

meteoblue point moonLight specifications

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0 Overview

0.1 meteoblue

meteoblue produces high value weather forecasts worldwide covering full areas. The forecasts are produced using special NMM-Modelling techniques and presentation forms and show the forecast weather exactly to the point. Thereby a unique variety of possibilities for data selection and presentation options are created. More information is found on <http://www.meteoblue.com/en/about-us/>.

0.2 p☼int

p☼int offers weather forecast for every location exactly to the point. The forecasts are adapted through special modelling techniques to the selected site and contain hourly detail.

0.3 p☼int m☼onLight

p☼int m☼onLight is a forecast, which presents the intensity of the moon light in relation to the moon rise and moon set times, the moon phase and the expected cloudiness.

0.4 Description

p☼int m☼onLight is offered as data feed. The specifications describes the basics, structure and syntax of the data.

1 Basics

1.1 Moon phases

One circulation of the moon around the Earth (also called "synodischer month") takes 29 days, 12 hours and 43 minutes and determines the moon phases.

During this "month", the moon passes through the main phases "Full Moon", "Waning Moon", "New Moon" and "Waxing Moon".

In apparent disparity to the general denomination "Half Moon" – this is the half phase (Dichotomie) – the astronomers refer to the full cycle of the moon and call the Waxing half phase the first quarter, the Waning correspondingly the last quarter.

The very slim crescent moon is also called "new light" and "old light".

1.2 Moon rise and moon set

The moon rise and moon set times differ daily and on different locations, in relation to the moon phase as well as the season. In addition, moon rise and moon set time must be corrected for the valid timezone and evtl. summertime. A detailed presentation about the basics can be found under http://en.wikipedia.org/wiki/Lunar_phase.

1.3 Influence on the Earth

The gravitation of the moon moves the tides on the Earth. These include not only High Tide and Low Tide in the oceans, but also rise and fall of the Earth mantle. Besides the visible solar radiation, the moon also reflects a very small part of it's heat to the Earth. The influence of the moon on the weather is, however, insignificant.

<http://www.meteoblue.com/en/help/point/picto-cast/>

<http://www.meteoblue.com/en/help/point/meteorgrams/>

<http://www.meteoblue.com/en/help/sky/>

2 Presentation

2.1 Moon rise and moon set ("rise" und "set")

The moon rise and moon set is indicated in local time for the selected location and day. If the moon rises and sets on same day, both hours are indicated. Therefore, the moon set time can be before the moon rise time, if the moon sets early in the morning and rises again in the evening. If during the selected day there is only a moon rise or a moon set, the "missing" event is indicated by an dashes ("---"), as shown in the following example (Table 1).

Table 1. Example for moon rise and moon set times in a meteoblue data set.

```
date;      rise;   set;   phase; age;   illuminated fraction(%);
27.09.2009; 16:54; ---;   101;  08;   062;
28.09.2009; 17:14; 00:18; 113;  09;   071;
```

2.2 Moon phase ("phase")

The moon phase indicates, which share and side of the moon surface is casting sunlight on the Earth. meteoblue indicates the phases in "phase" (corresponds approximately to days after New Moon) and "Fraction" (visible part of the moon) (see Table 2). An example of a data set can be found in Table 3.

Table 2. Moon phases and symbols in the moonfeed data set.

#	Phase ¹⁾	Age ²⁾	Description ³⁾	Astronomical ⁴⁾	LK. ⁵⁾	Symbol ⁶⁾	Comments
1.	0	0	New Moon	Beginn 1. quarter	0%	0	
2.	90	7	Half Moon	Beginn 2. quarter	50%	90	
3.	180	14	Full Moon	Beginn 3. quarter	100%	180	
4.	270	21	Half Moon	Beginn 4. quarter	50%	270	
5.	360	28	New Moon	Ende 4. quarter	0%	360	

Notes: ¹⁾ In degrees. ²⁾ Days. ³⁾ According to moon calendar. ⁴⁾ Astronomical division. ⁵⁾ Luminosity, in % of the maximal possible. ⁶⁾ Number of the corresponding symbols.

Table 3. Example for moon phases and illumination in a meteoblue data set.

```
date;      rise;   set;   phase; age;   illuminated fraction(%);
date;rise;set;phase;age;illuminated fraction(%);
</meta>
<data>
27.09.2009;16:54;---;101;08;062;
28.09.2009;17:14;00:18;113;09;071;
29.09.2009;17:29;01:34;125;10;079;
30.09.2009;17:40;02:49;138;11;086;
01.10.2009;17:50;04:03;150;12;092;
02.10.2009;17:59;05:22;162;13;097;
03.10.2009;18:08;06:34;174;14;099;
04.10.2009;18:19;07:56;186;15;100;
```

2.3 Moon stage ("age")

The stage indicates, how many days passed after new moon. It begins with 0 and ends with 28.

2.4 Moon brightness ("illuminated fraction")

The moon brightness indicates, which share of the maximal possible moon light (illuminated fraction) appears through the predicted cloudiness on Earth at a given time. In the example (Table 4), the moon sets on 29.09.2009 around 01:34 and rises again around 17:29; it appears in phase "10" (see 2.2.) and is 79% illuminated (as seen from Earth). The sun sets after 19:00. Thereby, no moon light is visible before 20:00. From 20:00 onwards, the moon shines with 56% of it's maximal luminosity – until midnight (00:00). On 30.09.2009 00:00 the moon shines with 5%, an hour later with 47%. This is caused by temporary cloudiness, so that the moon shines only with 66% during each hour from 20:00 to midnight (00:00). At 30.09.2009 01:00 the moon shows only for 6% of an hour, an hour later for 55%. The parameter "moon light%" = moonlight(% of full moon) can be not be larger as the parameter "illuminated fraction(%)".

Table 4. Example for moon phases and illumination.

date;	rise;	set;	phase;	age;	illuminated fraction(%)
-------	-------	------	--------	------	-------------------------

...

29.09.2009;17:29;01:34;125;10;079;

30.09.2009;17:40;02:49;138;11;086;

local date;	weekday;	local time;	sunshine time(%);	sunshine time(min);	moonlight(% of full moon);	moonlight time(%of time with moon visible);
-------------	----------	-------------	-------------------	---------------------	----------------------------	---

29.09.2009;Tue;16; 1; 2; 0; 0;

29.09.2009;Tue;17;39; 66; 0; 0;

29.09.2009;Tue;18;39; 66; 0; 0;

29.09.2009;Tue;19;14; 23; 0; 0;

29.09.2009;Tue;20; 0; 0;56; 66;

29.09.2009;Tue;21; 0; 0;56; 66;

29.09.2009;Tue;22; 0; 0;57; 66;

29.09.2009;Tue;23; 0; 0;57; 66;

30.09.2009;Wed;00; 0; 0;57; 66;

30.09.2009;Wed;01; 0; 0; 5; 6;

30.09.2009;Wed;02; 0; 0;47; 55;

2.5 Moonlight time (%of time with moon visible)

The moonlight time (%of time with moon visible) indicates for which percentage of one hour direct moon light is to be expected (see Table 4). Moonlight time does not indicate light intensity and can also be 100% with new moon (0% illuminated fraction), since it depends only on the cloudiness.

3 Moon symbols

3.1 Symbols selection

For `point moonLight` there are 72 symbols available. They correspond to the angle of the illuminated moon as visible from the Earth, in steps of 5° from 005 bis 360.

3.2 Symbol control

The symbols can be controlled by the parameter "phase" in data set. For the presentation, the symbol with the number next to the "phase"-number is selected – i.e. for phase=125 the symbol "moon_125.png" is used, for phase=138 "moon_140.png", and for phase=152

"moon_150.png". For the symbols selection, the phase must thus be simply approximated to the next 5 degrees-step.

3.3 Symbol gallery

The symbols can be made available in a file (meteoblue_moon_symbols.zip) .



Figure 1. Moon symbols for the phases 10, 45 90, 180, 270, 315 and 355.

4 Location search

4.1 Global location search (GLOS)

point moonLight is offered for all locations available on www.meteoblue.com . This database contains more than 5 million locations currently. Further locations can be added.

4.2 Location selection

The locations selected for the moonfeed must be identified with ID and coordinates. The moon rise and set times refer to the astronomical time observed on a perfect plain. Topography and obstacles, as well as air turbulence are not included in the calculation.

5 Data format in moonfeed

5.1 Metadata for the Site

```
<mb_metadata>
id;name;latitude;longitude;height (m.asl.);country;timezone;utc-timedifference;sunrise;sunset;
1;;8.327E;54.957N ;-999.000;;CEST;UTC+2.0;07:17;19:21;
```

5.2 Metadata for the moon phase

The meta data for the moon phase contains date (date) moonrise (rise), moonset (set), moon phase (phase), moon stage (age) and "illuminated fraction (%)". The daily data for "illuminated fraction" for the respective date are indicated for 01:00 o'clock. Since the moon "illuminated fraction" changes continuously, it increases or decreases in the course of the same daily with waxing or waning moon, as the following example shows:

```
<moon>
<meta>
date;rise;set;phase;age;illuminated fraction(%);
</meta>
<data>
23.09.2009;13:45;20:29;052;04;025;
24.09.2009;14:52;21:09;064;05;034;
25.09.2009;15:44;22:01;077;06;043;
26.09.2009;16:25;23:10;089;07;053;
27.09.2009;16:54;---;101;08;062;
28.09.2009;17:14;00:18;113;09;071;
29.09.2009;17:29;01:34;125;10;079;
30.09.2009;17:40;02:49;138;11;086;
</data>
</moon>
```

5.3 Example of an entire dataset

```

<mb_metadata>
id;name;latitude;longitude;height (m.asl.);country;timezone;utc-timedifference;sunrise;sunset;
local date;weekday;local time;sunshine time(%);sunshine time(min);moonlight(% of full moon);moonlight time(%of time
with moon visible);
</mb_metadata>
<station>
<data>
1;;8.327E;54.957N ;-999.000;;CEST;UTC+2.0;07:17;19:21;
23.09.2009;Wed;02;0; 0; 0; 0;
23.09.2009;Wed;03;0; 0; 0; 0;
23.09.2009;Wed;04;0; 0; 0; 0;
23.09.2009;Wed;05;0; 0; 0; 0;
23.09.2009;Wed;06;0; 0; 0; 0;
23.09.2009;Wed;07;28; 47; 0; 0;
23.09.2009;Wed;08;39; 66; 0; 0;
23.09.2009;Wed;09;0; 0; 0; 0;
23.09.2009;Wed;10; 6; 11; 0; 0;
.....
29.09.2009;Tue;04;0; 0; 0; 0;
29.09.2009;Tue;05;0; 0; 0; 0;
29.09.2009;Tue;06;0; 0; 0; 0;
29.09.2009;Tue;07; 9; 15; 0; 0;
29.09.2009;Tue;08;17; 29; 0; 0;
29.09.2009;Tue;09;17; 29; 0; 0;
29.09.2009;Tue;10;22; 37; 0; 0;
29.09.2009;Tue;11; 7; 12; 0; 0;
29.09.2009;Tue;12;10; 17; 0; 0;
29.09.2009;Tue;13;0; 0; 0; 0;
29.09.2009;Tue;14;0; 0; 0; 0;
29.09.2009;Tue;15;0; 0; 0; 0;
29.09.2009;Tue;16; 1; 2; 0; 0;
29.09.2009;Tue;17;39; 66; 0; 0;
29.09.2009;Tue;18;39; 66; 0; 0;
29.09.2009;Tue;19;14; 23; 0; 0;
29.09.2009;Tue;20;0; 0;56; 66;
29.09.2009;Tue;21;0; 0;56; 66;
29.09.2009;Tue;22;0; 0;57; 66;
29.09.2009;Tue;23;0; 0;57; 66;
30.09.2009;Wed;00;0; 0;57; 66;
30.09.2009;Wed;01;0; 0; 5; 6;
30.09.2009;Wed;02;0; 0;47; 55;
</data>
<moon>
<meta>
date;rise;set;phase;age;illuminated fraction(%);
</meta>
<data>
23.09.2009;13:45;20:29;052;04;025;
24.09.2009;14:52;21:09;064;05;034;
25.09.2009;15:44;22:01;077;06;043;
26.09.2009;16:25;23:10;089;07;053;
27.09.2009;16:54;---;101;08;062;
28.09.2009;17:14;00:18;113;09;071;
29.09.2009;17:29;01:34;125;10;079;
30.09.2009;17:40;02:49;138;11;086;
</data>
</moon>
</station>
<station>
<data>
2;;8.657E;54.957N ;-999.000;;CEST;UTC+2.0;07:16;19:19;
    
```

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