How heatwaves form in the tropics

In recent weeks, heatwaves have claimed around 200 lives in North-east Asia and sparked massive wildfires in Europe. Heatwaves occur in South-east Asia too, but form in a completely different way thanks to the region's tropical climate. The Straits Times explains the process.

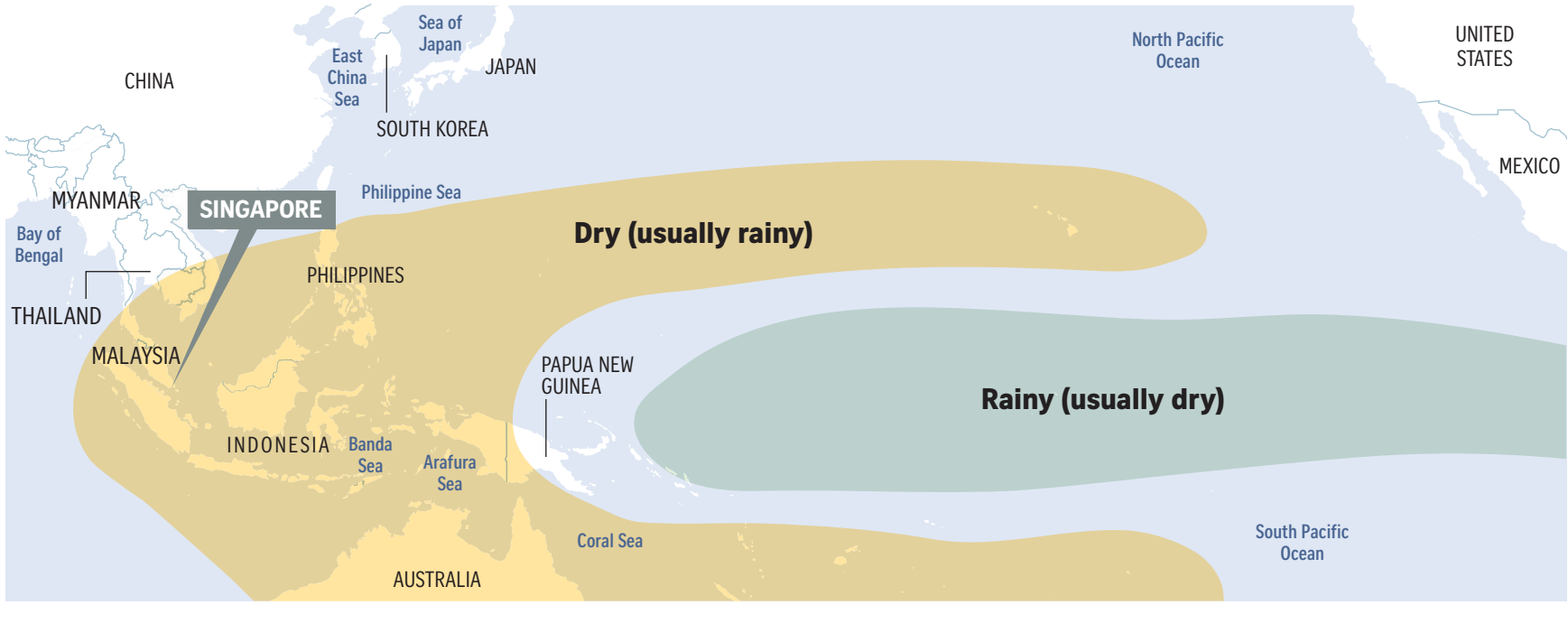
WHAT IS A HEATWAVE?

- No standard definition because different countries have different climates
- In Singapore a heatwave is defined by the National Environment Agency as occurring when the daily maximum temperature is at least 35 deg C on three consecutive days, and the daily mean temperature throughout the period is at least 29 deg C

WHY DO HEATWAVES IN SINGAPORE OCCUR?

- The main factor is strong heat from the sun, combined with a lack of cloud cover
- Singapore has only ever experienced heatwaves in the March to May inter-monsoon seasons during strong El Nino years, but that may change with global warming
- This inter-monsoon season sees lower winds, less cloud cover and hence higher temperatures than the rest of the year
- El Nino exacerbates this by making South-east Asia drier than normal (while conversely making the central and eastern Pacific wetter than normal)
- Less cloud cover means South-east Asia is exposed to more direct sunlight, which is strong and constant on the equator
- Less rain due to less cloud cover also means that there is less water in the atmosphere and on the ground to cool the area through the process of evaporation
- This makes conditions ripe for a heatwave

WHAT THE WEATHER IS LIKE DURING EL NINO YEARS



MONSOON

Wind direction

North-east

(December to early March)

- Winds blow from the north or north-east, bringing widespread continuous moderate to heavy rain with winds that occasionally blow up to 35kmph
- Afternoon and early evening showers form rapidly

South-west

(June to September)

- Winds blow from the south or south-west, sometimes bringing extremely strong gusts of winds called "Sumatra Squalls" that reach up to 80kmph
- Short showers and thunderstorms in the afternoon are common

SINGAPORE HAS EXPERIENCED SIX HEATWAVES SINCE RECORDS BEGAN IN 1979, AND ITS HIGHEST TEMPERATURE OF 37 DEG C WAS RECORDED IN TENGAH ON APRIL 17, 1983 DURING A HEATWAVE

1983
March 10-14, 24-28. April 9-21

1998
March 20-29

2010
March 6-9

2016
April 17-19

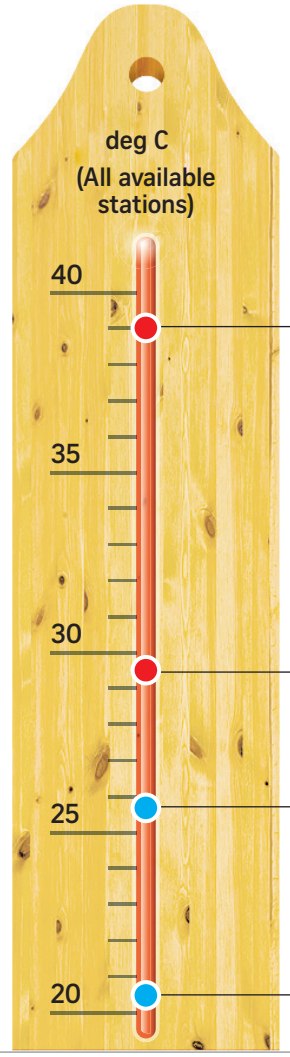
HOW WORRIED SHOULD WE BE ABOUT HEATWAVES?

- El Nino events could become more extreme with climate change (see accompanying story), which could increase the chances of heatwaves

However, we do not need to be too concerned for several reasons:

- Singapore's climate is regulated by the sea, which prevents the land from becoming too hot
- Research is being conducted to make Singapore cooler
- The country is well-prepared for the heat, and infrastructure is designed with high temperatures in mind
- Air-conditioning is easy to access

2018 MEAN TEMPERATURE



Warmest day
35.9
April 22
(Clementi)

Warmest month
29.5
May
(Marina Barrage)

Coldest month
25.7
January
(Pulau Ubin)

Coldest night
20.5
March 30
(Tengah)

NOTE: Temperatures are for up to July.

Sources: NATIONAL ENVIRONMENT AGENCY, INTERNATIONAL RESEARCH INSTITUTE FOR CLIMATE AND SOCIETY STRAITS TIMES GRAPHICS