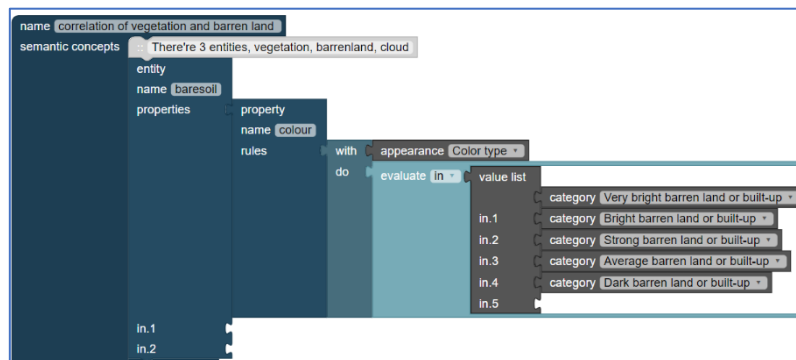


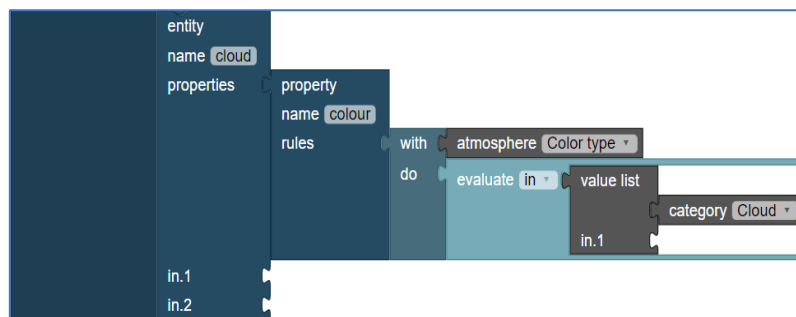
Exercise: Sen2Cube.at Semantic EO Data Cube

1. Model structure

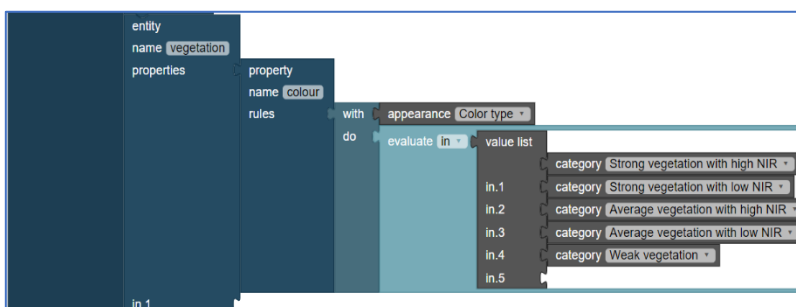
In this model aims to analyze the correlation between vegetation and bare soil areas and also cloud percentage during 1st January 2018 – 1st January 2019. There are 3 entities, vegetation, barren land and cloud.



Barren land entity



Cloud entity



Vegetation entity

Digital Earth: Big Earth Data Concepts
Parinda Pannoon s1093357

The results of inferences are 7 parts which are 1. barren land or bare soil reduce over and 2. space (using percentage), 3. vegetation reduce over time and 4. space, 5. cloud reduce over space, 6. vegetation criteria (less than 50percent), 7. vegetation area that cloud is masked out.

1.

```

result
name baresoil_percenttime
instructions
  with entity baresoil
  do reduce over time using percentage
export yes

```

2.

```

result
name vegetation_percentage
instructions
  with entity vegetation
  do reduce over space using percentage
export yes

```

3.

```

result
name baresoil_percentage
instructions
  with entity baresoil
  do reduce over space using percentage
export yes

```

4.

```

result
name vegetation_percenttime
instructions
  with entity vegetation
  do reduce over time using percentage
export yes

```

5.

```

result
name cloud_percentage
instructions
  with entity cloud
  do reduce over space using percentage
export yes

```

Test which timestamps meet the vegetation criteria
and replace the value of vegetation percentage

6.

```

result
name vegetationfilter
instructions
  with result vegetation_percentage
  do chain
    evaluate < scalar 50
    in.1 filter
    in.2 replace by image metadata timestamp
    in.3
export yes

```

Don't export this time series.

```

result
name vegetation or cloud
instructions
  or
  in.1 entity vegetation
  in.2 entity cloud
export no

```

with the index of the corresponding image.

7.

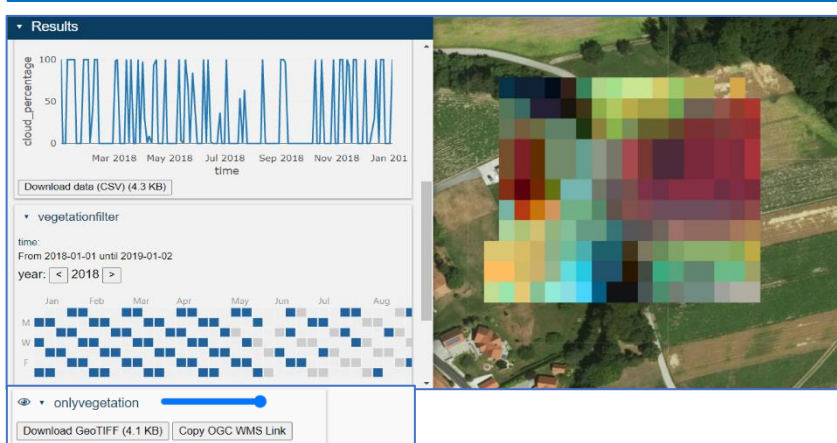
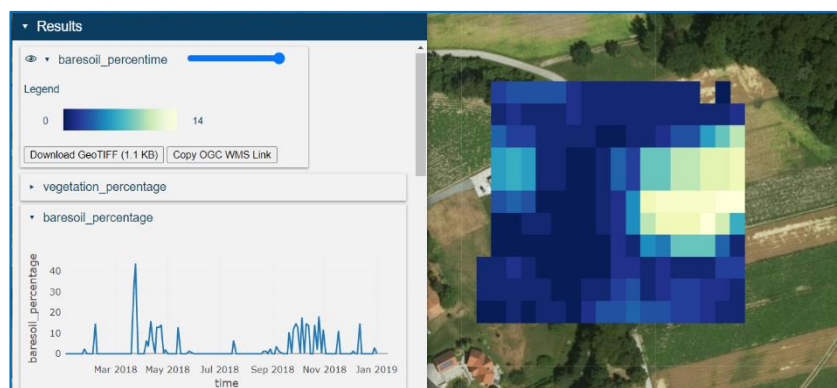
```

result
name onlyvegetation
instructions
  with concatenate dimension bands
  in.1
  in.2
  in.3
  do with reflectance s2b_band_11
  do label as b11
  do with reflectance s2b_band_08
  do label as b8
  do with reflectance s2b_band_02
  do label as b2

```

2. Execute the model in AOIs

2.1. Area of interest 1



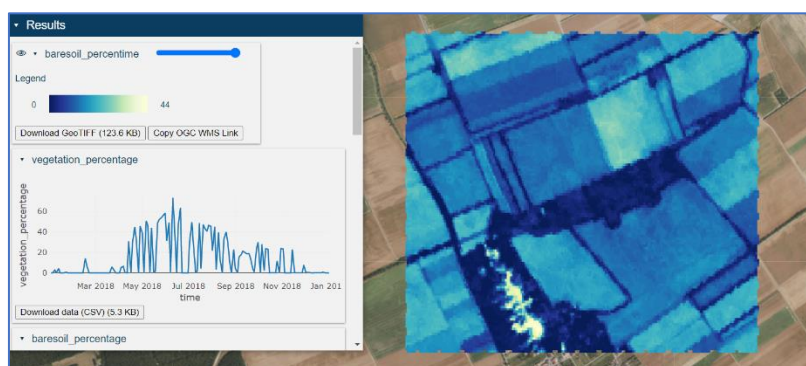
The results of bare soil reduce over time shows the percentage of observations, I choose percentage in this model to prevent problems that some chosen area of interests have 2 overlapping orbits. The yellow in the right side represents areas that have a higher number of barren land than the blue color. Comparing to vegetation reduce over time, the vegetation percentages is high in the area at bottom-left corner which makes sense because this area has green area with trees so it is observed as a high vegetation area but in the right side you can see there are more barren lands with tractor tracks.

There is a correlation between barren land and vegetation area, as you see the curves, during May - September the percentage of vegetation is high while barren land is so low which means vegetations are planted or growing in this period and then harvested during March- April.

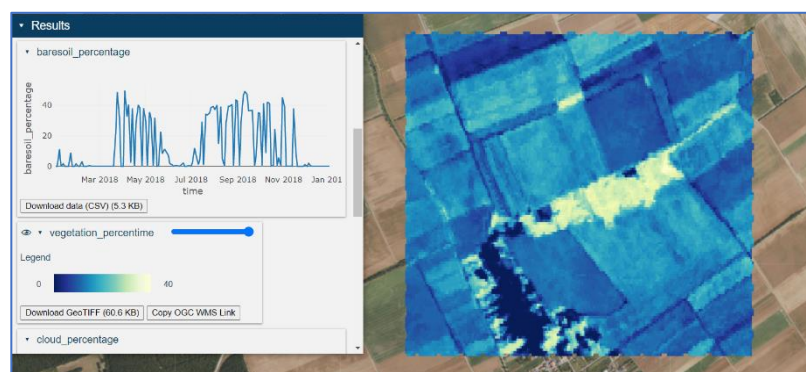
The vegetation timestamp calendar shows available vegetation data that is less than 50 percent. During November-April, images are available every 2-3 days and less in May-September because in May-September there are full of vegetation so the vegetation < 50% will be less available during this time.

Anyway, the vegetation and barren land are also influenced by clouds, you can see the cloud curve has many peaks in the timeframe so I mask out clouds from the vegetation percentage (the last picture) and visualize as map with agriculture bands (11,8,2) From this result, the red color represents non vegetation such as bare soil and buildings.

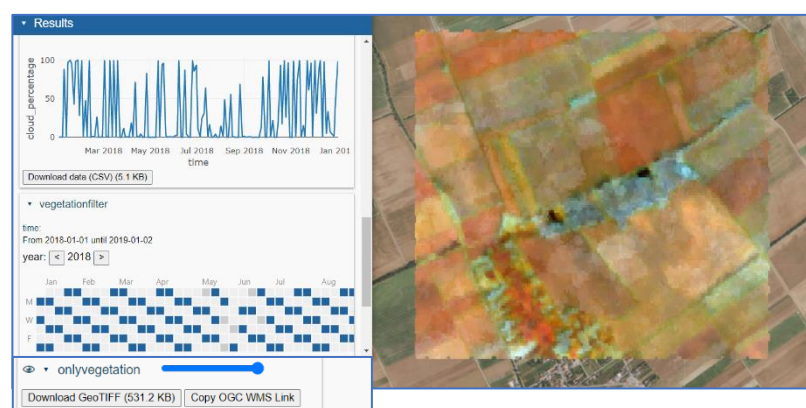
2.2. Area of interest 2



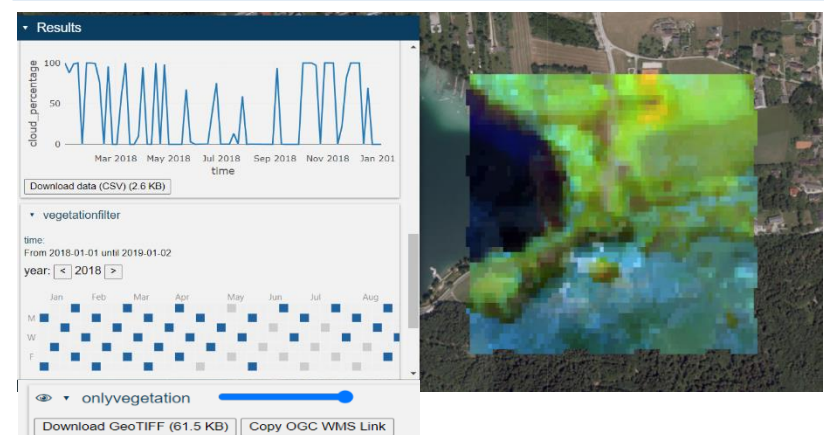
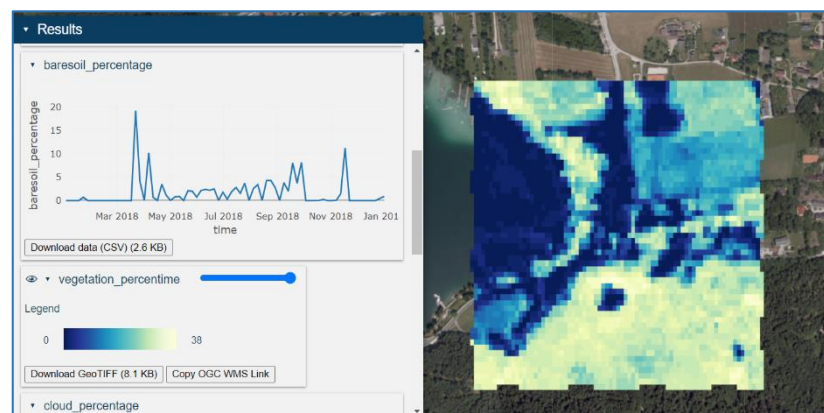
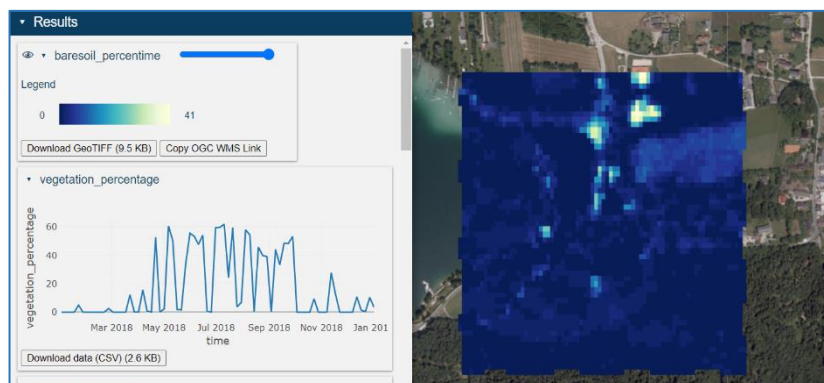
This area of interest has mostly barren land, from the bare soil curve, there is low percentage in July but percentage of the vegetation in July is the highest. We can notice the vegetation map, it is strong vegetation in the middle area (yellow area) and in an urban area hardly has any crops during this period (dark blue).



For the timestamp calendar, the number of vegetation images that less than 50% are available almost the whole year because mostly of the study area is barren land so it is possible that it does not have crops or trees so much. Moreover, cloud masked map shows the whole area is mainly barren land.



2.3. Area of interest 3



In this area is consisted of water, urban area, vegetation and barren land. For bare soil map, the percentage of exploration bare soil is quite small as you see most of them are dark blue. The percentage of bare soil is high, especially in March. For the vegetation percentage, there is a lot of yellow area which means most of the study area is observed as strong vegetation during this year and the vegetation curve indicates that since May until October the vegetation is quite high.

For the timestamp calendar, the number of vegetation images that less than 50% are most available from August-April, related to the vegetation percentage curve.

However, the percentage of clouds in each period is not as frequent as other study areas but the percentage of clouds is quite stable in November 2018- January 2019. The last map visualizes sentinel2b agriculture bands and overall area is obviously vegetation area and a lake (on the left side).