

Specifying a manual cloud mask

Overview

The SCC cloud screening module aims to identify cloud-free regions in lidar data, where aerosol retrievals can be applied. In parallel, the SCC allows the user to supply a manual cloud mask inside the submitted measurement file that will override the automatic one. While this should be generally avoided, this option could be useful for specific strong aerosol events or scenes with complex cloud structures, where the cloud screening module could perform suboptimally.

The manual cloud mask is defined as a variable in the measurement netCDF file, by defining two variables in the input netCDF file, `cloud_mask_channel_idx` and `cloud_mask`, as described below.

The `cloud_mask_channel_idx` variable is used to link the provided cloud mask with a lidar channel. This is only needed for the correct processing of the cloud mask e.g. its association with the correct time and vertical scales; of course, the provided cloud mask is used for processing all defined products in the SCC. The `cloud_mask_channel_idx` variable should be an integer, specifying the index of the corresponding lidar channel (in terms of channel position in the file starting with 0, i.e. channel dimension index).

The `cloud_mask` variable is a 2D array defining a cloud mask value for each time/range bin. The 2 dimensions of the array correspond to *time* and *point* dimensions. The variable is defined as a bit mask with the following values.

BIT	MEANING
0	Unknown cloud
1	Cirrus cloud
2	Water cloud

Accordingly, the following values can be defined:

VALUE	MEANING
0	No cloud
1	Unknown cloud
2	Cirrus cloud
3	Unknown cloud, Cirrus cloud
4	Water cloud
5	Unknown cloud, Water cloud
6	Cirrus cloud, Water cloud
7	Unknown cloud, Cirrus cloud, Water cloud

The manual cloud mask will be processed and stored in the cloud screening file, in the variable `manual_cloud_mask`. The automatic cloud mask will be also included in the same file for reference, but it will not be used during further processing.

Example

As an example, suppose we want to define a manual cloud mask, specifying that all measurements bins are cloud-free. Moreover, suppose that the file we are preparing includes data from three lidar channels, and that the channels are defined by the `channel_string_ID` variable as:

```
channel_string_ID = "oh000", "oh001", "oh002" ;
```

We can choose to define the manual cloud mask in respect to any of the above channels. Let's assume that we decide to define it in respect to channel "oh001", because this channel has convenient time / range scales. We register this decision by defining the variable:

```
int cloud_mask_channel_idx ;
```

and give it the value 1 (since the index is defined to starts with 0):

```
cloud_mask_channel_idx = 1 ;
```

Finally, we define the cloud mask variable as:

```
byte cloud_mask(time, points) ;
```

and assign the value 0 to all array points:

```
cloud_mask = 0, 0, ...
```