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The Universal Thermal Climate Index UTCI

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One of the fundamental issues in human biometeorology is the assessment and forecast of the outdoor thermal environment in a sound, effective and practical way. Contrary to the common use of one of the numerous simple thermal indices this requires the application of a complete heat budget model that takes all mechanisms of heat exchange into account. Based on current advances in science of heat budget modelling there is a need for harmonisation of the development and dissemination of a universally valid health related climate index. Since 2005 the COST Action 730 (Cooperation in Science and Technical Development) provides the basis that at least the European scientists can join together on a regular basis in order to achieve significant progress to derive such an index as a standard (www.utci.org).

The main objective of the Action is to develop and make easily available a physiologically relevant assessment model of the thermal environment in order to significantly enhance applications related to health and well-being. The core issues of human biometeorology range from daily forecasts and warnings of extreme weather, to bioclimatic mapping, urban and regional planning, environmental epidemiology and climate impacts research. This covers the fields of public weather service, the public health system, and precautionary planning.

The Universal Thermal Climate Index UTCI (working title) will feature the following:

- 1) Thermo-physiological significance in the whole range of heat exchange conditions of existing thermal environments.
- 2) Include the capability to predict both whole body thermal effects (hypothermia and hyperthermia; heat and cold discomfort), and local effects (facial, hands and feet cooling and frostbite).
- 3) The most advanced multi-node thermo-physiological models as reference to obtaining the key results from systematic simulations. Meanwhile it was agreed to base the development on the 340-node Fiala (2001) model.
- 4) Represent a temperature-scale index, (i.e. the air temperature of a defined reference environment providing the same heat exchange condition).

The development of UTCI requires co-operation of experts from thermo-physiology, thermo-physiological modelling, occupational medicine, met data handling, in particular radiation modelling, application development etc. The interdisciplinary development strategy, the actual state of the UTCI development, and selected examples for typical applications in the above mentioned core issues will be given.