of hard work from a team of observers and forecasters. Yujia, how accurate do you think the local weather forecast is?  H：原来我们平日用1分钟查看的天气预报，背后是多人的心血，花了多少时间才能推测出来！虞嘉，你觉得本地的天气预报准确度有多高？  YJ: We provide forecasts that are as accurate as possible given the available data and forecasting methods. However, as weather is a complex and dynamic system, sometimes unexpected and changing conditions can make it difficult to forecast the weather with complete accuracy. We are working continuously to improve our forecasting capabilities and provide the most up-to-date and accurate weather information to the public.  YJ：我们提供的天气预报在现有数据和预测方法下，是尽可能的精准的。然而，由于天气是一个复杂的动态系统，有时意外和变化的大气条件会使我们难以完全准确地预测天气。“天有不测风云”，虽然预报做不到百分之百的准确，但是精准预报是我们永恒的追求目标。我们正在不断努力的加大相关业务的研发能力，提高预测的准确度和精准度，以更好的满足社会需求。  B: I know that countries around the world use weather balloons to observe the weather, does Singapore use weather balloons too?  B：我知道在全球各地都会使用“气象气球”探测仪，那在新加坡也有使用“气象气球”吗？  YJ: Yes! The radiosonde is a small, expendable sensor package that is suspended below a large balloon inflated with hydrogen or helium gas. During its ascent, the radiosonde transmits upper air weather data in real time to the ground station for further processing.  YJ：是的！无线电探空仪是一个小型、可消耗的感应器装置包，悬挂在一个充满氢气的大气球下面。上空的时候，感应器会在每一秒发出讯号，发送资料到我们的电脑，并让我们可以实时的利用这些数据来进行分析。。  I: Can we see how the weather balloon is released?  I：那我们有机会开开眼界，看看释放“气象气球”的过程吗？  YJ: Of course, you can go to the Centre for Climate Research Singapore at 7am tomorrow to look for my colleague, Pei Yi.  YJ：可以啊，明早7am你们到新加坡气候研究中心（Centre for Climate Research Singapore）找我的同事佩仪吧！  B: That’s great! Thank you Yujia, for sharing with us about the operations of MSS!  B：太好了！谢谢虞嘉跟我们分享新加坡气象局的运作！  YJ: You’re welcome! Our mission is to provide reliable weather services to the public and enhance quality of life.  YJ：不客气！新加坡气象局的目标是让公众可以全面的掌握本地的天气情况，提高公众生活质量。  H: We really learned a lot today! Thank you Yujia!  H：今天我们真的是长知识了！谢谢虞嘉！ |
| Day 2 29/05/2023  @ Centre for Climate Research Singapore | | |
| **5** | CCRS  - Weather Balloon | @CCRS – entrance + lobby  B: So this is CCRS!  I: Quick, Yujia asked is to look for Pei Yi.  H: Do not worry, I have already contacted Pei Yi, she is waiting for us upstairs. Senior will lead the way!  B: 这里就是新加坡气象研究中心（CCRS）！  I：快点！虞嘉叫我们去找XX。  H：放心，我已经联络XX了，他在楼上等我们！Senior来带路！~ |
| **6** | Release Weather Balloon | \*工作人员准备释放气球  \*Technician preparing the balloon launch  H: There she is!  H：就是这里了！X在那！  S: Hello I am Pei Yi, a meteorologist. Welcome to the Upper Air Observatory. You are really punctual, we are just about to release the weather balloon.  S：Hello! 我是佩仪，是一名气象员（job title）。欢迎来到位于新加坡气候研究中心的高空观测站(Upper Air Observatory)。你们很准时，我们正要准备释放“气象气球”。  B: Yu Jia reminded us to be punctual. Do you release the weather balloon everyday?  B：虞嘉叮咛我们一定要准时。你们每天都会释放“气象气球”吗？  S: Yes, we release the weather balloon twice a day, once at 7.30am and the other at 6.40pm. It is almost 7.30am, and we are about to release the weather balloon. You can take a look…  S：是的，我们每天释放“气象气球”2次，一次在早上7.30am，另一次在傍晚6.40pm。现在已经是7.30am，我们要释放气球了，你们可以看看…  \*Technician prepares balloon launch  \*工作人员放气球的过程  \*Hosts observe and improvise  \*主持人观察+自由发挥  I: What does the weather balloon measure?  I：这个“气象气球”能探测什么呢？  S: Our technician will attach the radionsonde to the helium balloon. As the balloon flies up into the sky, it will collect atmospheric data, such as air pressure, temperature and humidity. The data is transmitted back to the ground system.  S：气象技术人员会把无线电探空仪(radiosonde)放在氦气气球下方。当气球飞上天空时，就能探测到大气层的气候数据，例如气压、气温、湿度等等，再通过无线电将数据传送到他们的系统。  H: I have some questions! How high do the balloons go, and how do you collect back the balloons?  H：我有疑问！气象气球可以飞多高？你们会怎样把它收回来呢？  S: As the balloon rises, air pressure decreases, causing the balloon to expand. As the balloon rises to about 35km, it will burst. The parachute is then activated and helps the radiosonde to fall back to the ground slowly. The weather balloon and radiosonde are single-use, so we do not need to recover them. They usually fall into the sea. If they land on the ground, anyone who picks them up can throw them away.  S：随着气球上升，气压变低，导致气球膨胀，直到约35公里的高空，气球便会破裂。这将启动降落伞，帮助无线探空仪慢慢地掉落回地面。这些气象气球的配备都是一次性使用的，我们不需要回收。多数时候，无线电探空仪会落到海里。当它降落在陆地上时，捡到的人可以把它扔掉。  B: In just a few minutes, the weather balloon is in the air!  I: What an eye-opening experience!  H: Have a safe journey! Help us collect more meteorological data!  \*\*say bye bye to the balloon  B：短短几秒钟，气球就升空了！~  I：真的是大开眼界~  H：一路顺风！帮我们收集多一点气象数据啊…  \*\*跟气球bye bye ~…  B: Thank you for your sharing, and letting us witness the launch of the weather balloon.  B：谢谢XX的分享，还让我们看到“气象气球”升空的这一幕。  S: You’re welcome…  HI: Thanks Pei Yi, we learned something new today!  S：不客气…..  HI：谢谢XX！今天又长知识了！ |
|  | 打卡  Handphone | @bkgd with a lot computer- YuJia  H: Weather forecasters do their best to analyse various meteorological data  B: To provide the public with timely and reliable weather forecasts  I: So that we can be well-prepared before leaving the house. Let us take a photo together!  H: 气象预报员每天不遗余力地分析气象，  B: 为的就是要提供大家及时且可靠的天气预报，  I: 好让我们出门前作好准备！我们 一起拍照留念！ |