論文 / 著書情報
Article / Book Information

Title	Development of Dynamic Standard Effective Temperature (D-SET) for evaluation of the change in thermal comfort over time
Authors	Ryoga Hiroki, Alvin Christopher Galang Varquez, Do Ngoc Khanh, Florent Renard, Lucille Alonso, I Dewa Gede Agung Junnaedhi, Manabu Kanda, Atsushi Inagaki
Citation	12th International Conference on Urban Climate
Pub. date	2025, 7
Creative Commons	See next page.

License

ICUC12-662, updated on 11 May 2026
https://doi.org/10.5194/icuc12-662
12th International Conference on Urban Climate

Development of Dynamic Standard Effective Temperature (D-SET) for evaluation of the change in thermal comfort over time.

Ryoga Hiroki[1], Alvin Christopher Galang Varquez[1], Do Ngoc Khanh[2], Florent Renard[3], Lucille Alonso[4], I Dewa Gede Agung Junnaedhi[5], Manabu Kanda[1], and Atsushi Inagaki[1]

[1]Department of Transdisciplinary Science and Engineering, Institute of Science Tokyo, Tokyo, Japan (hiroki.r.aa@m.titech.ac.jp)
[2]SIT Research Laboratories, Shibaura Institute of Technology, Tokyo, Japan
[3]UMR 5600 CNRS Environment, University Jean Moulin Lyon 3, Lyon, France
[4]Actierra, Lyon, France
[5]Faculty of Earth Sciences and Technology, Bandung Institute of Technology, Bandung, Indonesia

The evaluation of thermal comfort in urban outdoor spaces has become increasingly important due to growing concerns about climate change and heat island effects. Many thermal comfort indices have been developed, but existing indices, such as the SET, assume steady-state conditions. Hence, it may not adequately capture outdoor thermal comfort in the short-term, especially under rapidly changing thermal environments (e.g., walking from indoors to outdoors). To address these limitations, this study proposes the Dynamic Standard Effective Temperature (D-SET), an index based on the principles of SET and the two-node model. D-SET provides a simplified yet approach to represent dynamic thermal comfort without necessitating the use of complex human physiological models. To develop the proposed index, comprehensive subject walking experiments were conducted in diverse climatic regions in Japan, France, and Indonesia. These experiments measured both physiological and psychological responses, such as skin temperature and thermal sensation votes (TSV), during transitional phases from indoor to outdoor environments. D-SET may enable the assessment of time-dependent thermal comfort and risks with reduced computational complexity, particularly in wide-area microclimate simulations and risk studies. By integrating temporal variations into the analysis, D-SET enhances the understanding and management of thermal risks in urban spaces, supporting the development of more adaptive and sustainable urban strategies.