

Aspects of inter-catchment signal leakage due to filtering of GRACE observed total water storage

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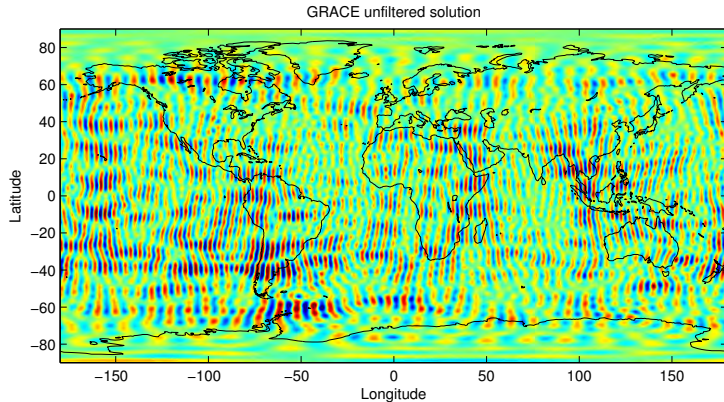
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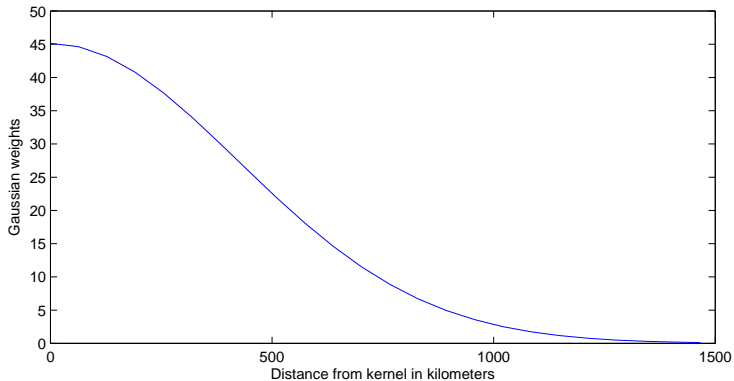
Overview

- 1 What is Leakage?
 - GRACE observed total water storage
 - Idea of leakage at Basin scale
- 2 Intercatchment Leakage
 - Different catchment, leaks differently
 - South American catchments
- 3 Conclusion

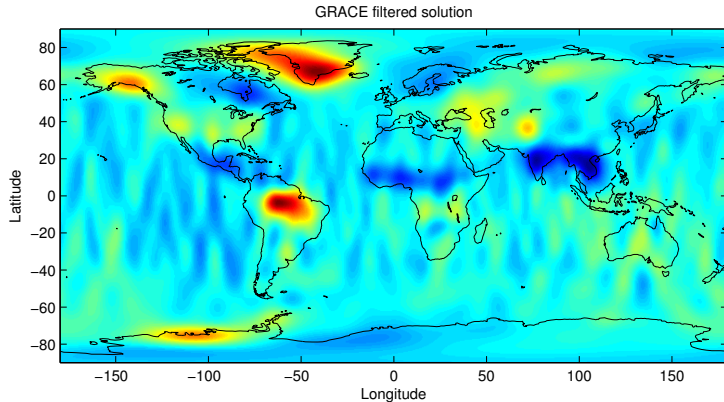
GRACE monthly solution (May 2005)



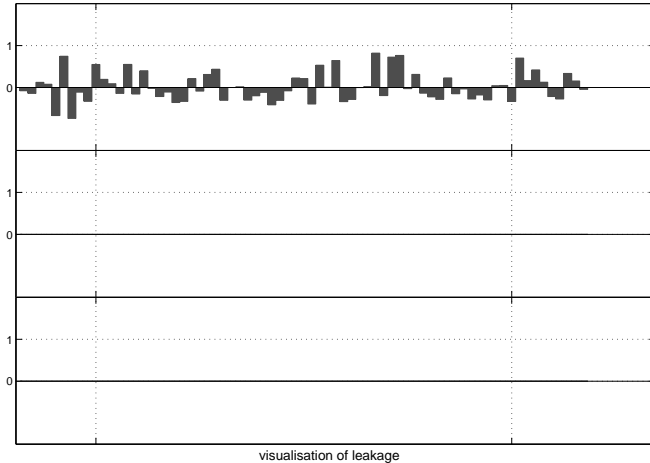
Gaussian 500 km



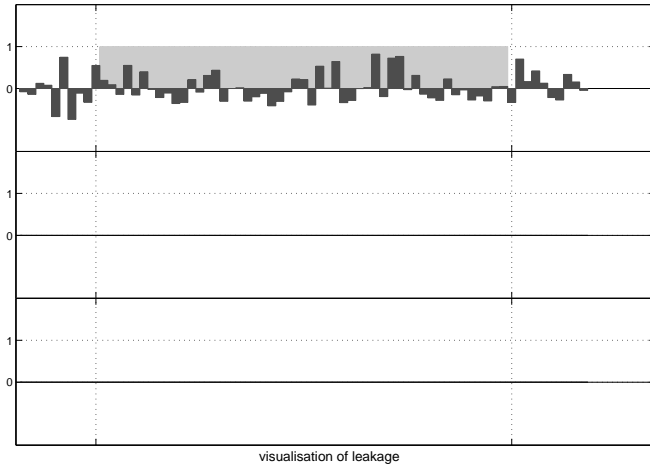
GRACE monthly solution filtered (May 2005)



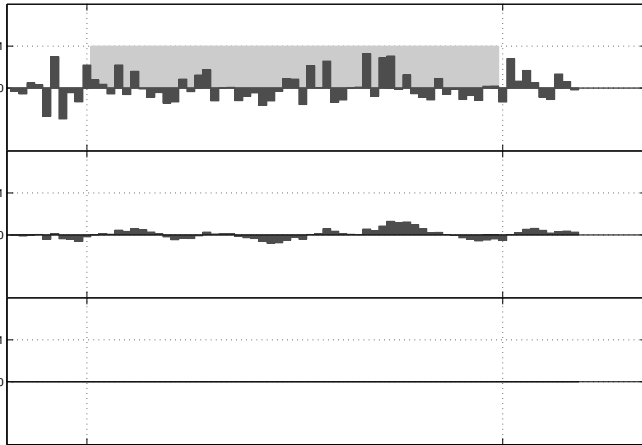
Signal observed



Aggregate signal over a basin, use basin function

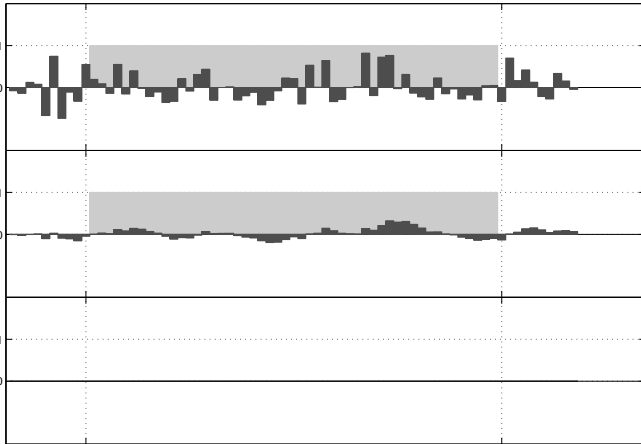


Filtered signal



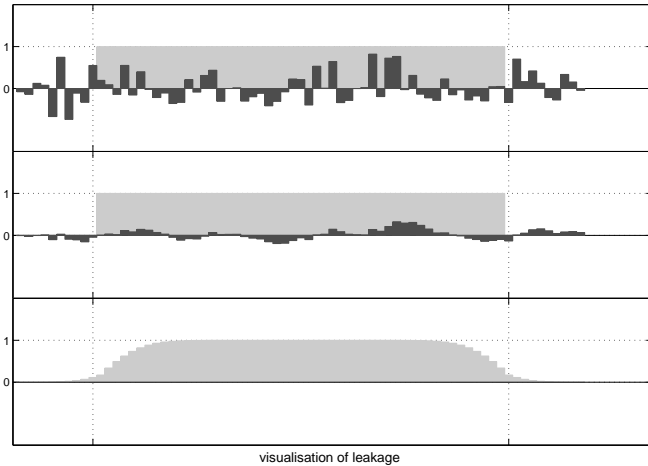
visualisation of leakage

Aggregate filtered signal

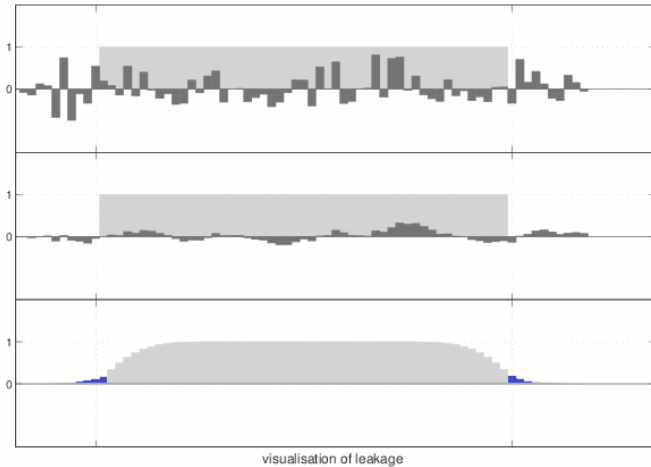


visualisation of leakage

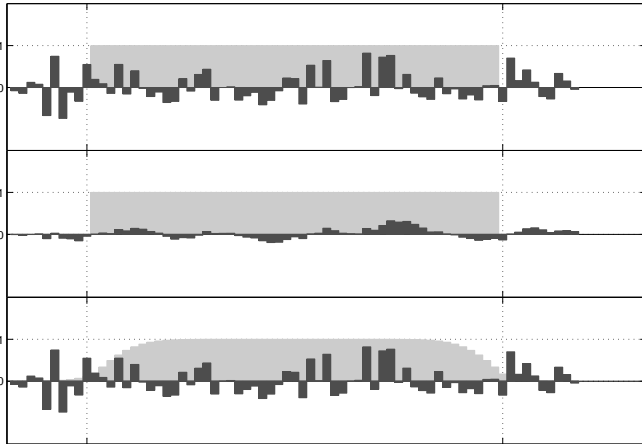
Filtered basin function



Filtered basin function

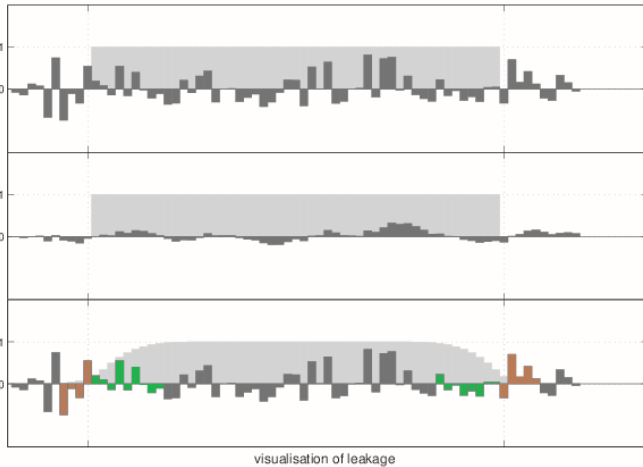


Yes it leaked...

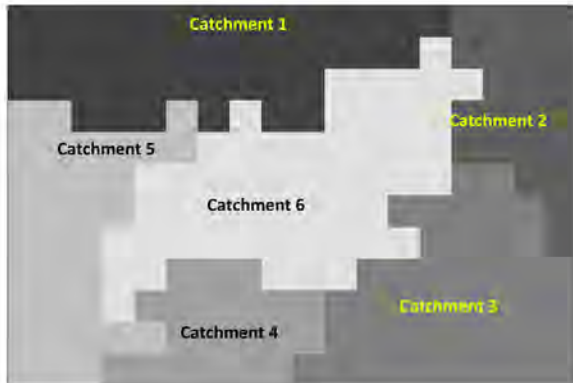


visualisation of leakage

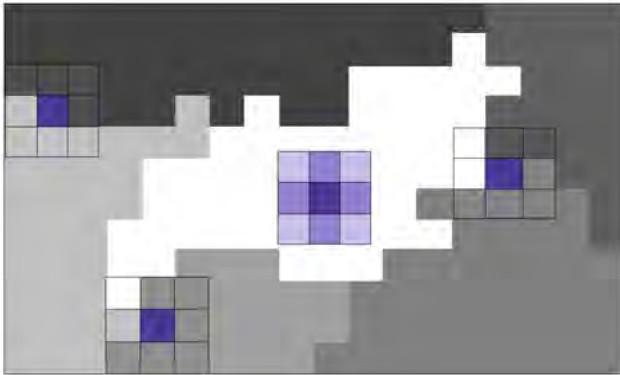
Yes it leaked...



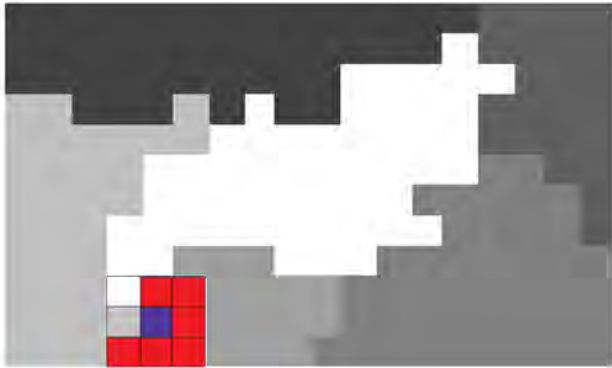
A sample situation



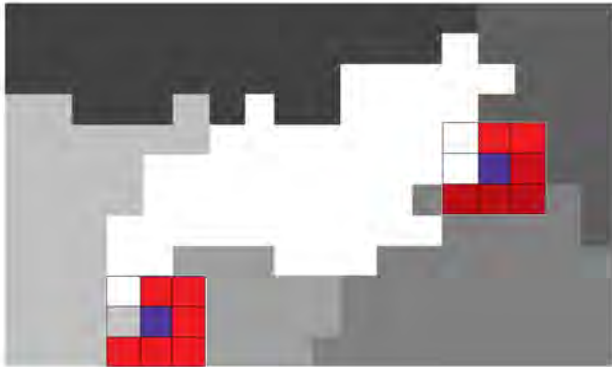
What convolution does



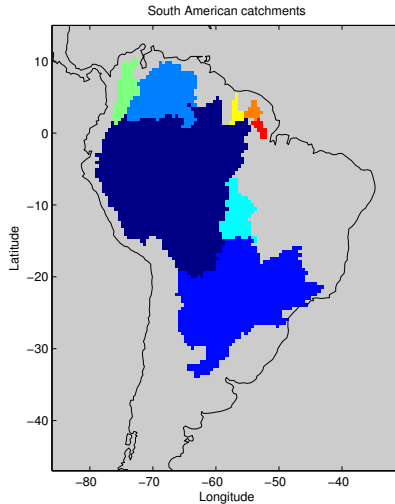
Quantify leakage from just one catchment...



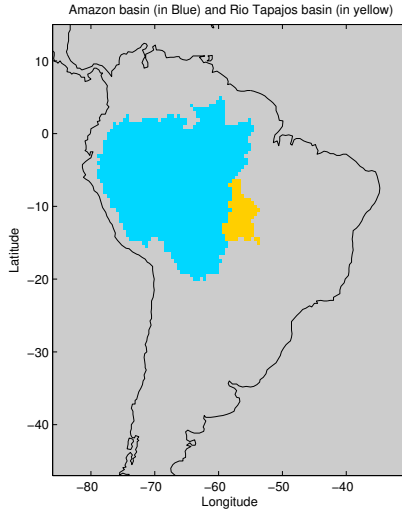
... no matter where we convolve



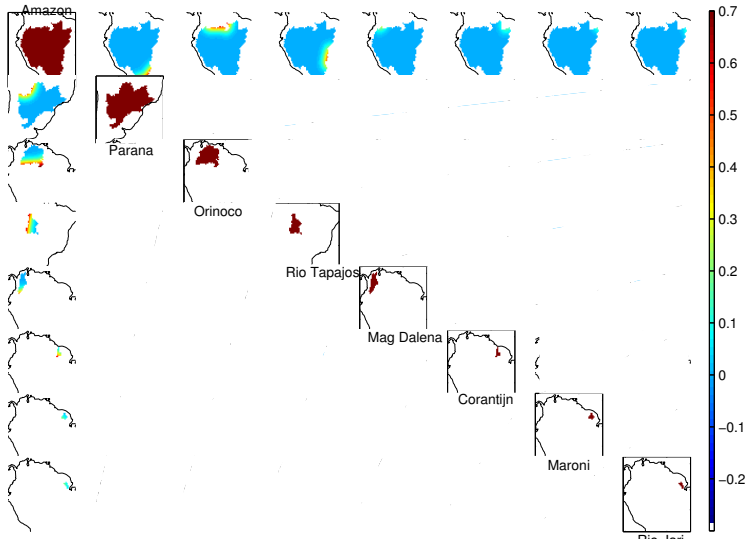
Catchments involved



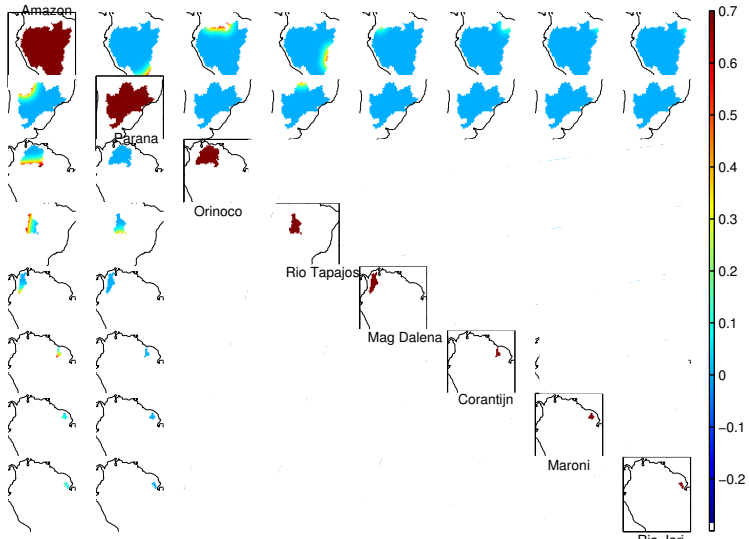
What we do...



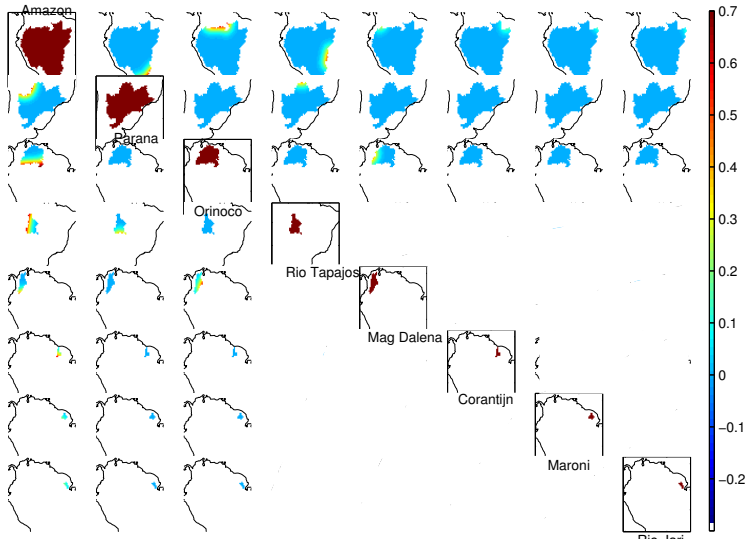
The inter-catchment leakage behaviour



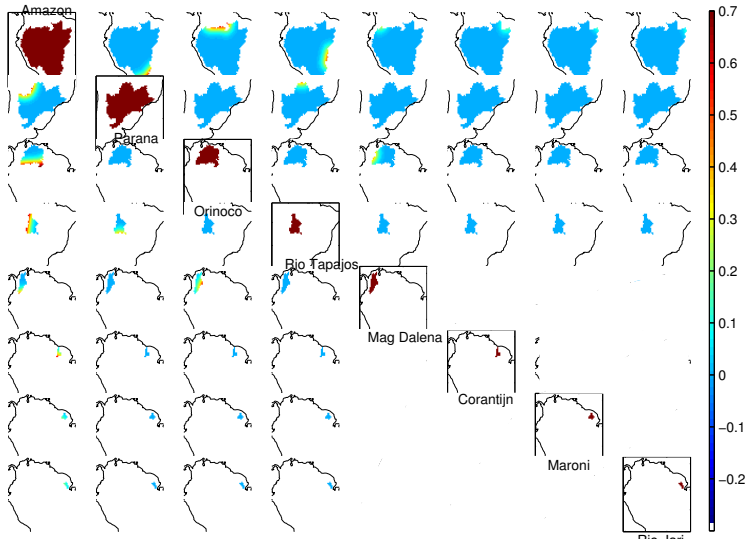
The inter-catchment leakage behaviour



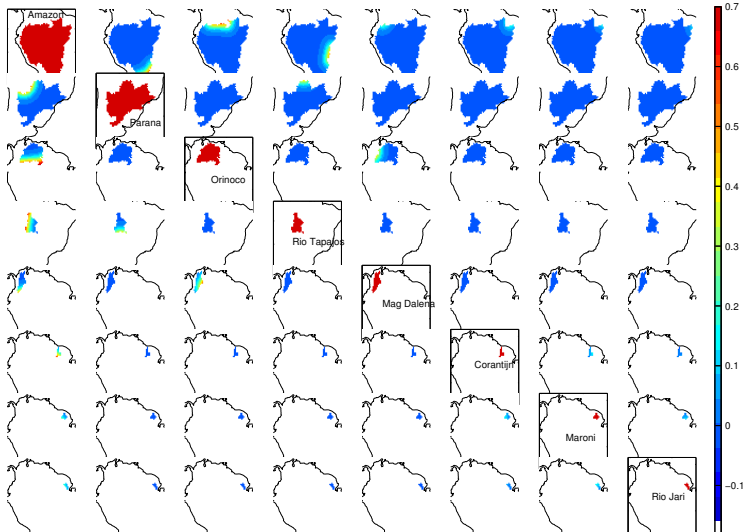
The inter-catchment leakage behaviour



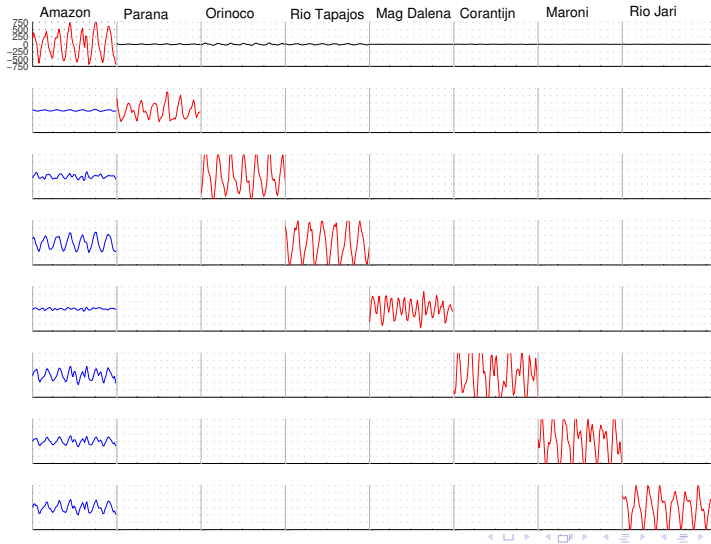
The inter-catchment leakage behaviour



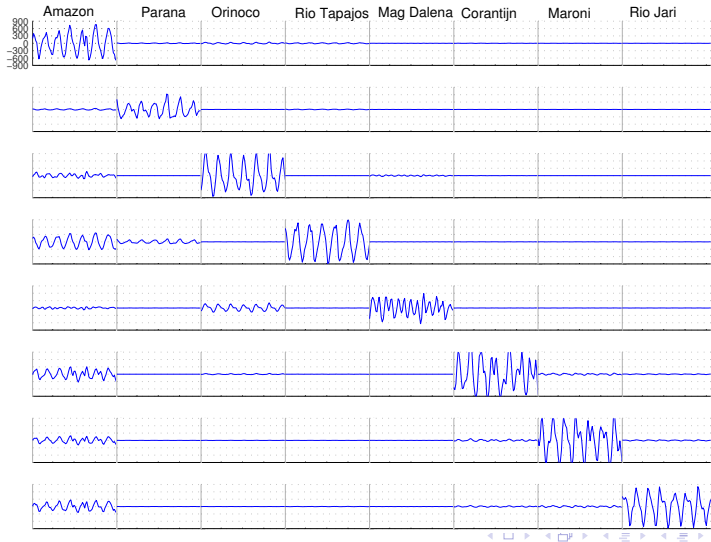
The inter-catchment leakage behaviour



Applying strategy to WGHM model to get time series



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Quantification

Basin	RMS (mm)	RMS leakage (mm)	Ratio	Correlation coefficient
Amazon	398.4	12.3	0.03	0.51
Parana	252.5	26.2	0.10	0.87
Orinoco	522.2	75.5	0.14	0.49
Rio Tapajos	522.9	250.0	0.47	0.89
Magdalena	278.5	112.4	0.40	0.78
Corantijn	622.7	185.6	0.29	0.67
Maroni	582.2	123.2	0.21	0.92
Rio Jari	447.3	163.0	0.36	0.90

Table: analysis of WGHM model

Conclusion

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- Individual contribution to observed leakage signal for a basin depends on shape and size of neighbouring basin.
- Each basin should be analysed for its contribution separately.
- “Smaller the basin more is leakage due to nearby large basin” - not true.
- Analysis of basins like Rio Tapajos - be careful.
- GRACE solutions have high noise content, what happens to signal happens to noise. The analysis is thus tricky.

Acknowledgement

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Thank you

Questions and Suggestions