**Proposal Applied Geo-Scripting assignment Gijs van Lith**

The influence of Surface Water Dynamics on Vegetation change in North Siberia

**Introduction**

I have done this scripting assignment as part of my thesis. For my thesis I want to find out if the surface water dynamics have influence on the vegetation change of North –Siberia. For my applied Geo-Scripting assignment I want to find out if it is possible to download, process, and visualise Modis data into water and vegetation indexes. So my main research question is;

*Is R suitable to perform a time series analysis of surface water dynamics versus change in vegetation in North Siberia?*

To illustrate the vegetation change I have used the Normalised Difference Vegetation Index, and to illustrate the surface water I have used the Normalised Difference Water Index. I have compared these indexes for the summer (the defrosted period) of the year 2000. Siberia is frozen most of the year, the lakes are only defrosted a few months a year. Namely from the end of May to the end of September. So these months have been the only ones taken into account.

For this assignment I have selected a small study area of Siberia, and I have performed a visualisation of time series of NDVI and NDWI of it.

I have used Modis’ 8 day composites to create the NDVI and NDWI of the year 2000. Then I have visualised this in a graph.

To keep the data amount workable, I have selected a subset of the entire North Siberia. namely image h22v1. This image has a small amount of land, which is very swampy and low-lying, so factors such as height and slope will not have a large influence on the correlation.

The expected outcome was that R is suitable to perform time series analysis of the indexes, but because of the time shortage I will not be able to preprocess the images correctly.

**Data needed**

* MODIS 8 day composites of 2000 – 2005

**Steps**

1. Download the Modis images
2. Transform the needed bands to Geotiffs, and change the projection
3. Create NDWI and NDVI per image
4. Calculate NDWI and NDVI mean per image
5. Plot these means in a time series graph

**Results**

* [place img here-

**Conclusion and discussion**

R is very suitable for performing a time series analysis of NDWI versus NDVI. Automated downloading and processing means handling large amounts of data with little effort. Also changes in the middle of the process will not be a problem, because the programme can just be rerun.

However because of time constraints, a lot of steps which usually have to be taken in pre-processing images have not been taken during this analysis. Namely the clouds have not been masked, nor quality flags have been taken into account. Also snow and ice have not been taken out of the images, so values will turn out lower or higher because of this.

Also because of time constraint some scripts have not been changed into larger functions which can be called from the mainscript. So when the folders where to save the files change, now this has to be done manually. This will be adapted at a later stage. Furthermore, at a later stage I will also perform an analysis to mask snow and ice pixels in the images, and make sure the quality flags are taken into account.

In future, I will take a larger study area, so the images will be mosaicked. This is a reason why a lot of steps have been file based, e.g. raster objects have been saved directly to file, instead of working in memory. When using larger chunks of data, the memory will be insufficient, as a try I did showed already.

Then a time series analysis can be performed.