DAYCLI message : brainstorming on a reference time for daily data

Expert Team on Data Development and Stewardship (ET-DDS)

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World Meteorological Organization
Organisation météorologique mondiale

Agenda

12:00 UTC
- ✓ What is the DAYCLI message?
- ✓ DAYCLI history and status
- ✓ Proposed modifications for DAYCLI and use cases
- ✓ Requirements for DAYCLI

Questions

12:45 UTC
- ✓ Brainstorming

Discussion, collecting feedback

13:30 UTC

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DAYCLI message?

A WMO message with a worldwide mission to share daily values of temperature, precipitation and snow, currently at a month frequency.
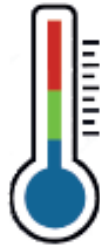
Daily Minimum Mean and Maximum temperatures

Daily total accumulated precipitation

Daily total snow depth & Daily depth of fresh snow

Its special feature is the exchange of daily data and its metadata on the quality of the measurements, including the **time period of each variable**, the **computation method**, the **siting classification**, the **measurement quality classification** and the **data quality information**, all of which contributing to better quality of climate services.

It enables the **climatology departments** of each National Meteorological Hydrological Service (**NMHS**) **to assess** and then share their **reference daily climate datasets** nationally, regionally and globally.

DAYCLI Status: a long story…

Before 2012: Attempts to use SYNOP data for collection of daily parameters. This solution was abandoned due to difficulties on climatological practices around the world.

2012: The Global Climate Observing System (GCOS) Atmospheric Observation Panel for Climate recommends to share daily observations values.

2015: WMO approves the DAYCLI BUFR sequence **3 07 074.**

2019-2020: Trial phase for the DAYCLI. It reveals issues and the need to modify the DAYCLI BUFR Template.

2020: SERCOM and INFCOM collaborate to define a new DAYCLI BUFR sequence.

2022: WMO approves the DAYCLI BUFR sequence **3 07 075** (https://github.com/wmo-im/BUFR4/issues/51)

2024: Update of the WIGOS Manual (WMO-No. 1160) where Members should provide DAYCLI report.

2024: Experts review that recommend modifications to the sequence **3 07 075.**

2025: SERCOM (ET-DDS) and INFCOM (ET-DATA STANDARDS) experts to propose a modification of **3 07 075** to better precise the reference time of each measurement point and to preserve the integrity of the historical NMHS's daily data series (https://github.com/wmo-im/BUFR4/issues/238).

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Jay Lawrimore, NOAA/NCEI, July 2024
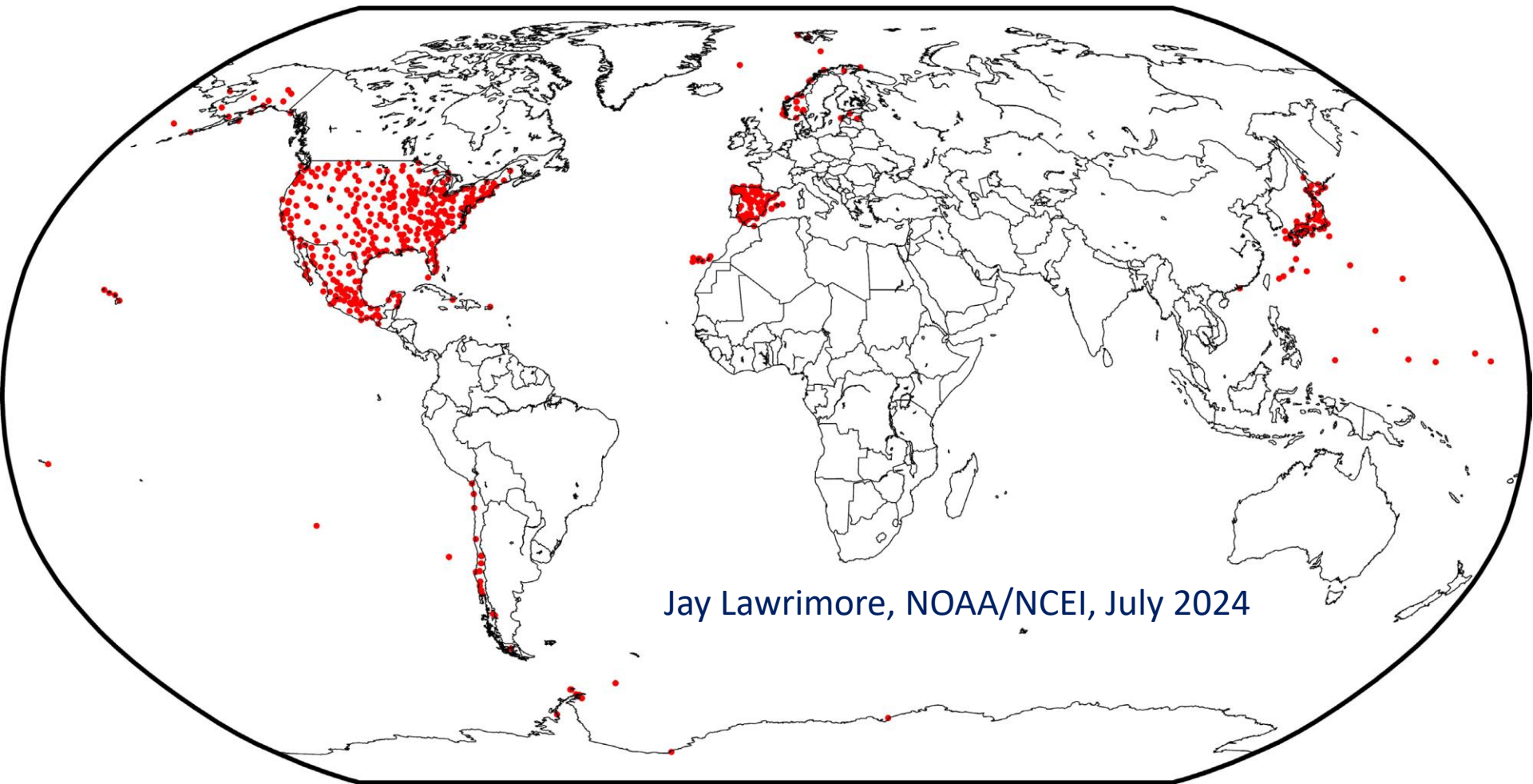
So far, no one uses the latest DAYCLI BUFR template **3.07.075**. Those who transmit the DAYCLI message use the **3.07.074**.

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Which modifications?

2 modifications are proposed:

1. Maintain the national **Reference date and time (RDT)** (or the national **Climatological date and time, or…**) applies for each NMHS meteorological station for its daily climate data **instead of UTC**. These represent the day (the 24-hour period) on which the measurement values are attributed.

2. Add the time difference (offset) between the **reference date and time (RDT)** of the station measurement and **UTC**.
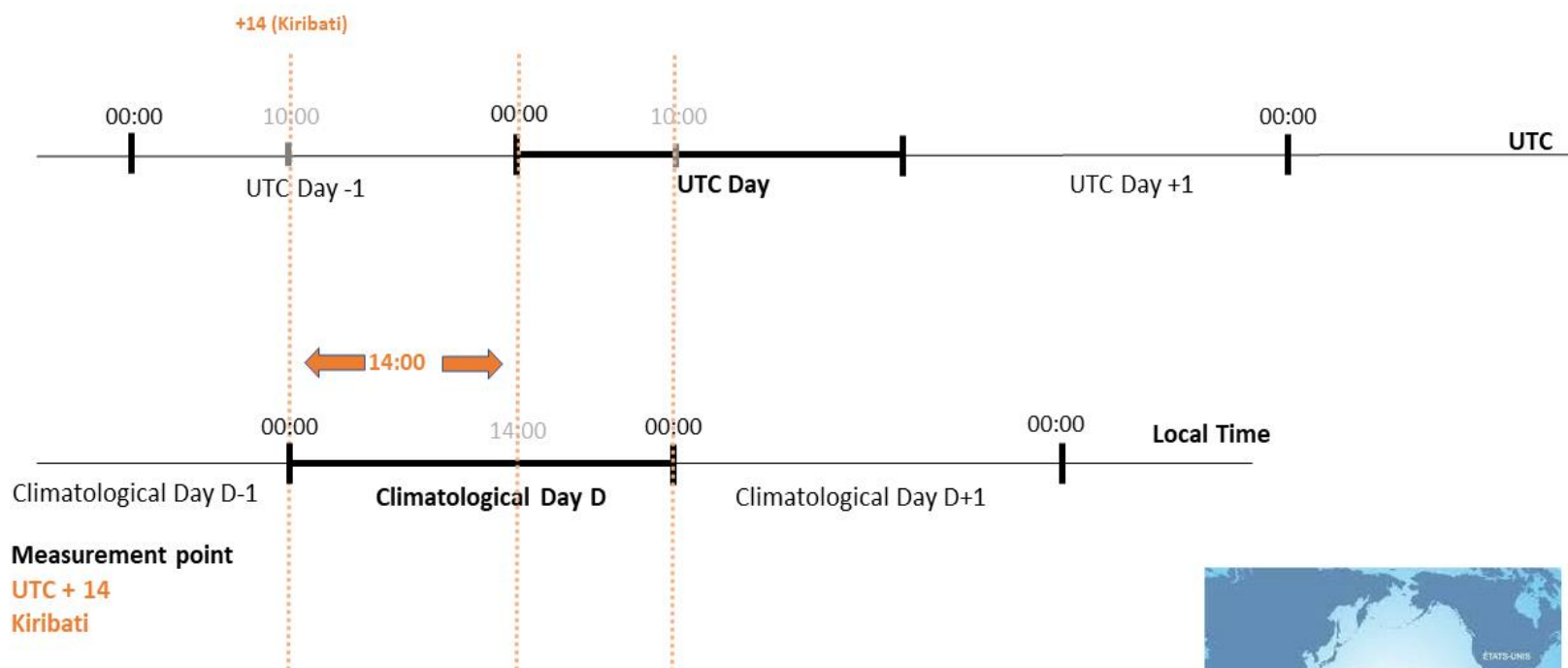
Note:
*   **RDT,** used by the NMHS for a station, does not necessarily correspond to the **standard time zone** in which the meteorological station is located.
*   An NMHS may manage several **RDTs**.
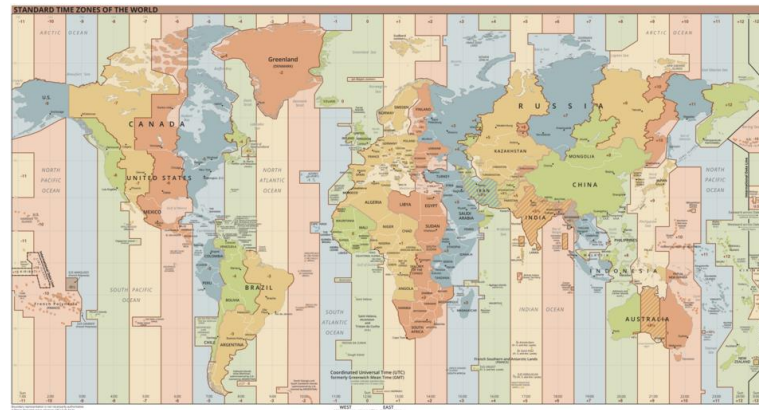
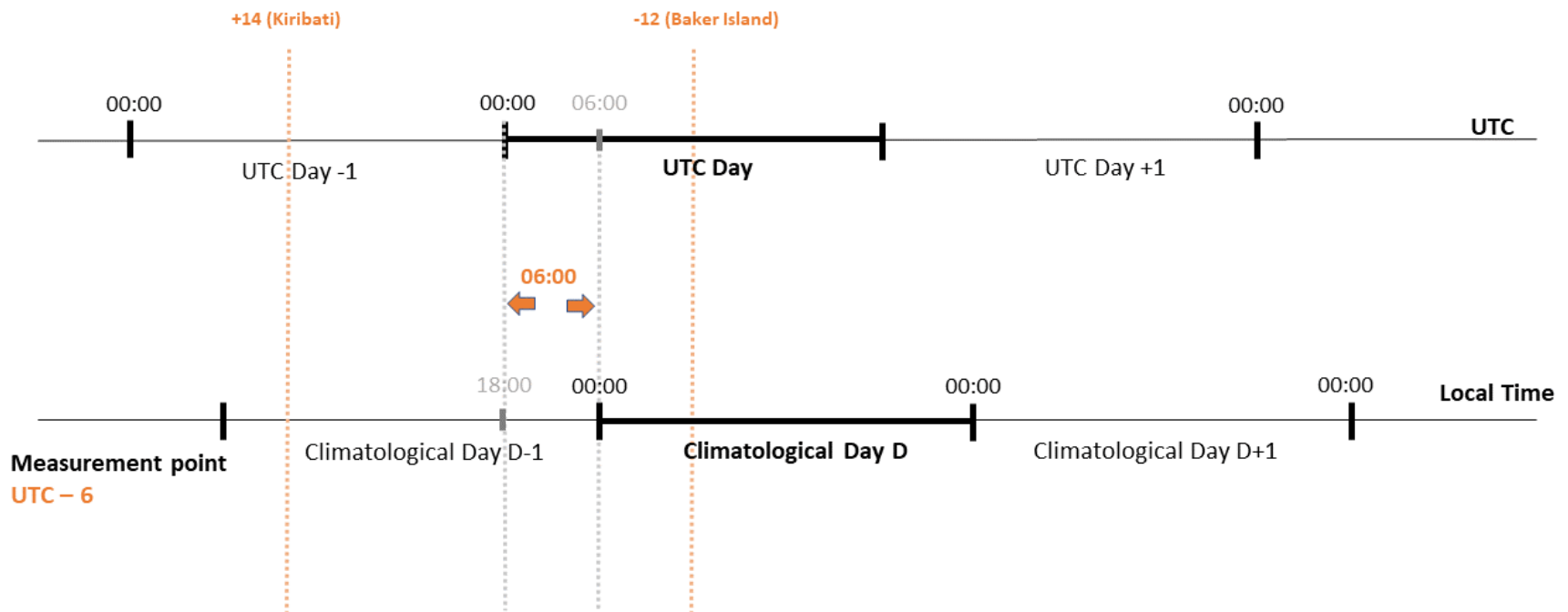*Standard Time Zones map from UTC -12:00 to UTC+14:00*

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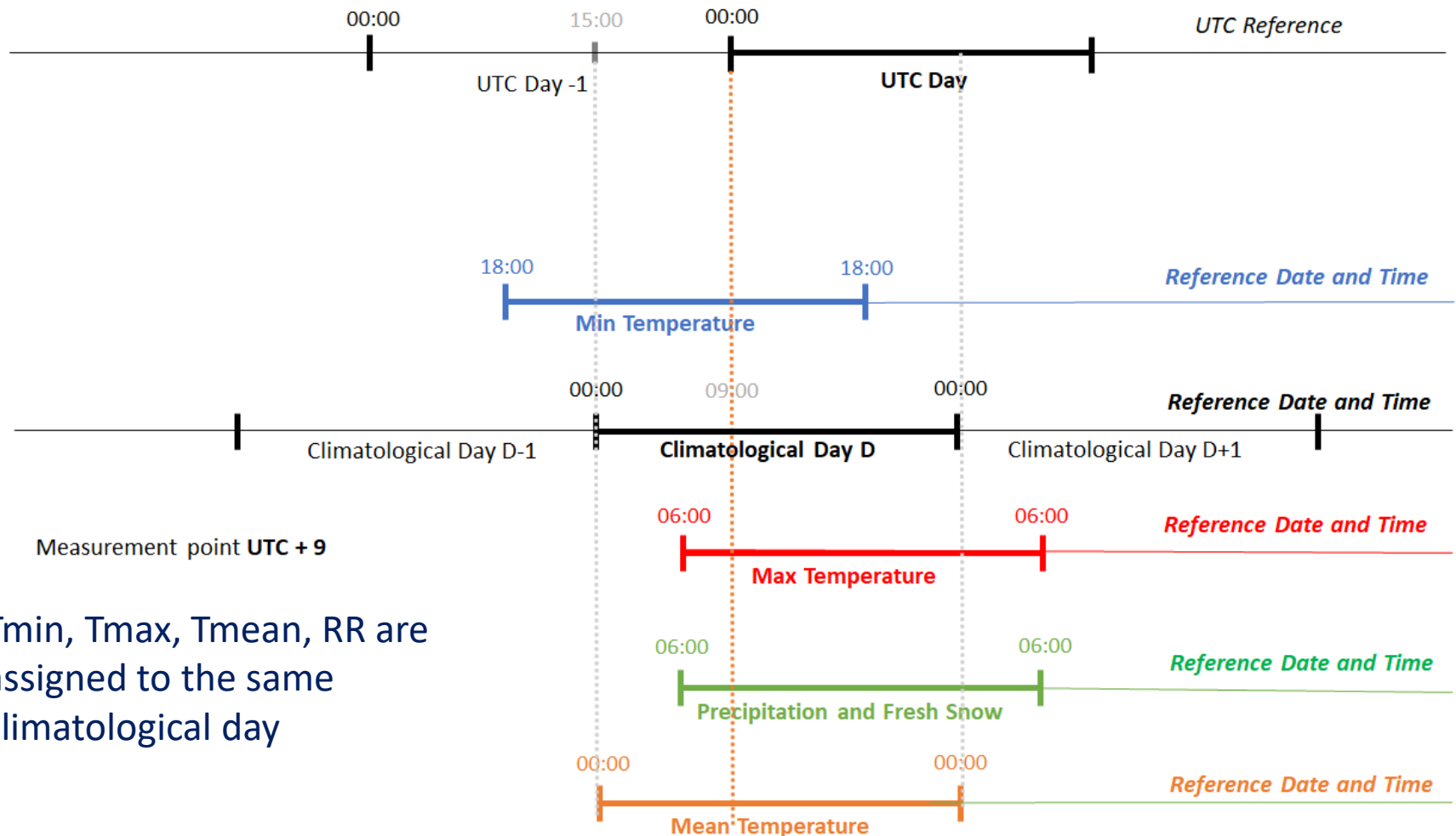Many NMHSs do not use UTC as a reference when assigning daily parameter values.

Why these modifications? Facts and examples

illustration for a measurement point at -6 UTC e.g. Mexico City

Why these modifications? Facts and examples

illustration for a measurement point at +9 UTC, and time period of parameters

Tmin, Tmax, Tmean, RR are assigned to the same climatological day

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DAYCLI sample RDT to UTC: modification of the data series

For example, a station that measures and stores its daily precipitation amount with the Reference Date and Time of UTC+8.

Its local practice is to measure the precipitation every day at 06:00 RDT and to assign this precipitation amount to the previous day.

National historical data series with RDT

Station	Date (RDT)	RR
Station A	01/05/2025	0.0 mm
Station A	**02/05/2025**	**1.5 mm**
Station A	03/05/2025	5.0 mm
Station A	04/05/2025	0.0 mm
Station A	05/05/2025	2.8 mm
Station A	…	

Data series with UTC

Station	Date (UTC)	RR
Station A	01/05/2025	1.5 mm
Station A	**02/05/2025**	**5.0 mm**
Station A	03/05/2025	0.0 mm
Station A	04/05/2025	2.8 mm
Station A	…	
Station A	…	

For example, for the day 02/05/2025 RDT it is assigned 1.5 mm of precipitation from the 02/05/2025 at 06:00 RDT to the 03/05/2025 at 06:00 RDT.

If we switch to UTC that gives:
from the 01/05/2025 at 22:00 UTC (RDT-8) to the 02/05/2025 at 22:00 UTC.

Values are identical but with a mismatch of 1 day

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Example of convention for 3 daily datasets providers

- ✓ **NOAA/NCEI** and in particular its GHCND (**Global Historical Climatology Network Daily**), exchanges its daily data according to the time of observation that "*is the 24 hour clock time of the observation given as the local time at the station of record*". https://www.ncdc.noaa.gov/cdo-web/datasets and see https://www.ncei.noaa.gov/pub/data/cdo/documentation/GHCND_documentation.pdf

- ✓ **BoM** (Australia) exchanges its daily data according its Reference Date and Time (RDT). E.g. for rainfall at the station of Melbourne Airport , measurements are nominally made at 9 am local clock time and record the total for the previous 24 hours http://www.bom.gov.au/jsp/ncc/cdio/weatherData/av?p_nccObsCode=136&p_display_type=dailyDataFile&p_startYear=&p_c=&p_stn_num=086282

- ✓ **Météo-France** exchanges its daily data according the Reference Date and Time zones. That means in UTC for its territory in continental Europe (0 meridian), and in RDT for stations in Polynesia, in the Caribbean, etc. https://www.data.gouv.fr/fr/datasets/donnees-climatologiques-de-base-quotidiennes/

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Requirements for DAYCLI

- ✓ Maintain the integrity of the historical daily climate data series of NMHSs-> the « Climatological day ».

- ✓ Clarify and minimize the date/time management to avoid error-prone manipulation and make the job easier for NMHSs.

Note:

- ✓ Most NMHSs use a Reference date and time (RDT) because it reflects the conditions on their local days.
- ✓ DAYCLI is not managing Daylight saving time (DST) which is not recommended by WMO.

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Brainstorming the definition and naming of a reference time for daily data

Definition: reference date at a measurement point used to assign daily parameters to a day (Year-Month-Day)

Some proposals:

- ✓ Reference date and time (RDT)
- ✓ Climatological date and time (CDT)
- ✓ Climatological day
- ✓ Nominal reporting time
- ✓ …

Thank you !

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