

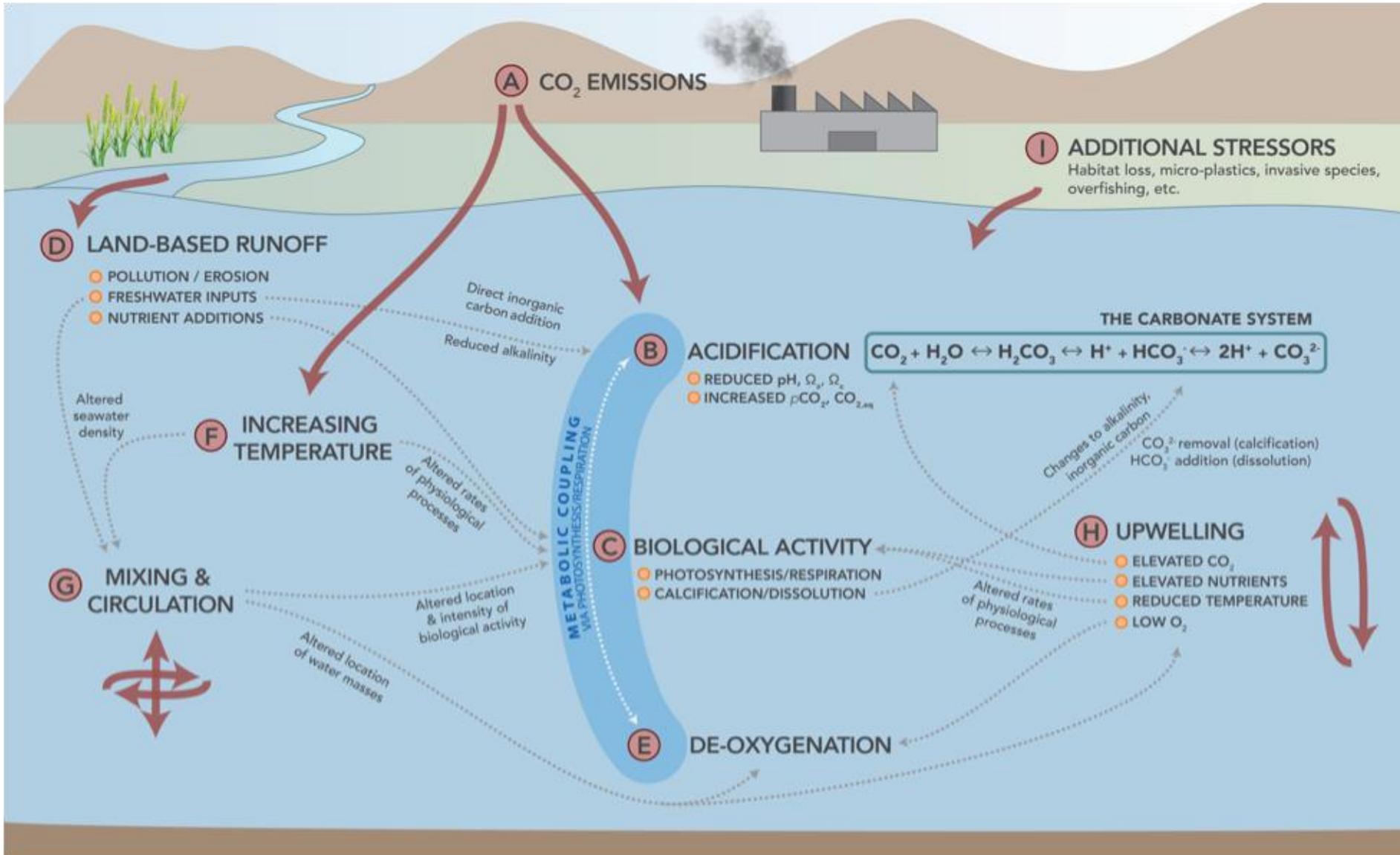


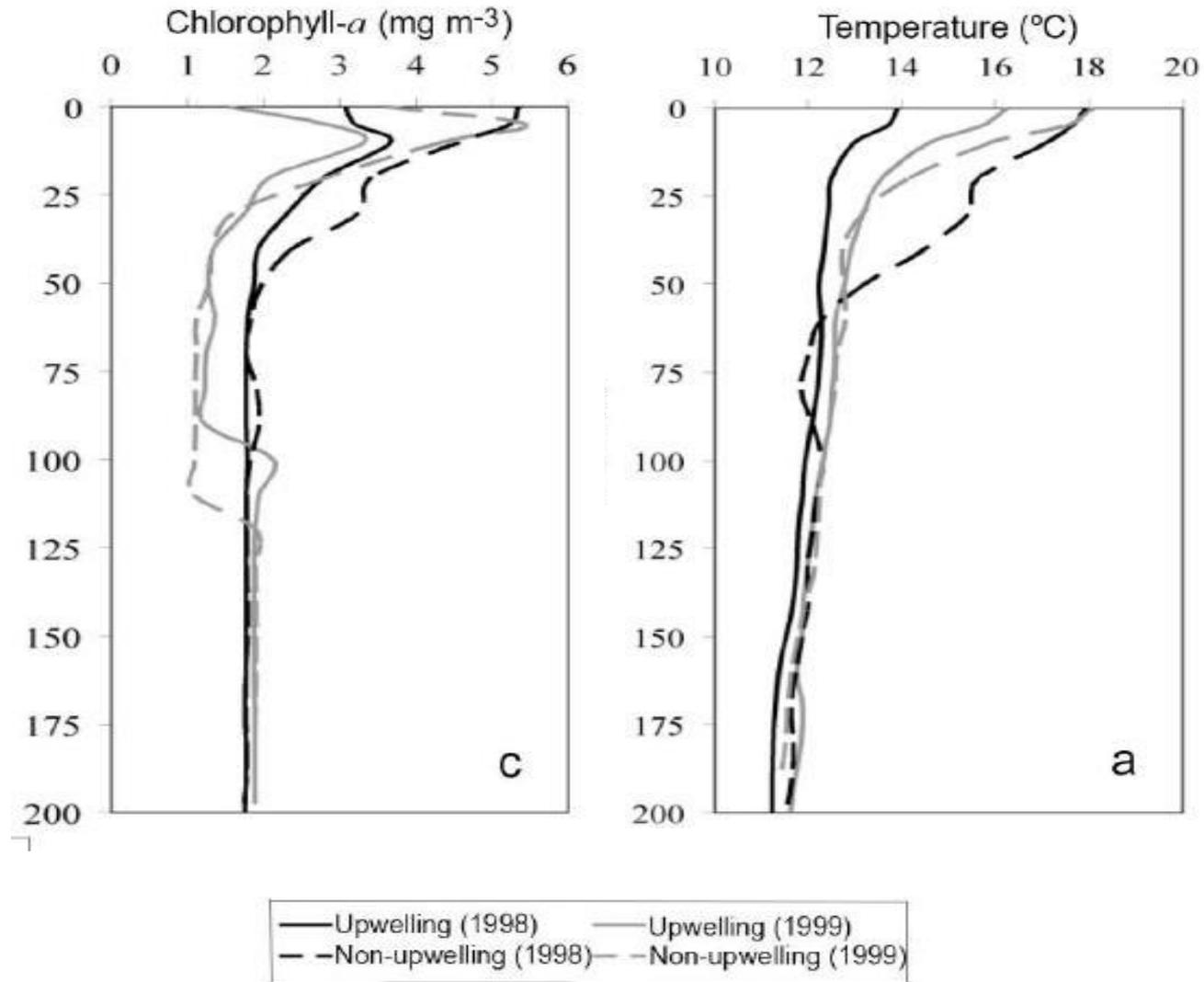
Trabalho Final

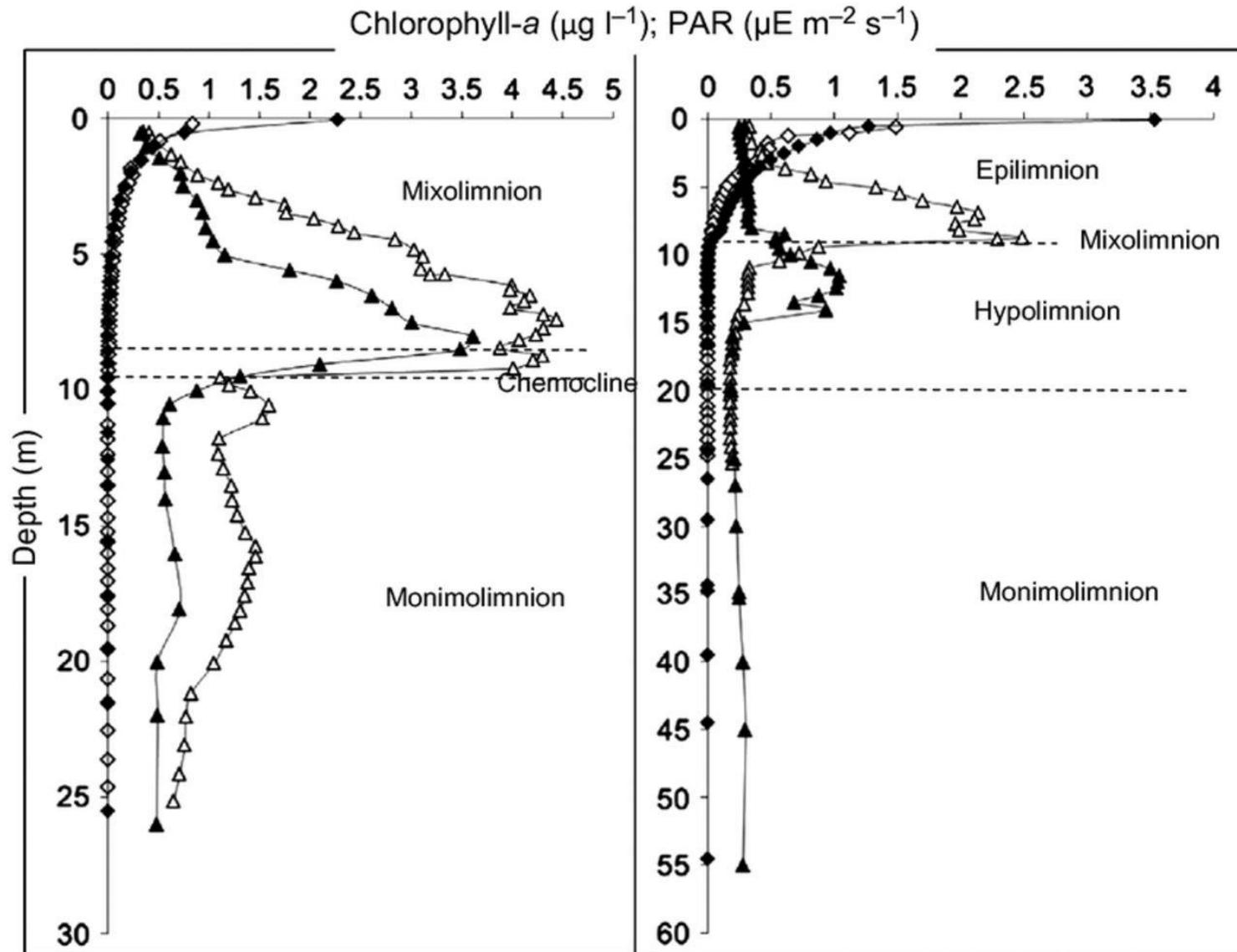


Uma abordagem geoestatística para a avaliação de variáveis meteo-oceanográficas na costa brasileira

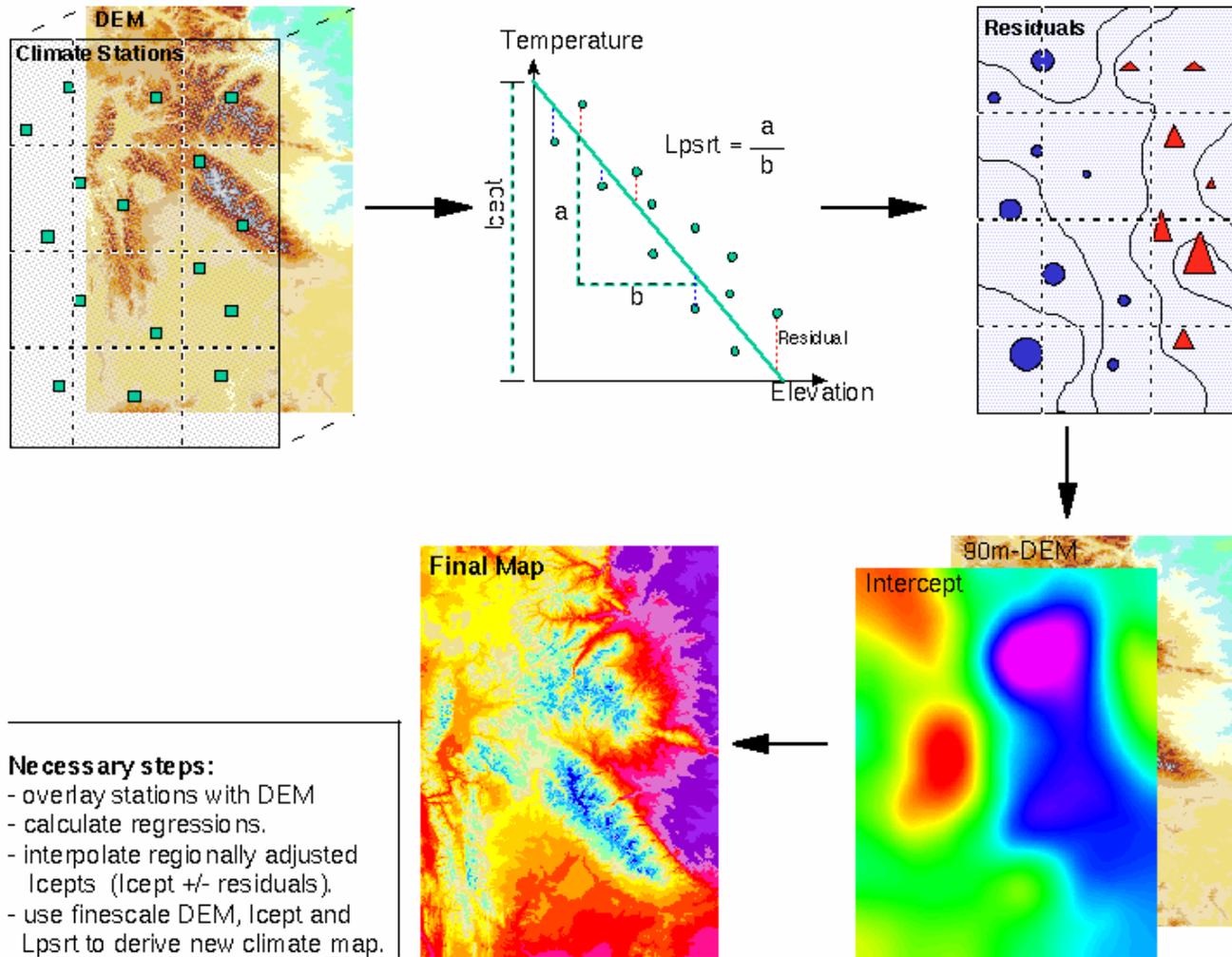
Diogo Amore







Generating Temperature maps from climate stations



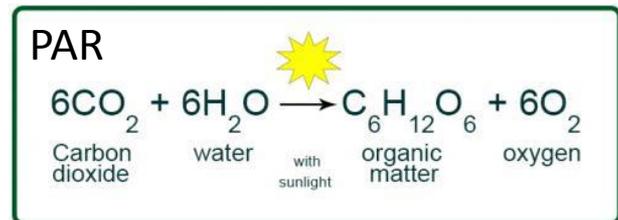
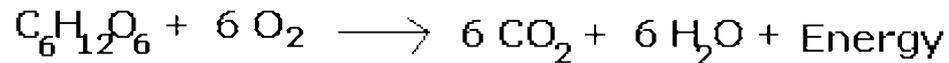
Correlacionar através de GWR:

Concentração de clorofila (dependente) com TSM (independente)

Concentração de clorofila (dependente) com PAR (independente)

Com fins de avaliar se os parâmetros estimados pelo arcabouço teórico da GWR apresentam-se mais robustos que de outras técnicas de correlação para a investigação de se TSM apresenta realmente uma melhor correlação espaço-temporal que PAR em relação a concentração de clorofila como encontrado na literatura.

SST Cellular Respiration



Também teve por fim avaliar a eficácia da técnica BGWR em relação a GWR.

Spatial Autocorrelation Report

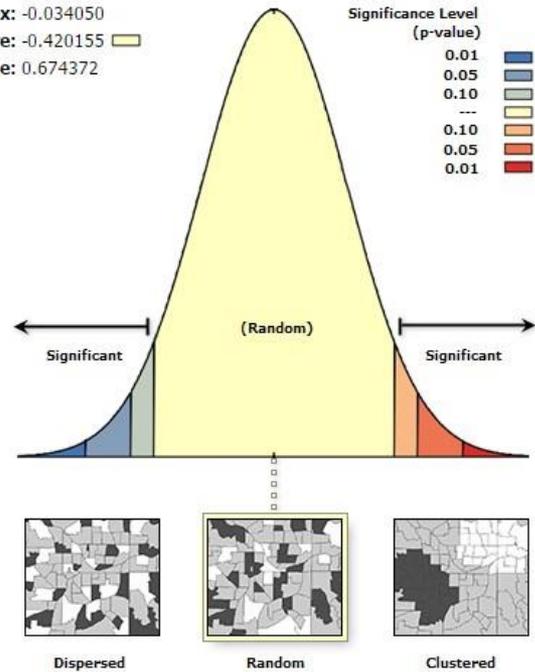
Moran's Index: -0.034050

z-score: -0.420155

p-value: 0.674372

Significance Level
(p-value)

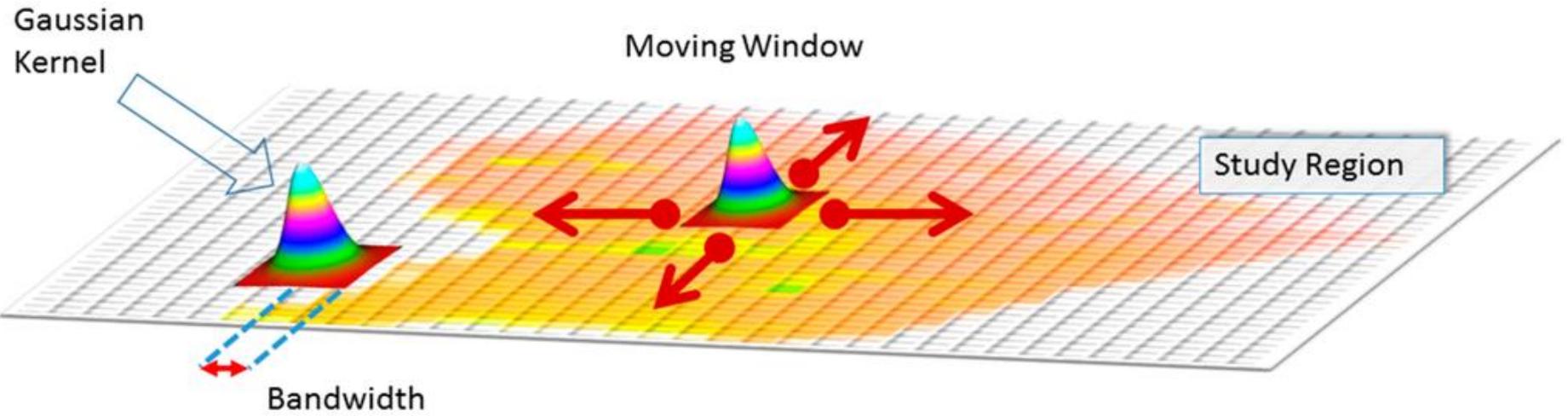
Significance Level (p-value)	Critical Value (z-score)
0.01	< -2.58
0.05	-2.58 -- -1.96
0.10	-1.96 -- -1.65
---	-1.65 -- 1.65
0.10	1.65 -- 1.96
0.05	1.96 -- 2.58
0.01	> 2.58

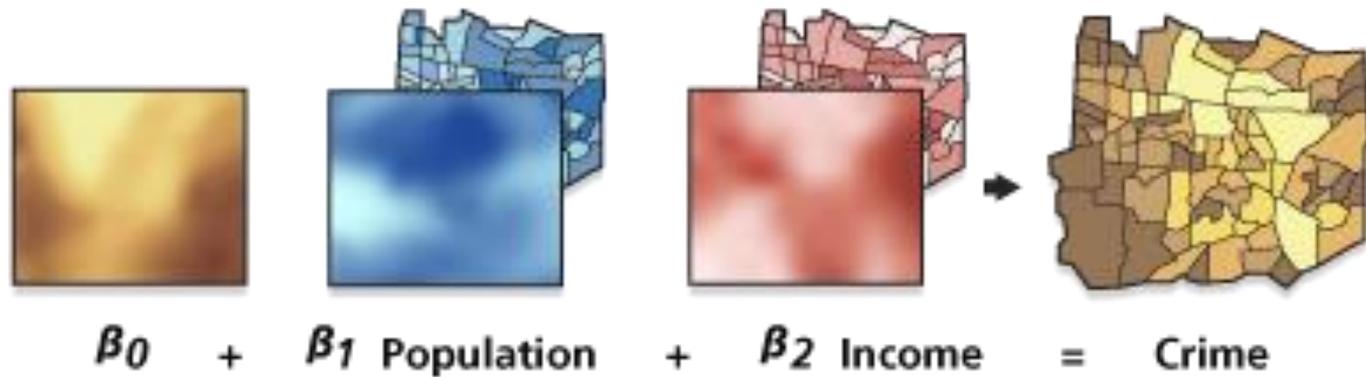
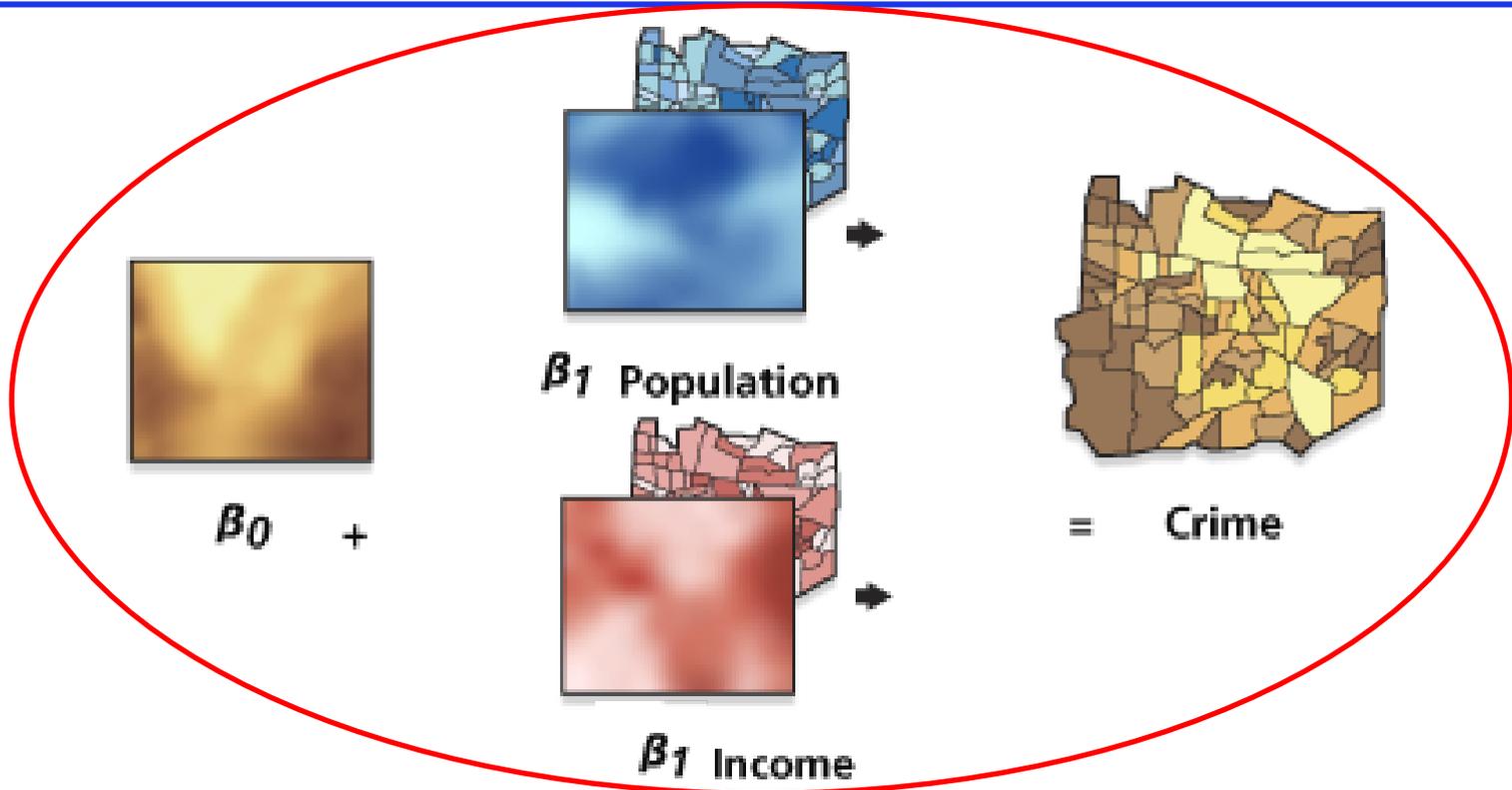


Given the z-score of -0.420155055538, the pattern does not appear to be significantly different than random.

Global Moran's I Summary

Moran's Index:	-0.034050
Expected Index:	-0.011628
Variance:	0.002848
z-score:	-0.420155
p-value:	0.674372





BGWR

Likelihood

Bayes Rule

Chla

SST ou
PAR

How likely is it that you
see the satellite data
if the plane crashed there?

$$P(A|B) \propto P(B|A)P(A)$$

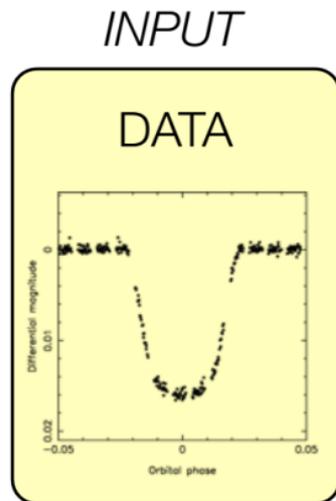
Posterior

How likely is it that
the plane crashed there given
the satellite data we have?

Prior

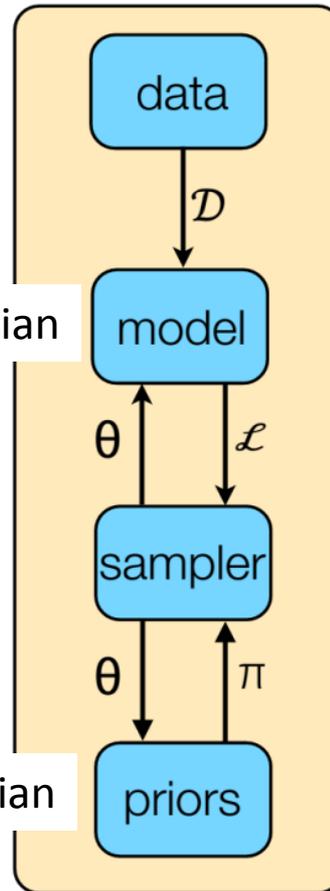
How likely is
it that the
plane was there?

the sampler “guesses” different θ vectors, calculates the posterior probability of that guess, and then makes small jumps



Gaussian

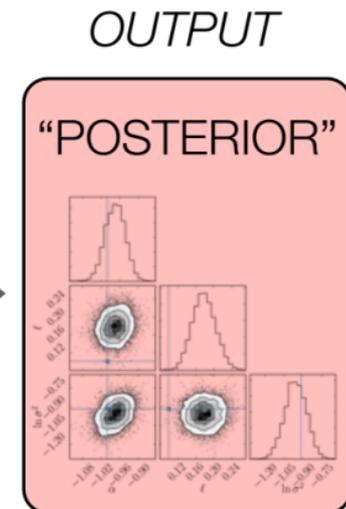
Gaussian



MCMC



actually the point of the sampler is to make intelligent guesses with high posterior probabilities



Correlação por GWR e BGWR

Parte I

Aquisição de imagens MODIS nível L3 de SST, PAR e chl-a para os meses de Janeiro, Abril, Julho e Outubro de 2002 até 2014

Chl-a

SST

PAR

Recorte da área de estudo para a costa brasileira em relação a zona EEZ

Parte II

Análise preliminar da estatísticas dos dados de entrada

Shapiro-Wilk: Normality
Breusch-Pagan: Heterocedastic.
Moran I: sobre os resíduos OLS
Teste F: sobre a variância dos resíduos da OLS e GWR pra igualdade de variâncias

Parte III

GWR e BGWR entre Clorofila e SST
Clorofila e PAR
Em cada um dos 48 meses

GWR: lambda, mapeamento dos parâmetros, matrizes of betas (SST, PAR (β_1); constant term (β_0)), resíduos, MSE (sig.), *t-statistic*, R^2
BGWR: GWR beta vs IC95 BGWR beta em forma de plot, ratio, location

ANÁLISE DESCRITIVA

Shapiro-Wilk teste para PAR/SST/chla rejeitou a hipótese nula a .05 de significância de que a distribuição é normal com média e variância não especificadas.

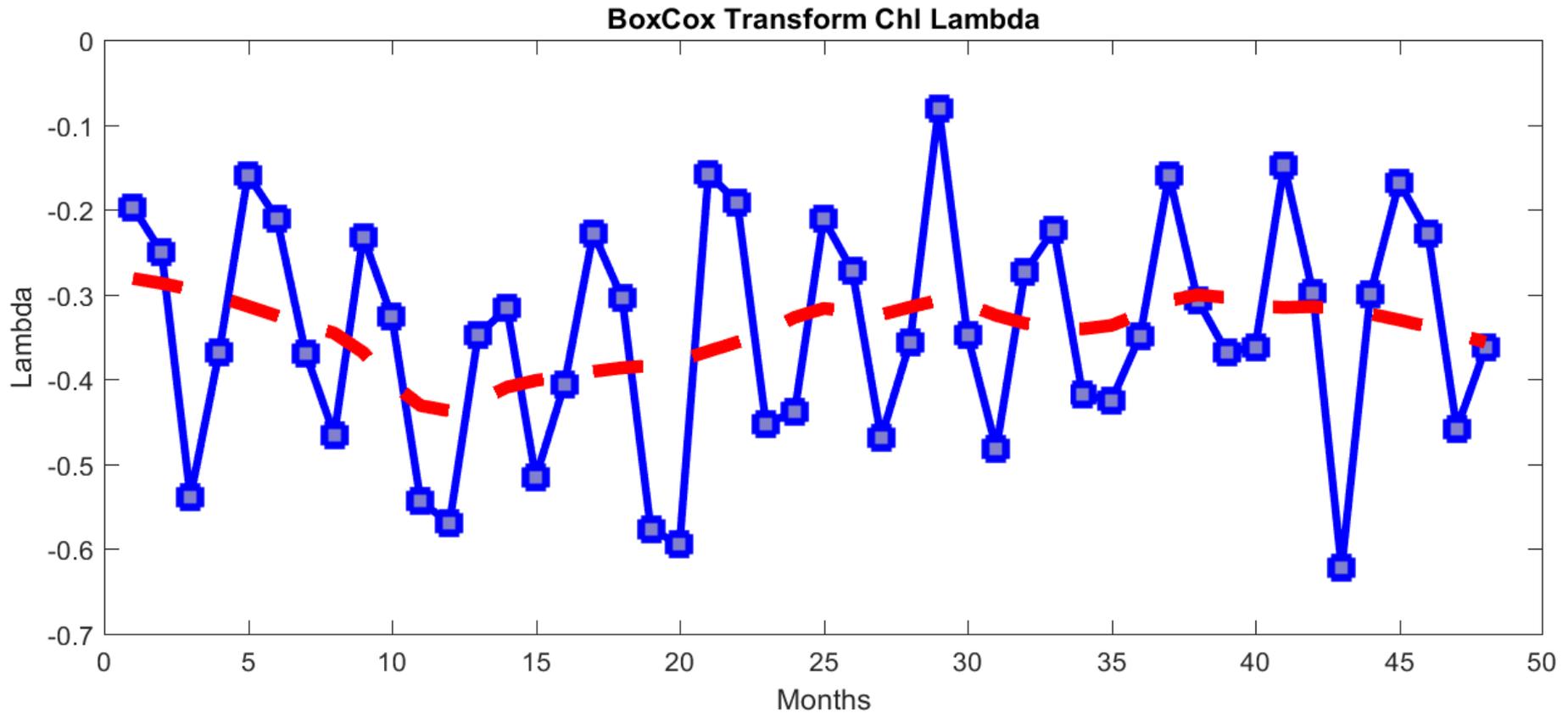
Breusch-pagan teste foi positivo para heterocedasticidade pros resíduos da GWR pra SST vs chla e PAR vs chla (i.e., p-valores bem baixos).

Portanto, uma transformação boxcox foi aplicada nas três variáveis (PAR/SST/chla) para normalizá-las.

Moran's I teste confirmou a auto-correlação espacial (Moran I: 0.95-0.97).

O valor I-Stat foi de 123 a 126 muito maior que o limiar de teste of 1.96 (5% significância) pra rejeição da hipótese nula de aleatoriedade a favor do agrupamento já que o valor de I-Stat foi alto e positivo.

O resultado do F-test pros resíduos da GWR e OLS foram 1, implicando no fato de que há evidências de que os resíduos das duas distribuições vem de distribuições diferentes. A rejeição da hipótese nula indica que o modelo GWR é uma ferramenta mais adequada do que a OLS para esse conjunto de dados.



$$\lambda = 2$$

$$Y' = Y^{2'}$$

$$\lambda = 0.5$$

$$Y' = \sqrt{Y}$$

$$\lambda = 0$$

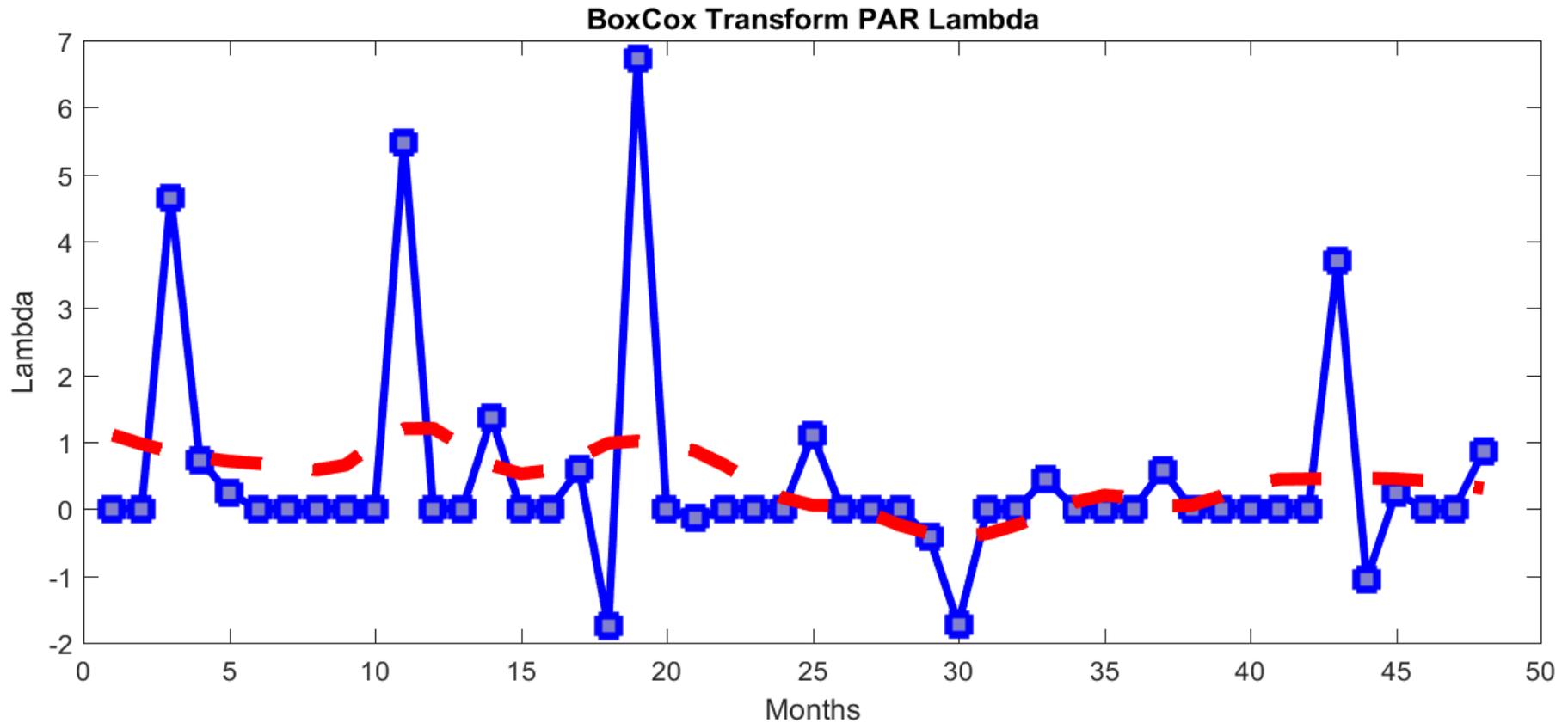
$$Y' = \text{Log}_e Y$$

$$\lambda = -0.5$$

$$Y' = \frac{1}{\sqrt{Y}}$$

$$\lambda = -1$$

$$Y' = \frac{1}{Y}$$



$$\lambda = 2$$

$$Y' = Y^{2'}$$

$$\lambda = -0.5$$

$$Y' = \frac{1}{\sqrt{Y}}$$

$$\lambda = 0.5$$

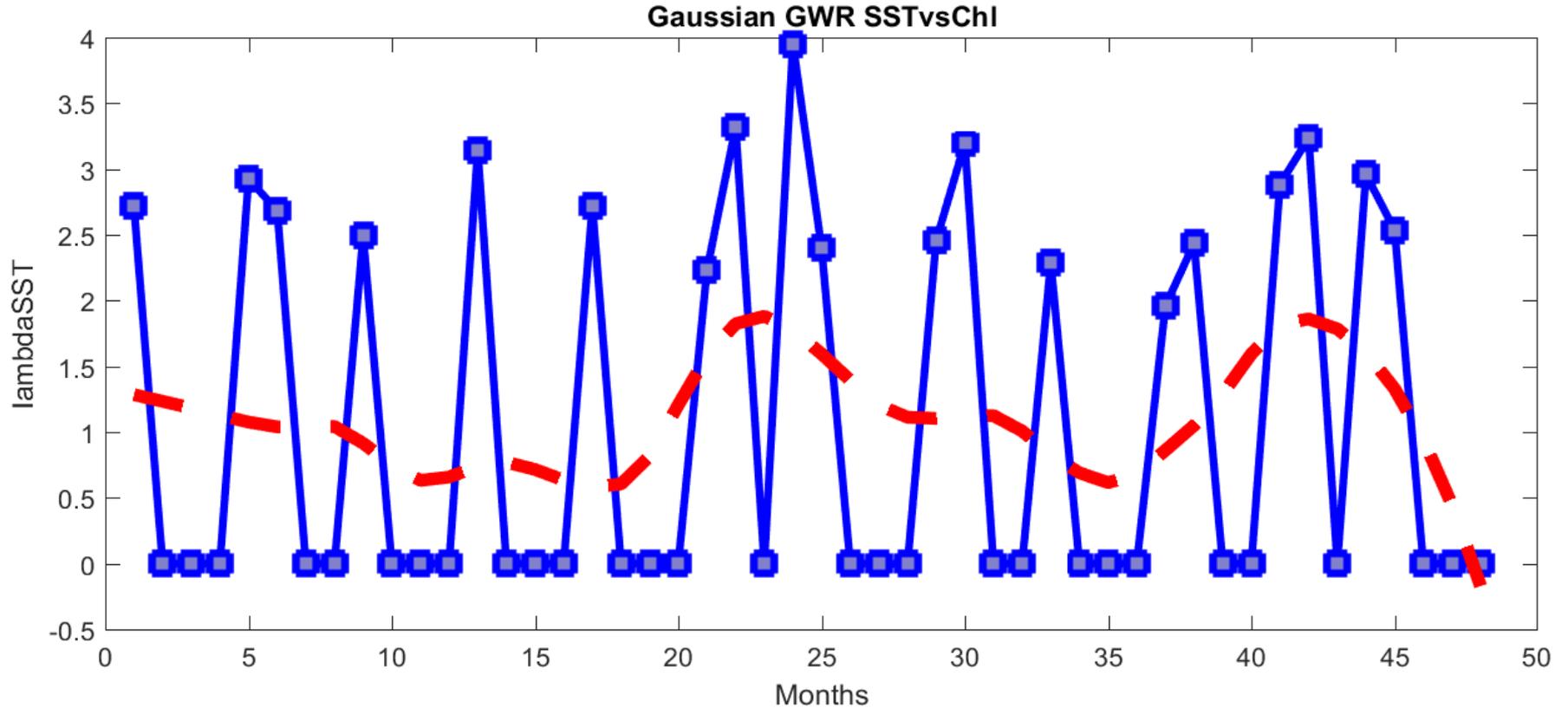
$$Y' = \sqrt{Y}$$

$$\lambda = 0$$

$$Y' = \text{Log}_e Y$$

$$\lambda = -1$$

$$Y' = \frac{1}{Y}$$



$$\lambda = 2$$

$$Y' = Y^{2'}$$

$$\lambda = -0.5$$

$$Y' = \frac{1}{\sqrt{Y}}$$

$$\lambda = 0.5$$

$$Y' = \sqrt{Y}$$

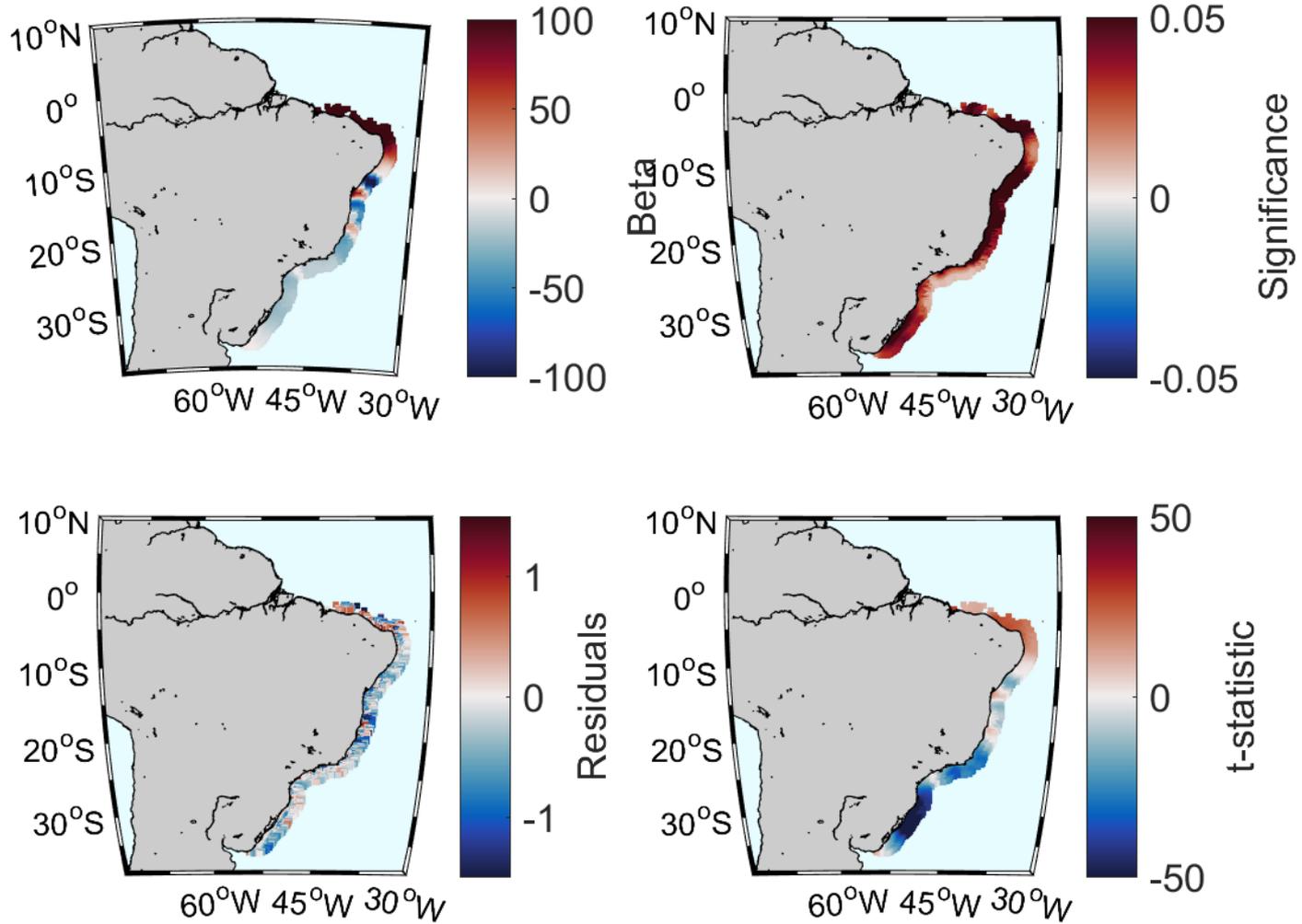
$$\lambda = 0$$

$$Y' = \text{Log}_e Y$$

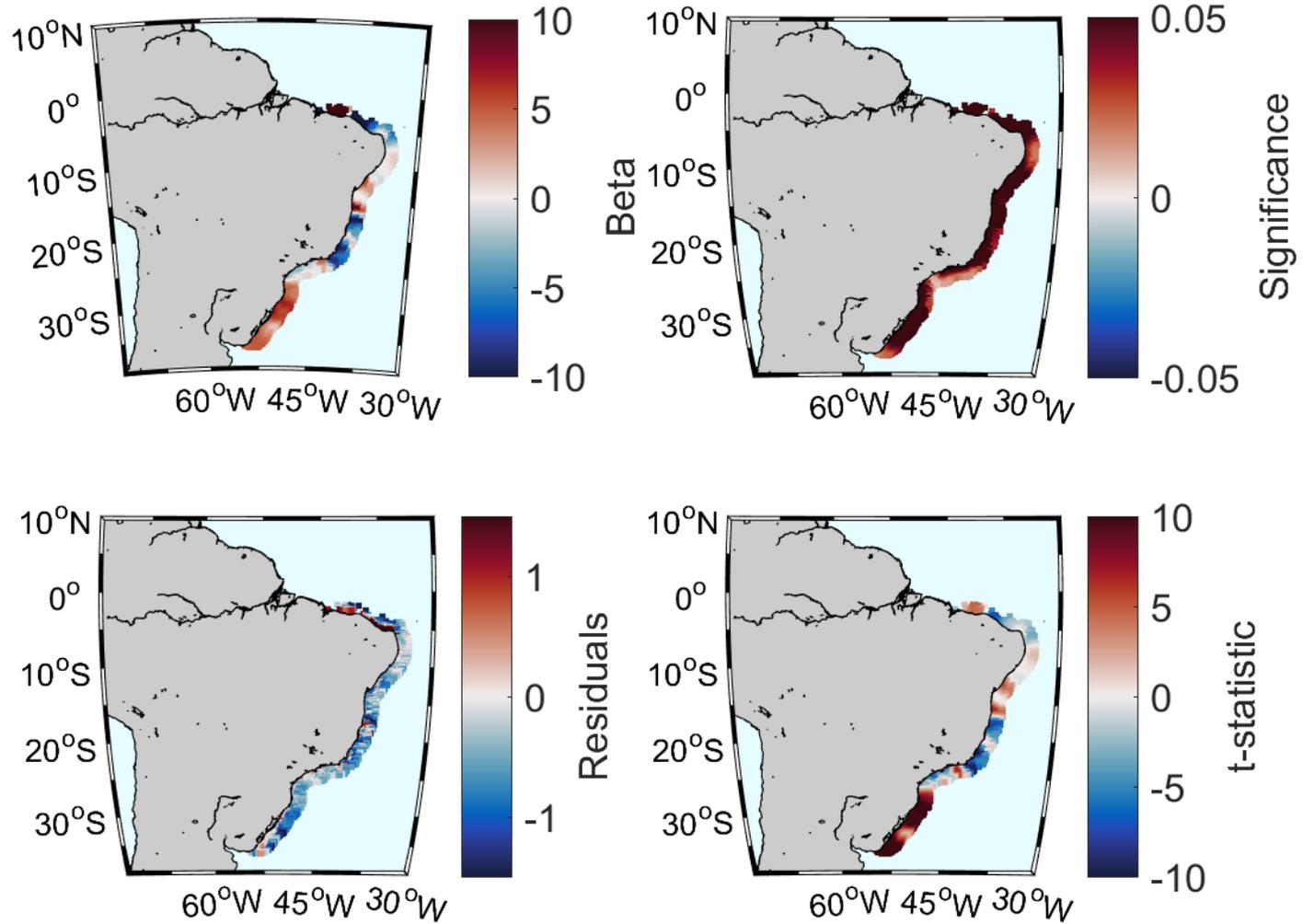
$$\lambda = -1$$

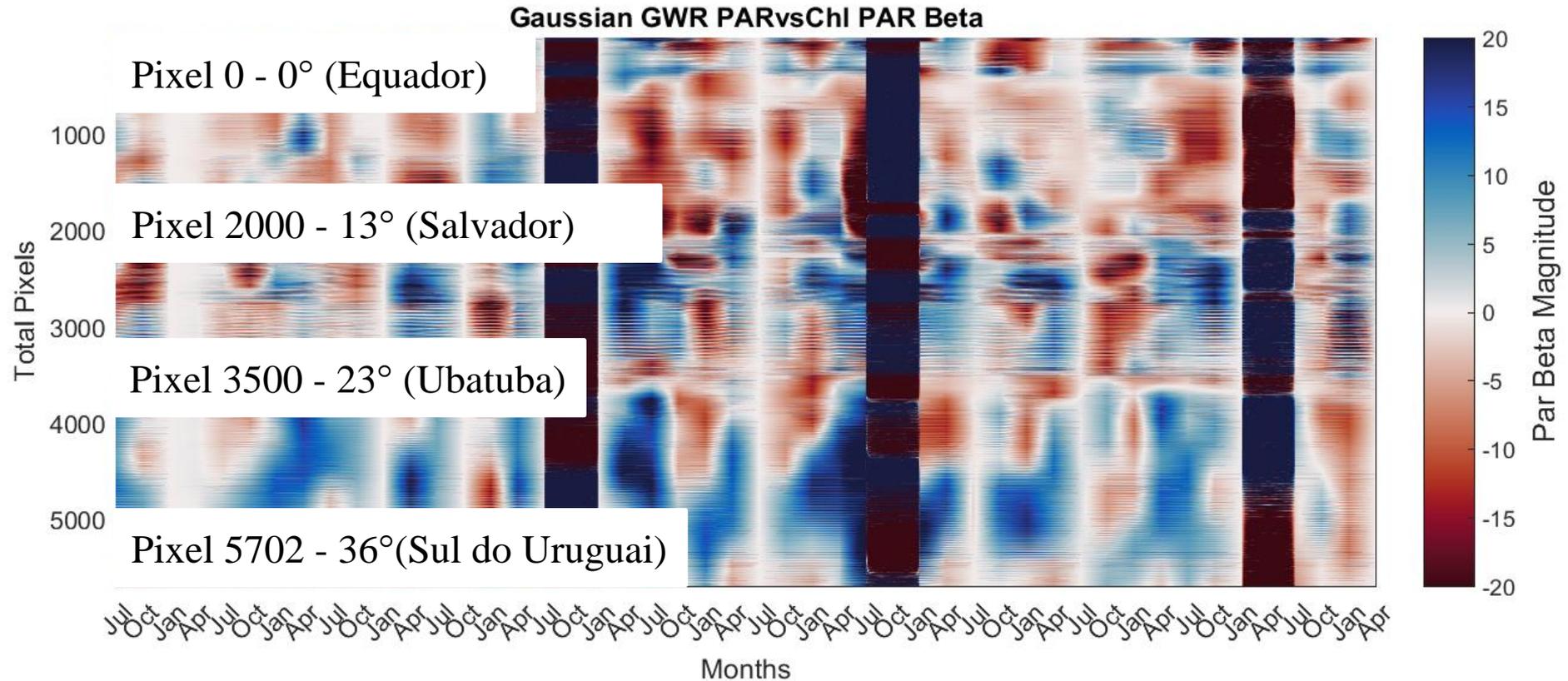
$$Y' = \frac{1}{Y}$$

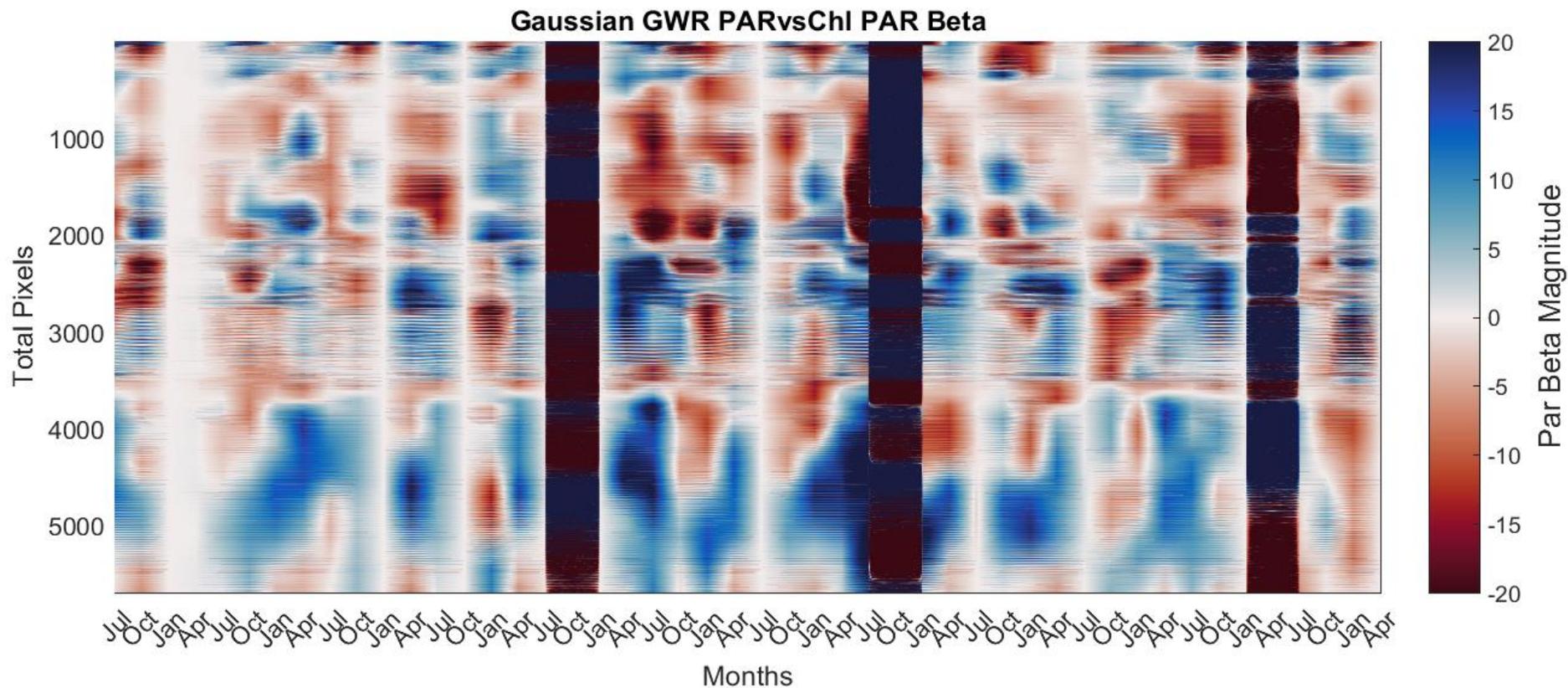
Example of Mapped GWR Statistics for Chl vs SST

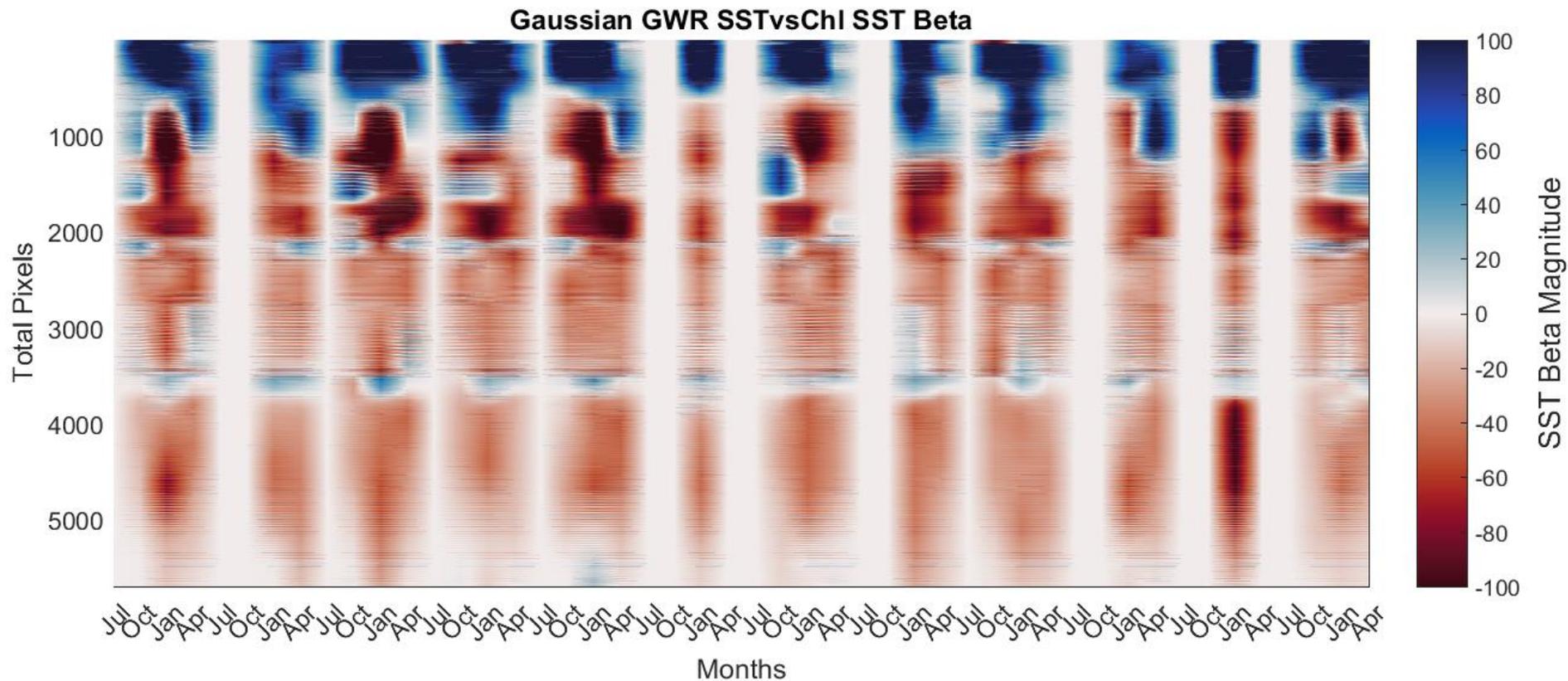


Example of Mapped GWR Statistics for Chl vs PAR

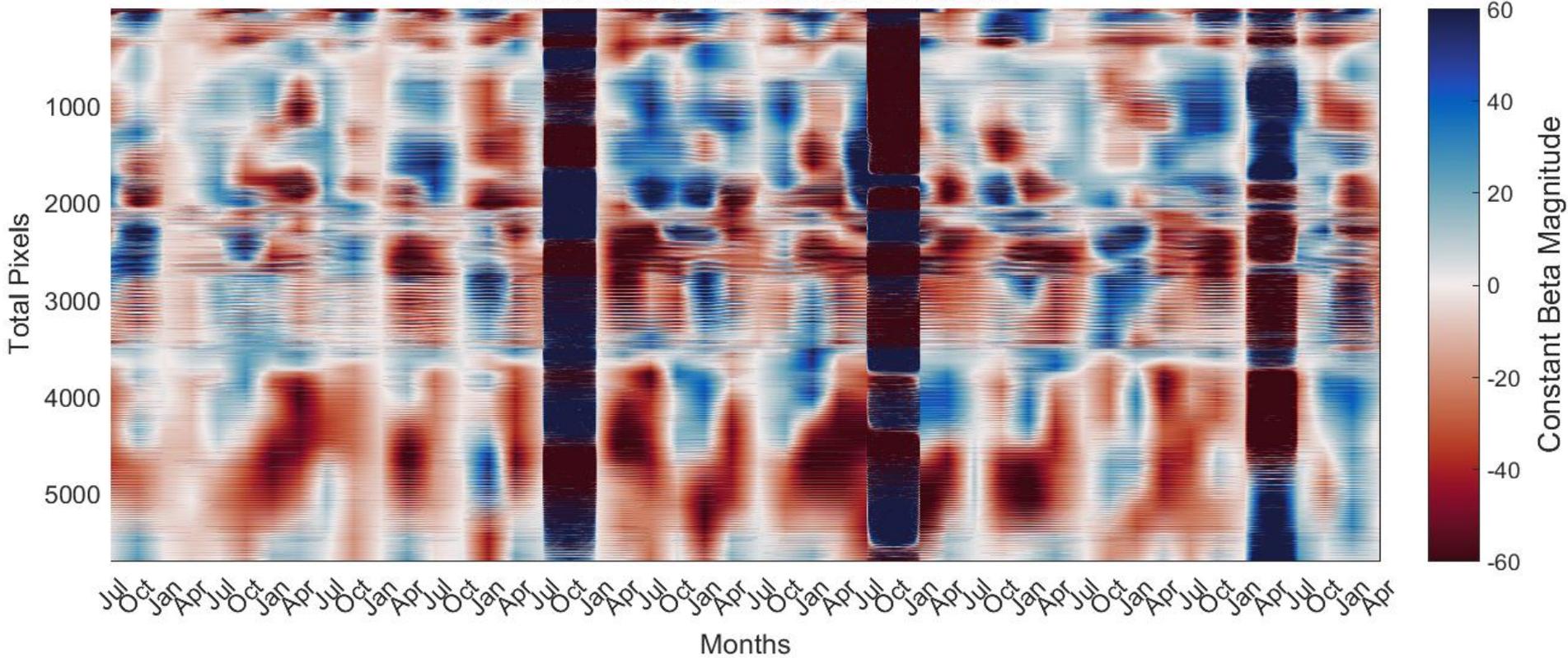




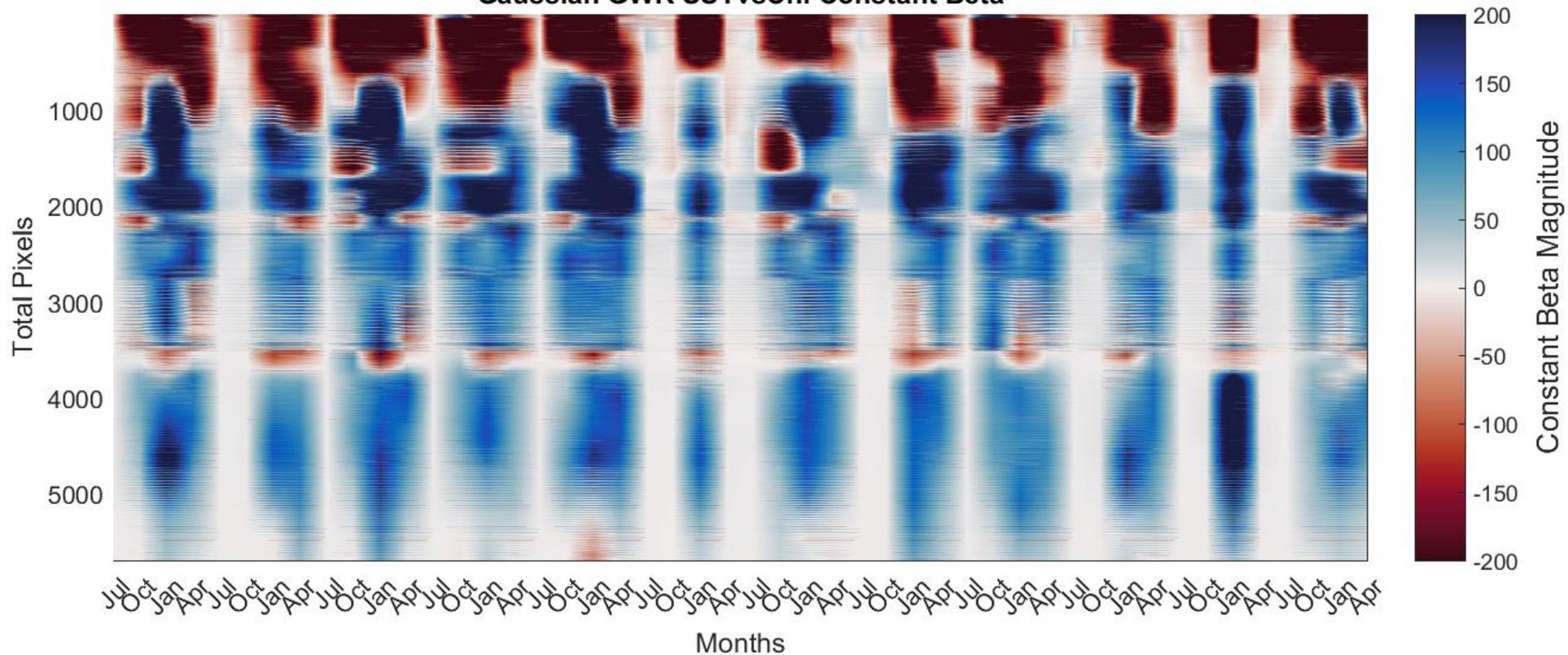




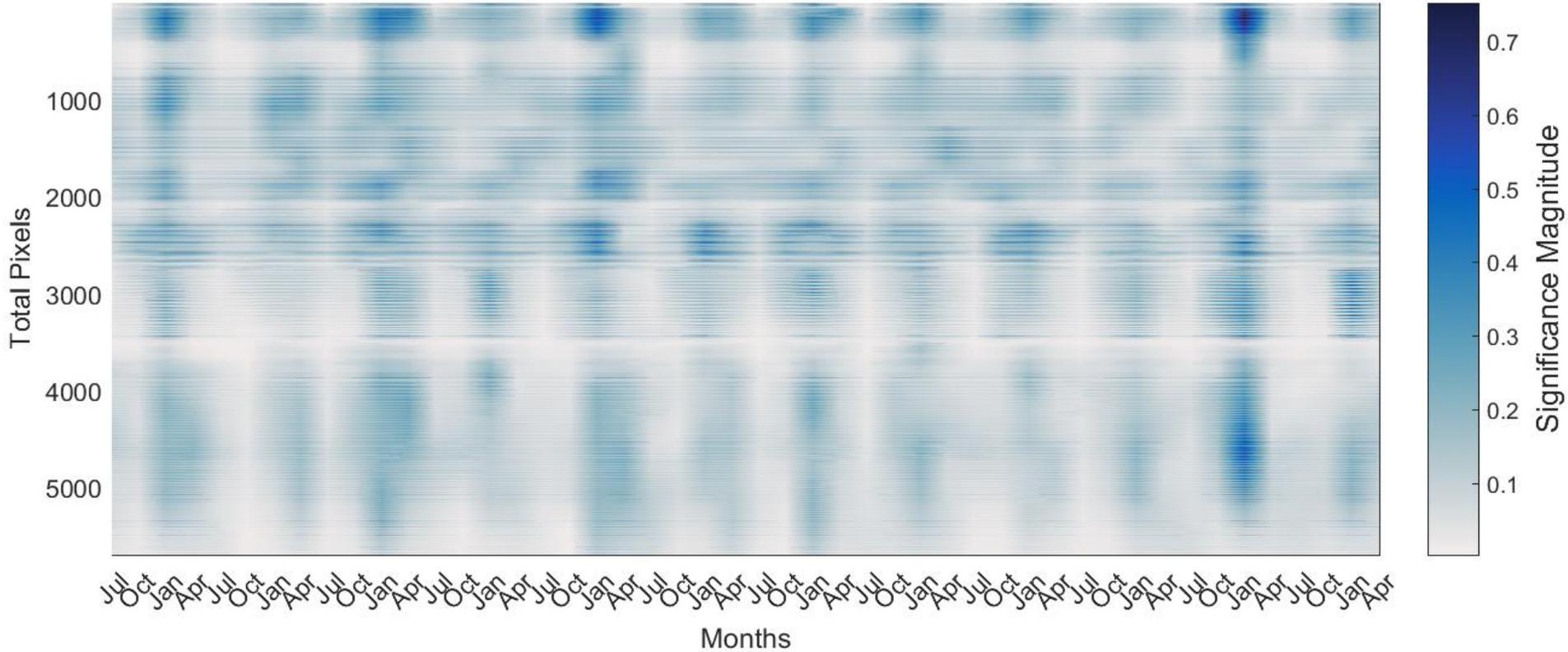
Gaussian GWR PARvsChl Constant Beta



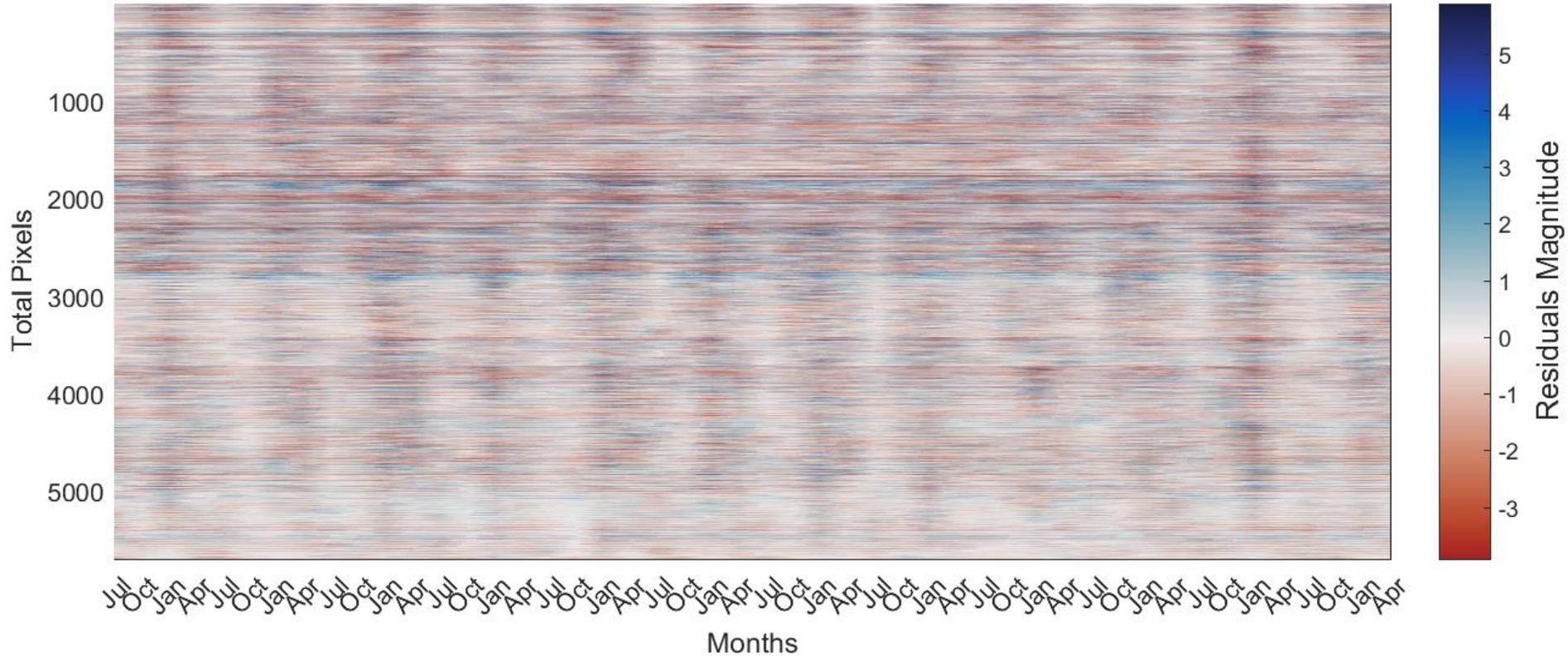
Gaussian GWR SSTvsChl Constant Beta



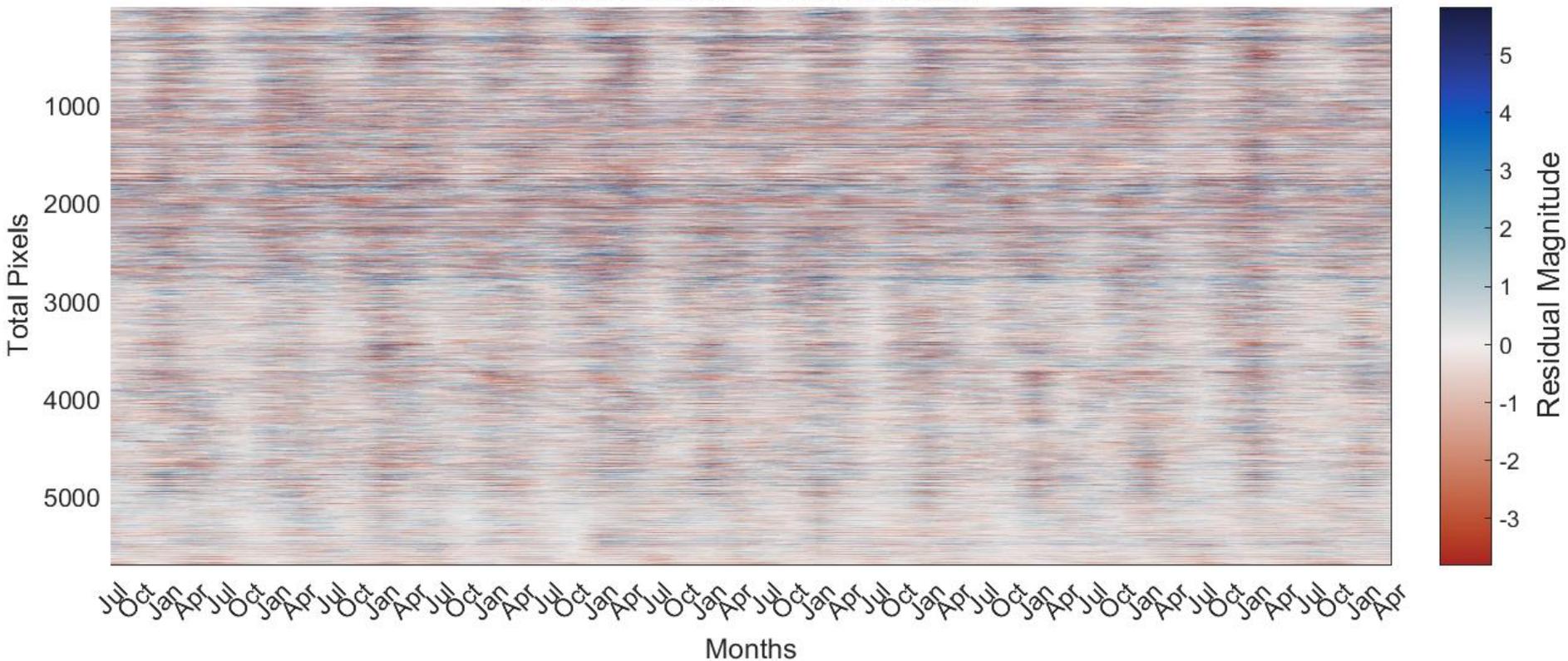
Gaussian GWR PAR Significance



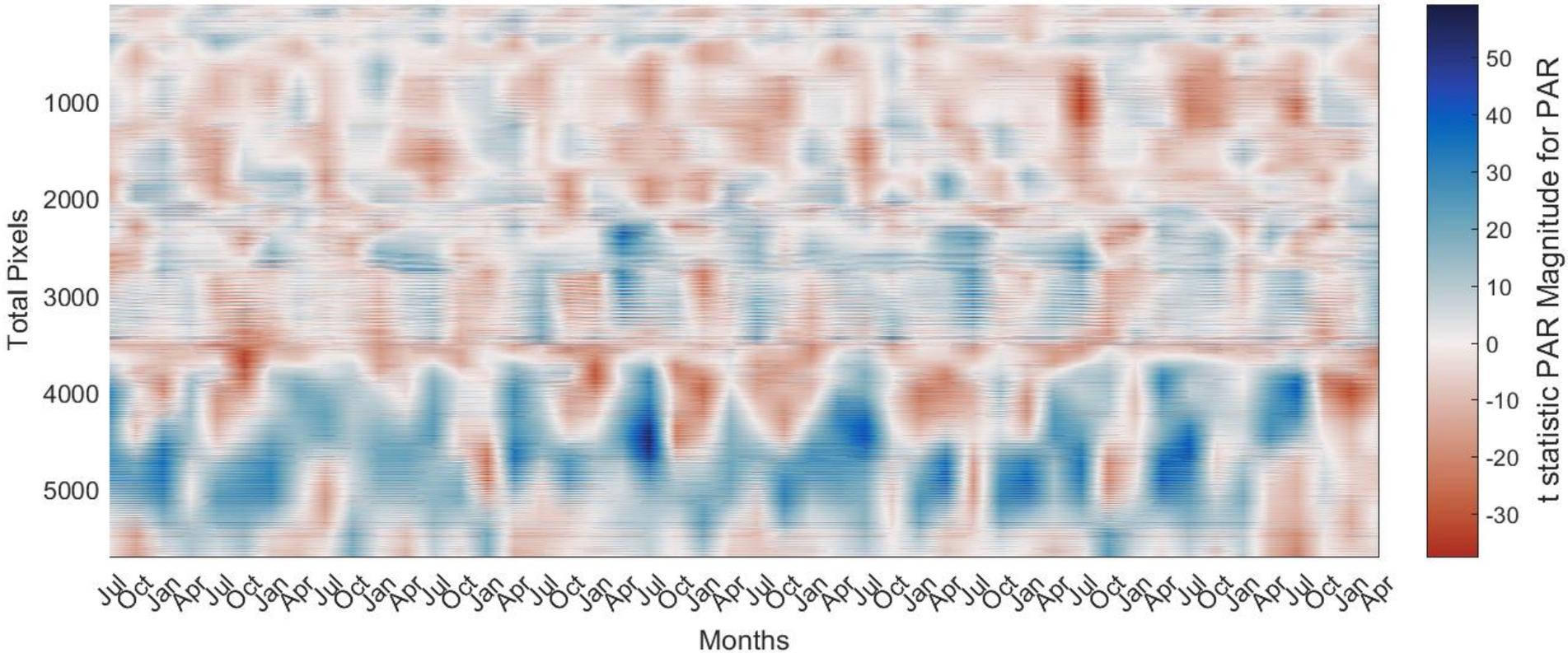
Gaussian GWR PAR Residual



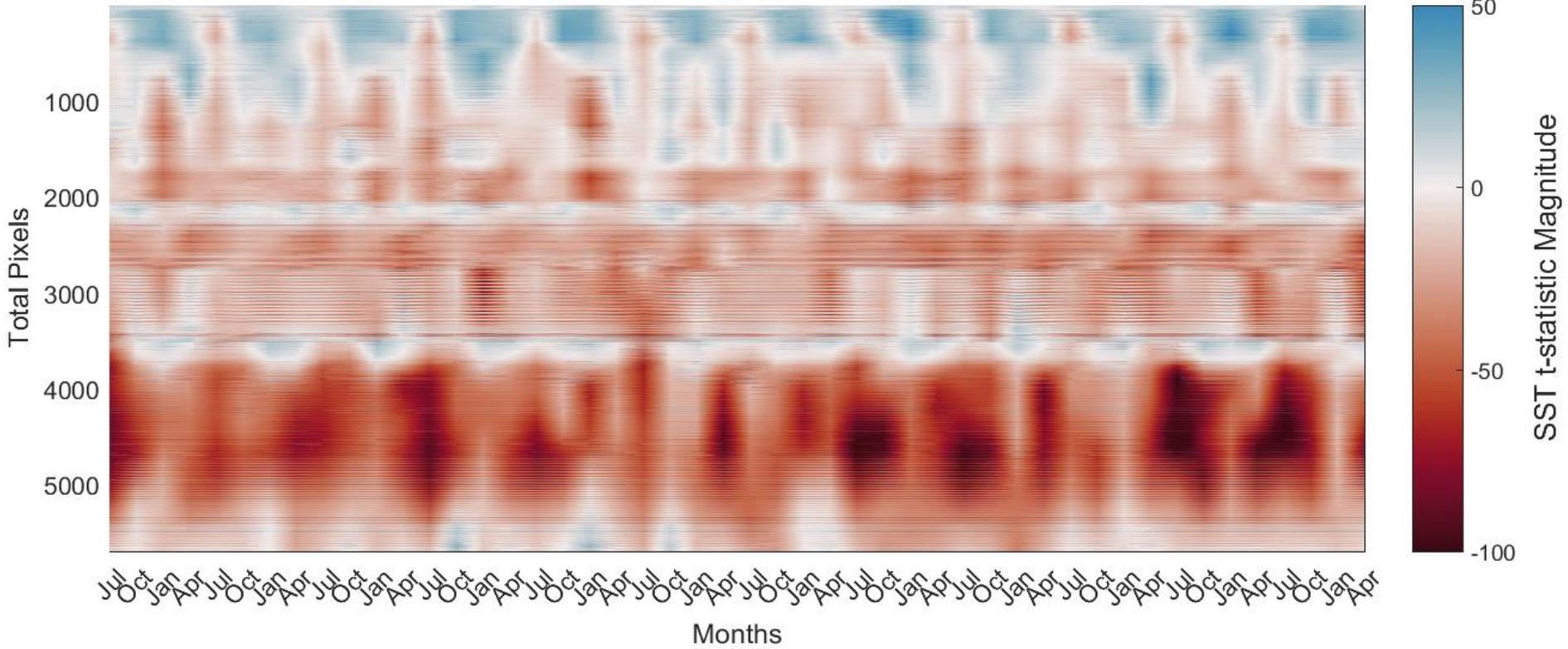
Gaussian GWR SSTvsChl Residual



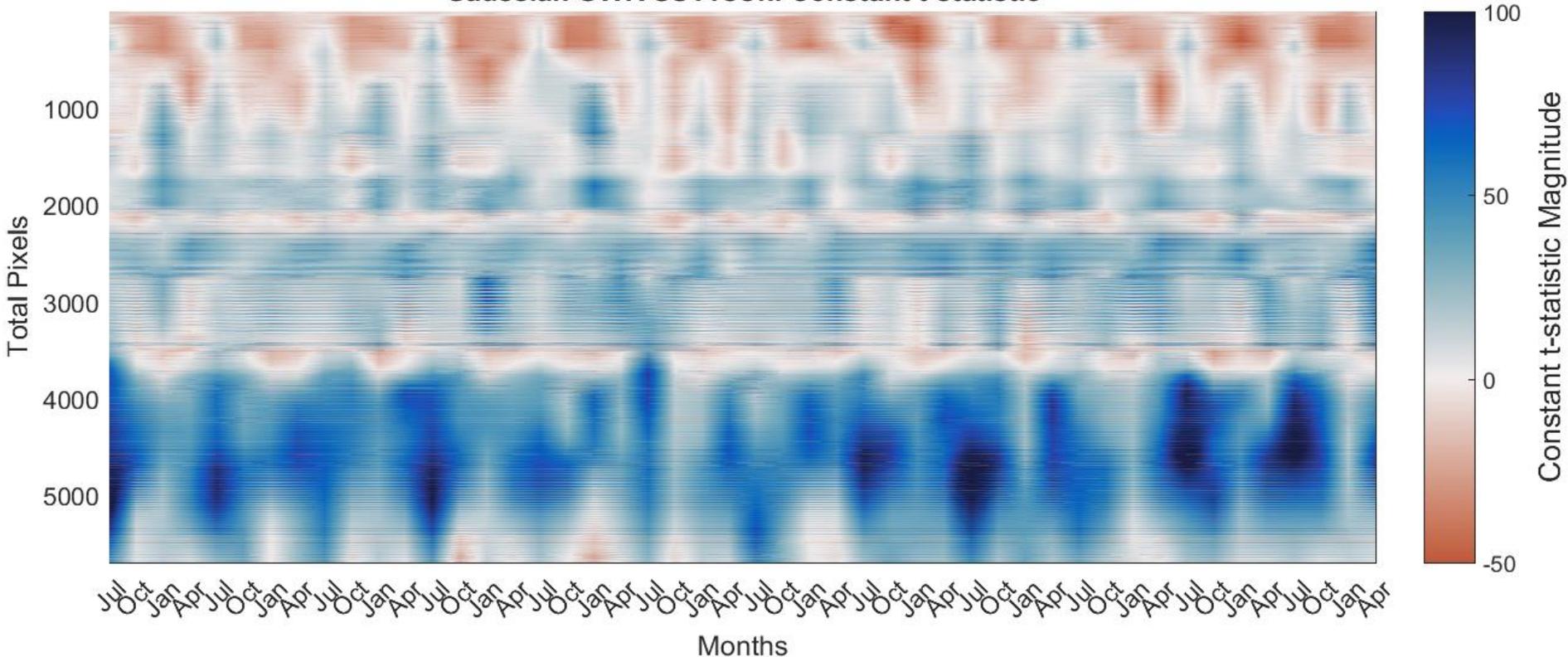
Gaussian GWR PARvsChi PAR t-statistic



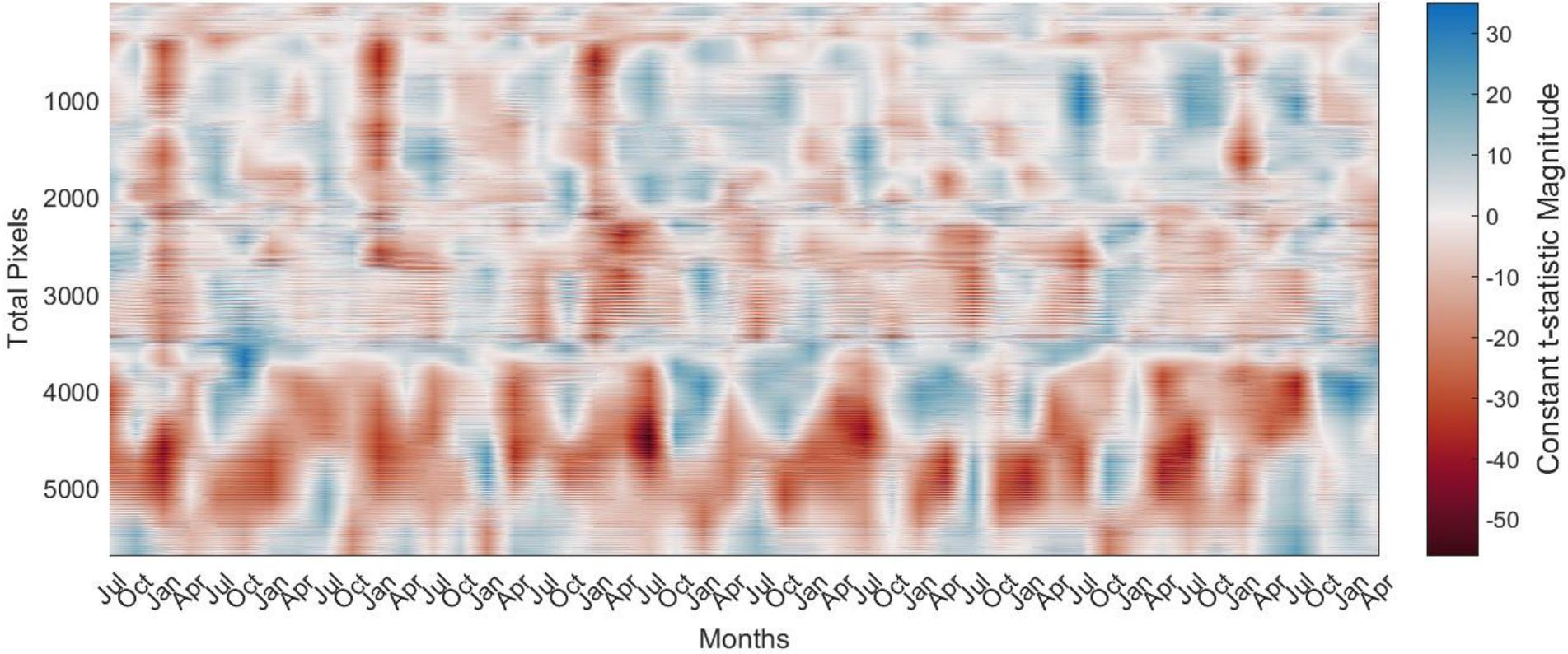
Gaussian GWR SSTvsChl SST t-statistic



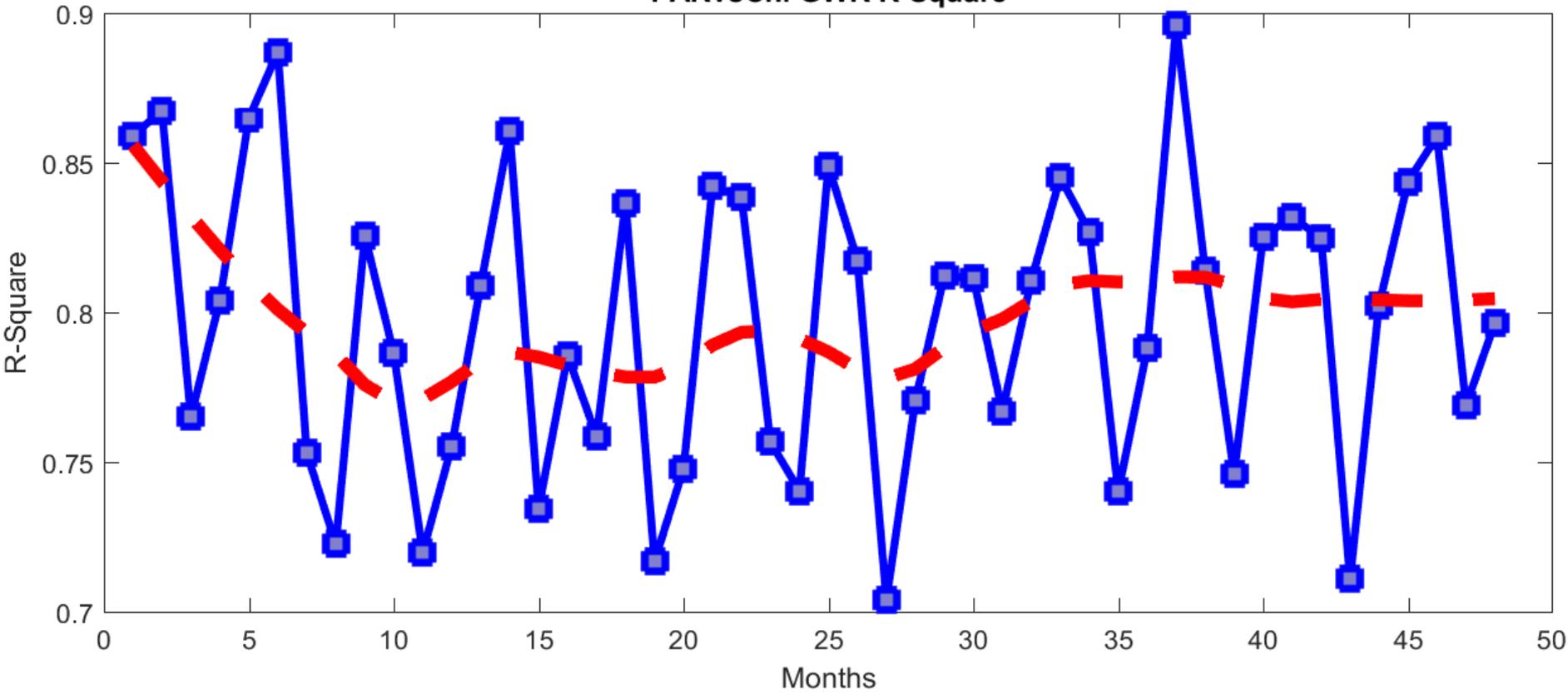
Gaussian GWR SSTvsChl Constant t-statistic



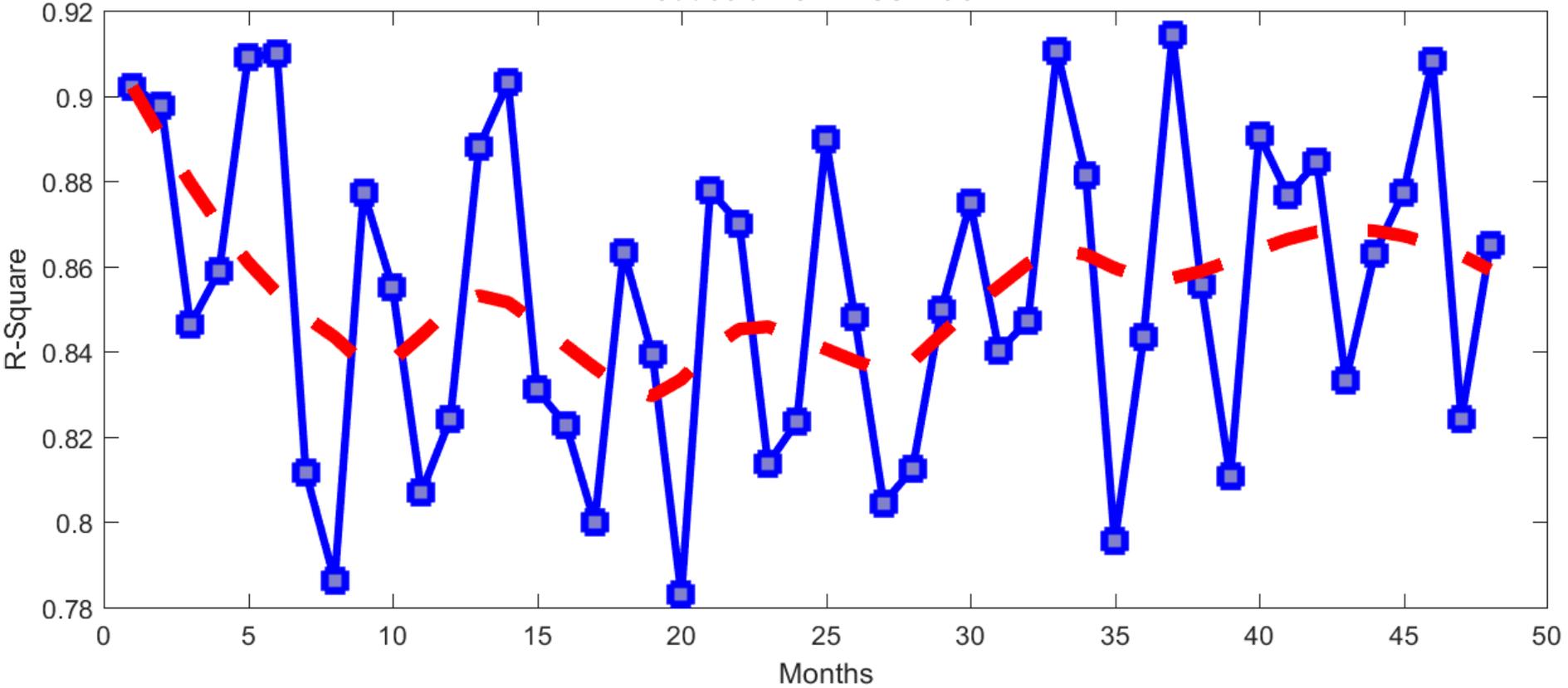
Gaussian GWR SSTvsChl Constant t-statistic



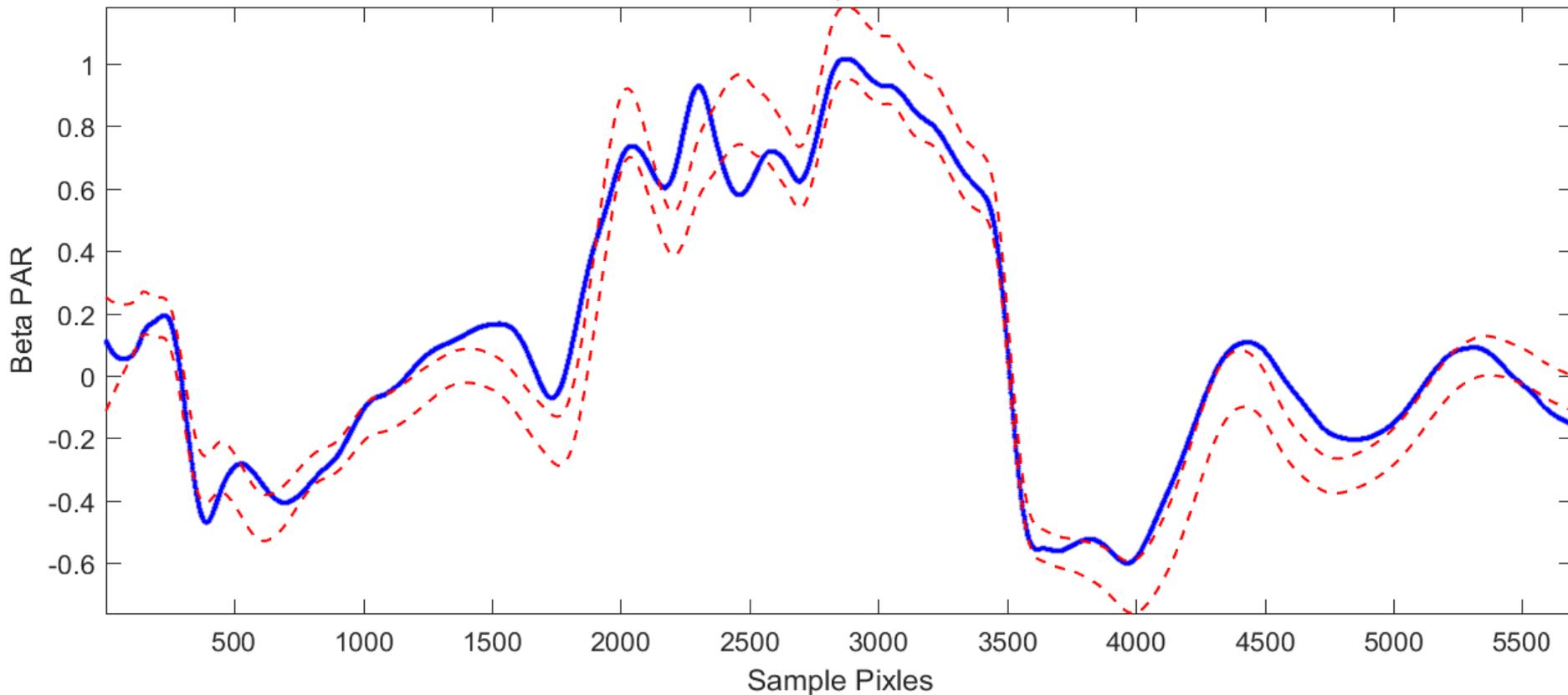
PARvsChl GWR R-Square



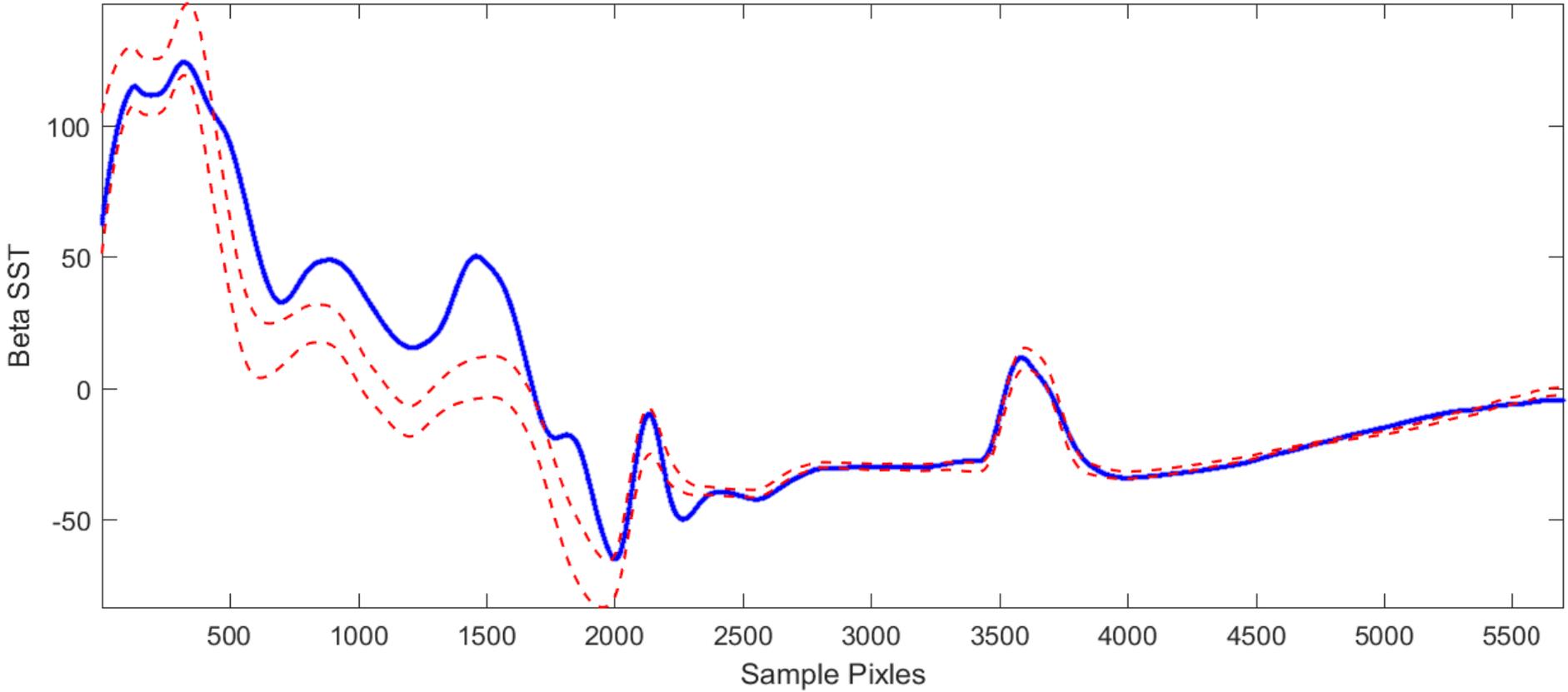
Gaussian GWR SSTvsChl

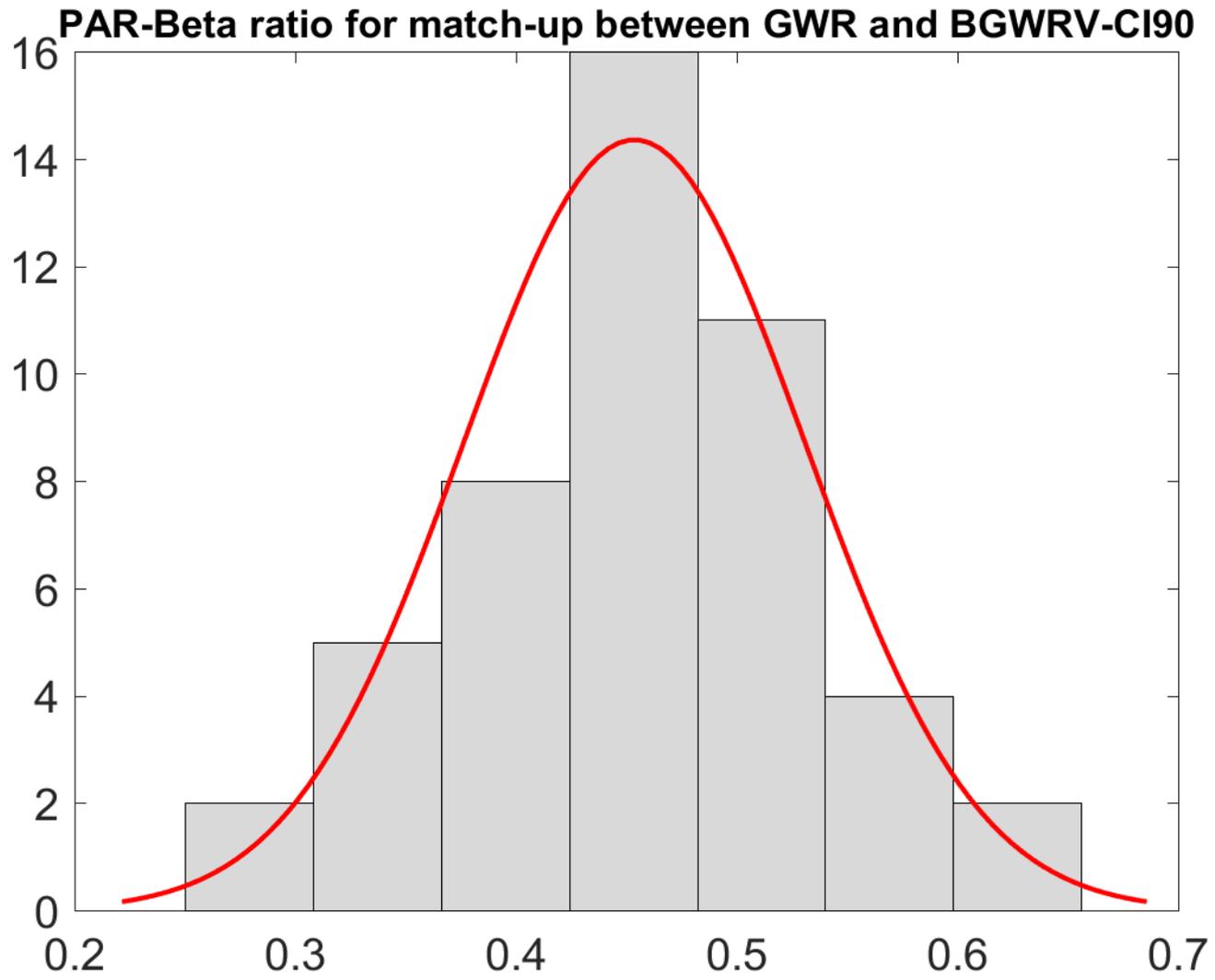


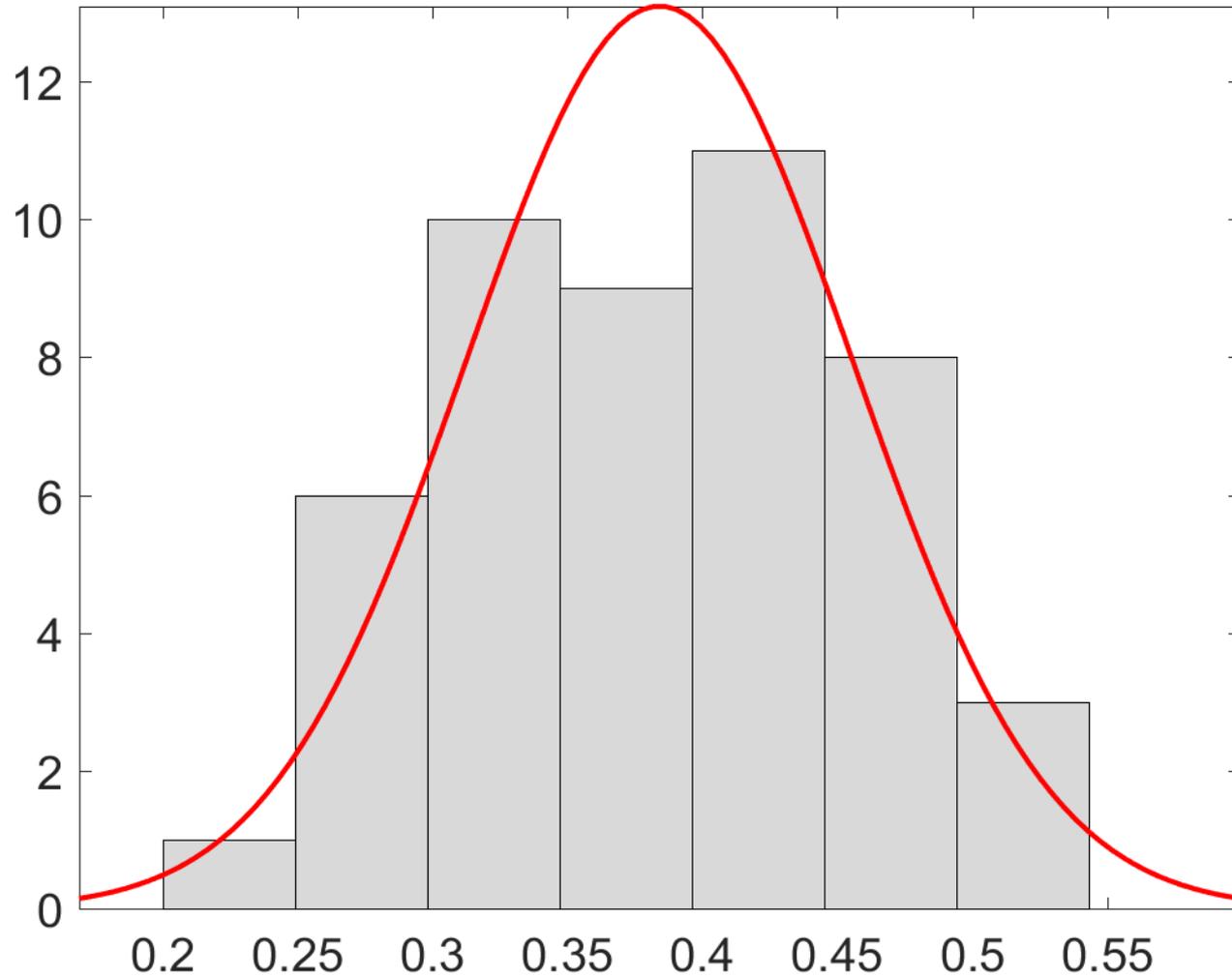
Solid Line: Beta PAR from GWR; Dashed Lines: IC95 for BGWRV



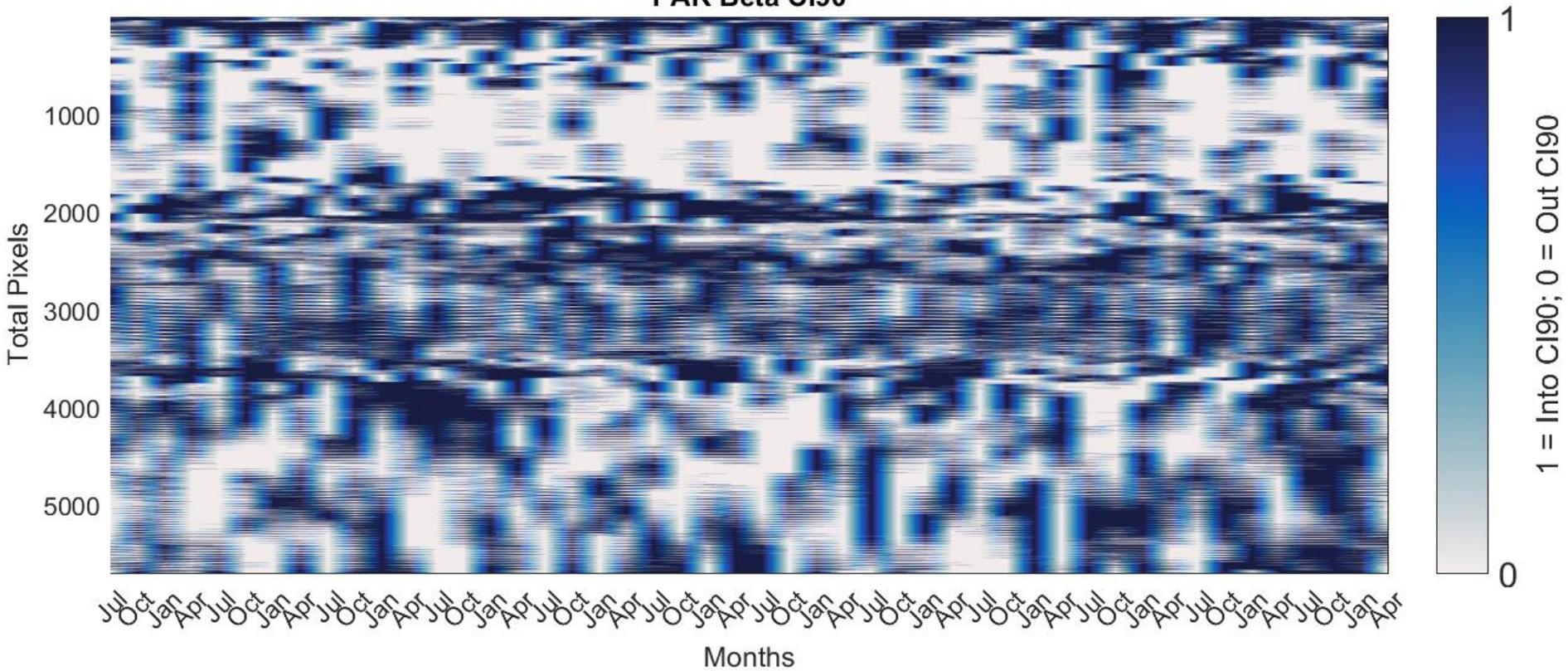
Solid Line: Beta SST from GWR; Dashed Lines: IC95 for BGWRV

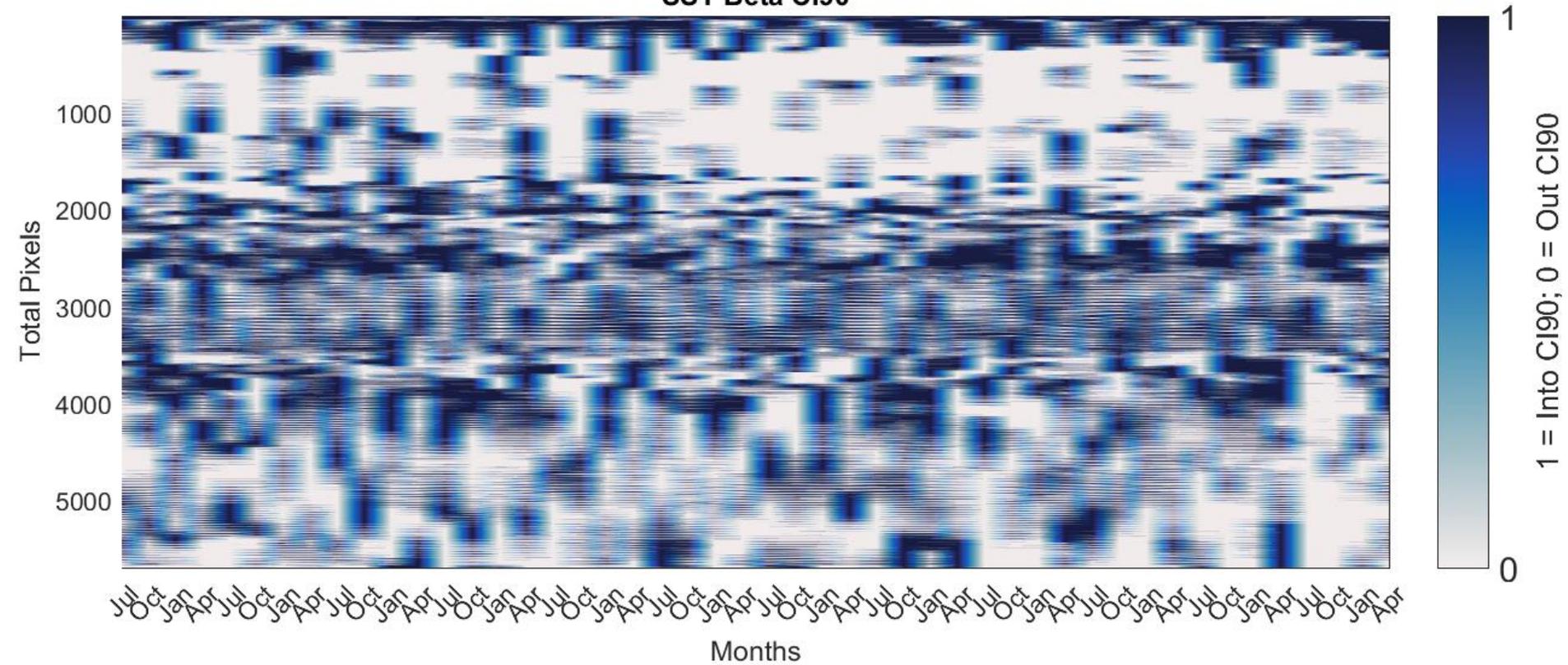




SST-Beta ratio for match-up between GWR and BGWRV-CI90

PAR Beta CI90

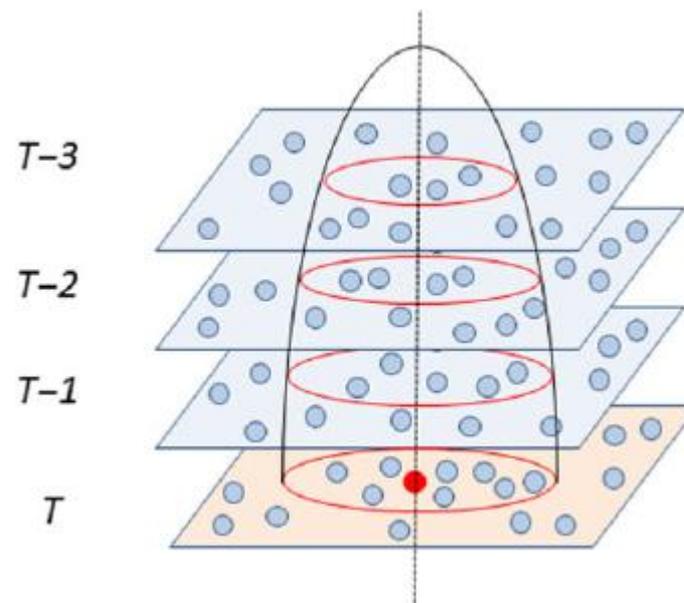


SST Beta CI90

BGWR demonstrou que GWR não apresentou resultados tão robustos indicando a importância de uma abordagem estocástica.

Como os R^2 para as duas regressões não foram substancialmente diferentes, pode-se concluir que GWR permite a estimativa de que tanto SST e PAR são eficazes preditores da concentração de clorofila na costa do Brasil.

GTWR





Trabalho Final



*Uma abordagem geoestatística para
a avaliação de variáveis meteo-
oceanográficas na costa brasileira*

OBRIGADO

Diogo Amore