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| **Use Case Name** | ***Heat wave health impacts #2 – Heat Health Warning System for Germany*** |
| **Sector** | *Health* |
| **Reference** | *SEC-HEA-UCT-004* |
| **Scope of decision-making** | Give alerts about strong and extreme hot conditions (based on perceived temperature and indoor conditions) that impact health of the population. |
| **Actor** | **Name:** Prof. Dr. Andreas Matzarakis  **Name of organisation:** Research Centre Human Biometeorology, German Meteorological Service  **Job title:** Head  **Country:** Germany |
| **ECV/CII** | Air temperature, mean radiant temperature (which considers short- and long wave radiation fluxes), air humidity and wind speed wind velocity at 1.1 meters. Values at 12 UTC. For night conditions, indoor temperature is used. |
| **Data source** | Current:  -observations for the last 30 days and weather forecast (1-2 days scale).  - EuroHEAT project that finished and the website was not updated, but again running on early June 2017): up to 10 days within Europe EuroHEAT project. EuroHEAT is a probabilistic ensemble prediction system that uses 50 ensemble forecasts from ECMWF with perturbed initial conditions to predict the temperature at 2m.  Beyond 10 days DWD does not believe the forecast are enough reliable.  - Seasonal forecast are useful for only internally, from a scientific point of view but not health-end users (he says). |
| **Type of required product** | Raw data, maps, plots, also summary statistics. Key tools would be region depending threshold tools, plots and summary statistics. |
| **Application** | The information is used to set alert of extreme and strong heat. |
| **Current sources** | German Meteorological Service (DWD) |
| **Key characteristics of the climate information** | |
| **Timeliness** | As death rates rise soon after temperature increases, with many deaths occurring in the first two days, this is an important stage to ensure readiness and swift action to reduce harm from a potential heatwave. |
| **Frequency of update** | Daily |
| **Horizontal spatial resolution** | County level and cities with population higher 100.000 habitants. Nocturnal conditions are given for cities to take into count Urban Heat Island Model but in a simple manner. DWD head of Human Biometeorology warns against neighbourhood city level heat alarm. He does not think it should be used for warnings, but for preparation of the city in terms of architecture, urban planning, etc. Heat is not a local or regional phenomena, he says. |
| **Horizontal Spatial coverage** | Germany |
| **Vertical spatial resolution** | 200 m |
| **Vertical spatial coverage** | 3000 m |
| **Temporal resolution** | Daily data (at 12 UTC, every two days) |
| **Temporal coverage** | All year |
| **Normal flow of events -** *The typical flow of events from user request, to successfully obtaining the climate data, to using the data. Document the step-by-step chain of activities.* | |
| **Internal or external processing** | Internally but in coordination within different institutes inside the DWD. The Biometeorological institute are the ones that issue the alerts by newsletters, Smartphone app, Internet, Email, Ministries of Heath, nursing homes and public. |
| **Details on data processing / manipulation** | The numerical weather prediction variables are introduced in a model of a person to compute the perceived temperature. For this calculation thermo-physiological factors like the metabolic rate and the clothing are taken into account.  The perceived temperature (PT), together with the PT during the last 30 days, is used to set warning criteria corresponding to strong heat load (32-38 degrees, variable lower value, because of acclimatization) and extreme heat load (greater than 38 degrees). The temperature thresholds are shifted to account for human acclimatization (using the PT of the last 30 days). The thresholds also vary from region to region.  If the night minimum temperature is below a certain threshold a recovery effect is considered. Also models of indoor conditions.  At the end biometeorologist processes warning from the weather forecast and decides if an alert should be issued or not. |
| **Tools for data processing** | The raw data is generated, averaged up to the desired regional level and introduced in models. Threshold values for the PT (which are function on the last 30 days, the specific region and other parameters) are considered. |
| **User requirements in relation to accessibility and visualisation** | |
| **Accessibility** | Close collaboration between CDS and DWD can help to give visibility to initiatives like the EuroHEATproject, [http://www.euroheat-project.org](http://www.euroheat-project.org/). CDS could potentially contribute to keep this online tool functioning. |
| **Visualisation capabilities required** | Maps for specific regions of a level of alert. |
| **Quality requirements -** *What information do users require about the quality of climate information in order to use the climate information. Essentially ECMWF wants to know what is the minimum ‘quality’ that is required in order for the user to decide whether or not to use the dataset.* | |
| **Level of skilfulness** | The minimum skill would depend on the specific final end user. The interviewed warns against given complex products to not well-trained end-users. In reality, he says, we are responsible if we are giving the information. The end-user cannot, in general, be able to process all the underlying scientific information. |
| **Validation of data** | - |
| **Meta data** | - |
| **Stability** | *-* |
| **Uncertainty representation** | - |
| **Other** | - |