Appendix A  Indices excluded by Criteria C1-C7

Table 1 shows the indices excluded by C1 to C7, their abbreviation, references and the reason for their exclusion.

Table 1: Indices excluded from further analysis with the first criterion (C) they do not meet. Indices are given with their abbreviations (Abbr.) and reference in alphabetical order per failed criterion. Reasons for exclusion and comments include equations for the calculation of the indices if they are short enough. Indices for which differences are found in our literature review and the one by de Freitas and Grigorieva (2016) are marked with a star (*). Details on the differences are given in the Appendix. The air temperature design range of indices ($\Delta T$) are taken from de Freitas and Grigorieva (2016). The following abbreviations of human body related parameter are used: $c_{lo}$ is clothing, $E_{sk}$ is evaporative heat loss from skin surface, $HR$ is heart rate, $HB$ is heart beats, $M$ is metabolic heat, $PEx$ is physical exertion, $R$ is thermal resistance of clothing, $SR$ is sweat rate, $T_h$ is body temperature, $T_{cr}$ is core temperature, $T_{rect}$ is rectal temperature, $T_{sk}$ is skin temperature, $T_{sk,init}$ is initial skin temperature, $TS$ is thermal sensation, $WL$ is water loss. Additional parameters: $a$ is a general function $e$ is water vapour pressure, $h_c$ is convective heat transfer coefficient, $L$ is longwave radiation, $n$ is elevation, $N$ is cloudiness, $p$ is pressure, $T$ is point temperature, $F$ is vapor tension of air, $F$ is vapor tension at 36.5 °C, $c_l$ is dew point temperature, $h$ is hour of the day, $h_c$ is convective heat transfer coefficient, $L$ is longwave radiation, $n$ is elevation, $N$ is cloudiness, $p$ is pressure, $p_d$ is diurnal pressure range, $q$ is absolute humidity, $S$ is solar radiation, $T$ is air temperature, $T_d$ is diurnal temperature range, $T_{dp}$ is dew-point temperature, $T_g$ is globe temperature, $T_{gr}$ is ground temperature, $T_w$ is mean temperature of surroundings, $T_{wall}$ is wall temperature, $T_{wb}$ is wet-bulb temperature, $Tu$ is turbulence intensity, $v$ is wind speed.

| C   | Index                                | Abbr. | Reference                        | Reason / Comments                        |
|-----|--------------------------------------|-------|-----------------------------------|------------------------------------------|
| 1   | Air Cooling Power                    | ACP   | McPherson (1992)                  | Requires $T_{sk}$                        |
| 1   | Cold strain Index                    | CSI   | Moran et al. (1999)              | Requires $T_{cr}$, $T_{sk}$               |
| 1   | Cumulative Heat Strain index         | CHSI  | Frank et al. (1996)              | Requires $HB$, $HR$, $T_{rect}$        |
| 1   | Grade of Heat strain                | GHSI  | Hubac et al. (1989)              | Requires $HR$                           |
| 1   | Heat tolerance index                | HTI   | Hori (1978)                      | Requires $T_{rect}$, salt loss, $WL$     |
| 1   | Increment Temperature Equivalent to Radiation Load | ITER | Lee and Vaughan (1964)          | Requires $SR$                           |
| 1   | Index of Physiological Effect        | E_p   | Robinson et al. (1944)            | Requires $HR$, $T_{sk}$, $T_{rect}$, $SR$|
| 1   | Maximum Exposure Time               | MET_b | Brauner and Shacham (1995)       | Requires $T_{sk,init}$                   |
| 1   | Perceptual Hyperthermia Index*       | PHI   | Gallagher et al. (2012)          | Requires $TS$, $PEx$ or $T_c$           |
| 1   | Perceptual strain index*            | PeSI  | Tikuisis et al. (2002)           | Requires $TS$, $PEx$                    |
| 1   | Physiological index of Strain       | Is    | Hall and Polte (1960)            | Requires $HR$, $T_{rect}$, $SR$         |
| 1   | Physiological Strain Index          | PSI   | Moran et al. (1998)              | Requires $HR$, $T_{rect}$               |
| 1   | Qc-index (correct name: $\Delta Q_c$-index, see Table 6)* | Rublack et al. (1981) | Requires $T_{sk}$                   |
| 1   | Quotient of heat stress             | Q SkT | Hubac et al. (1989)              | Requires $HR$                           |
| 1   | Skin Temperature                    | SKT   | Mehnert et al. (2000)            | Requires $T_{rect}$                     |
| 1   | Skin wettedness                     | SkW   | Gonzalez et al. (1978)           | Requires $E_{sk}$/ in original publication measurements were used. However, $E_{sk}$ could be estimated from thermophysiological models (e.g. Gagge et al. (1986)) including all six variables. Nonetheless the index characterizes stress only for warm conditions and is thus rejected due to C7 |
| 1   | Required Clothing Insulation        | Ireq  | Holmer (1988)                    | Requires $T_{sk}$ and $SR$ / Except for minimum $I_{req}$ ($I_{req,\max}$), which is calculated for $T_{sk} = 30 ^\circ C$ and |
| C | Index | Abbr. | Reference | Reason / Comments |
|---|-------|-------|-----------|------------------|
| 2 | Climate Index | CI | Becker (2000) | Requires monthly averages of hot and cold days estimated from Predicted Mean Vote values |
| 2 | Heat Stress Index | HSI\(_{WK}\) | Watts and Kalkstein (2004) | Requires, among others, daily maximum and minimum Apparent Temperature values and numbers of consecutive days of heat stress |
| 2 | Mahoney scale | MS | Koenigsberger et al. (1971) | Requires monthly mean air temperature and humidity to estimate daytime and nighttime thermal stress |
| 2 | Spatial Synoptic Classification | SSC | Kalkstein and Nichols (1996); Sheridan (2002) | Requires long-term input (about 30-year) to determine seed days for weather classification |
| 2 | Summer Severity Index | SSI / I\(_u\) | McLaughlin and Shulman (1977) | Requires, among others, air temperature deviations from a 30-year average period |
| 2 | Weather Stress Index | WSI | Kalkstein and Valimont (1986) | Requires deviations from 40-year average of Apparent Temperature |
| 3 | Black sphere actinograph | | Poschmann cited by Brüner (1959) | No fitted equation |
| 3 | Classification of Weather in Moments | CWM/ KPM | Golovina and Rusanov (1993) | No fitted equation / Table to read weather classification from \(T, RH, N, v\) |
| 3 | Comfort Index | CI | Terjung (1966); Terjung (1968) | No fitted equation / Only available as nomogram |
| 3 | Corrected Effective Temperature | CET | Bedford (1964) | No fitted equation / Only available as nomogram |
| 3 | Cylinder | | Brown and Gillespie (1986) | No fitted equation |
| 3 | Daily Weather Types | DWT | Lecha Estela (1998) | No fitted equation / Table to read weather classification from \(T, v, N, P\) |
| 3 | Ellipsoid Index | | Blazejczyk et al. (1998) | No fitted equation |
| 3 | Eupathescope | | Brüner (1959); Dufton (1929) | No fitted equation |
| 3 | Evans Scale | ES | Evans (1980) | No fitted equation / Table to read comfort conditions from \(T, RH\); comfort ranges derived from \(v, M, clo\) |
| 3 | Frigorimeter | | Thilenius and Dorno (1925) | No fitted equation |
| 3 | Metal man (Thermal manikin) | | Pedersen (1948) cited by Brüner (1959) | No fitted equation |
| 3 | Modified Effective Temperature | MET\(_S\) | Smith (1952) | No fitted equation / Only available as nomogram |
| 3 | Resultant thermometer | | Missenard (1935) cited by Brüner (1959) | No fitted equation |
| 3 | Thermal Resistance of Clothing | TRC / \(R_{wa}\) | Jokl (1982) | If \(T \neq T_{mrt}\), \(h_{r}\) must be read from a diagram. Otherwise TRC is only a function of \(v\) and the number of clothing layer (rejected due to C5) |
| 3 | Thermo-integrator | | Winslow et al. (1935) | No fitted equation |
| C | Index                                | Abbr. | Reference                                                                 | Reason / Comments                                                                 |
|---|--------------------------------------|-------|---------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| 3 | Effective Temperature                | ET    | Houghten and Yagloglou (1923) cited by Givoni (1976)                      | No fitted equation / Only available as nomogram                                    |
| 3 | Heat Tolerance Limits                | HTL   | Vogt et al. (1982)                                                       | No fitted equation / Only available as nomogram                                    |
| 3 | Mean Equivalence Lines               | MEL   | Wenzel (1978)                                                            | No fitted equation / Only available as nomogram                                    |
| 3 | Predicted four hour sweat rate       | P4SR  | McArdle et al. (1947)                                                    | No fitted equation / Basic four hour sweat rate (input of P4SR) only available as nomogram |
| 3 | Still Shade Temperature              | SST   | Burton and Edholm (1955); Parsons (2014)                                 | No fitted equation / The insulation decrement is only available in a table        |
| 3 | Wind Effect Index                    | WEI   | Terjung (1966)                                                           | No fitted equation / Only available as nomogram                                    |
| 4 | Acclimatization Thermal Strain Index | ATSI  | de Freitas and Grigorieva (2009)                                         | Thermal stress due to abrupt change of climates / \( ATSI \) = 100\((Q_{rh} - Q_e')/Q_{rh}\) \(Q_{rh}\) is respiratory heat loss at home and \(Q_e'\) at destination |
| 4 | Adaptation Strain index              | ASI   | Blazejczyk and Vinogradowa (2014)                                       | Thermal stress due to abrupt change of climates                                    |
| 4 | Bioclimatic Contrast Index           | BCI   | Blazejczyk (2011)                                                        | Thermal stress due to abrupt change of climates / \( BCI \) = \left(\Delta UTCI + \Delta PST + \Delta WL + \Delta I_{clp}\right)/4 for parameter names see this table |
| 4 | Bioclimatic Distance Index           | BDI   | Mateeva and Filipov (2003) cited by Blazejczyk (2011)                    | Thermal stress due to abrupt change of climates / \( BDI = (ECI_h - ECI) / 13 \cdot 100\) \(ECI\) is effective clothing insulation, \(h\) indicates home location |
| 4 | Integral Load Index                  | ILI   | Matyukhin and Kushnirenko (1986)                                        | Thermal stress due to abrupt change of climates / methodology can be used for different meteorological parameters |
| 4 | Weather-Climate-Contrasts            | WCC   | Rusanov (1987)                                                           | Thermal stress due to abrupt change of climates / difference in clo-units between two climates in relation to maximum difference |
| 5 | Air Enthalpy                         | AirE  | Gregorczuk (1968)                                                        | Does not consider all 6 variables / \( i = 0.24 \left( T_{wb} + \frac{1.555}{p} e \right) \) |
| 5 | Apparent Temperature                 | AT    | Arnoldy (1962)                                                           | Does not consider all 6 variables / Considers \( T \)                              |
| 5 | Apparent Temperature* or Heat Index  | AT/   | Steadman (1979); Steadman (1984)                                        | Does not consider all 6 variables / Considers \( T, e, v, S, M, Clo \)            |
| 5 | Belgian Effective Temperature        | BET   | Bidlot and Ledent (1947) cited by Bruner (1959); Eissing (1995)          | Does not consider all 6 variables / \( TEL = 0.9 T_{wb}[{^\circ C}] + 0.1 T[{^\circ C}] \) |
| 5 | Bioclimatic Index of the Severity of Climatic Regime | BISCR | Belkin (1992)                                                            | Does not consider all 6 variables / Considers \( T, p, v, RH, n \)                |
| 5 | Biometeorological                    | BCI   | Rodriguez et al. (1985)                                                  | Does not consider all 6 variables /                                                |
| C | Index | Abbr. | Reference | Reason / Comments |
|---|-------|-------|-----------|-------------------|
| 5 | Bodman’s Weather Severity Index | BWSI/ S | Bodman (1908) | Does not consider all 6 variables / Considers $T, e, v, S, M, Clo$ |
| 5 | Body-atmosphere Energy Exchange Index | BIODEX | de Freitas and Ryken (1989) | Does not consider all 6 variables / Considers $T, e, v, S, N, P$ |
| 5 | Clothing Insulation | I<sub>c</sub> | Mount and Brown (1985) | Does not consider all 6 variables / Considers $T, e, v, S, N, P$ |
| 5 | Clothing Thickness | Clo | Steadman (1971) | Does not consider all 6 variables / Considers $T, e, v, S, N, P$ |
| 5 | Comfort Chart | CmCh | Mochida (1979) | Does not consider all 6 variables / Considers $T, e, v, L, Clo, M$ Calculates $T_{me}$ from surrounding walls |
| 5 | Comfort Vote | CmV S | Bedford (1936); Bedford (1961) | Does not consider all 6 variables / $S = 11.16 - 0.0556 T[°F]$ $- 0.538 T_g[°F]$ $- 0.0372 e[mmHg]$ $+ 0.00144 \frac{v^{0.5}}{[ft/min]} (100 - T[°F])$ From questionnaires in winter season in Great Britain for sedentary activity, only indoors |
| 5 | Cumulative Discomfort Index | CumDI | Tennenbaum et al. (1961) | Does not consider all 6 variables / $\frac{\sum_{h=1}^{h_{end}} T(h) - T_{wb}(h)}{2} = 24$ Hourly summation over period |
| 5 | Dew point temperature |  | Bruce (1916) cited by Brüner (1959); Eissing (1995) | Does not consider all 6 variables / Considers $T_{dp}$ |
| 5 | Discomfort Index | DI<sub>K</sub> | Kawamura (1965) cited by Ono and Kawamura (1991) | Does not consider all 6 variables / $DI_K = 0.99 T[°C] + 0.36 T_{dp}[°C] + 41.5$ Based on DI<sub>T</sub> |
| 5 | Discomfort Index or Temperature Humidity Index | DI<sub>T</sub> / THI | Thom (1957) and Thom (1958) cited by Landsberg (1972); Tromp (1966) | Does not consider all 6 variables / $THI = T[°F]$ $-(0.55 - 0.55R_H)(T[°F] - 58)$ $DI_T = 0.4(T[°F] + T_{wb}[°F]) + 15$ $DI_L = 0.4(T[°C] + T_{wb}[°C]) + 4.8$ |
| 5 | Draught Risk Index* / Percent dissatisfied | PD | Fanger et al. (1988) | Does not consider all 6 variables / $PD = 3.143(34 - T) \cdot (v - 0.05)^{0.6223} + 0.3696v \cdot T_u(34 - T)(v - 0.05)^{0.6223}$ |
| 5 | Effective Temperature | ET<sub>M</sub> | Missenard (1933) cited by Gregorczuk and Cena (1967) | Does not consider all 6 variables / $ETM = T_a + T_{wb} \cdot \frac{v^2}{3.4} \cdot \frac{g}{R_H}$ |
| C | Index                                     | Abbr. | Reference                      | Reason / Comments                                                                 |
|---|-------------------------------------------|-------|--------------------------------|-----------------------------------------------------------------------------------|
| 5 | Environmental Stress Index                | ESI   | Moran et al. (2001)            | Does not consider all 6 variables / ESI = 0.632T - 0.03RH + 0.002S + 0.005(T - RH) |
|   |                                           |       |                                | - 0.073(0.1 + S)^{-1}                                                            |
| 5 | Equatorial Comfort Index or Singapore Index| ECI   | Webb (1959)                    | Does not consider all 6 variables / ECI = 0.574 T + 0.488e - 0.231ν^{0.5} + 21.23 |
|   |                                           |       |                                | Sensations for Singapore climates indoors                                          |
| 5 | Equivalent Effective Temperature          | EET   | Aizenshtat and Aizenshtat (1974)| Does not consider all 6 variables / EET                                           |
|   |                                           |       |                                | = T[1 - 0.003(100 - RH)] - 0.385ν^{0.39}[(36.6 - T) + 0.662(ν - 1)] + (0.0015ν + 0.0008)(36.6 - T) - 0.0167(100 - RH) |
| 5 | Equivalent Rectal Temperature             | ERT   | Givoni and Goldman (1972)      | Does not consider all 6 variables / Considers T, e, v, M, Clo                      |
|   |                                           | T_{rec}|                                |                                                                                  |
| 5 | Equivalent Temperature*                   | EqT   | Bedford (1936); Bedford (1951) | Does not consider all 6 variables / EqT                                           |
|   |                                           |       |                                | = 0.522 T [°F] + 0.478 T_{mrt}[°F] - 0.01474√ν [ft/min] (100 - T[°F]) T_{mrt} from T_g or Eupathoscope |
| 5 | Equivalent Warmth*                        | EqW   | Bedford (1936)                 | Does not consider all 6 variables / EqW                                           |
|   |                                           |       |                                | = 0.522 T [°F] + 0.478 T_{mrt}[°F] - 0.01474√ν [ft/min] (100 - T[°F]) T_{mrt} from T_g or Eupathoscope |
| 5 | Exposed skin Temperature*                 | EST   | Brauner and Shacham (1995)     | Does not consider all 6 variables / Considers T, v, S                            |
| 5 | Globe Thermometer Temperature             | T_g   | Dimiceli et al. (2011); Vernon and Warner (1932) | Does not consider all 6 variables / Considers T_g, or in approximation equation T,v,e, S |
| 5 | Heart Rate Index                          | HRI_G | Givoni and Goldman (1973)      | Does not consider all 6 variables / Considers T, e, v, M, Clo                      |
| 5 | Heat Stress Index*                        | HSI_{BH}| Belding and Hatch (1955)      | Does not consider all 6 variables / Does not explicitly account for solar radiation in the equation for radiative balance. |
| 5 | Heat Stress Prediction Model / Heat Strain Model | HSPM/ARIEM | Cadarette et al. (1999); Pandolf et al. (1985) | Does not consider all 6 variables / Considers T, e, v, S, M, Clo Different versions for laptop, pocket calculator and desktop exist. Based on HRI_G and T_{rec} |
| 5 | Humidex                                  | HD    | Masterson and Richardson (1979)| Does not consider all 6 variables / HD = T [°C] + \frac{5}{9}(e[mbar] - 10) |
| 5 | Humisery                                 | Weiss (1982) | Does not consider all 6 variables / Humisery = T + a(T_{dp},v,n) |
| 5 | Humiture                                 | Pepi (1999); Weiss (1982) | Does not consider all 6 variables / Humiture = T + T_{dp} - 18[°C] |
| C | Index | Abbr. | Reference | Reason / Comments |
|---|-------|-------|-----------|-------------------|
| 5 | Index of Clothing required for Comfort* | CLODE X | de Freitas (1986); de Freitas (1987) | Does not consider all 6 variables / Different versions exist |
| 5 | Index of Pathogenicity of Meteorological Environment | IPME | Latyshev and Boksha (1965) cited by Kobyscheva et al. (2008) | Does not consider all 6 variables / Considers $T, T_d, e, v, n, S, p_d$ |
| 5 | Index of Sultriness Intensity | ISI | Aikimovich and Balalla (1971) | Does not consider all 6 variables / Classes of $e$ only |
| 5 | Index of thermal sensation | ITSN | Rohles and Nevis (1971) | Does not consider all 6 variables / Considers $T, RH$ / Further developments link sensations also to new ET* and $v$ Rohles et al. (1975); Rohles et al. (1974) |
| 5 | Index of thermal stress* | ITS_{dav} | Givoni (1976) | Does not consider all 6 variables / $L$ is not considered |
| 5 | Index of thermal stress | ITS_{K} N | Kondratyev (1957) cited by Rusanov (1981) | Does not consider all 6 variables / $N = \frac{0.16 (T_{sk} - T)}{R} + \frac{5.7}{0.175 + \frac{a(v)}{M}}$ $N = 0.78 \frac{2.3274}{100}$ |
| 5 | Insulation Predicted index* | $I_{clp}$ | Blazejczyk (2011) | Does not consider all 6 variables / $I_{clp} = 0.082 \cdot \left[ \frac{91.4 - (1.8 \cdot T + 32)}{2.3274 - \left[ 1/0.61 + 1.9 \cdot v_{0.5} \right]} \right]$ |
| 5 | Integral Index of Cooling Conditions | IICC | Afanasieva et al. (2009) | Does not consider all 6 variables / $IICC = 73.882 - 0.60361T + 1.3096v - 9.1985 I_{sk} - 0.15527M$ |
| 5 | Kata thermometer | Hill and Hargood-Ash (1919); Maloney and Forbes (2011) | Does not consider all 6 variables / Approximation equations considers $T, v, RH, S$ |
| 5 | Maximum Recommended Duration of Exercise* | MRDE | Young (1979) | Does not consider all 6 variables / Considers $T, RH, S$ and $Clo, M$ |
| 5 | Meteorological Health Index | MHI | Bogatkin and Tarakanov (2006) | Does not consider all 6 variables / Considers $T, RH, v, N, P, p, T_d, p_d$ |
| 5 | Modified Discomfort Index | MDI | Moran et al. (2001) | Does not consider all 6 variables / $MDI = 0.75 T_{wb} + 0.3 T$ |
| 5 | Modified (Reduced) Temperature / Equivalent facial skin temperatures* | MTTR / $T_{up}$ | Adamenko and Khairullin (1972) | Does not consider all 6 variables / Considers $T, v$ |
| 5 | Natural Wet Bulb Temperature | NWBT $T_n$ | Maloney and Forbes (2011) | Does not consider all 6 variables / $T_n = 0.85T + 0.17RH - 0.61v^{0.5} \cdot 0.0016S - 11.62$ |
| 5 | New Wind Chill | NWCI / | Office of the Federal | Does not consider all 6 variables / |
| C | Index                          | Abbr. | Reference                                                                 | Reason / Comments                                                                                                                                 |
|---|-------------------------------|-------|---------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| 0 | Temperature Index             | WCET / WCI | Coordinator for Meteorological services and supporting research (2003); Osczevski and Bluestein (2005) | \[ WCT[°C] = 13.12 + 0.6215T[°C] - 11.37v^{0.16}[\text{km/h}] + 0.3965v^{0.16}[\text{km/h}] \]                                                                 |
| 5 | Oxford Index / Wet-Dry Index* | OxI WD | Lind et al. (1956) cited by Bedford (1957); Lind and Hennon (1957)       | Does not consider all 6 variables / 
\[ WD = 0.15 T + 0.85T_{sub} \]                                                                                                                     |
| 5 | Operative Temperature         | OpT T_o | Winslow and Herrington (1949); Winslow et al. (1937)                     | Does not consider all 6 variables / Summarizes effect of dry heat exchange; Considers \( T, v, T_{mrt} \) in original form \( T_{wall} \)                                      |
| 5 | Outdoor Apparent Temperature  | OAT    | Steadman (1984); Steadman (1994)                                        | Does not consider all 6 variables / Considers \( T, v, S, M, C_l o \); regression version is more frequently used than complete model version |
| 5 | Physiological Heat            | PHEL   | Dasler (1977)                                                             | Does not consider all 6 variables / Considers time-weighted-mean of WBGT and \( M \)                                                                   |
| 5 | Radiation Equivalent          | REET   | Sheleihovskyi (1948) cited by Rusanov (1981)                             | Does not consider all 6 variables / Considers \( T, v, S \)                                                                                                                                 |
| 5 | Relative Heat Strain*         | RHS    | Lee and Henschel (1966)                                                   | Does not consider all 6 variables / Considers \( T, v, L \) and \( C_l o, M \)                                                                   |
| 5 | Relative Humidity Dry         | RHDT   | Wallace et al. (2005)                                                     | Does not consider all 6 variables / \[ RHDT = 0.9 T + 0.1 RH \]                                                                                   |
| 5 | Respiratory Heat Loss         | RHL/ Qr | Rusanov (1989) cited by de Freitas and Grigorieva (2016)                  | Does not consider all 6 variables / C1 to C4 not checked since required literature could not be obtained. Considers \( T, e, p, el, M \) |
| 5 | Resultant Temperature or      | RT/ NET | Missenard cited by Landsberg (1972)                                      | Does not consider all 6 variables / \[ NET = 37 - (37 - T) \cdot \left(0.68 - 0.0014RH + \frac{1}{1.76 + 1.4v^{0.75}}\right)^{-1} - 0.29T\left(1 - \frac{RH}{100}\right) \] |
| 5 | Net Effective Temperature     |        |                                                                          |                                                                                                                                                      |
| 5 | Saturation deficit            |        | Flügge (1912) cited by Brüner (1959)                                     | Does not consider all 6 variables / Considers \( q \)                                                                                             |
| 5 | Severity Rating               | S      | Osokin (1968) cited by Rusanov (1981)                                    | Does not consider all 6 variables / \[ S = (1 - 0.067)(1 + 0.20v)(1 + 0.0006n)T_{k}(RH)A_{c}(T_{d}) \] |
| 5 | Standard Operative Temperature| T_o / T_so | Gagge et al. (1973)                                                      | Does not consider all 6 variables / Considers \( T, v, T_{mrt}, T_{sk} \) can be calculated from provided model                                      |
| 5 | Subjective Temperature        | T_{sub} | McIntyre (1973)                                                          | Does not consider all 6 variables / \[ T_{sub} = 0.44 T_{e} + 0.56 (5 - \sqrt{10v(5 - T)}) + 0.44 + 0.56v^{1/3} \]                           |
| 5 | Summer Simmer Index           | SSI    | Pepi (1987); Pepi (1999); Tzenkova et al. (2007)                         | Does not consider all 6 variables / \[ SSI = T[\text{°F}] - (0.55 - 0.0055 \cdot RH[\%]) \cdot (T[\text{°F}] - 58) \] - 56.83 Different versions exist (further developments) |
| 5 | Sultriness value              |        | Scharlau (1943)                                                          | Does not consider all 6 variables /                                                                                                                                 |
| C  | Index                                              | Abbr.       | Reference                                                                 | Reason / Comments                                                                 |
|----|----------------------------------------------------|-------------|---------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| 5  | Survival Time Outdoors in Extreme Cold*            | STOEC       | de Freitas and Symon (1987)                                              | Does not consider all 6 variables / Considers $T, e, v, S, Clo, M$                 |
| 5  | Temperature Humidity Index                         | THI S       | Schoen (2005)                                                            | Does not consider all 6 variables / $THI = T - 1.0799e^{0.0375ST}$ (1)            |
| 5  | Temperature-Wind Speed-Humidity Index              | TWH         | Zaninovic (1992)                                                         | Does not consider all 6 variables / Considers $T, v, e$                             |
| 5  | Thermal Acceptance Ratio                           | TAR         | Ionides, Plummer and Siple (1945) cited by Auliciems and Szokolay (2007)| Does not consider all 6 variables / Considers $T, e, L, M$                          |
| 5  | Thermal Balance                                    | ThBal, / Qs | Rusanov (1981)                                                           | Does not consider all 6 variables / 2 versions exist: full heat balance version that includes all terms (ThBal, Table 2) and a regression version based on EET, which does not consider longwave radiation and is applicable only for nude persons (ThBal) but has an assessment scale |
| 5  | Thermal Insulation Characteristics of Clothing     | TICC / R    | Kondratyev (1957) cited by Rusanov (1981)                                | Does not consider all 6 variables / $R = 3.36 \frac{T_{stk} - T}{M} - 0.99 \frac{0.00197}{a(v)}$ $T_{stk}$ set to 33 °C. |
| 5  | Thermal Insulation of Clothing                     | TIC R       | Rusanov (1981)                                                           | Does not consider all 6 variables / Is based on ThBal, and therefore does not consider longwave radiation |
| 5  | Thermal Insulation of Protective Clothing          | TIPC        | Afanasieva (1977)                                                        | Does not consider all 6 variables / Considers $T, v, M$. Designed especially for winter conditions ($\delta$-input is assumed very small) |
| 5  | Thermal Sensation Index*                           | TSNI        | de Paula Xavier and Lamberts (2000)                                      | Does not consider all 6 variables / Regression equation developed for indoors; coefficient of $T_o$ is probably different if solar radiation is included. $S = 0.219 T_o + 0.012 RH - 0.547v - 5.83$ |
| 5  | Thermal Strain Index                               | TSI / G     | Lee (1958)                                                               | Does not consider all 6 variables / $G = \frac{(M - W)}{I_e(v) + I_c}^{d} - 0.00033(46 - e) - 0.00033(46 - e) \frac{c - e}{I_e(v) + I_c}$ |
| 5  | Total Thermal Stress*                              | TTS         | Auliciems and Kalma (1981)                                               | Does not consider all 6 variables / Does not consider $L$                            |
| 5  | Tropical summer index                              | Tsi         | Bureau of Indian                                                         | Does not consider all 6 variables /                                               |
| C | Index                  | Abbr. | Reference                          | Reason / Comments                                                                 |
|---|------------------------|-------|------------------------------------|-----------------------------------------------------------------------------------|
| 5 | Wet Bulb Dry Temperature | WBDT  | Wallace et al. (2005)              | Does not consider all 6 variables / $WBDT = 0.4T_{wb} + 0.6T_g$                  |
| 5 | Wet Bulb Globe Temperature | WBGT  | Auliciems and Kalma (1981); Yaglou and Minard (1957) | Does not consider all 6 variables / $WBG_T = 0.7T_{wb} + 0.2T_g + 0.17T$          |
| 5 | Wet Bulb Temperature | $T_{wb}$ | Brüner (1959); Eissing (1995); Stull (2011) | Does not consider all 6 variables / Approximation equation considers $T, RH$      |
| 5 | Wet Kata Cooling Power by Hill | WKCP $H_w$ | Hill and Hargood-Ash (1919) | Does not consider all 6 variables / $H = (0.27 + 0.49\sqrt{v})(36.5 − T) + (0.85 + 0.102v^{0.3})(F − f)^{4/3}$ |
| 5 | Wind Chill Equivalent Temperature | WCT$_{wc}$ $T_{wc}$ | Falconer (1968) | Does not consider all 6 variables / $T_{wc} \approx (\sqrt{v} \cdot 100 + 10.45 - v)(91.4 - T[F]) \cdot (\sqrt{1.34 \cdot 100 + 10.45 - 1.34} + 91.4)^{-1}$ Under sunshine cooling is reduced |
| 5 | Wind Chill Equivalent Temperature | WCET  | Steadman (1971) | Does not consider all 6 variables / Considers $T, v, L, M, I_c, L, M$ and $I_g$ are assumed fixed |
| 5 | Wind Chill Index | WCI    | Siple and Passel (1945)            | Does not consider all 6 variables / Considers $T, v$                            |
| 6 | Thermal Sensation | TS$_{GIV}$ | Givoni et al. (2003)              | Does not consider longwave radiation from all directions / $TS_{GIV} = 1.7 + 0.1118T + 0.00195 - 0.322v - 0.0073RH + 0.0054T_pr$ For fixed clothing + activity; considers only longwave radiation from ground |
| 7 | Body Temperature Index | BTI    | Dayal (1974)                      | Air temperature range smaller than $-5^\circ C$ to $35^\circ C$ / Designed for $30 \leq \Delta T \leq 42$; Equation for $T_{mrt}$ from $T_g$-measurements might be needed to be adapted to consider solar influence |
| 7 | Effective Heat Strain Index | EHSI  | Kamon and Ryan (1981)             | Air temperature range smaller than $-5^\circ C$ to $35^\circ C$ / Designed for $27\leq \Delta T \leq 36$; Equation for $T_{mrt}$ from $T_g$-measurements might be needed to be adapted to consider solar influence |
| 7 | Heart Rate Index | HRI$_D$ | Dayal (1974)                      | Air temperature range smaller than $-5^\circ C$ to $35^\circ C$ / Designed for $30 \leq \Delta T \leq 42$; Equation for $T_{mrt}$ from $T_g$-measurements might be needed to be adapted to consider solar influence |
| C | Index | Abbr. | Reference | Reason / Comments |
|---|------|------|-----------|------------------|
| 7 | Heat Strain Decision Aid Model | HSDA | Cadarette et al. (1999); Santee and Wallace (2003) | Air temperature range smaller than -5 °C to 35 °C / Designed for $18 \leq \Delta T \leq 43$ |
| 7 | Humid Operative Temperature | HToh / $T_{oh}$ | Gagge et al. (1973); Gagge et al. (1971) | Air temperature range smaller than -5 °C to 35 °C / Designed for $10 \leq \Delta T \leq 40$ |
| 7 | New Effective Temperature | ET* | Gagge et al. (1973); Gagge et al. (1971) | Air temperature range smaller than -5 °C to 35 °C / Designed for $10 \leq \Delta T \leq 40$ |
| 7 | Predicted Mean Vote – indoors | PMV | Fanger (1970) | Temperature range smaller than -5 °C to 35 °C / Designed for $15 \leq \Delta T \leq 45$ [indoors] |
| 7 | Predicted Mean Vote – outdoors* | PMV* | Gagge et al. (1986) | Air temperature range smaller than -5 °C to 35 °C / Designed for $0 \leq \Delta T \leq 50$ |
| 7 | Predicted Mean Vote – Fuzzy | PMV F | Hamdi et al. (1999) | Air temperature range smaller than -5 °C to 35 °C / Designed for $-10 \leq \Delta T \leq 32$; Fuzzy logical estimation of PMV. Designed for indoors; Rules for $T_{mrt}$ may require adjustment if used outdoors |
| 7 | Predicted Percentage Dissatisfied | PPD | ASHRAE (2001); Fanger (1970) | Air temperature range smaller than -5 °C to 35 °C / Designed for $15 \leq \Delta T \leq 45$ [indoors] |
| 7 | Reference Index | RI | Pulket et al. (1980) | Air temperature range smaller than -5 °C to 35 °C / Designed for $30 \leq \Delta T \leq 40$; Originally included only $L$; but expected to work if $S$ is included as based on heat balance principles |
| 7 | Required Sweat Rate | Req SR / $S_r$ | Vogt et al. (1981) | Air temperature range smaller than -5 °C to 35 °C / Designed for $20 \leq \Delta T \leq 60$ |
| 7 | Standard Effective Temperature | SET* | Gagge et al. (1973); Gonzalez et al. (1974) | Air temperature range smaller than -5 °C to 35 °C / Designed for $0 \leq \Delta T \leq 50$ |
| 7 | Thermal Discomfort | DISC | Gagge et al. (1986) | Air temperature range smaller than -5 °C to 35 °C / Designed for $0 \leq \Delta T \leq 50$; calculated from 2-node model |
| 7 | Thermal Work Limit | TWL | Brake and Bates (2002) | Air temperature range smaller than -5 °C to 35 °C / Designed for $36 \leq \Delta T \leq 40$; developed for indoors but uses heat balance equations with $T_{mrt}$ so $S$ can be included |
Appendix B  Found differences in index inputs

To evaluate the criteria for the different indices in Sec.3, the original publication of the indices were reviewed. For some indices our analysis of the indices differed from the results by de Freitas and Grigorieva (2016). This might be in some cases due to the use of secondary literature by de Freitas and Grigorieva (2016). In other cases we interpret the same publication differently, indicating that indices are not always thoroughly documented. The found differences of index characteristics are documented in Table 2. As evidence for our interpretation citations or equations are given.

Table 2: Index characteristics found in our literature review of the thermal indices and used in the present study compared to the ones by de Freitas and Grigorieva (2016).

| Index (Abbreviation) | Variable inputs considered according to de Freitas and Grigorieva (2016) (cited reference) | Variable inputs considered according to our review (reference) | Evidence, Comments |
|----------------------|------------------------------------------------------------------------------------------|-----------------------------------------------------------------|-------------------|
| Apparent Temperature (AT) or Heat Index (HI) | A: $T, e, S$
B: Clo, M
(Steadman 1979; Steadman 1984) | A: $T, e, v, S$
B: No
(Steadman 1979; Steadman 1984) | Using the nomenclature of this paper the publication by Steadman (1984) reads: “The apparent temperature of a set of meteorological conditions $T, e, v, S$ may be defined as equal to dry-bulb temperature at $v = S = 0$, and at a base vapor pressure of moderate humidity, which would require the same thermal resistance, in a walking adult, as this set of conditions”. Clothing and activity are considered in AT but fixed and are therefore no variable inputs. From the full model regression equations were developed, which are used far more frequently. In the final development stage (Steadman 1979) the scope of the index “has been enlarged to cover the range of dry-bulb temperatures from -40 to +50 °C”. This range is larger than +20 to +60 °C mentioned by de Freitas and Grigorieva (2016) |
| Draught Risk Index (PD; Percent dissatisfied) | A: $T, v$
B: No
(Fanger et al. 1988) | A: $T, v, Tu$
B: No
(Fanger et al. 1988) | The full equation reads: $PD = 3.143(34 - T)(v - 0.05)^{0.6223} + 0.3696v \cdot Tu(34 - T)(v - 0.05)^{0.6223}$
Thus, turbulent intensity $Tu$ is included as input. |
| Equivalent Temperature (EqT) | Not considered | A: $T, v, Tw$
B: No
(Bedford 1936; Bedford 1951) | EqT is mentioned by de Freitas and Grigorieva (2015) but not analyzed by de Freitas and Grigorieva (2016). The definition reads: $EqT = 0.522 T[^\circ F] + 0.478 Tw[^\circ F] - 0.01474 \sqrt{v} [\text{ft/min}](100 - T[^\circ F])$ |
| Index (Abbreviation)                        | Variable inputs considered according to de Freitas and Grigorieva (2016) (cited reference) | Variable inputs considered according to our review (reference) | Evidence, Comments |
|---------------------------------------------|---------------------------------------------------------------------------------------------|----------------------------------------------------------------|------------------|
| Equivalent Warmth (EqW)                    | A: $T, T_{mrt}, e$                                                                          | A: $T, T_{w}, e, v$                                              | The definition is: $EqW = 9.979 - 0.1495 x^2 - 2.89$        |
|                                             | B: $T_{ab}$ (Bedford (1936) cited by Auliciems and Szokolay (2007))                      | B: No                                                          | $x = 0.0556 T + 0.0538 T_w + 0.0372 e - 0.00144 \sqrt{v}(100 - T)$ |
| Exposed skin Temperature (EST)             | A: $T, v, S$                                                                                | A: $T, v, S$                                                   | The equation reads:                                      |
|                                             | B: $M$ (Brauner and Shacham 1995)                                                          | B: No                                                          | $\frac{T_c - T_s}{T - T_b} = \frac{T_c - T}{r_b + 1/H_c}$    |
|                                             |                                                                                             | (Brauner and Shacham 1995)                                     | Fixed $M = 58 \text{Wm}^{-2}$ (comfortable steady state condition) is used for calculating $r_b$. |
| Heat Stress Index (HSI<sub>III</sub>)      | A: $T, T_p, e, v$                                                                           | A: $T, T_p, e, v$                                              | “Clothing is the third variable fixed for the estimate, and it is unfortunate that limitations of available knowledge make it necessary to fix on a no-clothing basis.” |
|                                             | B: $Clo, M$ (Belding and Hatch 1955)                                                       | B: $M$ (Belding and Hatch 1955)                                | (Belding and Hatch 1955)                                  |
| Index of Clothing Required for Comfort (CLODEX) | A: $T, v, e, L, S$                                                                         | A: $T, v, S$                                                   | The definition is                                           |
|                                             | B: $Clo, M$ (de Freitas 1986; de Freitas 1987)                                             | B: $M$ (de Freitas 1986; de Freitas 1987)                      | $CLODEX = \frac{T_s - T}{H} - \frac{l_a(H + S)}{H}$          |
|                                             |                                                                                             |                                                                 | with $T_s = 33 \degree C, H = 0.75 \text{M}$ and $1/l_a = [0.61 + 0.19(v \cdot 100)^{0.5}]H$. Thus, humidity and longwave radiation is not considered and clothing is not a variable input |
| Index of thermal Stress (ITS<sub>GW</sub> or I.T.S.) | A: $T, e, v, S, L$                                                                         | A: $T, e, v, S$                                               | “The I.T.S. does not as yet separately cover the factor of longwave radiation” (Givoni 1976) |
|                                             | B: $Clo, M$ (Givoni 1969)                                                                  | B: $Clo, M$ (Givoni 1969)                                     |                                                              |
| Insulation Predicted index (I<sub>ip</sub>) | A: $T, v$                                                                                  | A: $T, v$                                                     | The definition is                                           |
|                                             | B: $M$ (Blazejczyk 2011)                                                                   | B: No                                                         | $I_{clip} = 0.082 \cdot [91.4 - (1.8 \cdot T + 32)]/2.3274 - [1/0.61 + 1.9 \cdot v^{0.5}]$ |
|                                             |                                                                                             |                                                               | Thus, no variable metabolic heat is considered              |
| Maximum Recommended Duration of Exercise (MRDE) | A: $T, e, S$                                                                               | A: $T, RH, S$                                                | “The MRDE is determined by the level of exercise, the ambient temperature and humidity, the solar radiation and the clothing worn” (Young 1979) |
|                                             | B: $M$ (Young 1979)                                                                        | B: $Clo, M$ (Young 1979)                                      |                                                               |
| Index (Abbreviation) | Variable inputs considered according to de Freitas and Grigorieva (2016) (cited reference) | Variable inputs considered according to our review (reference) | Evidence, Comments |
|----------------------|--------------------------------------------------------------------------------------------|----------------------------------------------------------------|--------------------|
| Modified (Reduced) Temperature (MTTR, T<sub>mp</sub>) | A: T, v, S B: No (Adamenko and Khairullin 1972) | Not found in cited reference, however for \( \theta_{rf} \) cited in reference: A: T, v B: No (Adamenko and Khairullin 1972) | In the publication cited by de Freitas and Grigorieva (2016) for the index MTTR no temperature termed Modified (Reduced) Temperature could be found. Instead an equivalent facial skin temperature (\( \theta_{rf} \)) derived only from T and v is presented in the publication. |
| Oxford Index (OxI)/Wet-Dry Index (WD) | A: T, T<sub>wb</sub> B: No (Lind and Hellon 1957) | Not found in cited reference, however from secondary literature: A: T, T<sub>wb</sub> B: No (Lind et al. (1956) cited by Bedford (1957); Lind and Hellon (1957)) | The cited publication is wrong: in the publication cited by de Freitas and Grigorieva (2016) for the Oxford Index no index termed Oxford Index or Wet-Dry Index could be found. However, from the book review by Bedford (1957) of “Lind A.R., Weiner J.S., Hellon R.F., Jones R.M., Fraser D.C. (1956) Reactions of Mines-Rescue Personal to Work in Hot Environments, Medical Research Memorandum No 1” the equation given in Table 1 could be retrieved and therefore the variable inputs could be confirmed. |
| Perceptual strain index (PeSI) | A: T, e B: T<sub>c</sub>, HR (Tikuisis et al. 2002) | A: No B: No (Tikuisis et al. 2002) | The definition is \[
PeSI = 5 \cdot \frac{T_S}{6} - 7 + 5 \cdot \frac{P_E}{10}
\]
Thus, only thermal sensation and physical exertion are needed. |
| Perceptual Hyperthermia Index (PHI) | A: No B: T<sub>c</sub>, HR (Gallagher et al. 2012) | A: No B: T<sub>c</sub> (Gallagher et al. 2012) | “The development of the PHI consisted of calculating PeSI values for all RPE-RTS combinations. […] Next, the mean \( T_c \) coincident with each calculated PeSI value was determined. These \( T_c \) values subsequently replaced the PeSI values on the constructed figure therefore linking the perceptual variables of RPE and RTS with the physiological criterion of \( T_c \).” (Gallagher et al. 2012) Thus, PHI can be estimated either from \( TS \) and \( PE \) or from \( T_c \). Heart rate was measured and found to be well correlated with \( TS \) and \( PE \) but is not further integrated into the calculation of PHI ranges. |
| Perceived Temperature (PT<sub>L</sub>) | A: T, v, L B: No (Linke 1926) cited by Eissing (1995) | Not found (Linke 1926) | In the publication cited by de Freitas and Grigorieva (2016) for PT<sub>L</sub> no such index could be found. Instead an equation to calculate the heat input from radiation measured with a specific kind of a black globe thermometer is presented in the publication. |
| Index (Abbreviation)       | Variable inputs considered according to de Freitas and Grigorieva (2016) (cited reference) | Variable inputs considered according to our review (reference) | Evidence, Comments |
|---------------------------|-----------------------------------------------------------------------------------------------|------------------------------------------------------------------|-------------------|
| Physical saturation deficit | A: $e$  
B: No (Thilenius and Dorno (1925) cited by Eissing (1995)) | Not found (Thilenius and Dorno 1925) | In the publication cited by de Freitas and Grigorieva (2016) for the index physical saturation deficit (Thilenius and Dorno 1925) cited by Eissing (1995) the following definition is given “Difference between the vapour pressure of the ambient air and the vapour pressure of exhaled air”. However in the original publication (Thilenius and Dorno 1925) no such index is described. Instead the Frigorimeter (Table 1) is described. |
| Relative Heat Strain (RHS) | A: $T, T_{wb}, e, v$  
B: $Clo, M$ (Lee and Henshel 1966) | A: $T, e, v, L$  
B: $Clo, M$ (Lee and Henshel 1966) | “The equation just cited includes terms for air temperature, humidity, air movement, radiant heat, metabolic rate and clothing” (Lee and Henshel 1966) |
| Skin wettedness (SkW, $w$) | A: $T, T_w$  
B: No (Gonzalez et al. 1978) | A: $e$  
B: $E_{sk}, e_{sk}$ (Gonzalez et al. 1978) | “Skin wettedness ($w$), defined as the fraction of the subjects’ body surface area covered by evaporative moisture, was determined as a ratio of the observed $E_{sk}$ to maximum evaporation ($E_{max}$) possible to the environment, assuming a subject’s entire surface is completely wet.” (Gonzalez et al. 1978)  
$$w = \frac{E_{sk}}{E_{max} = \frac{E_{sk}}{h_{e}(e_{sk} - e)}$$  
$h_{e}$ is the evaporative heat transfer coefficient |
| Survival Time Outdoors in Extreme Cold (STOEC) | A: $T, v, S$  
B: $M$ (de Freitas and Symon 1987) | A: $T, e, v, S$  
B: $M$ (de Freitas and Symon 1987) | STOEC includes $e$ to estimate respiratory heat loss (using the nomenclature of this paper):  
$$E_{res} = 1.73 \cdot 10^{-3}M(44 - e)$$  
Clothing is taken into account for convective heat exchange but fixed ($L_{cl} = 4$ clo). |
| Thermal Insulation of Clothing (TIC,$\lambda$) | A: $T, e, v, S, L$  
B: No (Aizenshstat 1964) | Not found (Aizenshstat 1964) | In the publication cited by de Freitas and Grigorieva (2016) for the index TIC,$\lambda$ (Aizenshstat 1964) no index TIC,$\lambda$ could be found. Instead this paper describes how a globe thermometer can be used to evaluate the thermal balance of a person. |
| Thermal Sensation Index (TSNI) | A: $T, e, v, T_{mrt}$  
B: $Clo, M$ (de Paula Xavier and Lamberts 2000) | A: $T, e, v, T_{mrt}$  
B: No (de Paula Xavier and Lamberts 2000) | “The activity was constant (school activity) and not considered to be an independent variable influencing the sensation of thermal comfort. In our studies, we do not treat the thermal insulation of clothes as an independent variable but as dependent on the external temperature” (de Paula Xavier and Lamberts 2000):  
$$S = 0.219 T_o + 0.012 R H – 0.547 v – 5.83$$  
Thus, clothing and metabolic heat are not variable inputs. |
| Total Thermal Stress (TTS) | A: $T, e, v, S, L$  
B: No (Auliciems and Kalma 1981) | A: $T, e, v, S$  
B: No (Auliciems and Kalma 1981) | “The net gain of shortwave solar radiation must be incorporated […]. (Q+$q$)$_{in}$ is the sum of net direct (Q) and diffuse ($q$) radiation falling upon man” (Auliciems and Kalma 1981). Includes only direct and diffuse radiation and no longwave radiation |
| Index (Abbreviation) | Variable inputs considered according to de Freitas and Grigorieva (2016) (cited reference) | Variable inputs considered according to our review (reference) | Evidence, Comments |
|----------------------|------------------------------------------------------------------|------------------------------------------------------------------|--------------------|
| Qₐ-index Correct name: ΔQ-index | A: $T, e, v, L$  
B: $ClO, M, T_{sk}$ (Rublack et al. (1981) cited by Graveling et al. (1988)) | A: $T, e, v, L$  
B: $ClO, M, T_{sk}$ (Rublack et al. 1981) | The Qₐ-index cited by Graveling et al. (1988) should be named Δ$q$-index since $Q_s$ according to the original publication (Rublack et al. 1981) describes only the longwave component in $ΔQ$:  

$ΔQ = Q_M + Q_c + Q_s - Q_{v,max}(e)$ |
Appendix C  Systematic literature review of thermal comfort studies with ORMs

A systematic literature review using the databases “Scopus” and “Web of Science” was conducted to identify which thermal indices have been used in the past with ORMs. Figure 1 shows the flow diagram corresponding to the method described in Sec. 2.4. Table 3 shows the 32 studies included in the analysis for F6 ordered by thermal index and climatic zone.

Figure 1: Flow Diagram for the systematic literature review adapted from the standardized Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) flow diagram (Moher et al. 2009) with changes.

Table 3: Cited studies to evaluate application frequency of indices. Studies have been selected according to the method in Sec. 2.4. For abbreviations of indices see Table 1 (Appendix A) and Table 1 (Sec. 3).

| Index | Zone     | References                                                                 |
|-------|----------|-----------------------------------------------------------------------------|
| PET   | Tropics  | Qaid et al. (2016); Morakinyo et al. (2016);                               |
|       | Sub-tropics | Morakinyo and Lam (2016); Taleghani et al. (2016); Yang et al. (2015); Lopes et al. (2014); Yahia and Johansson (2014); Chen and Ng (2013); Peng and Jim (2013); Yang et al. (2011); Ali-Toudert and Mayer (2006) |
|       | Mid-latitudes | Zölch et al. (2016); Lobaccaro and Acero (2015); Acero and Herranz-Pascual (2015); Taleghani et al. (2015); Ketterer and Matzarakis (2015); Ketterer and Matzarakis (2014); Müller et al. (2014); Ketterer et al. (2013); Minella et al. (2014) |
| PMV   | Sub-tropics | Hedquist and Brazel (2014) (PMV); Stavrakakis et al. (2012) (PMV (extended version)); Zhang et al. (2012) (PMV (extended version)) |
|       | Mid-latitudes | Robitu et al. (2006) (PMV*) |
| SET*  | Sub-tropics | He and Hoyano (2010) (OUT_SET*); He (2011) (OUT_SET*); Huang et al. (2005) (SET*) |
| THI   | Tropics   | Morakinyo et al. (2016); Kakon et al. (2009)                               |
| UTCI  | Mid-latitudes | Goldberg et al. (2013); Schrijvers et al. (2016); Tumini et al. (2016); Park et al. (2014); Minella et al. (2014) |
| WBGT  | Tropics   | Morakinyo et al. (2016)                                                    |
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