

The `metsymb` package*

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Abstract

This package introduces commands to generate professional meteorological symbols with vectorial quality. As of October 10, 2022, these include: oktas (\bigcirc , \oplus , \bigcirc , ...), cloud genera (\rightarrow , \angle , \angle , ...), and C_L – C_M – C_H cloud codes (\triangle , \times , \angle , ...). This package essentially introduces a new font in which each symbol is assigned to a glyph, which can then be called individually from \LaTeX documents via dedicated commands.

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1 Introduction

The creation of this package was motivated by the fact that in 2021, there were no dedicated Unicode elements for `okta` and `cloud genera` symbols. To the best of my knowledge, no \LaTeX package provides a uniform set of these symbols either¹.

This package is a direct attempt to remedy to this unfortunate state of affair. Individual symbols are designed using TikZ². They are then bundled into a dedicated font with FontForge³. Individual glyphs of this `metsymb` font are then tied to dedicated \LaTeX commands via this package.

*This document corresponds to `metsymb` v1.2, dated 2022/09/10.

¹If you know of one, please let me know and I shall list it here !

²<https://www.ctan.org/pkg/pgf>

³<https://fontforge.org/en-US/>

2 Usage

Using the `metsymb` package is straightforward. By importing it via a not-so-surprising `\usepackage{metsymb}` in the preamble of your documents, you will gain access to the commands listed in Tables 1 to 3.

Table 1: `metsymb` commands for the okta symbols.











	<code>\zerookta</code>		<code>\fiveoktas</code>
	<code>\oneokta</code>		<code>\sixoktas</code>
	<code>\twooktas</code>		<code>\sevenoktas</code>
	<code>\threeoktas</code>		<code>\eightoktas</code>
	<code>\fouroktas</code>		<code>\nineoktas</code>

Table 2: `metsymb` commands for the cloud genera symbols.






































	<code>\cirrus</code>		<code>\nimbostratus</code>
	<code>\cirrocumulus</code>		<code>\stratocumulus</code>
	<code>\cirrostratus</code>		<code>\stratus</code>
	<code>\altocumulus</code>		<code>\cumulus</code>
	<code>\altostratus</code>		<code>\cumulonimbus</code>

Table 3: `metsymb` commands for the C_L , C_M , and C_H cloud symbols.

	<code>\clI</code>		<code>\cmI</code>		<code>\chI</code>
	<code>\clII</code>		<code>\cmII</code>		<code>\chII</code>
	<code>\clIII</code>		<code>\cmIII</code>		<code>\chIII</code>
	<code>\clIV</code>		<code>\cmIV</code>		<code>\chIV</code>
	<code>\clV</code>		<code>\cmV</code>		<code>\chV</code>
	<code>\clVI</code>		<code>\cmVI</code>		<code>\chVI</code>
	<code>\clVII</code>		<code>\cmVII</code>		<code>\chVII</code>
	<code>\clVIII</code>		<code>\cmVIII</code>		<code>\chVIII</code>
	<code>\clIX</code>		<code>\cmIX</code>		<code>\chIX</code>

2.1 Using metsymb with matplotlib

`metsymb` can be used to include meteorological symbols inside Python plots, provided that the use of a system-wide L^AT_EX installation is enabled via the setting `text.usetex` in your `rcParams`⁴. In fact, the assembly of a dedicated vectorial font to store the `metsymb` symbols⁵ is directly motivated by the fact that `matplotlib` [requires proper font metrics](#) to include symbols in Python plots.

The following minimal working example, stored in `metsymb_mwe.py` inside the `metsymb` Github repository, illustrates how one can couple `metsymb` and `matplotlib` (see Fig. 1 for the result):

```
# -*- coding: utf-8 -*-
"""
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originally written by F.P.A. Vogt; frederic.vogt@meteoswiss.ch

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Module content: minimal working example of the metsymb LaTeX package
with matplotlib figures.
"""

# Import matplotlib
from matplotlib import pyplot as plt

# Set the proper rcparams elements
plt.style.use('./metsymb_mwe.mplstyle')

# Create a basic figure with some demo text in the center.
plt.close(1)
plt.figure(1, figsize=(4, 0.5))
plt.text(0.5, 0.5,
        r'\LARGE\Hello\World:\threeoktas\nimbostratus\chIX',
        ha='center')
plt.axis('off')

# Export to different format and display on-screen.
plt.savefig('metsymb_mwe.pdf')
plt.savefig('metsymb_mwe.png')
#plt.show()
```

where `metsymb_mwe.mplstyle` contains:

```
text.usetex: True
text.latex.preamble: \usepackage{metsymb}
```

Hello World: ☉☂☃

Figure 1: Result of the `metsymb_mwe.py` demonstration script, illustrating how the `metsymb` package can be used with `matplotlib`.

⁴<https://matplotlib.org/stable/tutorials/text/usetex.html>

⁵instead of a simpler TikZ approach, [for example](#)

3 Code development and bug reports

The `metasyb` package is being developed inside a dedicated Github repository under the MeteoSwiss organization, located at: <https://github.com/MeteoSwiss/metasyb>. User contributions are welcome and will be examined in details. So are bug reports and suggestions for new symbols, which are best submitted as *Github Issues* directly on the code's repo at: <https://github.com/MeteoSwiss/metasyb/issues>

4 License and copyright

The copyright (2021-2022) of `metasyb` is owned by MeteoSwiss. The code, originally written by Frédéric P.A. Vogt, is released under the terms of the BSD-3-Clause License, available at <https://opensource.org/licenses/BSD-3-Clause>.

5 Acknowledgments

The following resources proved immensely useful to assemble the first version of this package:

- *How to Package Your L^AT_EX Package*, Scott Pakin (2015): <https://mirror.foobar.to/CTAN/info/dtxut/dtxut.pdf>
- The FontForge documentation, and in particular the *FontForge and TeX* article: <https://fontforge.org/docs/techref/PfaEdit-TeX.html>
- The *TeX font errors: Cheatsheet*: <https://texdoc.org/serve/tex-font-errors-cheatsheet/0>

Several StackOverflow users also proved extremely helpful when building `metasyb`, in particular:

- those that provided clarifications and help [in this post](#), [in that post](#), and [in that other post](#).

Thank you also to the jklymak and anntzer.lee from the `matplotlib` discourse community for their clarifications in [this post](#).

6 Font table

The complete font table for `metasyb`, generated via the command `pdftex testfont` with the `\sample` call, is visible in Fig. 2.

7 Implementation

The `metasyb` package very simply defines new commands to fetch individual glyphs from the `metasyb` font. As such, its L^AT_EX side is rather simple.

```
\zerookta The 0 okta symbol:
1 \newcommand{\zerookta}{\usefont{U}{metasyb}{m}{n} \char33 }}%

\oneokta The 1 okta symbol:
2 \newcommand{\oneokta}{\usefont{U}{metasyb}{m}{n} \char34 }}%

\twooktas The 2 oktas symbol:
3 \newcommand{\twooktas}{\usefont{U}{metasyb}{m}{n} \char35 }}%

```

`\threeoktas` The 3 oktas symbol:
4 `\newcommand{\threeoktas}{\usefont{U}{metsymb}{m}{n} \char36 }%`

`\fouroktas` The 4 oktas symbol:
5 `\newcommand{\fouroktas}{\usefont{U}{metsymb}{m}{n} \char37 }%`

`\fiveoktas` The 5 oktas symbol:
6 `\newcommand{\fiveoktas}{\usefont{U}{metsymb}{m}{n} \char38 }%`

`\sixoktas` The 6 oktas symbol:
7 `\newcommand{\sixoktas}{\usefont{U}{metsymb}{m}{n} \char39 }%`

`\sevenoktas` The 7 oktas symbol:
8 `\newcommand{\sevenoktas}{\usefont{U}{metsymb}{m}{n} \char40 }%`

`\eightoktas` The 8 oktas symbol:
9 `\newcommand{\eightoktas}{\usefont{U}{metsymb}{m}{n} \char41 }%`

`\nineoktas` The 9 oktas symbol:
10 `\newcommand{\nineoktas}{\usefont{U}{metsymb}{m}{n} \char42 }%`

`\cirrus` The cirrus symbol:
11 `\newcommand{\cirrus}{\usefont{U}{metsymb}{m}{n} \char43 }%`

`\cirrocumulus` The cirrocumulus symbol:
12 `\newcommand{\cirrocumulus}{\usefont{U}{metsymb}{m}{n} \char44 }%`

`\cirrostratus` The cirrostratus symbol:
13 `\newcommand{\cirrostratus}{\usefont{U}{metsymb}{m}{n} \char45 }%`

`\altocumulus` The altocumulus symbol:
14 `\newcommand{\altocumulus}{\usefont{U}{metsymb}{m}{n} \char46 }%`

`\altostratus` The altostratus symbol:
15 `\newcommand{\altostratus}{\usefont{U}{metsymb}{m}{n} \char47 }%`

`\nimbostratus` The nimbostratus symbol:
16 `\newcommand{\nimbostratus}{\usefont{U}{metsymb}{m}{n} \char48 }%`

`\stratocumulus` The stratocumulus symbol:
17 `\newcommand{\stratocumulus}{\usefont{U}{metsymb}{m}{n} \char49 }%`

`\stratus` The stratus symbol:
18 `\newcommand{\stratus}{\usefont{U}{metsymb}{m}{n} \char50 }%`

`\cumulus` The cumulus symbol:
19 `\newcommand{\cumulus}{\usefont{U}{metsymb}{m}{n} \char51 }%`

`\cumulonimbus` The cumulonimbus symbol:
20 `\newcommand{\cumulonimbus}{\usefont{U}{metsymb}{m}{n} \char52 }%`

`\cII` The $C_L = 1$ cloud symbol:
21 `\newcommand{\cII}{\usefont{U}{metsymb}{m}{n} \char53 }%`

\c1II The $C_L = 2$ cloud symbol:
22 \newcommand{\c1II}{\usefont{U}{metsymb}{m}{n} \char54 }}%

\c1III The $C_L = 3$ cloud symbol:
23 \newcommand{\c1III}{\usefont{U}{metsymb}{m}{n} \char55 }}%

\c1IV The $C_L = 4$ cloud symbol:
24 \newcommand{\c1IV}{\usefont{U}{metsymb}{m}{n} \char56 }}%

\c1V The $C_L = 5$ cloud symbol:
25 \newcommand{\c1V}{\usefont{U}{metsymb}{m}{n} \char57 }}%

\c1VI The $C_L = 6$ cloud symbol:
26 \newcommand{\c1VI}{\usefont{U}{metsymb}{m}{n} \char58 }}%

\c1VII The $C_L = 7$ cloud symbol:
27 \newcommand{\c1VII}{\usefont{U}{metsymb}{m}{n} \char59 }}%

\c1VIII The $C_L = 8$ cloud symbol:
28 \newcommand{\c1VIII}{\usefont{U}{metsymb}{m}{n} \char60 }}%

\c1IX The $C_L = 9$ cloud symbol:
29 \newcommand{\c1IX}{\usefont{U}{metsymb}{m}{n} \char61 }}%

\cmI The $C_M = 1$ cloud symbol:
30 \newcommand{\cmI}{\usefont{U}{metsymb}{m}{n} \char62 }}%

\cmII The $C_M = 2$ cloud symbol:
31 \newcommand{\cmII}{\usefont{U}{metsymb}{m}{n} \char63 }}%

\cmIII The $C_M = 3$ cloud symbol:
32 \newcommand{\cmIII}{\usefont{U}{metsymb}{m}{n} \char64 }}%

\cmIV The $C_M = 4$ cloud symbol:
33 \newcommand{\cmIV}{\usefont{U}{metsymb}{m}{n} \char65 }}%

\cmV The $C_M = 5$ cloud symbol:
34 \newcommand{\cmV}{\usefont{U}{metsymb}{m}{n} \char66 }}%

\cmVI The $C_M = 6$ cloud symbol:
35 \newcommand{\cmVI}{\usefont{U}{metsymb}{m}{n} \char67 }}%

\cmVII The $C_M = 7$ cloud symbol:
36 \newcommand{\cmVII}{\usefont{U}{metsymb}{m}{n} \char68 }}%

\cmVIII The $C_M = 8$ cloud symbol:
37 \newcommand{\cmVIII}{\usefont{U}{metsymb}{m}{n} \char69 }}%

\cmIX The $C_M = 9$ cloud symbol:
38 \newcommand{\cmIX}{\usefont{U}{metsymb}{m}{n} \char70 }}%

\chI The $C_H = 1$ cloud symbol:
39 \newcommand{\chI}{\usefont{U}{metsymb}{m}{n} \char71 }}%

`\chII` The $C_H = 2$ cloud symbol:
`40 \newcommand{\chII}{\usefont{U}{metsymb}{m}{n} \char72 } }`%

`\chIII` The $C_H = 3$ cloud symbol:
`41 \newcommand{\chIII}{\usefont{U}{metsymb}{m}{n} \char73 } }`%

`\chIV` The $C_H = 4$ cloud symbol:
`42 \newcommand{\chIV}{\usefont{U}{metsymb}{m}{n} \char74 } }`%

`\chV` The $C_H = 5$ cloud symbol:
`43 \newcommand{\chV}{\usefont{U}{metsymb}{m}{n} \char75 } }`%

`\chVI` The $C_H = 6$ cloud symbol:
`44 \newcommand{\chVI}{\usefont{U}{metsymb}{m}{n} \char76 } }`%

`\chVII` The $C_H = 7$ cloud symbol:
`45 \newcommand{\chVII}{\usefont{U}{metsymb}{m}{n} \char77 } }`%

`\chVIII` The $C_H = 8$ cloud symbol:
`46 \newcommand{\chVIII}{\usefont{U}{metsymb}{m}{n} \char78 } }`%

`\chIX` The $C_H = 9$ cloud symbol:
`47 \newcommand{\chIX}{\usefont{U}{metsymb}{m}{n} \char79 } }`%

	'0	'1	'2	'3	'4	'5	'6	'7	
'04x		○	⊖	◐	◑	◒	◓	◔	"2x
'05x	◕	◖	⊗	⊢	↷	↶	↵	↹	
'06x	⚓	♂	--	⌢	⌣	⌤	⌥	⌦	"3x
'07x	⌧	⌨	—	---	〈	〉	⌫	⌬	
'10x	↷	↶	↵	↹	↻	↺	↻	↻	"4x
'11x	↻	↻	↻	↻	↻	↻	↻	↻	
	"8	"9	"A	"B	"C	"D	"E	"F	

[illegible]

Figure 2: Complete font table for metsymb.