

“Human Thermal Model Evaluation using the JSC Human Thermal Database” Cognata, T; Bue, G; Makinen, J

The human thermal database developed at the Johnson Space Center (JSC) is used to evaluate a set of widely used human thermal models. This database will facilitate a more accurate evaluation of human thermoregulatory response using in a variety of situations, including those situations that might otherwise prove too dangerous for actual testing—such as extreme hot or cold splashdown conditions. This set includes the Wissler human thermal model, a model that has been widely used to predict the human thermoregulatory response to a variety of cold and hot environments. These models are statistically compared to the current database, which contains experiments of human subjects primarily in air from a literature survey ranging between 1953 and 2004 and from a suited experiment recently performed by the authors, for a quantitative study of relative strength and predictive quality of the models.

Human thermal modeling has considerable long term utility to human space flight. Such models provide a tool to predict crew survivability in support of vehicle design and to evaluate crew response in untested environments. It is to the benefit of any such model not only to collect relevant experimental data to correlate it against, but also to maintain an experimental standard or benchmark for future development in a readily and rapidly searchable and software accessible format. The Human thermal database project is intended to do just so; to collect relevant data from literature and experimentation and to store the data in a database structure for immediate and future use as a benchmark to judge human thermal models against, in identifying model strengths and weakness, to support model development and improve correlation, and to statistically quantify a model’s predictive quality.