

The `metsymb` package*

Frédéric P.A. Vogt
`frederic.vogt@meteoswiss.ch`

September 10, 2022

Abstract

This package introduces commands to generate professional meteorological symbols with vectorial quality. As of September 10, 2022, these include: oktas (\bigcirc , \oplus , \bigcirc , ...), and cloud genera (\rightarrow , \searrow , \swarrow , ...). This package essentially introduces a new font in which each symbol is assigned to a glyph, which can then be called individually from L^AT_EX documents via dedicated commands.

Contents

1	Introduction	1
2	Usage	2
2.1	Using <code>metsymb</code> with <code>matplotlib</code>	2
3	Code development and bug reports	3
4	License and copyright	3
5	Acknowledgments	3
6	Font table	4
7	Implementation	4

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 L^AT_EX 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 dedicted L^AT_EX commands via this package.

*This document corresponds to `metsymb` v1.1, 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 Table 1 and Table 2.

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`

`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 -*-
"""
Copyright (C) 2021 MeteoSwiss,
originally written by F.P.A. Vogt; frederic.vogt@meteoswiss.ch

This file may be distributed and/or modified under the conditions
of the BSD-3-Clause License.
The terms of this license are available at:

https://opensource.org/licenses/BSD-3-Clause

SPDX-License-Identifier: BSD-3-Clause

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')
```

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

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

```
# 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:\threoktas\nimbostratus',
         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`.

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 (2021-2022) 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^AT_EX Package*, Scott Pakin (2015): <https://mirror.foobar.to/CTAN/info/dtutut/dtutut.pdf>
- The FontForge documentation, and in particular the *FontForge and TeX* article: <https://fontforge.org/docs/techref/PfaEdit-TeX.html>
- The *T_EX 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 \LaTeX side is rather simple.

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

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

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

Test of metsymb on September 10, 2022 at 1900

	'0	'1	'2	'3	'4	'5	'6	'7	
'04x		○	⊖	◐	◑	◒	◓	◔	"2x
'05x	◕	◖	⊗	↪	↯	↰	↱	↲	
'06x	◡	◢	--	◤	◥				"3x
'07x									
	"8	"9	"A	"B	"C	"D	"E	"F	

A complex knot diagram featuring multiple crossings and labels. The diagram includes several strands, some of which are labeled with '2' and '3'. There are also labels like 'A', 'B', 'C', 'D', 'E', 'F', 'G', 'H', 'I', 'J', 'K', 'L', 'M', 'N', 'O', 'P', 'Q', 'R', 'S', 'T', 'U', 'V', 'W', 'X', 'Y', 'Z' scattered throughout the diagram. The strands are connected by various types of crossings, including simple over/under crossings and more complex multi-strand crossings.

Figure 2: Complete font table for metsymb.