# From weather warning to personalized adaptation strategies to cope with thermal climate stress

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Climate change increases the intensity and frequency of extreme weather events. The impact of such events on human health and productivity is predicted to be profound. Heat waves and cold spells are major health challenges for workers, the elderly and other vulnerable populations, increasing mortality and morbidity. It is necessary for individuals and society to increase preparedness and adapt to climate extremes. Current climate services provide only environmental information. The consequences of thermal climate stress are determined not only by climate factors, but also by human thermoregulation capacity, individual characteristics, physical work intensity and clothing. For both warning and adaptation purposes, such climate services will be much more valuable for individuals facing adverse weather conditions if combined with individual factors and translated into adaptation strategies.

The present project with 9 partners from Sweden, Denmark and The Netherlands is funded by European Research Area for Climate Services (ERA4CS), and is to integrate climate service data with human heat balance models to develop personalized thermal evaluation tools, suggest adaptation strategies to cope with thermal climate stress. The existing and improved human thermal models, heat and cold stress indices including Wet Bulb Globe Temperature, Predicted Heat Strain, Predicted Mean Vote and Required Clothing Insulation are incorporated to develop a mobile phone App (ClimApp) to cover a wide range of thermal conditions. Researchers, stakeholders and end-users will be involved in the development process.

The ClimApp is used to evaluate body thermal responses and provides timely relevant guidelines for individuals, the public and private sectors to take decisions and actions to improve thermal resilience when adverse thermal environmental conditions

are expected. The effectiveness of the ClimApp will be assessed qualitatively and quantitatively at both individual user and European societal. Feedback will be utilized to improve the personalized climate service to maximize the impact and strengthen the integration of expertise from climatology, thermal physiology and thermal modelling to optimize adaptation strategies for climate challenges.

*Keywords.* Thermal climate; heat and cold stress; thermal physiology; personalized climate APP; adaptation strategies