June 2025, ET-DDS

DAYCLI message : brainstorming a reference time for daily data

WEATHER CLIMATE WATER
TEMPS CLIMAT EAU

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

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Agenda

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

Questions

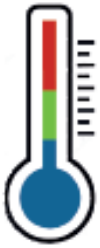
12:45 UTC
- ✓ Time reference brainstorming

Discussion, collecting feedback

13:30 UTC

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.

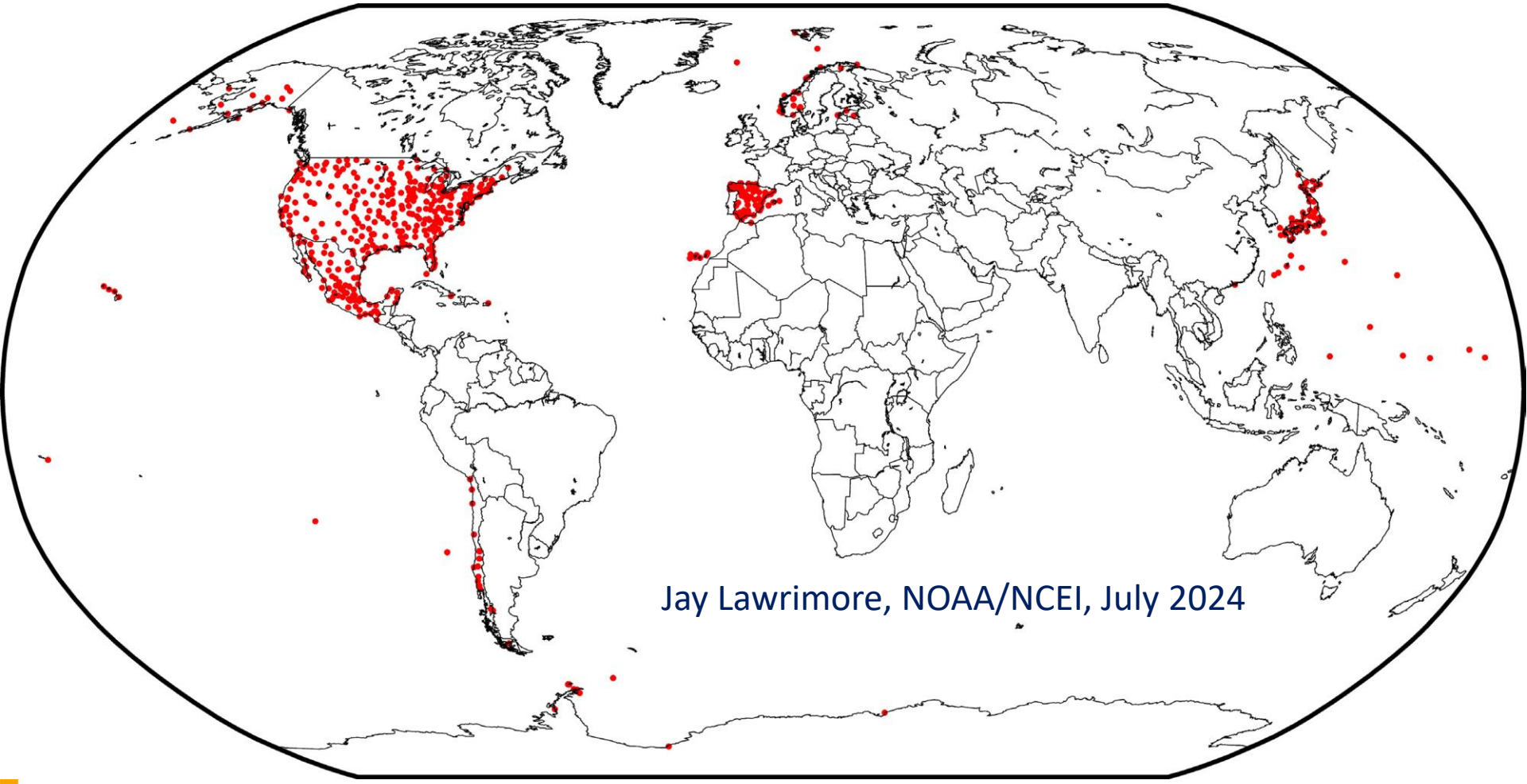
2022: WMO approves the DAYCLI BUFR sequence **3 07 075** (https://github.com/wmo-im/BUFR4/issues/51)

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).

Stations Transmitting DAYCLI and Received at NCEI in 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**.

Which modifications?

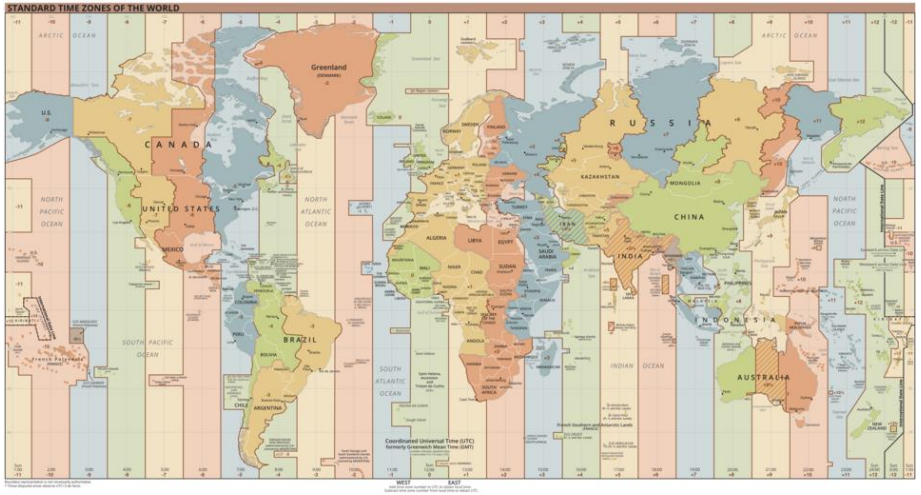
2 modifications are proposed:

1. **instead of using UTC**, use the national **Reference date and time (RDT)** for each meteorological station's daily climate data.

2. Add the time difference (offset) between the station's **RDT** and **UTC**.

Note:

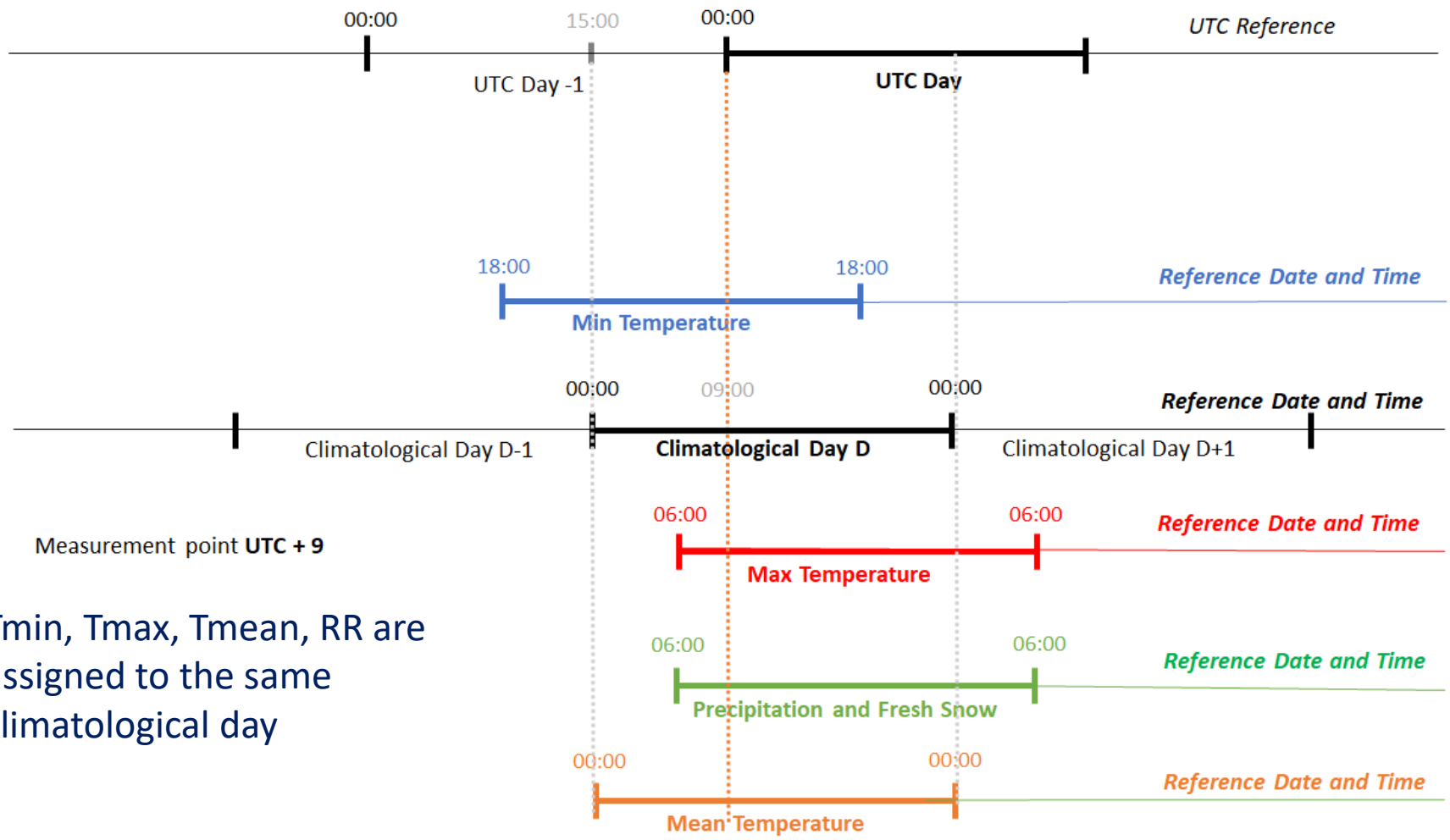
- A **national reference date an time (RDT)**, used by a NMHS, does not necessarily correspond to the **standard time zone** in which the meteorological station is located.
- A NMHS may manage several **RDTs**.



Standard Time Zones map from UTC -12:00 to UTC+14:00

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

From local to UTC: modification of the national 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 local time reference

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	…	

Same 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.
Without caution regarding metadata, misinterpretation may occur!

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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/

Requirements for DAYCLI

- ✓ Maintain the integrity of the NMHS's historical daily climate data series **-->** Maintain the NMHS's « Climatological day ».

- ✓ Minimize and clarify the date/time management process to simplify it and avoid error-prone manipulation and simplify at the NMHS level. For example, provide a clear process and handbook and free, easy-to-use software for coding/decoding. Also reserve post-processing for global or regional centers if needed.

Note:

- ✓ DAYCLI does not manage daylight saving time (DST) which the WMO does not recommend for a measurement location.

Questions ? Comments ?

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

Some proposals:

- ✓ Reference date and time (RDT)
- ✓ Climatological date and time (CDT)
- ✓ Climatological day (term that appears in WMO 1131 Edition 2025)
- ✓ Nominal reporting time
- ✓ …

NOAA Definition: *the 24 hour clock time of the observation given as the local time at the station of record*

Other possible Definition: reference date at a measurement point used to assign daily variables to a 24 hour period time (Year-Month-Day)

Definition? ……

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Thank you !

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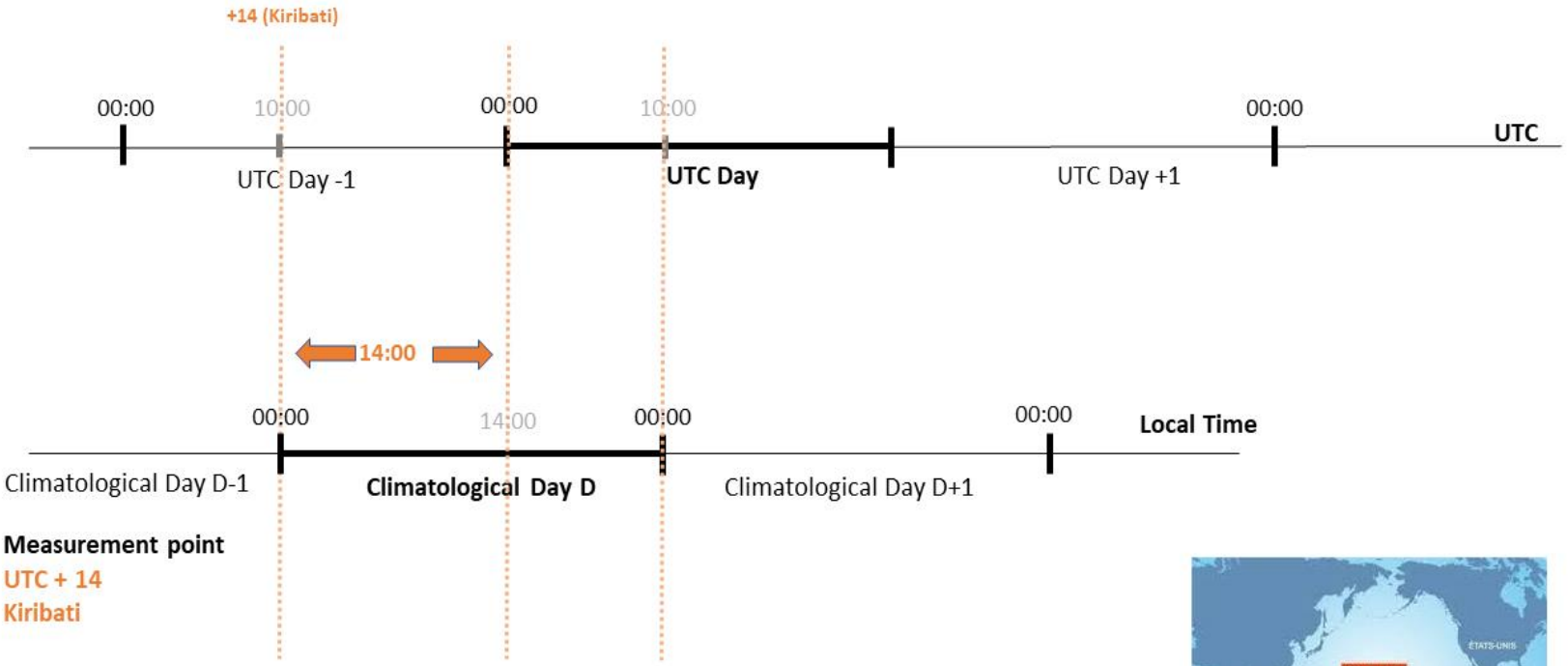
Why these modifications? Facts and examples

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