**Trophic state lake index: The Status and the Trend**

1. Download Sentinel-2 L2A Data Bands 2, 5 and SCL of one pixel in the lake

*Per Lake*

*Quality Control*

1. Remove all pixels which are either cloudy or ice and snow (SCL Label 7, 8, 9, 10 or 11)
2. Calculate the proportion of remaining water pixels
3. Only keep pixels (aka. lakes) in which the water classification is equal or higher than 80%

*Assessment*

1. Get the normalized difference trophic state index per image for each month from April to October
2. Average per Month
3. Average per season to obtain the seasonal NDTrI (the higher the value, the higher the trophic state)

**Status and Trends**

Due to high yearly variations of the trophic state within one lake it is important to use several years to define the status of a lake. I have used 5 years. The status is simply the average value (solid blue line in the plot). The trend is based on a regression over the last 5 years (solid black line), that includes the standard error of the slope to balance out fluctuations. It is defined as: . It uses the negative slope because decreasing NDTrI actually indicates an improvement of water quality.

In the case of Flughafensee (a little bit boring, but you know the lake well), the exact slope is -0.008. The standard error of the slope is 0.0051 (relative standard error -> 64%). The trend is 0.008 / 0.64 = 0.0125. --> a higher slope and/or a lower amount of fluctuations leads to a stronger trend.

Alternatively, if there is large number of lakes to compare, ranking can be a more robust interpretation of trophic status and trends. This might be especially important if copernicus hardware of algorithm change so that reflectance values are less comparable between years. However, a lot of information about the difference between lake trophic state will not be considered.

