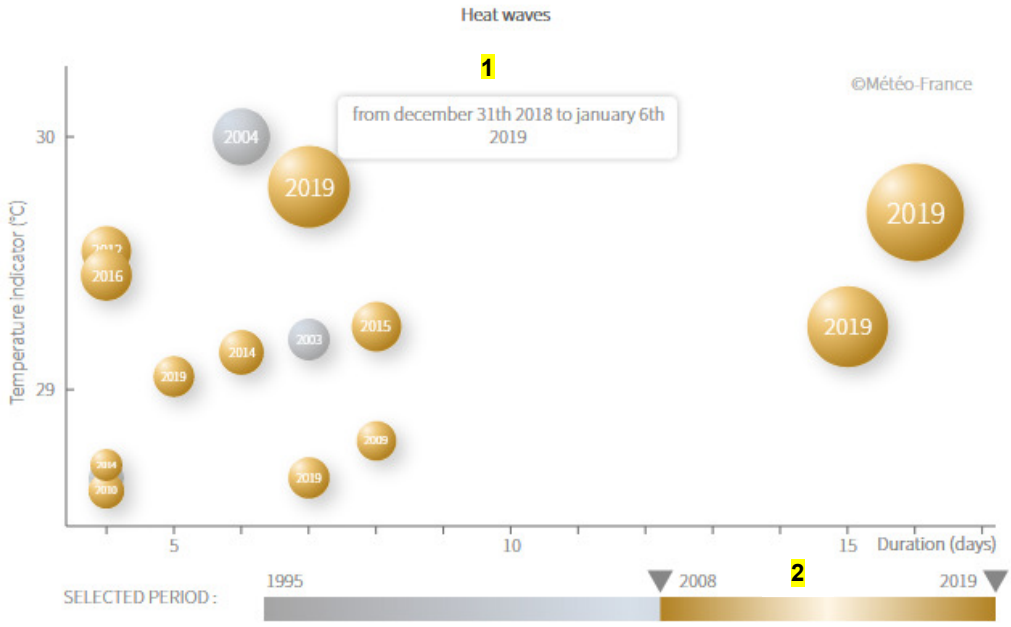
Evolution of Heat waves
Past climate - Reunion Island

1. Graph reading aid



This graph presents the heat waves identified in Reunion Island since 1995.

Each episode is represented by a bubble. Its position and size indicate the characteristics of the heat wave:

- The horizontal position indicates the duration (in days) of the episode,
- The vertical position indicates the heat wave intensity: it is the maximum value of the daily regional thermal indicator reached during the episode *(see §2. Definitions and §3. Data and methods)*,
- Size indicates the heat wave severity: it is proportional to the heat accumulated during the episode.

The year is mentioned on each bubble and the precise dates of the heat wave appear in a tool-tip when the mouse moves over it (1).

The selection bar (2) is used to highlight the heat waves in orange during a given period (here 2008-2019).

Note: Only heat waves of 4 days or more are shown.

2. Definitions

Daily average temperature:

- Daily minimum temperature (TNq) = minimum temperature observed between D-1 day at 7pm local time and D-day at 7pm local time
- Daily maximum temperature (TXq) = maximum temperature observed between D-day at 7am local time and D+1 day at 7am local time
- Daily average temperature (TMq) = (TNq + TXq)/2

3. Data and methods

Regional thermal indicator :
The regional thermal indicator is defined as the average over the whole region of daily spatialized data of average air temperature.

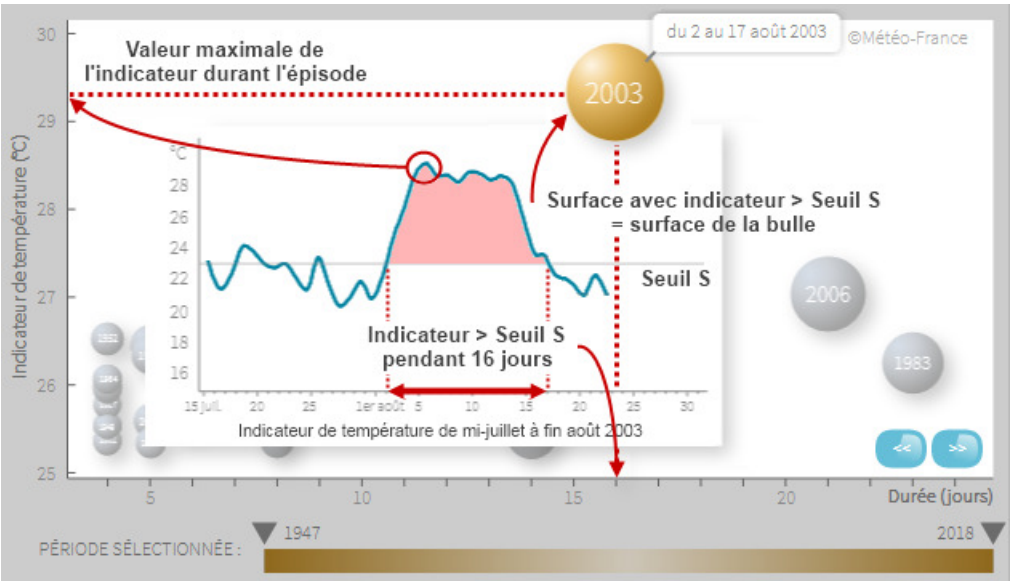
However, on Reunion Island, the number of daily reference series in temperature is too weak to calculate a *daily* thermal indicator. Therefore, to identify heat waves, a single daily reference series (Gillot-Sainte-Marie) is used.

Daily reference series :
Homogenization applies to *monthly* average data series. The homogenized series therefore do not allow to analyze the evolution of daily extremes, such as the number of days with temperature exceeding a threshold. The daily reference series are data series with no detected break in the process of homogenization, which were selected for their quality. They may start later than the homogenized series, if they do not fit the quality criteria at the beginning of the period.

For average temperatures, only one daily reference series was selected on Reunion Island (Gillot-Ste-Marie since 1995), according to criteria of availability, quality and representativeness.

Heat waves in Reunion Island are therefore identified from the daily average temperatures of this single station, since 1995. Several criteria based on the annual statistical distribution (calculated over the 1996-2015 period) are applied:

- An episode is detected when a daily average temperature in Gillot reaches or exceeds the 99.5 percentile.
- The episode includes the former days for which:
  - ✓ the daily average temperature is not durably below the 97.5 percentile (referred to as the S threshold in the figure below). ‘Durably’ means three days or more.
  - ✓ the average daily temperature is not below the 95.0 percentile.
- The episode severity corresponds to the integrated intensity over the episode duration.



4. References

Climate change and heat waves on meteofrance.fr:
http://www.meteofrance.fr/climat-passe-et-futur/impacts-du-changement-climatique-sur-les-phenomenes-hydrometeorologiques/changement-climatique-et-canicules