

Sky Condition Algorithm for CT25K Laser Ceilometer



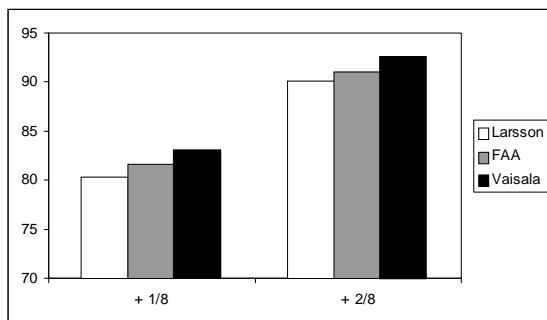
The Vaisala Sky Condition algorithm is an easy and cost effective way to produce more information from ceilometer data. The purpose of the algorithm is to construct an image of the whole sky based on the ceilometer measurements only from one single point. The sky condition algorithm uses a time series of ceilometer data to calculate the cloud amount of different cloud layers and the corresponding layer heights.

Sky Condition algorithms are generally used in automatic surface weather stations and in airport weather monitoring systems.

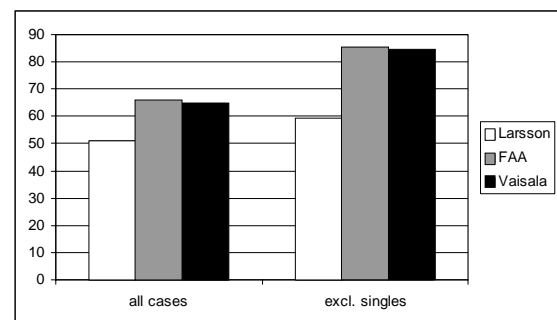
The algorithm is included in the 2.01 software version of the CT25K as an option, i.e., the algorithm is behind a password.

ALGORITHM RELATIVE PERFORMANCE

The algorithm success percentage depends largely on weather conditions. The success percentages of three different algorithms have been compared against a human observer in a long term field study in Finland*). The other algorithms are the FAA (Federal Aviation Administration) AWOS algorithm and original Larsson algorithm**). The success percentage of total cloud cover and the success percentage of the first cloud layer reporting capability are shown in the figures below.



The success percentages of total cloud cover with various algorithms



First layer reporting capability

*) Kärkkäinen, Pietarinen, Lönnqvist, 1997 : Cloud Amount : Relative Performance of Five Ceilometer Algorithms vs. Observer, 77th AMS Conference, Long Beach, California, USA

**) Developed by the Swedish Air Force and the Swedish Meteorological and Hydrological Institute (SMHI)

TECHNICAL INFORMATION

DATA COLLECTION

A new sky condition message is calculated every five (5) minutes based on data collected during the last 30 minutes. The last 10 minutes are double-weighted.

DATA DISPLAY

The Sky Condition message line is included in the CT25K Laser Ceilometer data messages 6 and 7. The message output interval is the same as the ceilometer data acquisition interval. It is recommended to use 15 or 30 seconds data acquisition interval for the ceilometer with the Sky Condition algorithm.

MESSAGE LINE

The Sky Condition message line in data messages 6 and 7 is:

	3 055 5 170 0 /// 0 ///	
where	3	The first number of the line: detection status as follows:
	0 ... 8	Cloud amount of the first layer in oktas
	9	Vertical visibility
	-1	Data missing or the ceilometer is in standby mode
	99	Not enough data (after start-up)
	055	The second number of the line: Height of the 1st cloud layer (5,500 ft or 550 m depending on feet or meter selection)
	5	The third number of the line: Cloud amount of the 2nd layer in oktas
	170	The fourth number of the line: Height of the 2nd cloud layer (17,000 ft or 1700 m depending on feet or meter selection)
	0	The fifth number of the line: Cloud amount of the 3rd layer in oktas
	///	The sixth number of the line: Height of the 3rd cloud layer
	0	The seventh number of the line: Cloud amount of the 4th layer in oktas
	///	The eighth number of the line: Height of the 4th cloud layer

LAYER HEIGHT RESOLUTION

• 100 ft or 30 m	0 ... 5 000 ft
• 500 ft or 150 m	5 000 ... 15 000 ft
• 1000 ft or 300 m	15 000 ... 25 000 ft

CLOUD AMOUNT

0, 1, 3, 5, 7 or 8 oktas (eighths), 9 vertical visibility

ALGORITHM

Vaisala Sky Condition algorithm for the CT25K Laser Ceilometer is derived from the so-called Larsson algorithm, developed by the Swedish Air Force and the Swedish Meteorological and Hydrological Institute (SMHI).



Internet:
<http://www.vaisala.com>

VAISALA Oyj
PL 26, FIN-00421 Helsinki
FINLAND
Phone: +358 9 894 91
Telefax: +358 9 894 9227
Telex: 122832 vsala fi

VAISALA GmbH
Postfach 540267
D-22502 Hamburg
DEUTSCHLAND
Phone: +49 40 851 763-0
Telefax: +49 40 850 8444

VAISALA (UK) Ltd
Suffolk House
Fordham Road
Newmarket
Suffolk CB8 7AA
UNITED KINGDOM
Phone: +44 1638 674 400
Telefax: +44 1638 674 411

VAISALA TMI Ltd
Vaisala House
349 Bristol Road
Birmingham B5 7SW
UNITED KINGDOM
Phone: +44 121 683 1200
Telefax: +44 121 683 1299

VAISALA SA
3, Parc Ariane
Saint-Quentin-En-Yvelines
F-78284 Guyancourt Cedex
FRANCE
Phone: +33 1 3057 2728
Telefax: +33 1 3096 0858

VAISALA Inc.
100 Commerce Way
Woburn, MA 01801 - 1068
USA
Phone: +1 781 933 4500
Telefax: +1 781 933 8029

VAISALA Inc.
Artais Division
7450 Industrial Parkway
Plain City, OH 43064 - 9005
USA
Phone: +1 614 873 6880
Telefax: +1 614 873 6890

VAISALA KK
42 Kagurazaka 6-Chome
Shinjuku-Ku,
Tokyo 162
JAPAN
Phone: +81 3 3266 9611
Telefax: +81 3 3266 9610

VAISALA Pty. Ltd.
3 Guest Street
Hawthorn, VIC 3122
AUSTRALIA
Phone: +61 3 9818 4200
Telefax: +61 3 9818 4522
A.C.N. 006 500 616

VAISALA Beijing
Representative Office
Room 518, 520
Wangfujing Grand Hotel
No. 57 Wangfujing Street
Beijing 100006
PEOPLE'S REPUBLIC OF
CHINA
Phone: +86 10 6522 4050
Telefax: +86 10 6522 4051