

Authors: **Jensen, Hanne M.** (DMI - Danish Meteorological Institute, Data and Climate Division), hmj@dmi.dk & **Kirsten Rajakumar** (DMI - Danish Meteorological Institute, Data and Climate Division), kir@dmi.dk

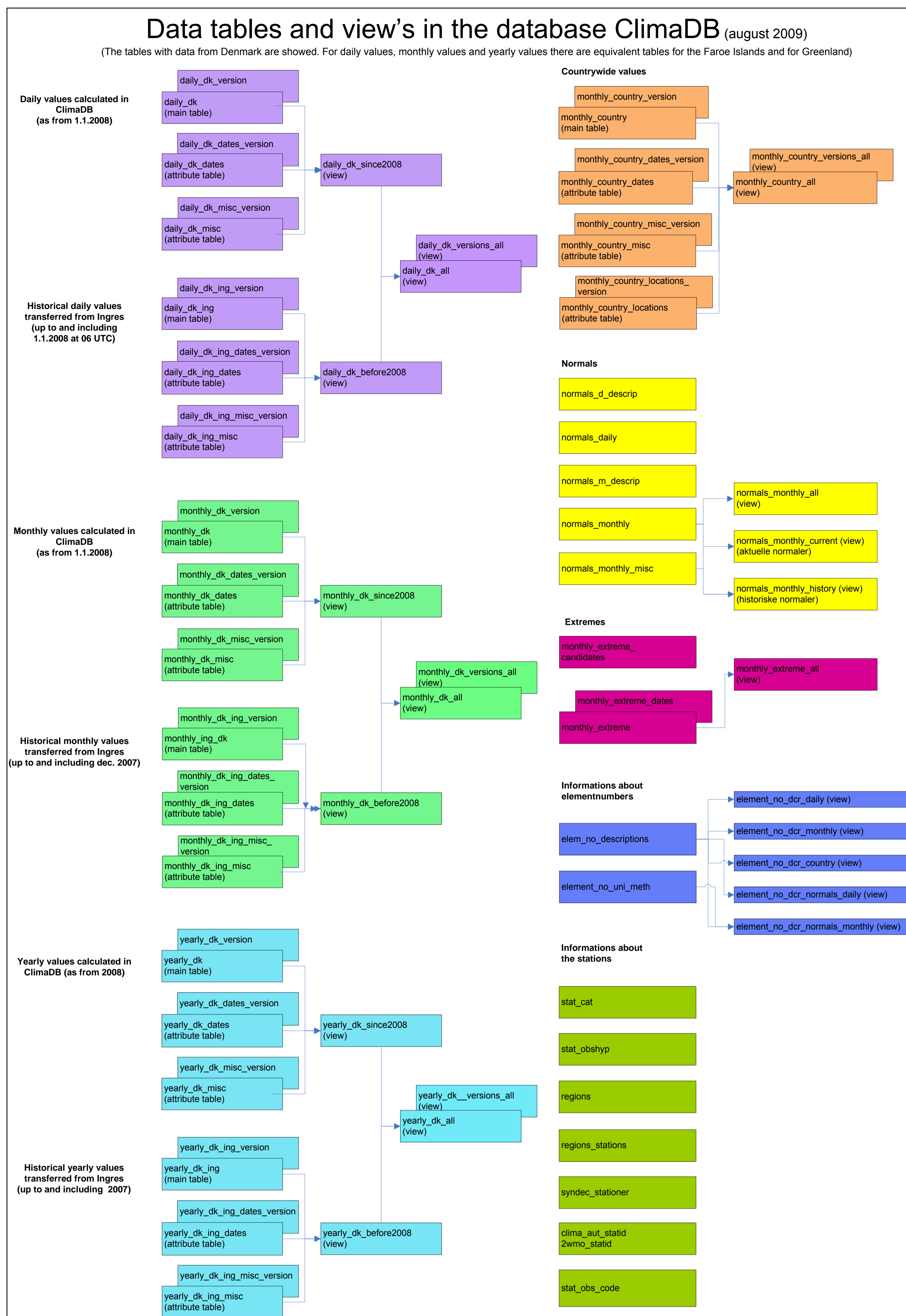
Abstract ID: 7P1

### **Design and functionality of the new climatological database at DMI**

DMI has designed and implemented a new climatological database ClimaDB and developed a new data generation system based on data from the new observational database ObsDB. New features are data versions and parameter labelling.

The poster illustrates the database design and the automatic generation of the derived values: daily, monthly, yearly, countrywide and extremes, including notification of updated observations in ObsDB.





**Element numbers** are used as a unique way to identify derived values and dealing with daily, monthly, yearly, country wise, normal reference and extreme conditions. Some element numbers with description, attributes and usage are shown below.

elem_no	derived_code	descrip.	dates	locations	misc	product_type	units	method
101c		Mean temperature				c_temp_th	degrees C	mean
101d		Mean temperature					degrees C	mean
101e		Mean temperature					degrees C	mean
101m		Mean temperature					degrees C	mean
101nd		Mean temperature					degrees C	mean
101nm		Mean temperature					degrees C	mean
201c		Mean relative humidity				c_temp_th	%	mean
201d		Mean relative humidity					%	mean
201e		Mean relative humidity					%	mean
201m		Mean relative humidity					%	mean
201nd		Mean relative humidity					%	mean
201nm		Mean relative humidity					%	mean
301c		Mean wind speed (10 minutes average)				c_wind	m/s	mean
301d		Mean wind speed (10 minutes average)					m/s	mean
301e		Mean wind speed (10 minutes average)					m/s	mean
301m		Mean wind speed (10 minutes average)					m/s	mean
301nd		Mean wind speed (10 minutes average)					m/s	mean
301nm		Mean wind speed (10 minutes average)					m/s	mean
401c		Mean pressure				c_pp	hPa	mean
401d		Mean pressure					hPa	mean
401e		Mean pressure					hPa	mean
401m		Mean pressure					hPa	mean
401nd		Mean pressure					hPa	mean
401nm		Mean pressure					hPa	mean
550j		Accumulated radiation (spectral range 305-2900 nm)					MJ/m <sup>2</sup>	sum
550k		Accumulated radiation (spectral range 305-2900 nm)					MJ/m <sup>2</sup>	sum
550l		Accumulated radiation (spectral range 305-2900 nm)					MJ/m <sup>2</sup>	sum
601c		Accumulated precipitation					mm	sum
601d		Accumulated precipitation with accumulation period in hours			x		mm	sum
601e		Accumulated precipitation					mm	sum
601m		Accumulated precipitation with accumulation period in hours			x		mm	sum
601nd		Accumulated precipitation					mm	sum
601nm		Accumulated precipitation with accumulation period in hours			x		mm	sum
601y		Accumulated precipitation with accumulation period in hours			x		mm	sum

**Definition tables for the table with element numbers**

derived_code	derived_type	definition
c	country	countrywise values (climate values covering the country as a whole)
d	daily	daily climate values
e	extreme	extremes of monthly climate values
m	monthly	monthly climate values
nd	normals_daily	normals for daily climate values
nm	normals_monthly	normals for monthly climate values
y	yearly	yearly climate values

dates	locations	misc
Indication of whether the element is associated with a date specifying when a derivative value is measured	Indication of whether the element is associated with a location that specifies where a derivative value is measured	Indication of whether the element is associated with another attribute than date or location. It can, for example have a direction associated with wind speed

**Informations about the stations**

ClimaDB has its own subset of stations information, mainly to keep it independent in case StatDB is unavailable. The selected data is transferred once a day from StatDB to the table stat\_cat in ClimaDB.

**Labels**

Every value in ClimaDB has a label that gives the user an overview of the process from observations to derived value and thereby also a sort of "quality label" to be used in the subsequent use and validation of data.

The mathematic composition of the label fields is:  
 Label = O\*1.000.000 + M\*100.000 + L\*10.000 + V\*1.000 + C\*10 + Q

Below is shown some of the information from a label to daily values.

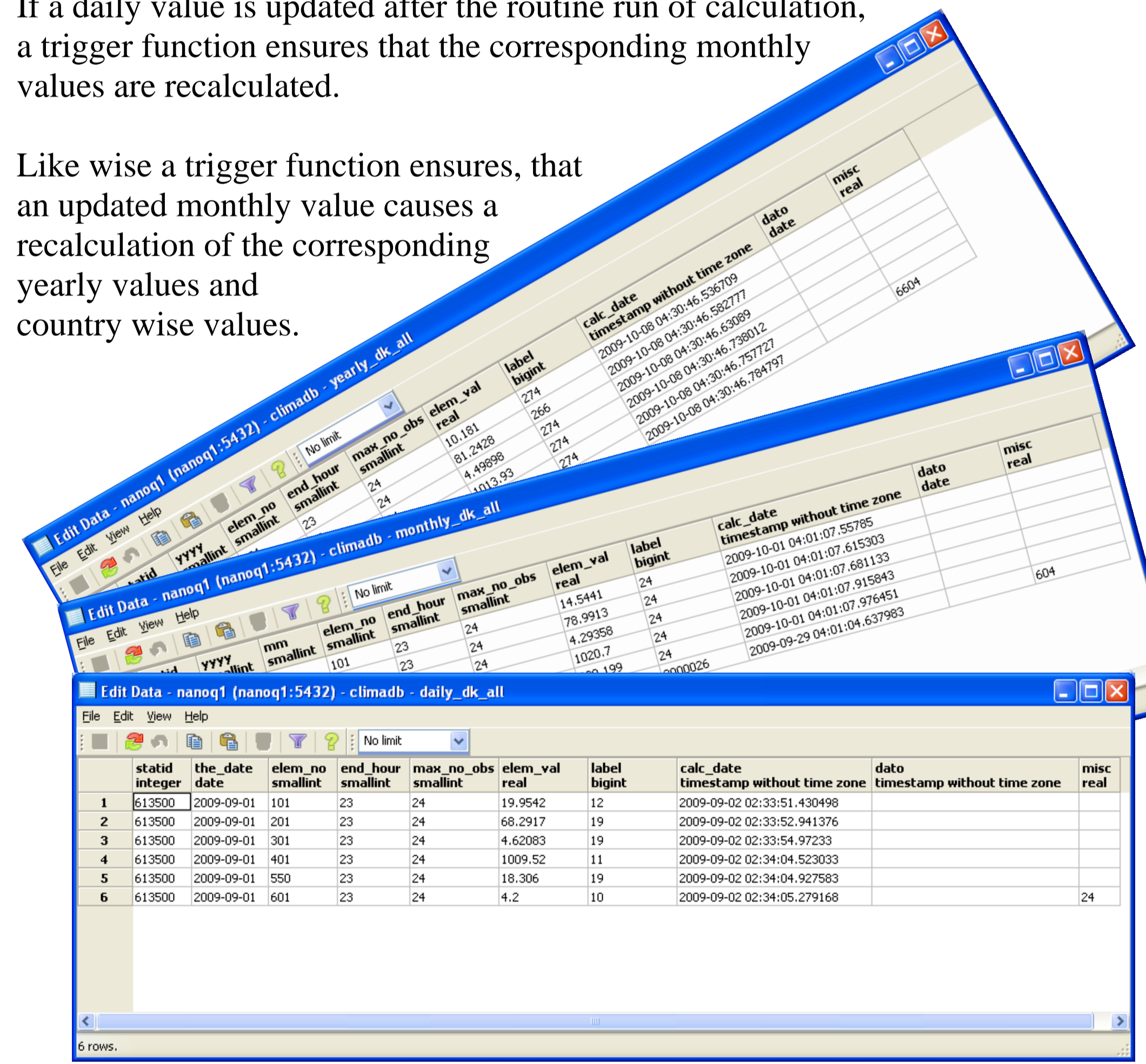
Value of digit	Digit 7	Digit 6	Digit 5	Digit 4	Digit 3 og 2	Digit 1
	<b>Observation info (O)</b>	<b>Miscellaneous (M)</b>	<b>Lock (L)</b>	<b>Verification (V)</b>	<b>Calculation (C)</b>	<b>Preceding Quality Control (Q)</b>
1	The precipitation sum is set to 0, but the observation was < 0.1	Historical value transferred from Ingres klimadb	Must not be updated or deleted	Element number not defined in Cavemet*	Daily calculation OK, no missing observations	All QC flags on observations = certainly or probably correct
2	The snow depth is set to 0, but the observation was < 0.5 cm	Value transferred from Ingres klimadb		Checked by Cavemet* daily	Missing observations	One or more QC flags on observations ≠ certainly or probably correct
5				Checked by Cavemet* yearly	Possible unreliable	

\*Cavemet is software that performs quality control of daily values by analyzing both the timeseries and the data from similar near-by stations.

**Daily-, monthly and yearly values**  
 Every night a programme runs to calculate the daily values from the day before. Shortly after a programme runs to recalculate the monthly values for the actual month.

If a daily value is updated after the routine run of calculation, a trigger function ensures that the corresponding monthly values are recalculated.

Like wise a trigger function ensures, that an updated monthly value causes a recalculation of the corresponding yearly values and country wise values.



**Countrywise values**  
 The table monthly\_country contains country-wise values. As an example Mean Temperature is a calculated climate value that can represent the mean temperature for the country as a whole. Another example is Highest temperature representing the highest temperature measured any place in the country. The Highest temperature has attributes describing where and when the temperature is measured. The calculations and extremes are based on the monthly values from the monthly tables.

**Versions**  
 When a value in ClimaDB is updated, trigger functions cause the old value to be moved to version tables with information about the date interval, where this value was valid. In this way we have documentation of all values that on a given time has been delivered to customers or used for statistics.

