Package: synopR (via r-universe)

May 14, 2026

Title Fast Decoding of SYNOP (Surface Synoptic Observations) Meteorological Messages

Version 1.0.0

Description Decode SYNOP (surface synoptic observations) messages into data frames, extracting data from Sections 0, 1, and 3, including temperature, dew point, pressure, wind, clouds, and precipitation. Available functions to download SYNOP messages from Ogimet <https://www.ogimet.com/> if needed. The decoding logic follows the specifications defined in the World Meteorological Organization (2019) ``Manual on Codes, Volume I.1 (WMO-No. 306)".

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Encoding UTF-8

Roxygen list(markdown = TRUE)

RoxygenNote 7.3.3

Depends R (>= 4.1.0)

Suggests tibble, knitr, rmarkdown, testthat (>= 3.0.0)

URL https://ezequiel1593.github.io/synopR/

BugReports https://github.com/ezequiel1593/synopR/issues

VignetteBuilder knitr

Repository https://ezequiel1593.r-universe.dev

Date/Publication 2026-04-14 15:39:31 UTC

RemoteUrl https://github.com/ezequiel1593/synopr

RemoteRef HEAD

RemoteSha c0d75bb4c4051a4813432ad98b4a728c9bdbb40f

Contents

`check_synop` *Check SYNOP messages for structural integrity*

Description

Validates if SYNOP strings meet basic structural requirements, considering section indicators and 5-digit data groups.

Usage

```
check_synop(data)
```

Arguments

`data`	A character vector of SYNOP strings or the exact data frame returned by `parse_ogimet()`.

Value

A data frame with validation results for each message.

Examples

```
msg <- paste0("AAXX 01123 87736 32965 13205 10214 20143 ",
              "30022 40113 5//// 80005 333 10236 20128=")
checked_synops <- check_synop(msg)
```

`direct_download_from_ogimet`
Direct download of meteorological data from Ogimet

Description

Direct download of meteorological data from Ogimet

Usage

```
direct_download_from_ogimet(wmo_identifier, initial_date, final_date)
```

Arguments

wmo_identifier	A 5-digit character string or integer representing the station WMO ID.
initial_date	Initial date, format "YYYY-MM-DD".
final_date	Final date, format "YYYY-MM-DD".

Details

The requested period cannot exceed 370 days. All queries assume UTC time zone. The returned data frame covers from 00:00 UTC of the `initial_date` to 23:00 UTC of the `final_date`, inclusive. Too many requests may trigger temporal blocks.

If the station identifier starts with 0 (zero), then `wmo_identifier` must be a string (e.g., "06447").

Value

A data frame, as returned by `show_synop_data()`

Examples

```
## Not run:
direct_download_from_ogimet(wmo_identifier = '87585',
                            initial_date = "2024-01-10",
                            final_date = "2024-01-11")

## End(Not run)
```

---

download_from_ogimet *Download SYNOP messages from Ogimet*

Description

Download SYNOP messages from Ogimet

Usage

```
download_from_ogimet(wmo_identifier, initial_date, final_date)
```

Arguments

wmo_identifier	A 5-digit character string or integer representing the station WMO ID.
initial_date	Initial date, format "YYYY-MM-DD".
final_date	Final date, format "YYYY-MM-DD".

Details

The requested period cannot exceed 370 days. All queries assume UTC time zone. The returned dataset covers from 00:00 UTC of the `initial_date` to 23:00 UTC of the `final_date`, inclusive. Too many requests may trigger temporal blocks.

If the station identifier starts with 0 (zero), then `wmo_identifier` must be a string (e.g., "06447").

Value

A character vector with SYNOP strings.

Examples

```
## Not run:
download_from_ogimet(wmo_identifier = '87585',
                     initial_date = "2024-01-10",
                     final_date = "2024-01-11")

## End(Not run)
```

`parse_ogimet` *Parse SYNOP strings downloaded from Ogimet into a data frame*

Description

Parse SYNOP strings downloaded from Ogimet into a data frame

Usage

```
parse_ogimet(ogimet_data)
```

Arguments

`ogimet_data`	A character vector of Ogimet-format SYNOP strings.

Value

A data frame with Year, Month, Day, Hour, and Raw_synop.

Examples

```
msg <- paste0("87736,2026,01,01,12,00,AAXX 01123 87736 32965 13205 10214 20143 ",
              "30022 40113 5//// 80005 333 10236 20128=")
parsed_data <- parse_ogimet(msg)
```

show_synop_data *Decode multiple SYNOP messages*

Description

This function decodes a vector or data frame column of SYNOP strings belonging to the same or different meteorological surface station.

Usage

```
show_synop_data(data, wmo_identifier = NULL, remove_empty_cols = TRUE)
```

Arguments

data	A character vector, a data frame column containing raw SYNOP strings, or the exact data frame returned by parse_ogimet().
wmo_identifier	A 5-digit character string or integer representing the station WMO ID. If NULL (default), all messages are decoded.
remove_empty_cols	Logical. Should columns containing only NA values be removed? Default is TRUE.

Value

A data frame where each row represents one observation time and each column a decoded meteorological variable.

1. wmo_id - WMO station identifier
2. Year - (from parse_ogimet())
3. Month - (from parse_ogimet())
4. Day - As informed by Section 0
5. Hour - As informed by Section 0
6. Cloud_base_height - Lowest cloud base height, in intervals
7. Visibility - In meters
8. Total_cloud_cover - In oktas, 9 means 'invisible' sky by fog or other phenomenon
9. Wind_direction - In tens of degree, 99 means 'variable wind direction'
10. Wind_speed
11. Wind_speed_unit - Either 'm/s' or 'knots'
12. Air_temperature - In degrees Celsius
13. Dew_point - In degrees Celsius
14. Relative_humidity - As a percentage
15. Station_pressure - In hPa

16. MSLP_GH - Mean sea level pressure (in hPa) or geopotential height (in gpm)
17. Pressure_tendency - In hPa
18. Charac_pressure_tend - String, simplified decoding
19. Precipitation_S1 - In mm
20. Precip_period_S1 - In hours ('Precipitation_S1' fell in the last 'Precip_period_S1' hours)
21. Present_weather - String, simplified decoding
22. Past_weather1 - String, simplified decoding
23. Past_weather2 - String, simplified decoding
24. Cloud_amount_Nh - Cloud coverage from low or medium cloud, same as 'Total_cloud_cover'
25. Low_clouds_CL - String, simplified decoding
26. Medium_clouds_CM - String, simplified decoding
27. High_clouds_CH - String, simplified decoding
28. Max_temperature - In degrees Celsius
29. Min_temperature - In degrees Celsius
30. Ground_state - String, simplified decoding
31. Ground_temperature - Integer, in degrees Celsius
32. Snow_ground_state - String, simplified decoding
33. Snow_depth - In cm
34. Ev_Evt - Evaporation (ev) or evapotranspiration (evt), in mm
35. Sunshine_daily - In hours (generally from the previous civil day)
36. Positive_Net_Rad_last_24h - In J/cm^2
37. Negative_Net_Rad_last_24h - In J/cm^2
38. Global_Solar_Rad_last_24h - In J/cm^2
39. Diffused_Solar_Rad_last_24h - In J/cm^2
40. Downward_LongWave_Rad_last_24h - In J/cm^2
41. Upward_LongWave_Rad_last_24h - In J/cm^2
42. ShortWave_Rad_last_24h - In J/cm^2
43. Net_ShortWave_Rad_last_24h - In J/cm^2
44. Direct_Solar_Rad_last_24h - In J/cm^2
45. Sunshine_last_hour - In hours
46. Positive_Net_Rad_last_hour - In kJ/m^2
47. Negative_Net_Rad_last_hour - In kJ/m^2
48. Global_Solar_Rad_last_hour - In kJ/m^2
49. Diffused_Solar_Rad_last_hour - In kJ/m^2
50. Downward_LongWave_Rad_last_hour - In kJ/m^2
51. Upward_LongWave_Rad_last_hour - In kJ/m^2
52. ShortWave_Rad_last_hour - In kJ/m^2

53. Net_ShortWave_Rad_last_hour - In kJ/m^2
54. Direct_Solar_Rad_last_hour - In kJ/m^2
55. Cloud_drift_direction - In cardinal and intercardinal directions for "low - medium - high" clouds
56. Cloud_elevation_direction - String indicating genera, direction and elevation angle
57. Pressure_change_last_24h - In hPa
58. Precipitation_S3 - In mm
59. Precip_period_S3 - In hours ('Precipitation_S3' fell in the last 'Precip_period_S3' hours)
60. Precipitation_last_24h - In mm
61. Cloud_layer_1 - String indicating cover, genera and height
62. Cloud_layer_2 - String indicating cover, genera and height
63. Cloud_layer_3 - String indicating cover, genera and height
64. Cloud_layer_4 - String indicating cover, genera and height

Examples

```
msg <- paste0("AAXX 01123 87736 32965 13205 10214 20143 ",
              "30022 40113 5//// 80005 333 10236 20128 56000 81270=")
synop_df <- data.frame(messages = msg)
decoded_data <- show_synop_data(synop_df)
```

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