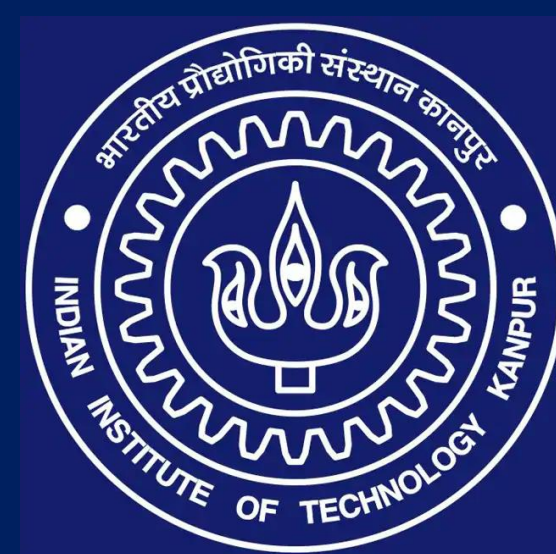




What is the relationship between water storage change and NDVI?

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INTRODUCTION

Vegetation growth and total water storage have mutual dependencies on each other and so it is expected that the same will be corroborated by the NDVI and GRACE data. If such a trend is found, it can be very useful in finding factors affecting vegetation.

NDVI (Normalized Difference Vegetation Index)

The Normalized Difference Vegetation Index (NDVI) is a numerical indicator that uses the visible and near-infrared bands of the electromagnetic spectrum to assess whether the location under observation contains live green vegetation or not. The index values are unit less quantities ranging between -1 to 1. [3]

NDVI value	Inference
0.1 to 0	Barren lands
0.2 to 0.5	Sparse vegetation such as shrubs and grasslands
0.5 to 0.9	Dense vegetation such as that found in temperate and tropical forests or crops at their peak growth stage.

GRACE (Gravity Recovery and Climate Experiment)

The GRACE twin satellites gives monthly surface changes, with most geophysical corrections applied, to analyze changes in the mass of the Earth's hydrologic components. The gravity variations studied by GRACE were used to determine total water storage on land masses.

GANGA CATCHMENT

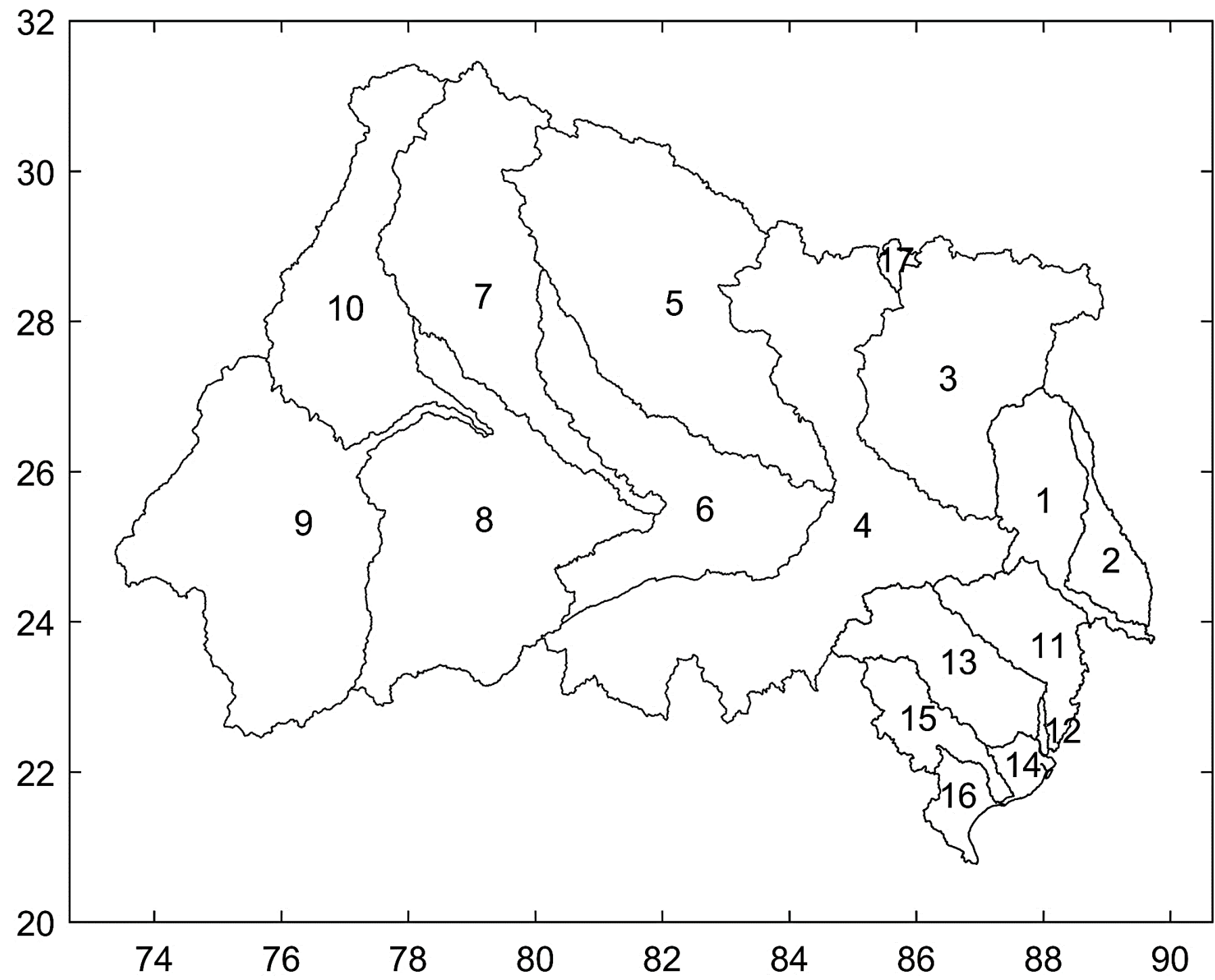


Fig 1:
Ganga Basin with sub-catchment numbers. This basin covers the major rivers in the country and is home to over 50% of the country's population.

We neglected the data of catchment number 3,4 and 5 as they show negative NDVI values which means no land area. As a result they are not values of our interest and don't provide any significant inference.

FILTERING OF DATA

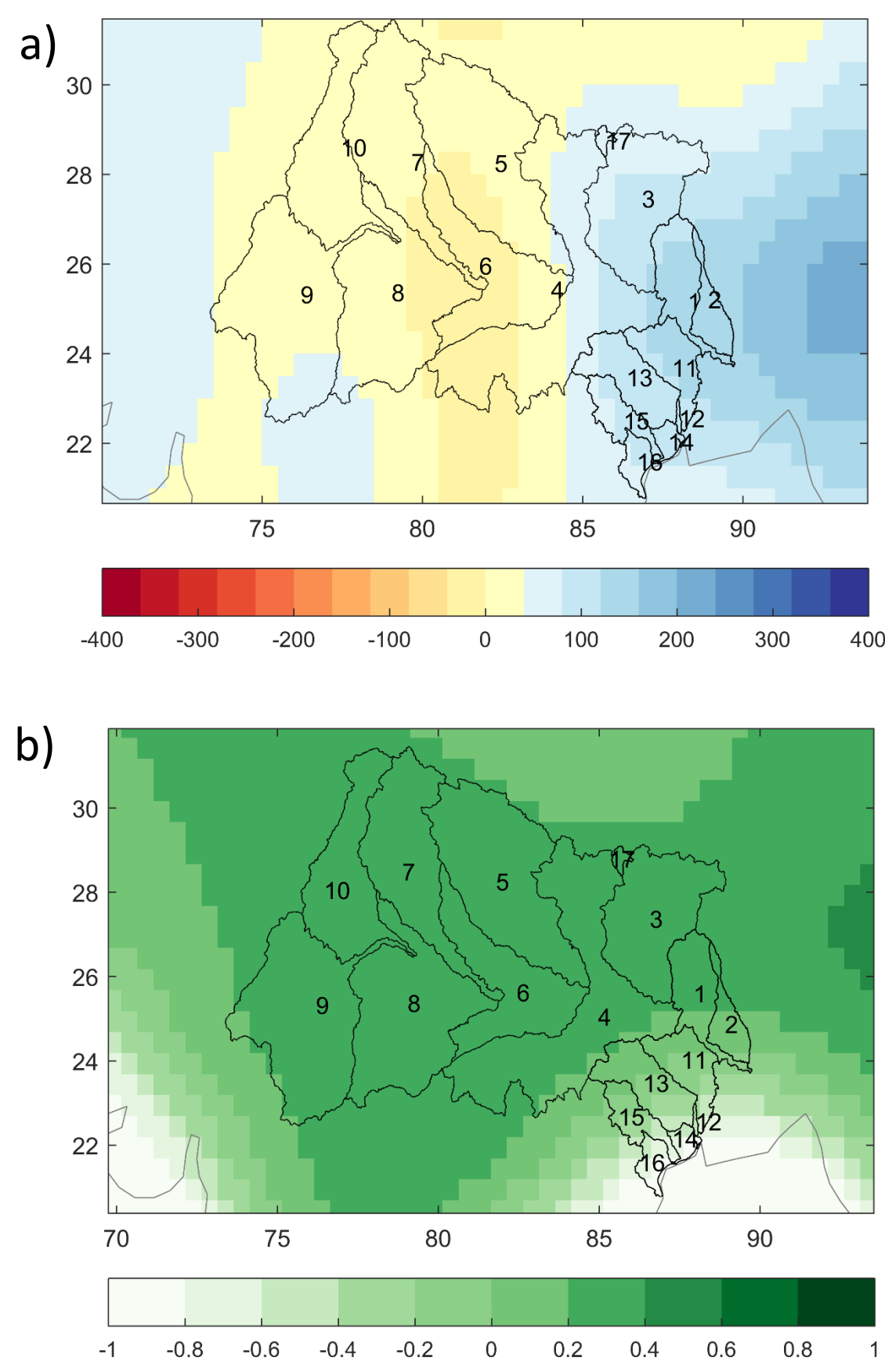
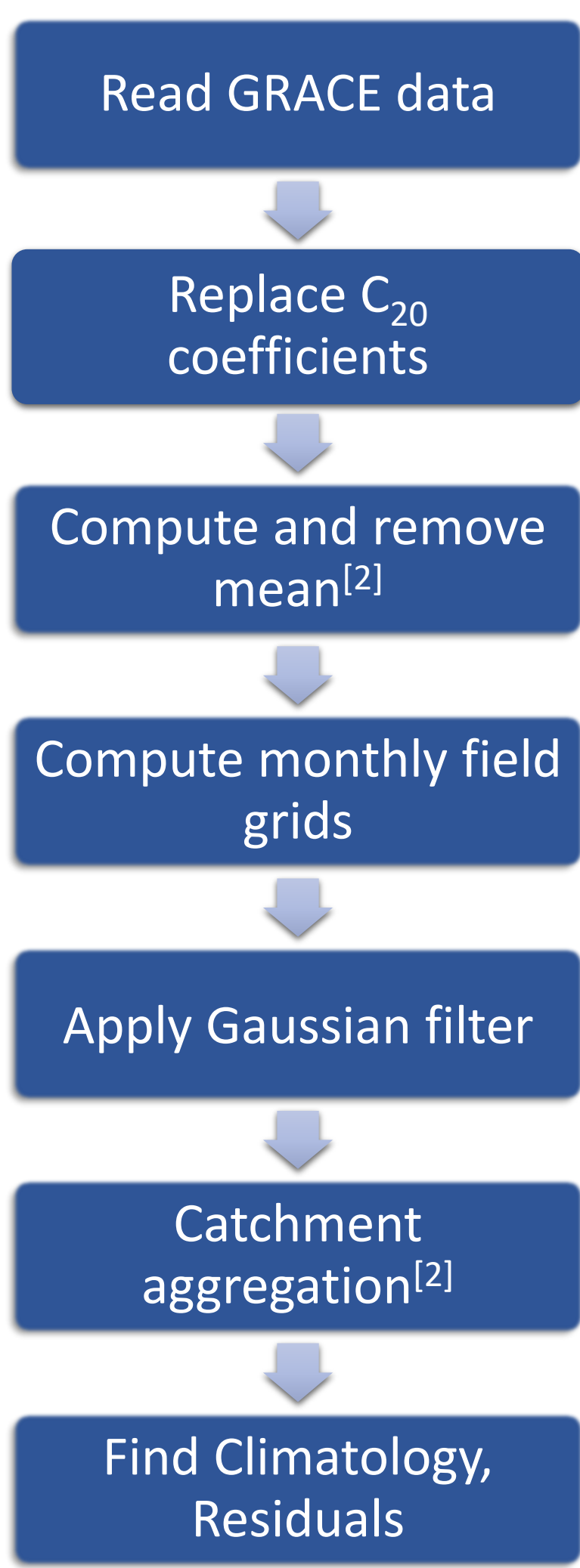
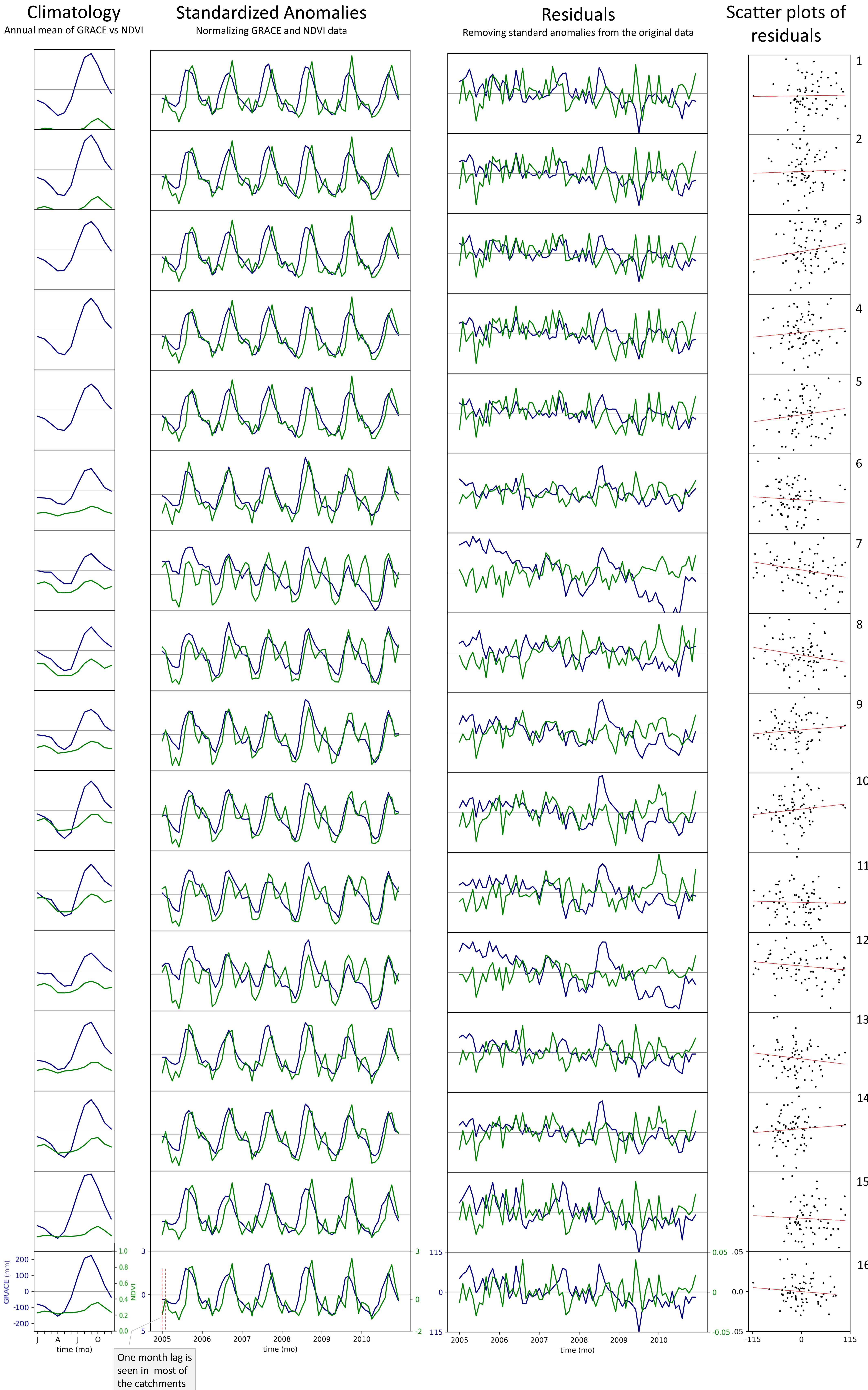


Fig 2:
a) Map of the filtered GRACE spherical harmonic field data for July 2007
b) Map of the filtered global NDVI values for July 2007 (grid sampling of 1/24)

DATA

GRACE	ITSG GRACE 2018 degree 60 Jan 2003 to December 2015 Replaced C_{20} with SLR C_{20}
NDVI	NASA AVHRR NDVI3g data July 1981 to December 2015
HydroSHEDS	Level 5 catchment boundaries

RESULTS



CONCLUSION

1. Full signal of NDVI and TWS match very well and have a lag of 1 month.
2. At residual level they show very less correlation. The residuals might comprise weather components.
3. In future we would like to study the dependencies of different components of total water storage and NDVI.

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