1. Look at the headers of the GISS and CRU data sets. Compare the spatial and temporal coverage and resolution of each data set e.g. it is monthly averages, how long are the time series, when do they start and when do they end, etc. Highlight differences and similarities.

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|  | **CRU** | **GISS** |
| spatial coverage | * 5 degree resolution * from -87,5° to 87,5° | * 2 degree resolution * from -89° to 89° |
| temporal coverage | * days since 1800: 16.1.1800 to 16 Mar 1964 | * from 15.1.1880 to 15 March 2017 |
| resolution | * monthly | * 28-30 days (monthly) |

1. Make spatial plots of the CRU temperature anomalies from 1850 and onwards in different 30-year time slices. Hint: Look into the code of the associated Matlab script and try to understand it; then adjust the periods to be shown. Try to reflect on the temperature development regionally and globally and discuss emerging spatial patterns (if any)

* Question in line 61

1. Using the CRU data we want to plot the time series of the global mean annual mean temperature anomalies, which we discussed in the lectures on Tuesday. For this aim we need for each year to calculate the global average over all the grid points, which needs to be weighted geometrically. Try to modify the Matlab script from the previous exercise to calculate the global mean temperature anomalies for each year in the data set then plot the entire time series from 1850 to present day.
2. Redo exercise 3 for the GISS data sets to plot the time series of global mean temperature anomalies and overlay it in the same plot with the result from the CRU data. Discuss whether there are differences between the two different estimates of the global mean temperature and wherefrom these differences stem.
3. (Bonus) Modify your scripts to plot the time series of mean temperature anomalies not globally but for different regions (e.g. northern/southern hemisphere, Europe, Africa and the Arctic) of your own choice similar to Figure SPM.4 from IPCC (2007) [ignore the blue and red shadings]. Discuss amongst yourselves different reasons why the regional mean temperature anomalies differ from the global.