Summary

Active air-conditioning (A/C)-systems typically are employed whenever the heat-stress risk needs to be decreased, as these impact on the hazard, namely on the indoor climate. These A/C-systems and their performance are dependent both on indoor and outdoor conditions in a complex way. Moreover, the use of these technical means implies demand of energy (heat or/and work) and water, feeding back in a negative way on the outdoor climate, both locally and globally.

The necessity to provide sustainable low-energy A/C calls for a restrictive use of conventional systems. The alternative option of using passive cooling and ventilation techniques in modern buildings generates the risk of an indoor-climate that is not suitable for highly vulnerable persons. Active A/C-systems driven by low-temperature heat are a promising third way as sustainable resources (e.g. solar or waste heat) can be employed.

There exists a multitude of concepts of thermally driven A/C-system but no overarching understanding and design methodology. Therefore, the proposal is focused on the development of universally applicable analytical methodologies, which are considered to foster a comprehensive understanding and allow for a fair systems' comparison, with the ability of an easy feedback into the other research modules of UCAHS. Accompanying numerical simulations are used for a detailed validation of semi-analytical characteristic functions, which will be developed to describe the sensitivity of effectiveness and efficiency with regard to heat-stress risks and demand of work, heat, and water.