## Class summary/homework 7 – Due Friday April 18<sup>th</sup>, 2014 9:00am

(1) Update your script myfunctions.R with the latest myfunctions.R and then download the script class19b.R. Make also sure you have the files below.

data/NY/USW00014735\_tavg\_mon\_mean\_ano.csv data/NY/USW00014750\_tavg\_mon\_mean\_ano.csv data/NY/USW00014771\_tavg\_mon\_mean\_ano.csv data/NY/USW00094728\_tavg\_mon\_mean\_ano.csv

If you don't have these station data anomaly files yet, download the month mean data files from the web page <a href="http://www.atmos.albany.edu/facstaff/timm/ATM315spring14/R">http://www.atmos.albany.edu/facstaff/timm/ATM315spring14/R</a>

- (1) Run the source code and check that all parts are executed and work properly (you will be asked to press enter several time in the console. When the script finished you will see the 'prompt'
  '>' in the command line console again (and a message "class19b.R finished successfully")
  [NOTE: Work with iscor<-FALSE]</li>
- (2) Describe each part (use the readline("press enter ...") to divide the program into parts) of the program script: What is the main purpose of the program part, what statistical properties are calculated? Mention what data are used as 'input' and what data are as result of the operations are considered 'output' data.

## (3) Describe the figures:

- (a) During what season or month are the linear regression lines and the eigenvector directions (of the first eigenvector) closest to each other?
- (b) Describe the geometric transformation associated with the Principal Component Analysis (PCA): What happens to the scatter cloud when we transform it with PCA into a new a new coordinate system?

What happens to the variance and covariance, when we express the data in the eigenvector coordinate system?

(c) How can we interpret the Principal Components (PC time series) in a physical way? Use the time series plot to support your statements.

Suggested reading:

<u>http://www.atmos.albany.edu/facstaff/timm/ATM315spring14/wilks-matrix-operations1.pdf</u> (9.1, 9.2.1, 9.3.1-9.3.3)

http://www.atmos.albany.edu/facstaff/timm/ATM315spring14/wilks-pca1.pdf

(11.1.1)