

# Impact of Typhoons on Heat Index Trends

Typhoon Events on Heat Index Variability: Implications for Meteorological Research and Community Resilience for Climate Adaptation

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## SPECIAL THANKS

### A. Introduction

The sector of Outdoor Thermal Comfort in Hong Kong has been poorly developed and hence this serves as an overview of current literature and data collected locally.

From 2020 to 2023, a comprehensive analysis of 23 typhoons affecting Hong Kong was conducted to assess their influence on temperature and moisture levels. This study identifies typhoons that significantly elevate temperatures ( $\geq 33^{\circ}\text{C}$ ) and examines their implications for urban heat dynamics.

### B. Methodology

- Data Collection
  - Typhoons (2020 to 2024) with high temperatures ( $\geq 33^{\circ}\text{C}$ ).
  - Utilized CoWIN, i-lens, and Met Warn
  - Select typhoons based on Relative heat index
    - Map areas in Hong Kong affected using GIS tools.

- Data analysis

- Hourly data ( $^{\circ}\text{C}$  & Rh) from CoWin calculated to heat index

- Data averaged from hourly to 6hrs

- Mitigation Strategy Development

- Refer to existing solutions and advice on white paper design.

### C. Results

Weak cold air mass from the Asian continent moderated the hot subsiding air from Saola and dried the air.

Hence the maximum temperature on HKO on 31/8 was relatively low ( $32.1^{\circ}\text{C}$ ) and the relative humidity stayed between 70%-80%.

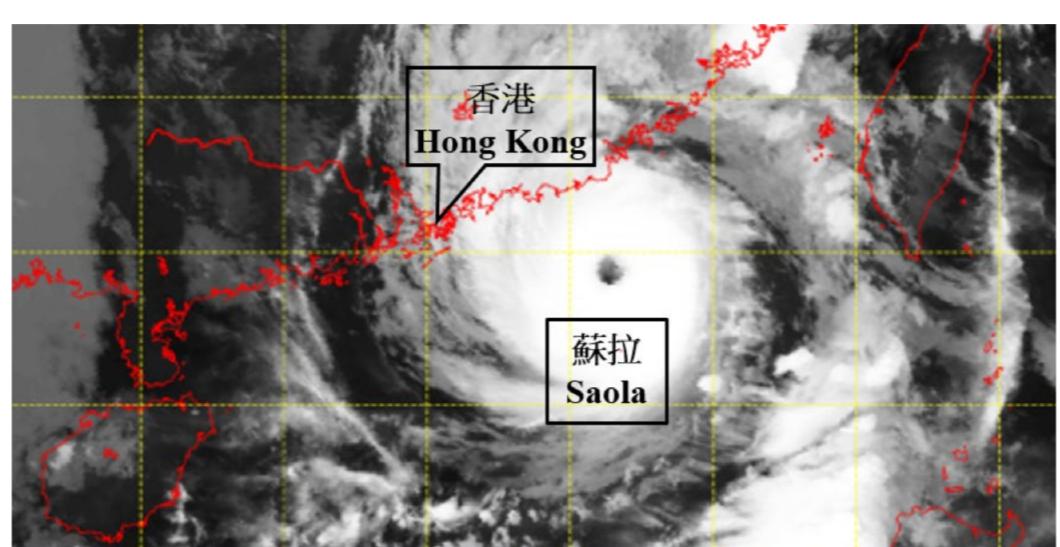


Figure 1. Super Typhoon Saola (2309), 23 August to 3 September 2023

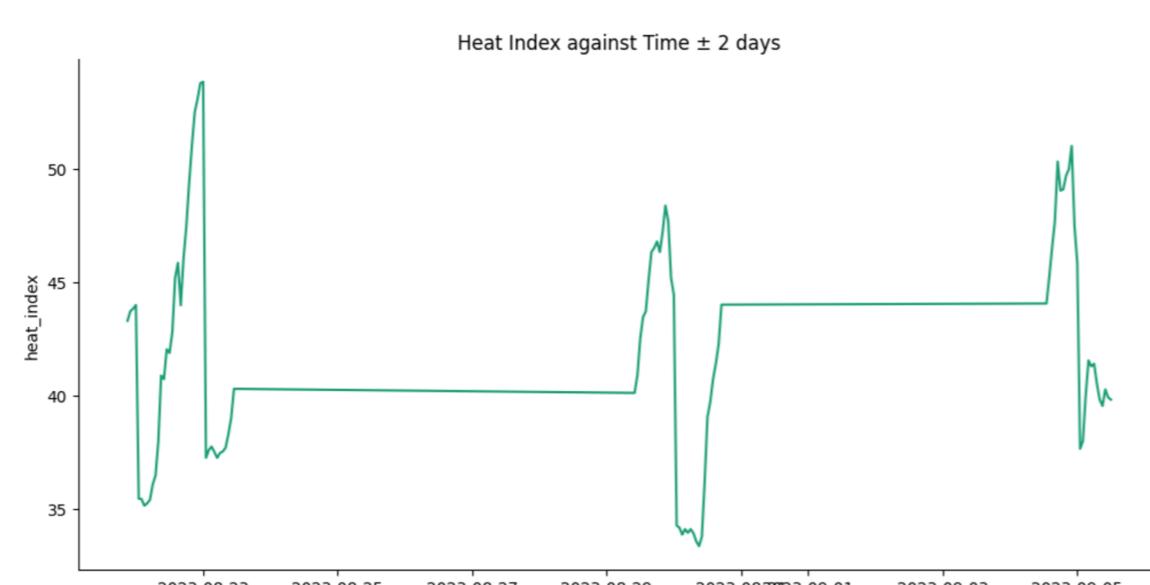


Figure 2. AVERAGED Heat index against time during the typhoon Saola between 23 Aug to 3rd Sept ± 2 days

### D. Literature

- Highest temperature recorded was  $38.9^{\circ}\text{C}$  in LCZ 1, while land cover LCZs had a low of  $29.9^{\circ}\text{C}$ .
- Relative humidity ranged from 55.6% to 73.0%, with higher values in vegetated LCZs
- Compact urban settings showed higher Mean Radiant Temperature values, reflecting increased solar exposure.
- Thermal Sensation: Most respondents reported "hot" or "warm" sensations in LCZ 1 and 4, while LCZ D and F yielded cooler perceptions due to vegetation.

### D. Analysis

The analysis of 23 typhoons in Hong Kong from 2020 to 2023, combined with findings from the study on outdoor thermal comfort across local climate zones (LCZs), reveals a strong correlation between typhoon activity and elevated temperatures. Significant heat index spikes, often exceeding  $40^{\circ}\text{C}$  during events requiring Signal No. 8, exacerbate urban heat dynamics, particularly in compact urban settings (LCZ 1). The identified urban hotspots highlight the need for targeted mitigation strategies, such as implementing green infrastructure and enhancing public awareness of heat safety, to improve community resilience against extreme weather and its impact on thermal comfort.

### E. Recommendation

- Implement Green Infrastructure:
  - Introduce green roofs and increase vegetation to lower ambient temperatures.
- Public Awareness Campaigns:
  - Educate residents about heat safety during typhoon events to encourage proactive measures.
- Enhance Emergency Response Planning:
  - Develop real-time monitoring and communication of heat index levels to better prepare communities for extreme weather.

### F. Conclusion & References

Typhoons in Hong Kong significantly raise urban temperatures and heat indices. Effective mitigation strategies are urgently needed. Enhancing green infrastructure and public awareness is crucial

## REFERENCES

