

# The `metsymb` package\*

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## Abstract

This package introduces commands to generate meteorological symbols. As of August 26, 2021, these include: okta symbols ( $\bigcirc$ ,  $\bigodot$ ,  $\bigbullet$ , ...), and cloud symbols ( $\rightarrow$ ,  $\angle$ ,  $\nearrow$ , ...). This package effectively introduces a new font in which each symbol is assigned to a glyph, which can then be called individually from L<sup>A</sup>T<sub>E</sub>X documents via dedicated new commands.

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## 1 Introduction

The creation of this package was initially motivated by the fact that, as of August 24, 2021, there were no dedicated Unicode element for all of [the okta symbols](#) and [the cloud genera symbols](#). To the best of my knowledge, no L<sup>A</sup>T<sub>E</sub>X package provides a uniform set of these symbols either<sup>1</sup>.

This humble package is a direct attempt to remedy –in part– to this sad state of affair. A new font, created using FontForge<sup>2</sup>, is used to generate the new symbols, and assign them to individual glyphs. Individual glyphs can then be called individually using dedicated L<sup>A</sup>T<sub>E</sub>X commands.

## 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 Table 1 and Table 2.

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\*This document corresponds to `metsymb` v1.0, dated 2021/08/26.

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

<sup>2</sup><https://fontforge.org/en-US/>

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>

## 2.1 Using `metsymb` with `matplotlib`

The assembly of a dedicated font to store the `metsymb` symbols<sup>3</sup> is directly motivated by the fact that `matplotlib` [requires proper font metrics](#) to include symbols in Python plots.

Hence, `metsymb` can be used to include meteorological symbols inside Python plots, provided that the use of a system-wide L<sup>A</sup>T<sub>E</sub>X installation is enabled prior to generating the plots. Modifying the `rcparams` elements is one way to do so, as illustrated in the following minimal working example (stored in `metsymb_mwe.py`; see Fig. 1 for the result):

```
# -*- coding: utf-8 -*-
"""
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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',
        ha='center')
```

<sup>3</sup>instead of a simpler `tikz` approach, [for example](#)

```
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`.

### WARNING !

The use of `text.latex.preamble` in the `rcparams` of `matplotlib` is not an officially supported feature of that package ! Proceed at your own risks !

## 3 Code development and bug reports

The `metsymb` package is being developed inside a dedicated Github repository under the MeteoSwiss organization, located at: <https://github.com/MeteoSwiss/metsymb>. 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/metsymb/issues>

## 4 License and copyright

The copyright (2021) of `metsymb` 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<sup>A</sup>T<sub>E</sub>X 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 *T<sub>E</sub>X font errors: Cheatsheet*: <https://texdoc.org/serve/tex-font-errors-cheatsheet/0>

Several StackOverflow users also proved extremely helpful when building `metsymb`, 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 `metsymb`, generated via the command `pdftex testfont` with the `\sample` call, is visible in Fig. 2.

## 7 Implementation

The `metsymb` package very simply defines new commands to fetch individual glyphs from the `metsymb` font. As such, its L<sup>A</sup>T<sub>E</sub>X side is rather simple.

```

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

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

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

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

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

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

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

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

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

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

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

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

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

```

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

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

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

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

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

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

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

	'0	'1	'2	'3	'4	'5	'6	'7	
'06x									"3x
'07x									
'10x									"4x
'11x	--								
	"8	"9	"A	"B	"C	"D	"E	"F	

Figure 2: Complete font table for metsymb.