UCI KOREY Practical Guide for Estimating the WBGT Index User Guide

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Contents

TAYYEB POST

MAIN FEATURE IMAGE MISSING

IMPORTANT INFORMATION

The present document is a practical guide that complements the Annex C of the UCI Road races regulations, which deals with the countermeasures to be taken during road races organized with high temperatures. It provides a simple way for estimating the **WBGT** climatic index and assessing the heat-related risks during a cycling road race. Exposure to heat during training or competition is at the origin of impaired physical performance but above all, is the leading cause of severe exercise-induced heat illnesses, such as exertional heat stroke.

According to the new Annex C, the prevention of heat-related injuries and the preservation of riders' health require,

- a proper and appropriate assessment of the environmental heat stress using a validated climatic index,
- risk mitigation measures based on the severity of the climatic index.

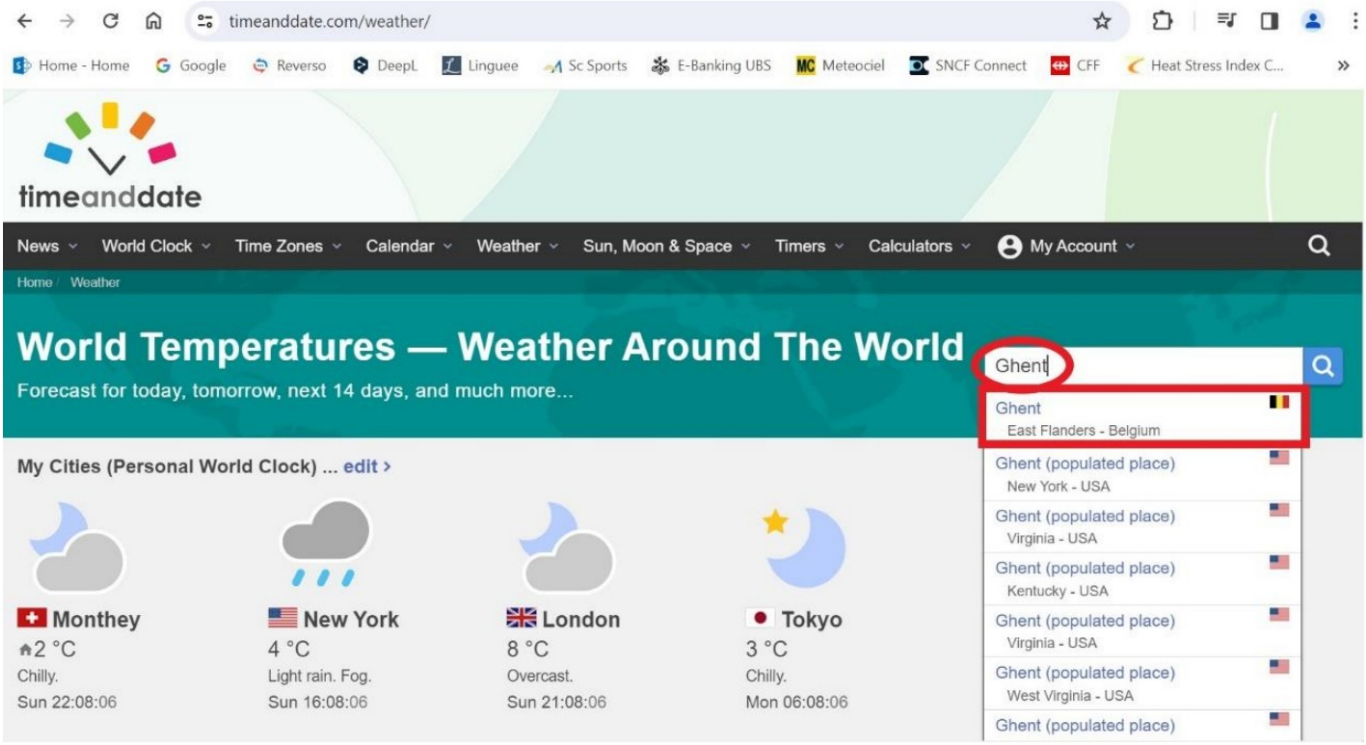
How to estimate the environmental heat stress?

Different heat stress indices can be used to determine how dangerous a given set of environmental conditions are to human health. The Wet Bulb Globe Temperature (WBGT) index is likely the more robust heat stress, since it accounts for the effect of air temperature, humidity, solar radiation and wind speed on human body temperature. The WBGT index is currently used by several international federations to guide their heat safety guidelines and recommendations.
WBGT is typically measured using specific devices that either directly measures or approximates individual

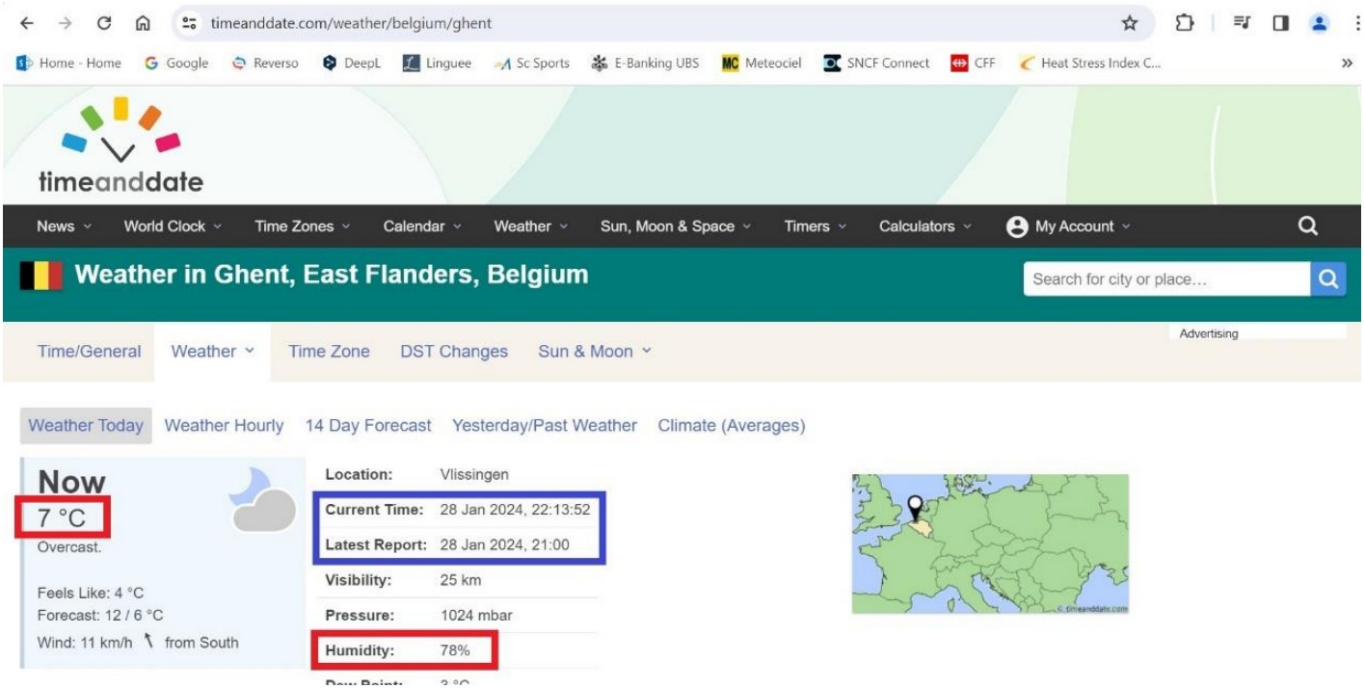
components of the index. Many devices are available, but most do not respect the original standards. However, accurate systems are expensive, should be mounted atop tripods, localized very precisely and are therefore very difficult to use during cycling road races.
WBGT can be estimated reliably from weather station observations available on open websites and frequently updated. Several methodologies have been developed to estimate WBGT using weather station measurements but varying in accuracy and computational complexity. The physically based model published by Lierne et al. (2008) is likely one of the most accurate methods for estimating WBGT.
Four main variables are needed to estimate WBGT with this model, and two of these variables are available from weather station observations through reference websites. These variables are,

✓ Ambient temperature, Td
✓ Relative humidity, %.

A- Search for weather information on official reference sites.
The latest values for these environmental parameters can be found on reference weather station websites, such as,
a- first example. https://www.timeanddate.com/weather/



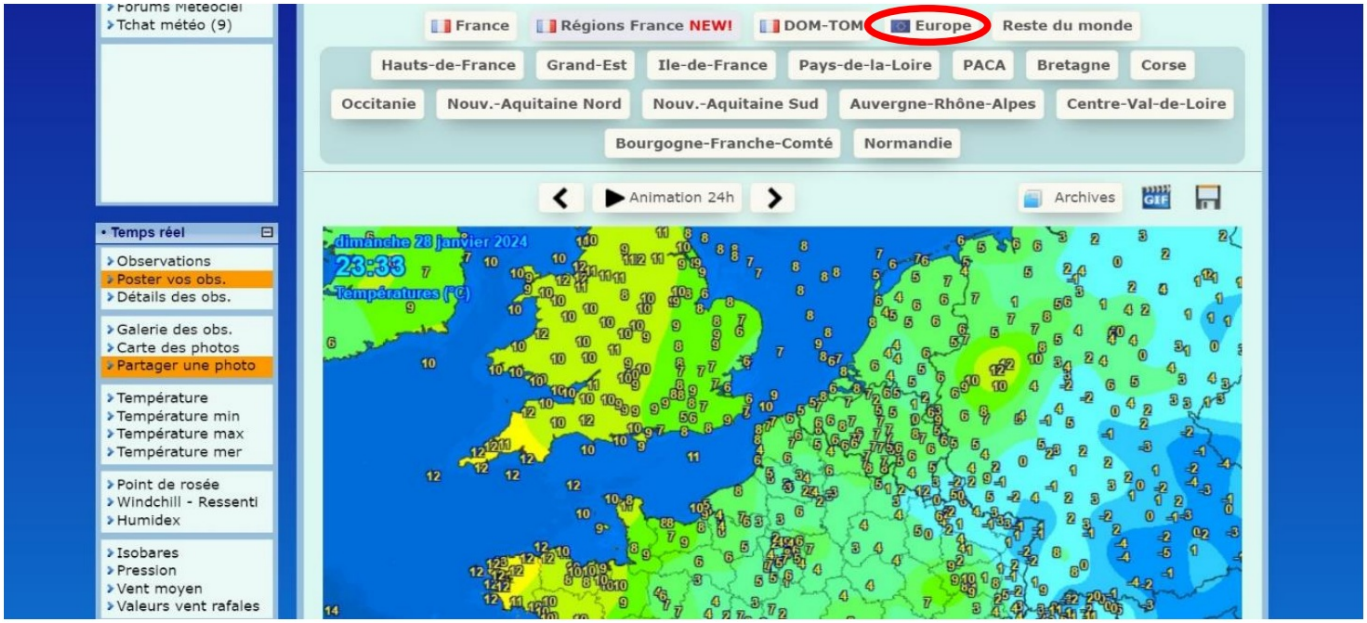
Enter the place you want to search in the search box, here Ghent in Belgium.



The next screen (see above) provides the required information. You can easily check the current time and the time of the latest report in the blue box. The latest values of the ambient temperature and relative humidity are available in the red boxes.

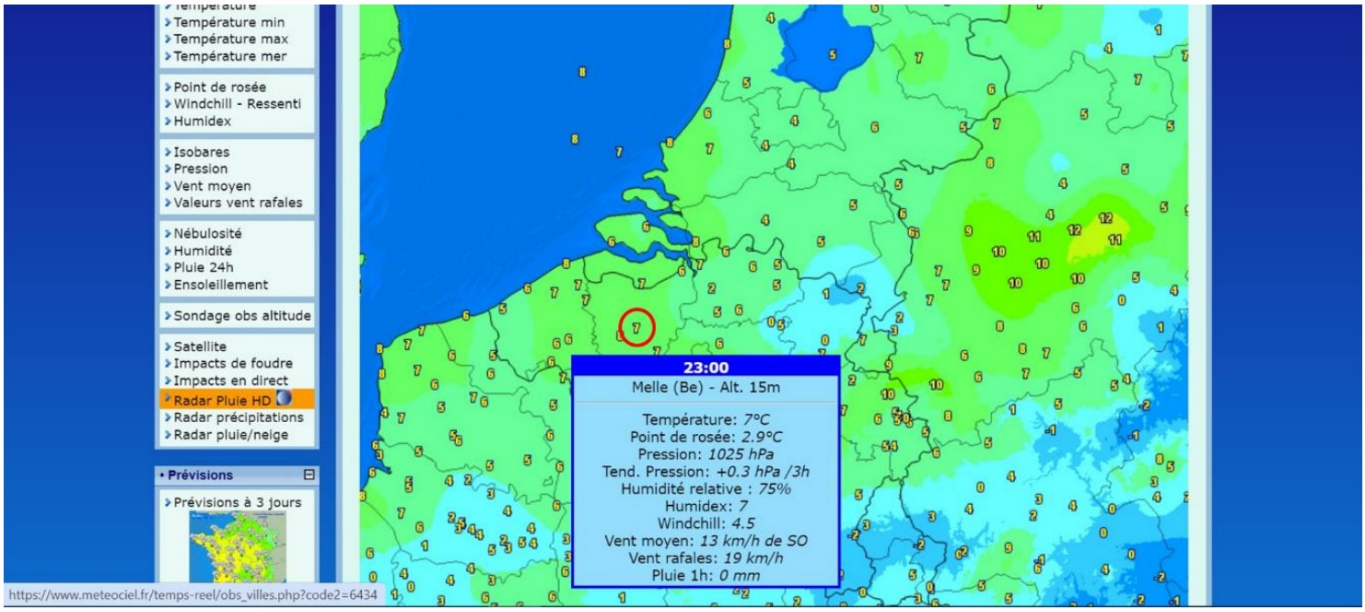
b- second example. https://www.meteociel.fr/

On the homepage, select “Temperature”, red oval above.

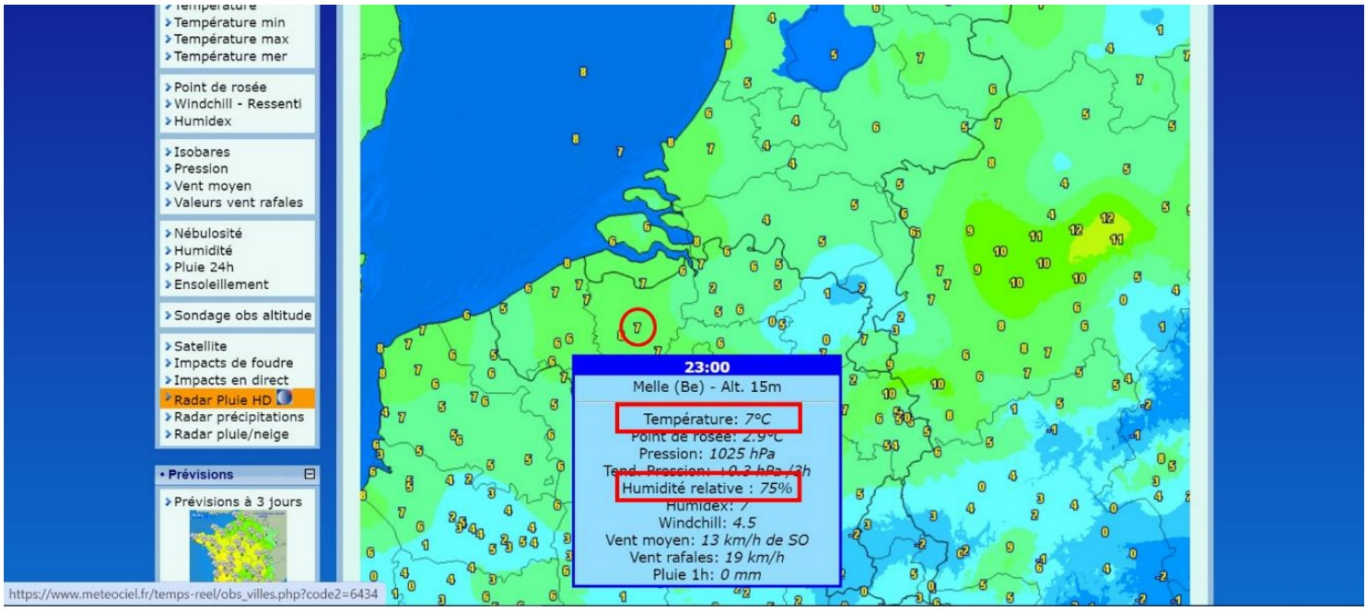


Then, select “Europe”.

Then, select “Benelux”.



Then select the town you want to look for, or the location of the nearest weather station. Here Mele, weather station near Ghent.

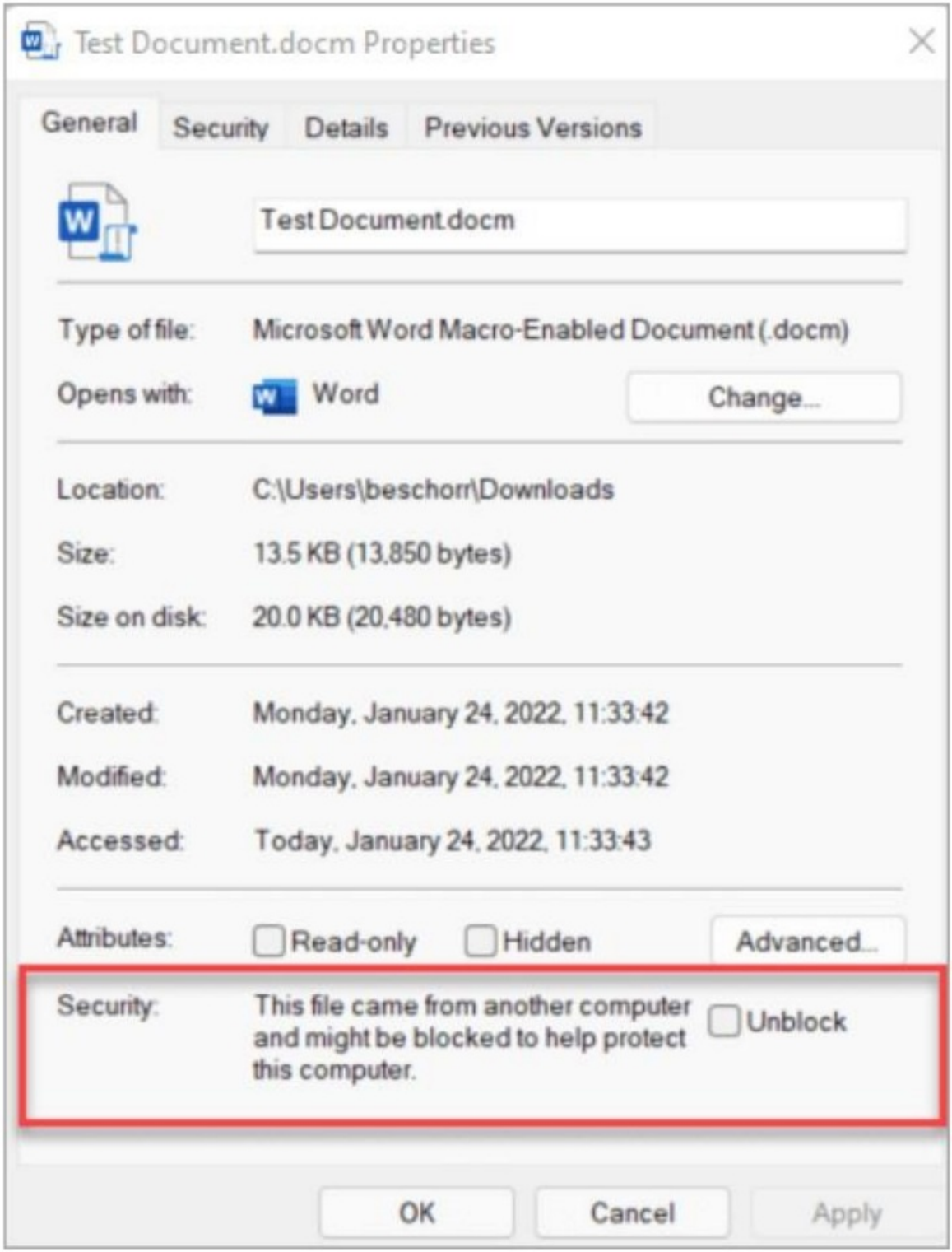


The latest values of the ambient temperature and relative humidity are available in the red boxes.

B- Estimate of the WBGT index for road cycling events.
To estimate the WBGT index, use the file available at the following link,
https://uciofficiel.sharepoint.com/:f:/s/UCIMedical/EqGg3j4eRktLIvRIW1etdksBijijp5MNCIAq8SWqzf6vwQ?e=repDol

Then,

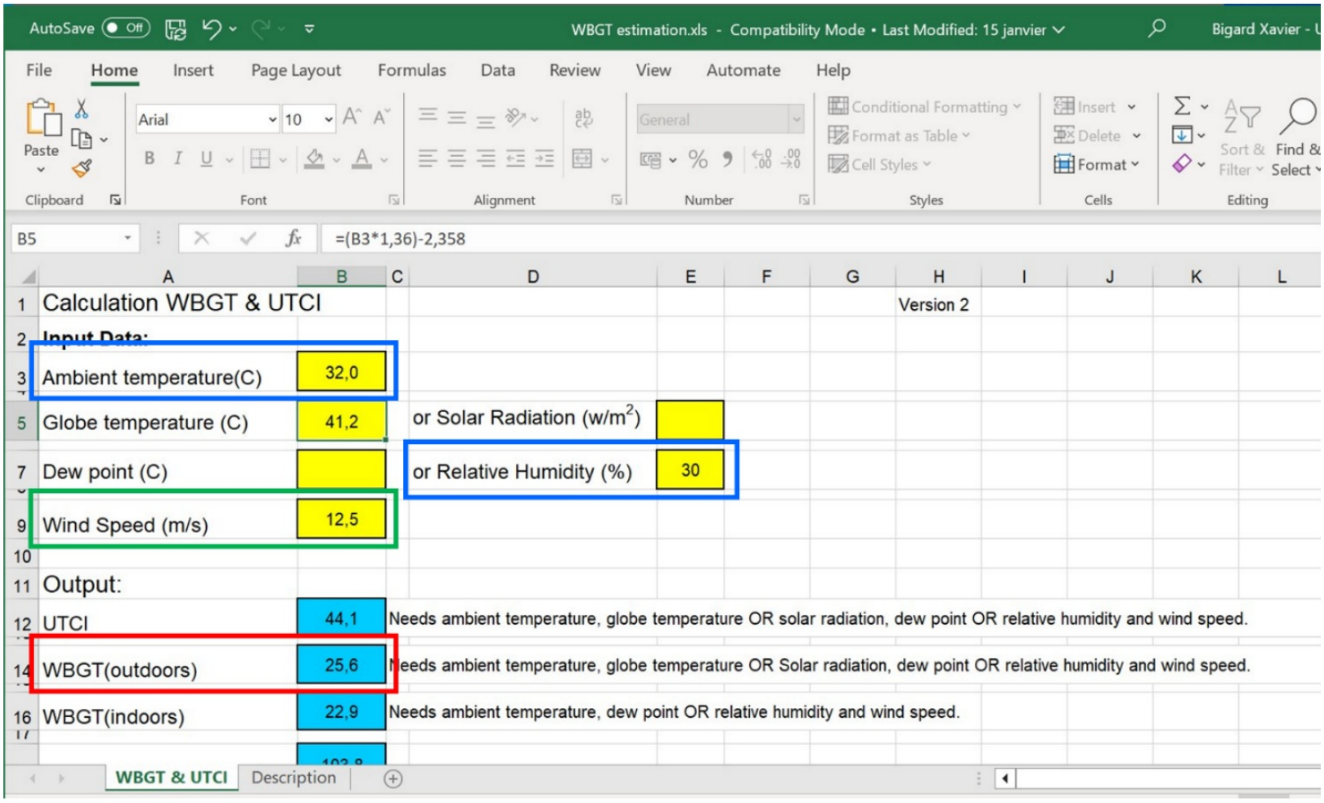
- download the Excel file to your computer
- right-click the file and choose “Properties”
- at the bottom of the General tab, select the Unblock checkbox and select OK (see the screenshot below)



- you can now open the file, edit it and keep it for future use.

To estimate the WBGT index, you will use,

- the two environmental variables obtained from weather station websites (see above)
- wind speed (see below)
- radiant temperature (calculated directly in the model used below)



Enter the values for ambient temperature and relative humidity (blue boxes above on the screenshot).
Cycling is characterized by significant heat loss through the speed of penetration in the air (heat convection loss in the air). In order to reproduce the favorable effects of air penetration, a value for the average speed of the peloton expected during the event (expressed in m/s) must be entered in the “Wind Speed” box (green box above on the screen).
40 km/h = 11.1 m/s
45 km/h = 12.5 m/s
50 km/h = 13.9 m/s
The estimated value of the WBGT index appears in the “WBGT (outdoors)” cell (red box above on the screen).

Risk assessment and countermeasures

The risk assessment of heat-related injury and the implementation of countermeasures to mitigate the risks to riders’ safety are based on an objective assessment of the environment.

The risk assessment can be expressed in the form of a colour code,

- White zone (WBGT below 15°C), very low risk;
- Green zone (WBGT between 15°C and 17.9°C), low risk;
- Yellow zone (WBGT between 18°C and 22.9°C), moderate low risk;
- Orange zone (WBGT between 23°C and 27.9°C), moderate high risk;
- Red zone (WBGT above 28°C), high risk.

Counter measures

Preventive measures should be discussed and determined during the meeting organised with representatives of the stakeholders. Recommendations for countermeasures are given below, with the final choice remaining the responsibility of the meeting participants. Countermeasures to be implemented will depend on the severity of the hot weather, i.e. value of the WBGT index, and several other parameters.

WBGT values

- White zone, no specific countermeasures.
- Green zone, warm-up in the shade with fans, skin protection with non-greasy sun creams, choice of light coloured clothing, normal hydration plan.
- Yellow zone, warm-up with ice vests, use of fresh towels, application of strict, individualized hydration plans, distribution of “ice-socks”, supply of ice to the teams during the race.
- Orange zone, adaptation of the start area to keep riders in the shade before the start, protect officials, organizing staff and volunteers from the sun, increase the number of neutral motorbikes providing riders with drinks and ice packs, adapt the rules limiting hydration and cooling in competition.
- Red zone, modification of start and finish times, possible neutralization of a section of the race or stage, cancellation of the stage/race.

Other parameters to take into consideration.

- Race or stage profile. The convective advantage given by the high velocity in cycling will disappear during up-hill where the racing speed is lower.
- Race route conditions. Long shaded sections or not.
- Heat acclimation status.

Documents / Resources

	UCI KOREY Practical Guide for Estimating the WBGT Index [pdf] User Guide KOREY Practical Guide for Estimating the WBGT Index, KOREY, Practical Guide for Estimating the WBGT Index, Guide for Estimating the WBGT Index, Estimating the WBGT Index

References

- Sign in to your account
- Meteociel - Météo - observations météo en temps réel et prévisions météo pour la France
- World Temperatures — Weather Around The World
- User Manual

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