

# **Validation process forCESAR**

**The epidemiology research group, EAFIT**

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## Chapter 1. Extension number1

### 1.1. Basic information

The extension to be validated consists of the time series from the data1 to the 70. The status of the validation is: COMPLETED.

The number of estimations needed to perform the validation was1000.

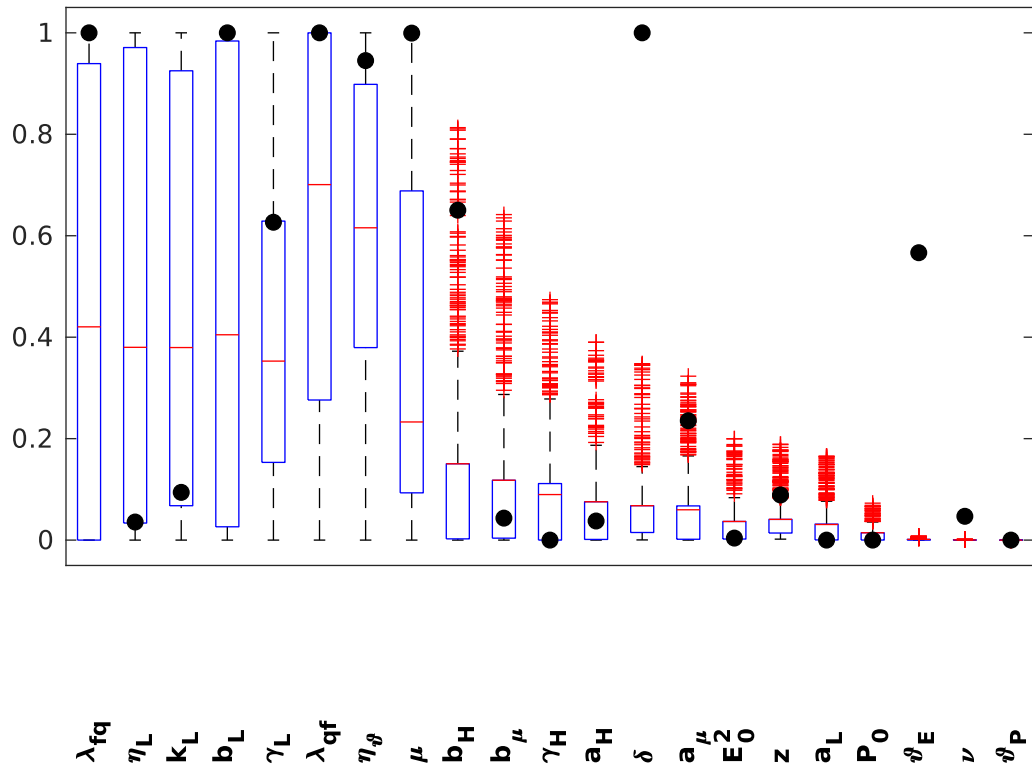
### 1.2. Estimated parameters with their intervals

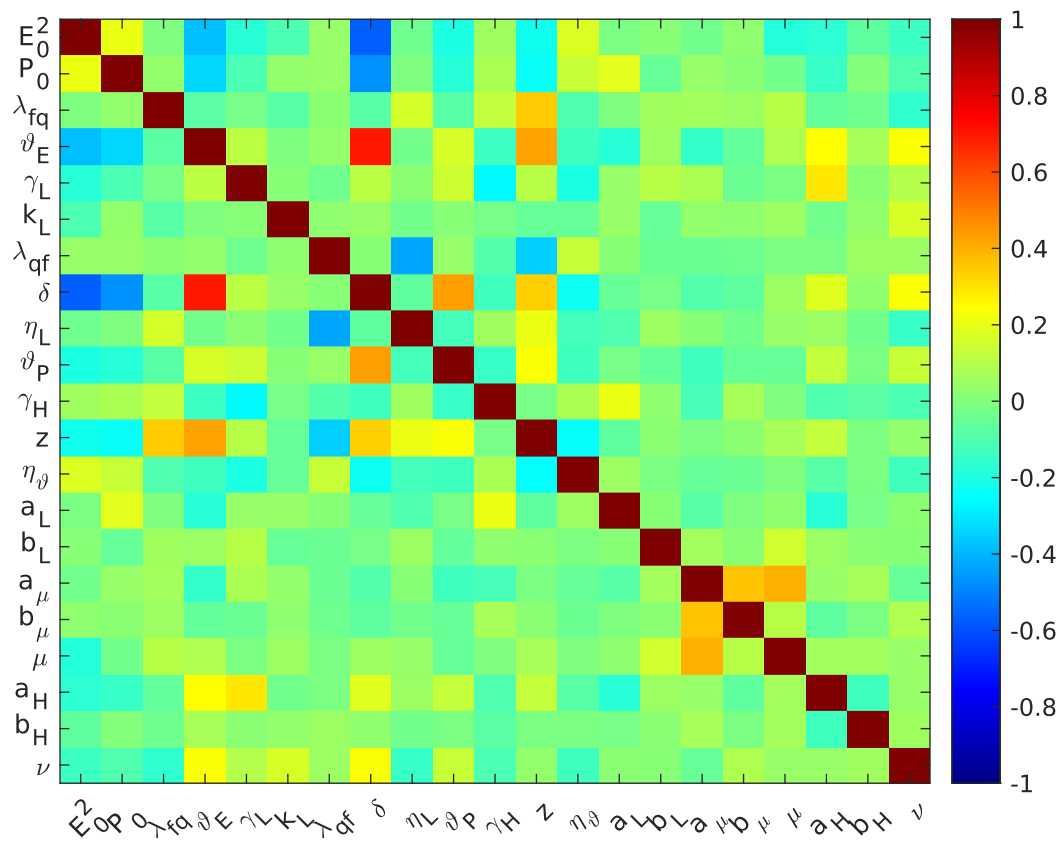
It was necessary to fix 0 parameters of 11 that could be fixed to complete validation.

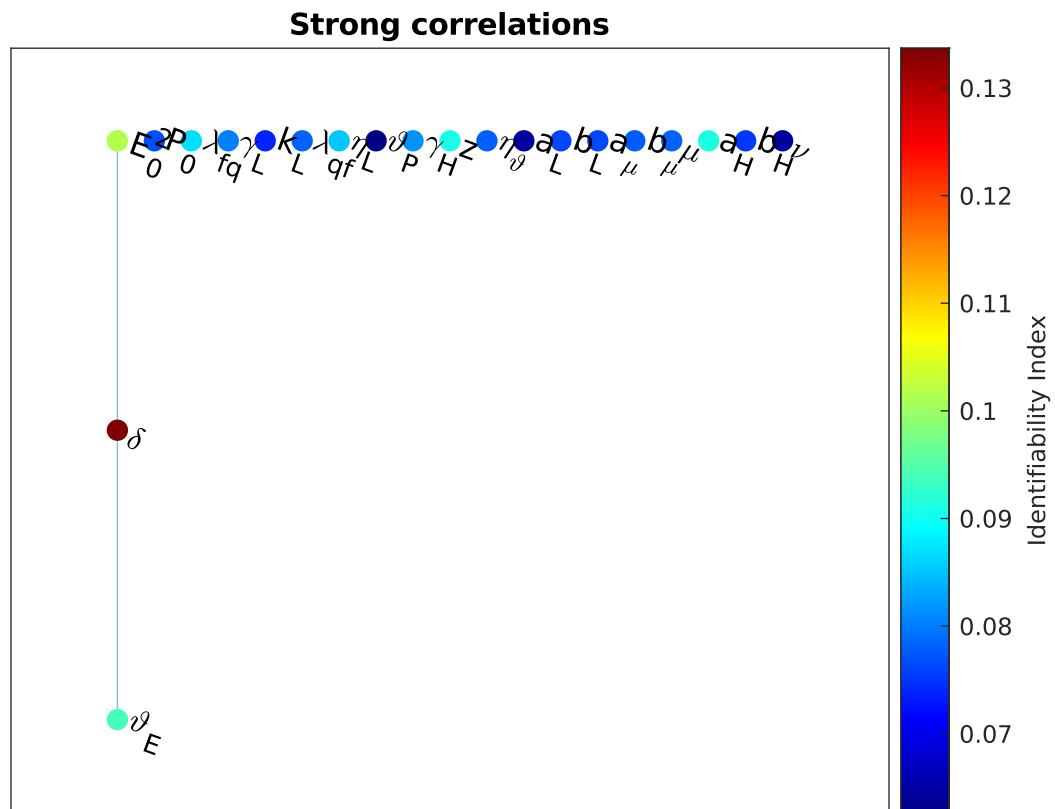
Due to a deviation from the median the CSB method was activated to obtain the parameter intervals.

	Rango		Nominal	Mejor	Index
$E^2_0$	'7.6049'	'9.5177'	'73.4819'	'7.9438'	'0.1016'
$P_0$	'0'	'0'	'5.7918'	'0'	'0.0769'
$\lambda_{fq}$	'0.9957'	'1'	'0.4204'	'1'	'0.087'
$\vartheta_E$	'0.5357'	'0.57'	'0.0014'	'0.5665'	'0.0939'
$\gamma_L$	'0.5863'	'0.6314'	'0.3529'	'0.6266'	'0.0804'
$k_L$	'1'	'10'	'4.4162'	'1.847'	'0.0739'
$\lambda_{qf}$	'0.9981'	'1'	'0.7008'	'1'	'0.0785'
$\delta$	'0.1183'	'0.15'	'0.0102'	'0.15'	'0.1337'
$\eta_L$	'0.027'	'0.5391'	'0.38'	'0.0356'	'0.0852'
$\vartheta_P$	'0'	'0'	'0'	'0'	'0.0627'
$\gamma_H$	'0'	'0'	'0.0898'	'0'	'0.0817'
$z$	'2.6403'	'2.8164'	'1.2253'	'2.6686'	'0.0909'
$\eta_{\vartheta}$	'0.2828'	'1'	'0.6157'	'0.9453'	'0.0781'
$a_L$	'1'	'1.1516'	'1.4307'	'1'	'0.0648'
$b_L$	'12.8846'	'15'	'6.6669'	'15'	'0.0764'
$a_{\mu}$	'3.9675'	'6.0492'	'1.8367'	'4.2945'	'0.0765'
$b_{\mu}$	'1.5196'	'3.076'	'2.6521'	'1.6064'	'0.0779'
$\mu$	'0.3298'	'1'	'0.2329'	'0.9994'	'0.0784'
$a_H$	'1'	'14.3'	'2.0582'	'1.527'	'0.0913'
$b_H$	'1.6913'	'15'	'3.1066'	'10.105'	'0.0754'
$\nu$	'2.6397'	'52.7934'	'0.1824'	'23.4637'	'0.0648'

### 1.3. Identifiability analysys

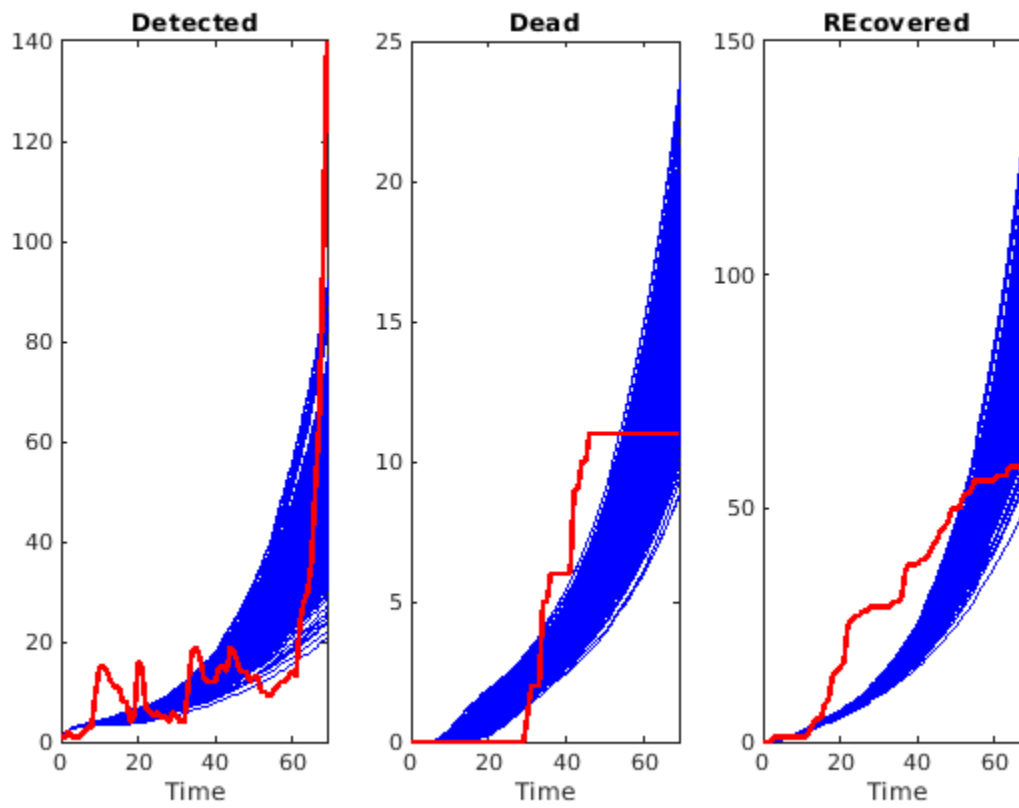






## 1.4. Uncertainty analysis

N=500





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## Chapter 2. Extension number2

### 2.1. Basic information

The extension to be validated consists of the time series from the data70 to the 120. The status of the validation is: COMPLETED.

The number of estimations needed to perform the validation was1000.

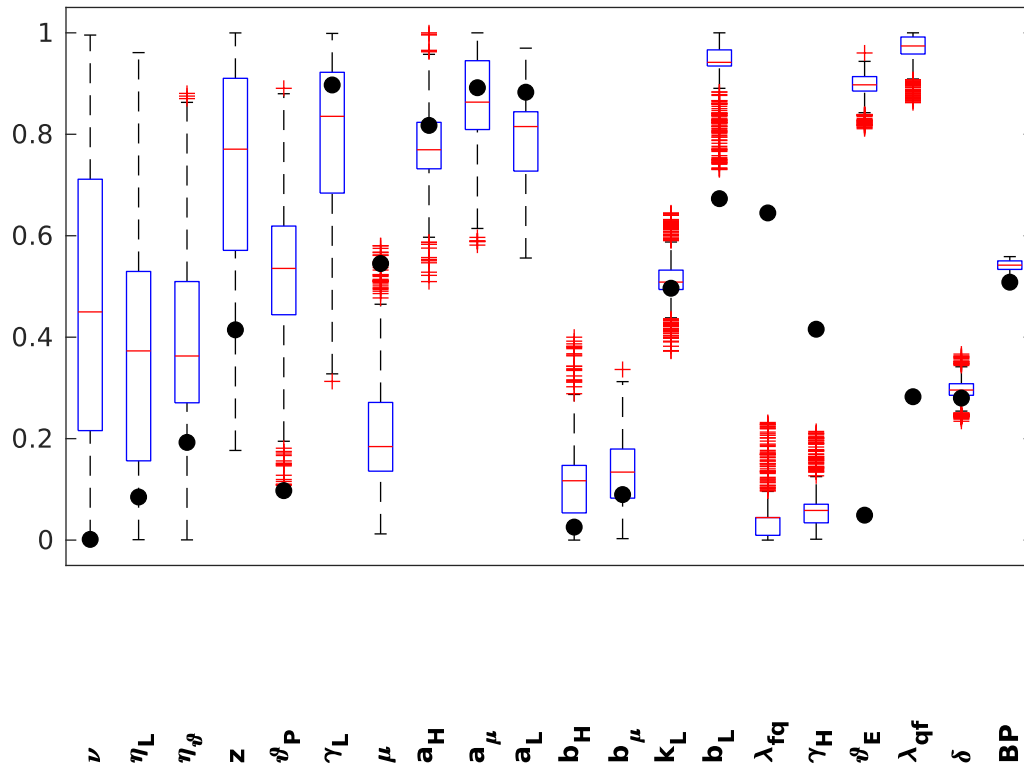
### 2.2. Estimated parameters with their intervals

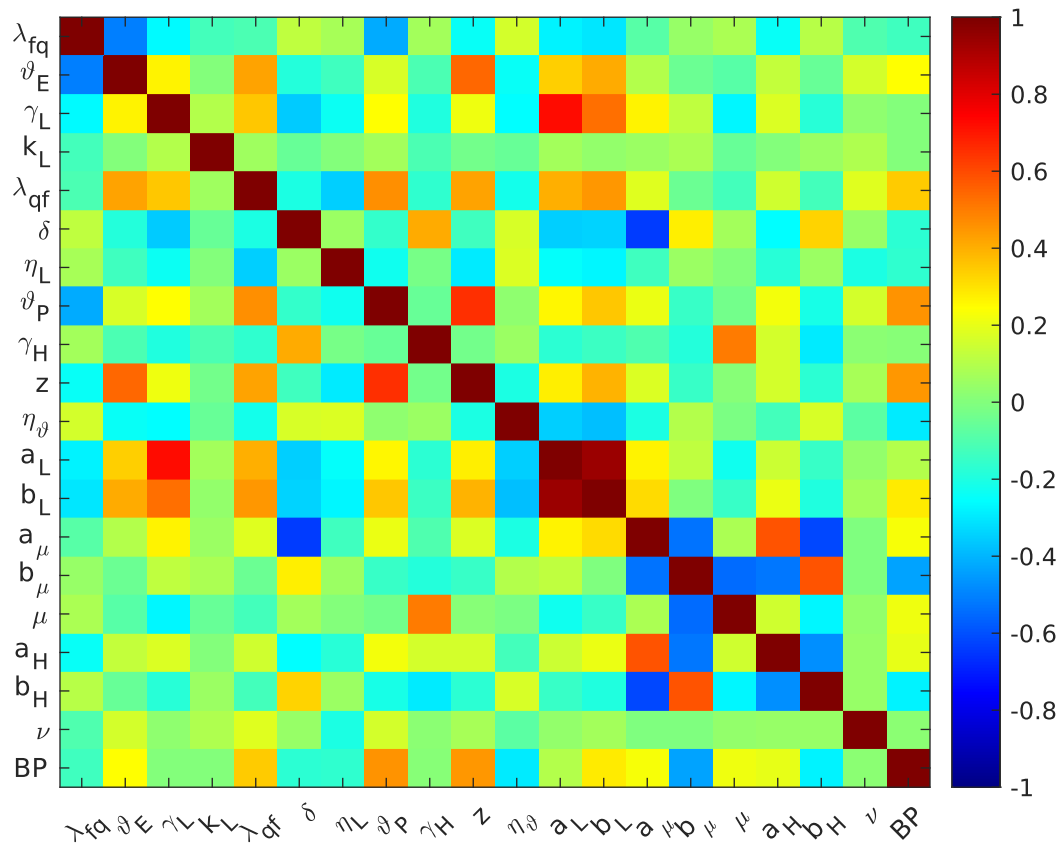
It was necessary to fix 0 parameters of 10 that could be fixed to complete validation.

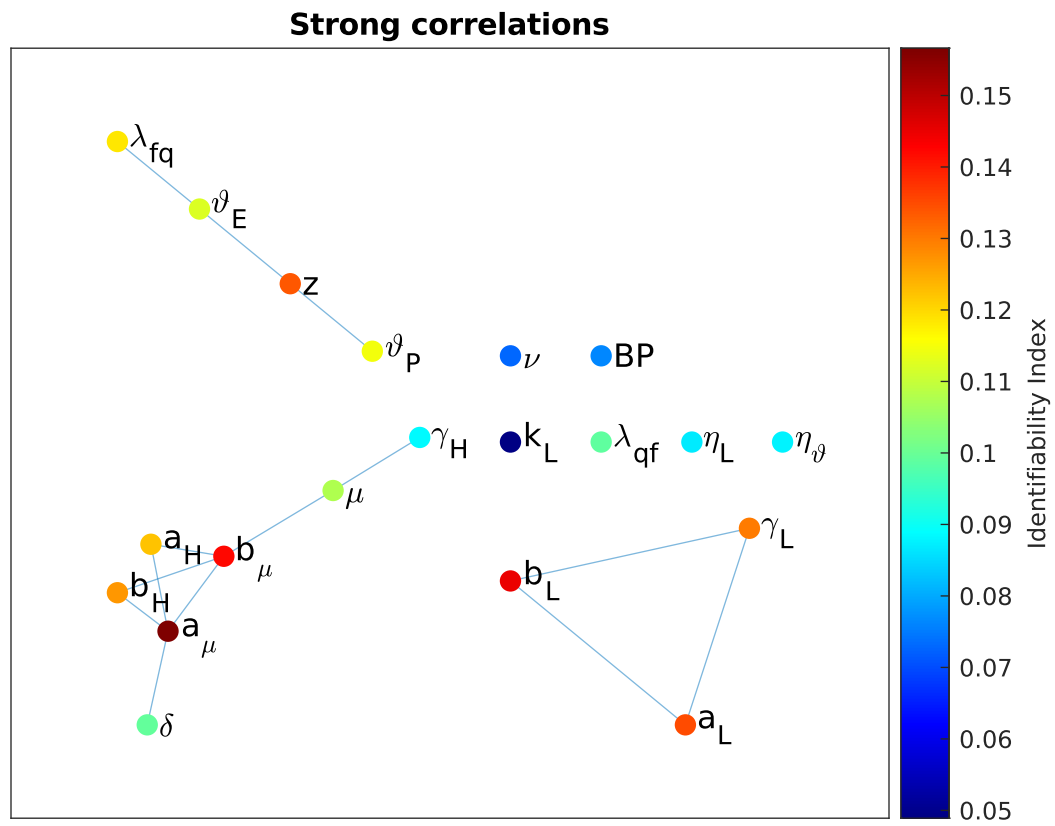
Due to a deviation from the median the CSB method was activated to obtain the parameter intervals.

	Rango		Nominal	Mejor	Index
$\lambda_{fq}$	'0.6317'	'0.6475'	'0.0444'	'0.6449'	'0.1185'
$\vartheta_E$	'0.0286'	'0.0798'	'0.8975'	'0.0492'	'0.1122'
$\gamma_L$	'0.6284'	'0.9332'	'0.8354'	'0.8972'	'0.1298'
$k_L$	'1.8273'	'6.0375'	'5.5776'	'5.4684'	'0.0489'
$\lambda_{qf}$	'0.2751'	'0.2831'	'0.9741'	'0.2826'	'0.0991'
$\delta$	'0.0304'	'0.0422'	'0.0444'	'0.042'	'0.0996'
$\eta_L$	'0.0461'	'0.1273'	'0.373'	'0.085'	'0.0869'
$\vartheta_P$	'0.0561'	'0.0992'	'0.5356'	'0.0975'	'0.1147'
$\gamma_H$	'0.087'	'0.4562'	'0.0585'	'0.4157'	'0.0886'
$z$	'12.0276'	'12.4372'	'23.1193'	'12.436'	'0.1336'
$\eta_{\vartheta}$	'0.0907'	'0.2238'	'0.3629'	'0.1926'	'0.088'
$a_L$	'11.7983'	'13.5459'	'12.4133'	'13.3613'	'0.1349'
$b_L$	'8.6747'	'11.5546'	'14.1852'	'10.4236'	'0.145'
$a_{\mu}$	'11.0229'	'13.6315'	'13.0871'	'13.4854'	'0.1566'
$b_{\mu}$	'2.2394'	'2.8172'	'2.8767'	'2.2561'	'0.1423'
$\mu$	'0.3107'	'0.5503'	'0.1844'	'0.5452'	'0.1078'
$a_H$	'9.9428'	'12.6213'	'11.7731'	'12.445'	'0.1221'
$b_H$	'1.244'	'1.9118'	'2.6378'	'1.3594'	'0.1269'
$\nu$	'0.5198'	'1.0025'	'224.926'	'0.6984'	'0.0729'
BP	'58.5129'	'65.0782'	'65.5'	'61.5'	'0.0766'

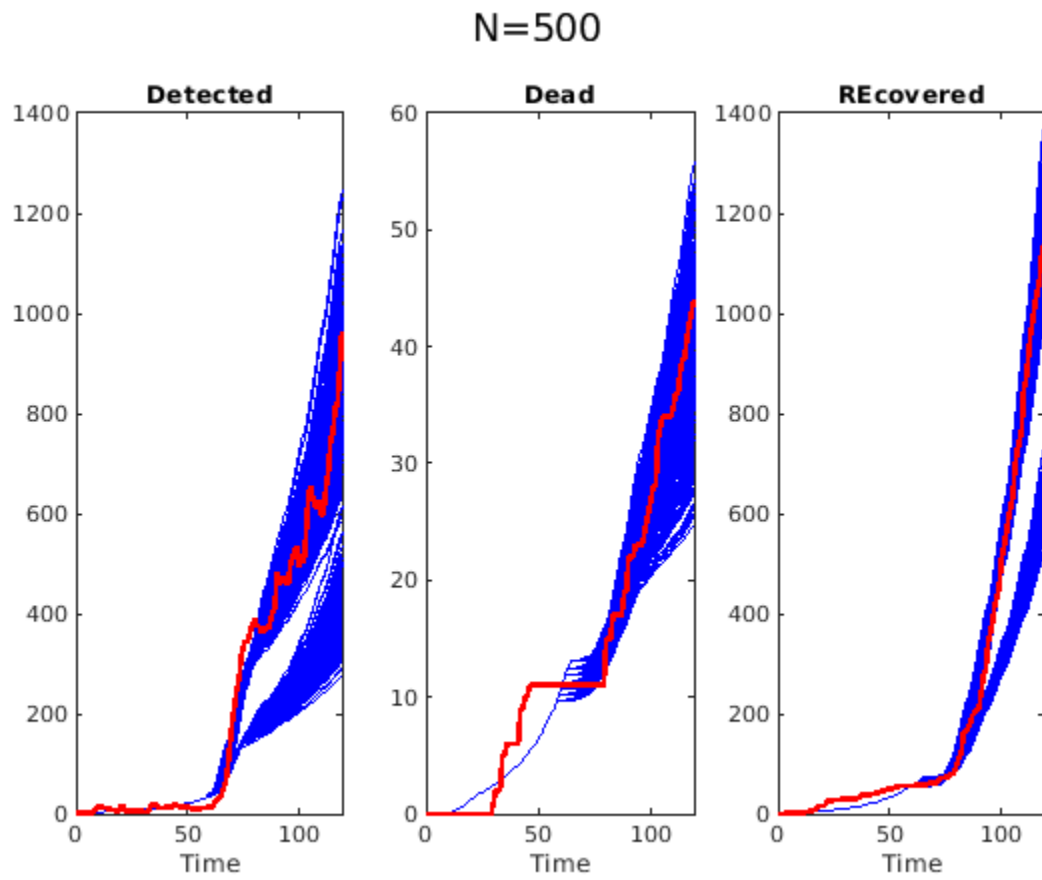
### 2.3. Identifiability analysis







## 2.4. Uncertainty analysis



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## Chapter 3. Extension number3

### 3.1. Basic information

The extension to be validated consists of the time series from the data120 to the 158. The status of the validation is: COMPLETED.

The number of estimations needed to perform the validation was1000.

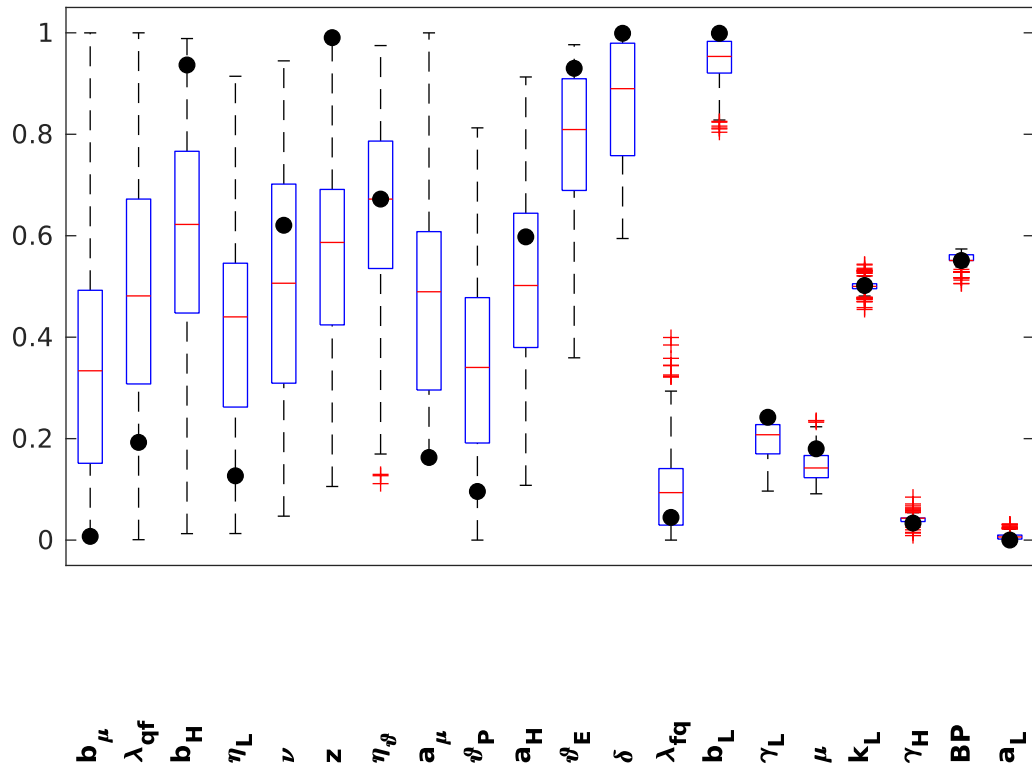
### 3.2. Estimated parameters with their intervals

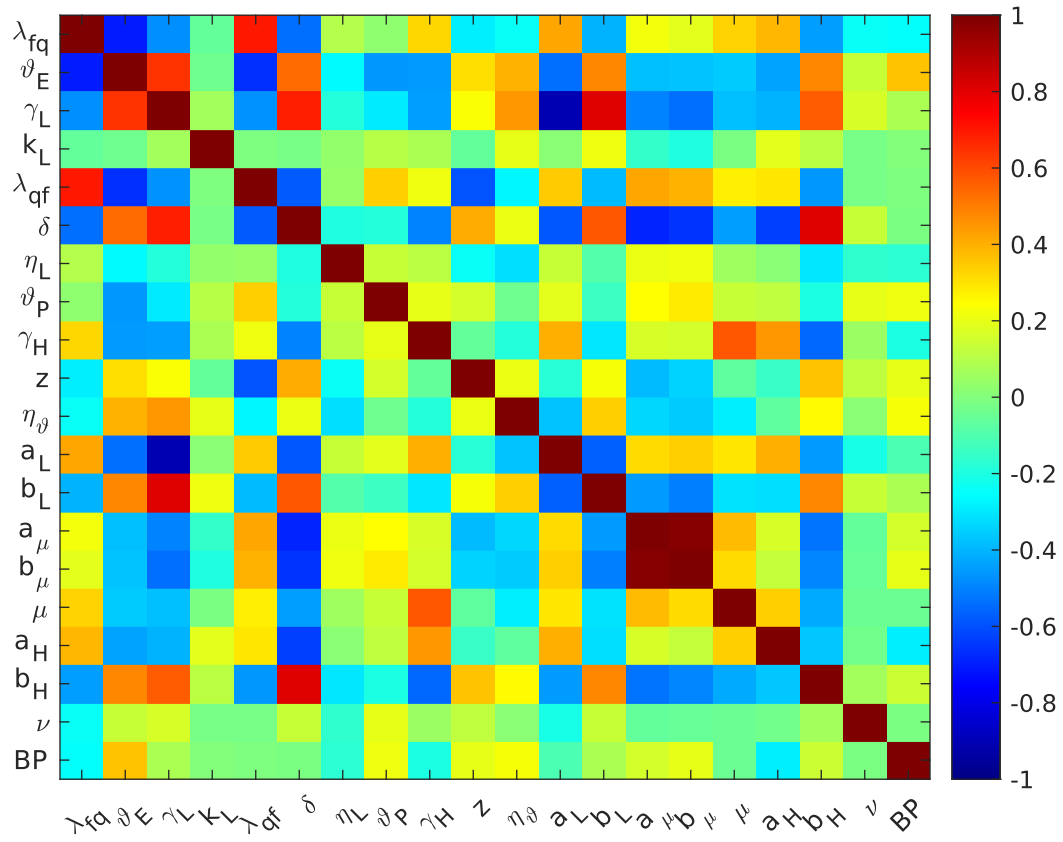
It was necessary to fix 0 parameters of 10 that could be fixed to complete validation.

Due to a deviation from the median the CSB method was activated to obtain the parameter intervals.

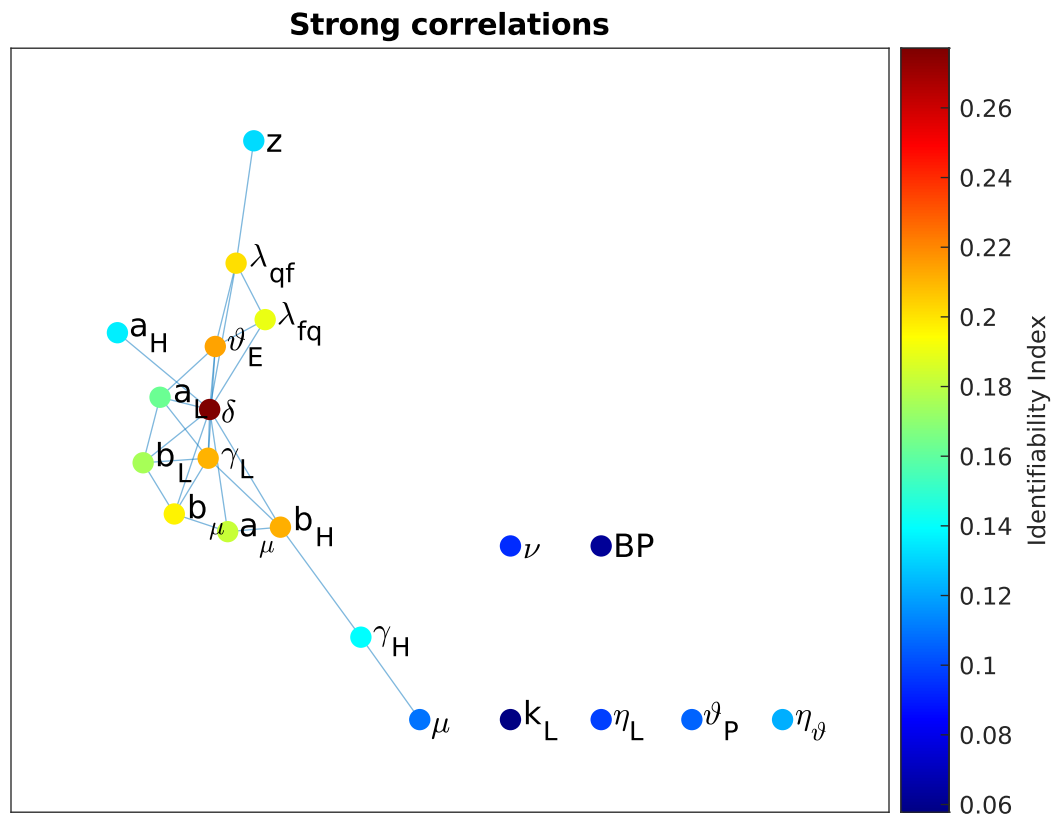
	Rango		Nominal	Mejor	Index
$\lambda_{fq}$	'0.0393'	'0.0528'	'0.0936'	'0.0447'	'0.19'
$\vartheta_E$	'0.9204'	'0.9305'	'0.8093'	'0.93'	'0.2145'
$\gamma_L$	'0.2177'	'0.2425'	'0.2077'	'0.2421'	'0.2111'
$k_L$	'1.6155'	'9.2622'	'5.5012'	'5.5167'	'0.0578'
$\lambda_{qf}$	'0.1822'	'0.2019'	'0.4814'	'0.1926'	'0.2012'
$\delta$	'0.1089'	'0.15'	'0.1335'	'0.1499'	'0.2771'
$\eta_L$	'0.0679'	'0.1277'	'0.44'	'0.1267'	'0.0984'
$\vartheta_P$	'0.0539'	'0.108'	'0.3403'	'0.0959'	'0.1065'
$\gamma_H$	'0.0066'	'0.0632'	'0.0432'	'0.0336'	'0.1393'
$z$	'27.3562'	'29.7792'	'17.6029'	'29.7139'	'0.1321'
$\eta_{\vartheta}$	'0.1794'	'0.7131'	'0.6722'	'0.6722'	'0.1227'
$a_L$	'1'	'5.8815'	'1.0872'	'1.0013'	'0.1624'
$b_L$	'8.9391'	'15'	'14.3481'	'14.9879'	'0.1756'
$a_{\mu}$	'3.2752'	'3.7975'	'7.8536'	'3.2806'	'0.1823'
$b_{\mu}$	'1.0765'	'1.318'	'5.6728'	'1.1028'	'0.1967'
$\mu$	'0.1611'	'0.3055'	'0.1422'	'0.18'	'0.1098'
$a_H$	'1.9554'	'14.468'	'8.0263'	'9.3687'	'0.1363'
$b_H$	'3.9455'	'14.5199'	'9.7118'	'14.1124'	'0.2114'
$\nu$	'164.5455'	'328.2887'	'253.1767'	'310.312'	'0.0941'
BP	'118.3762'	'120.4665'	'118.5'	'118.5'	'0.0622'

### 3.3. Identifiability analysis

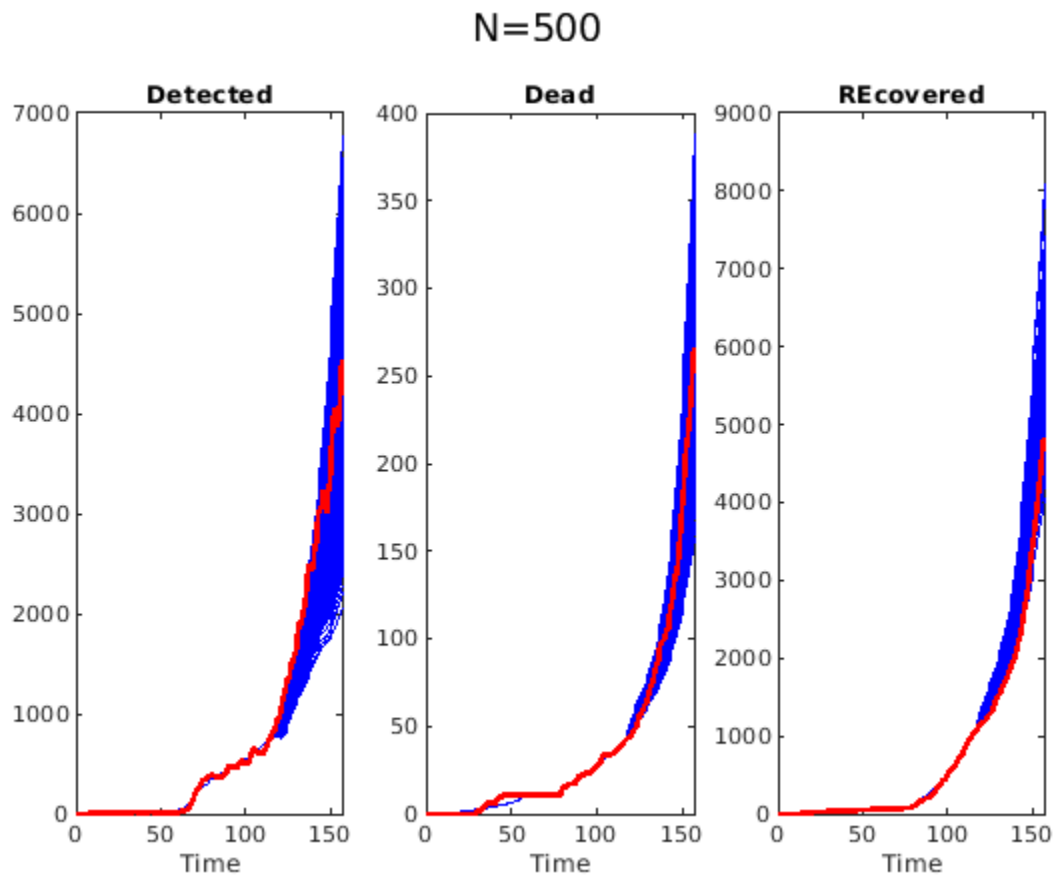








### 3.4. Uncertainty analysys



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## Chapter 4. Extension number4

### 4.1. Basic information

The extension to be validated consists of the time series from the data158 to the 192. The status of the validation is: COMPLETED.

The number of estimations needed to perform the validation was1000.

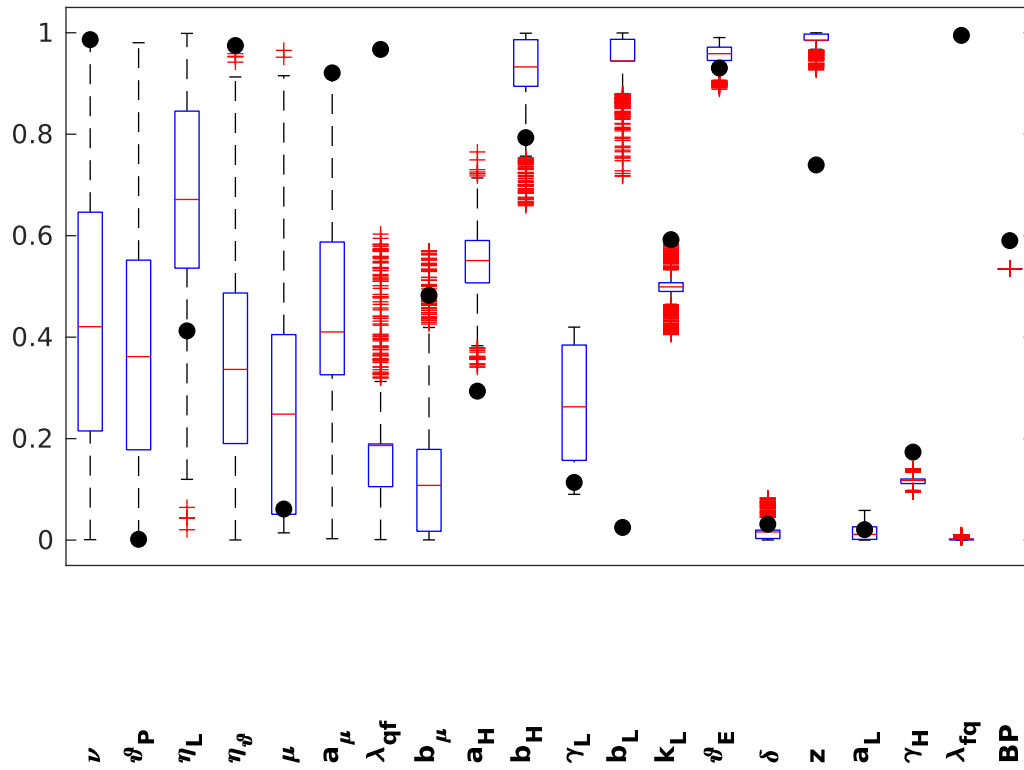
### 4.2. Estimated parameters with their intervals

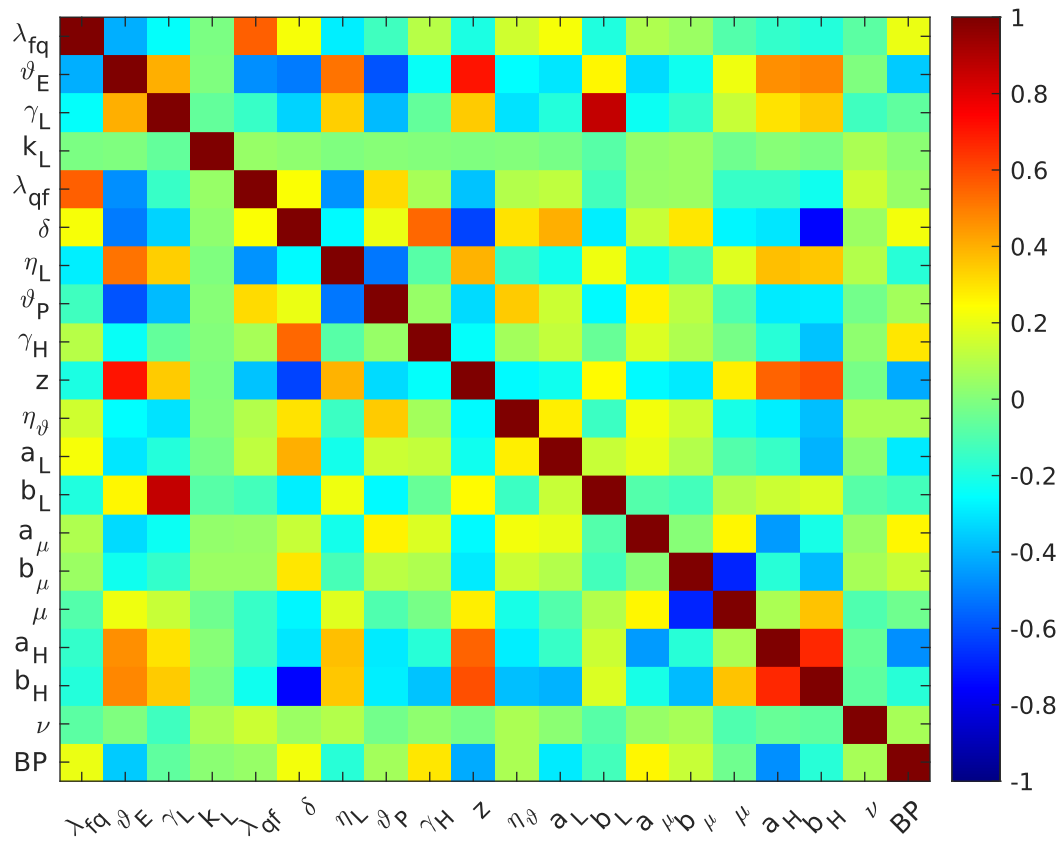
It was necessary to fix 0 parameters of 10 that could be fixed to complete validation.

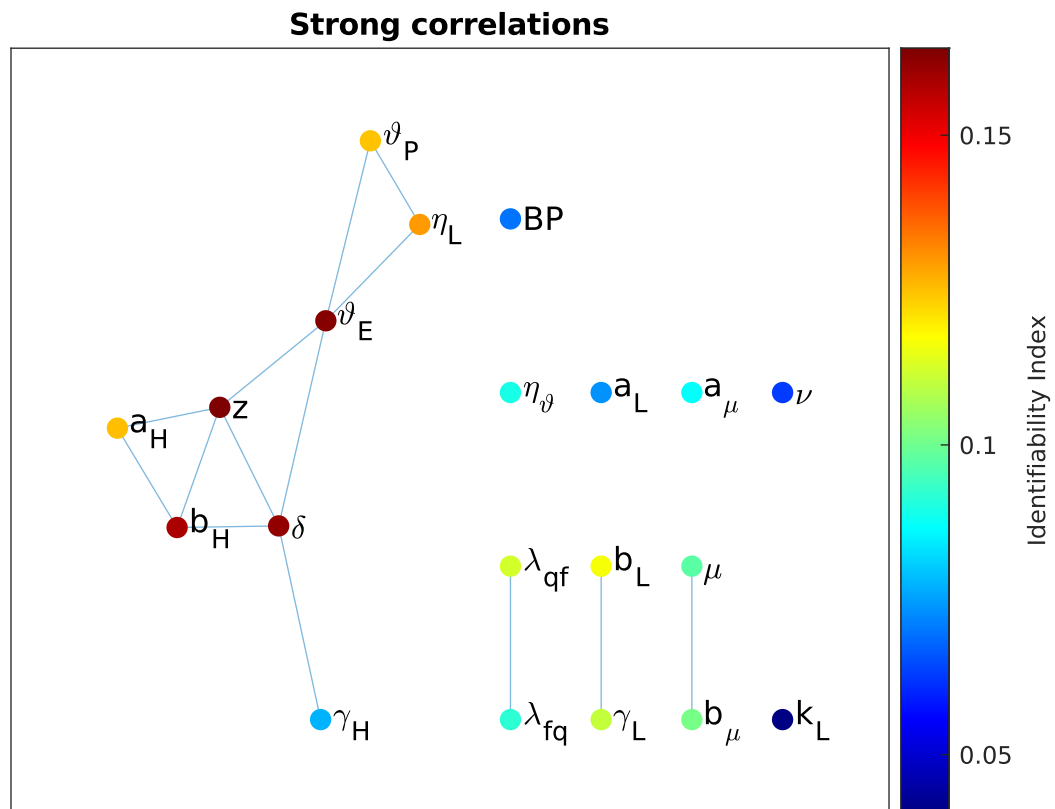
Due to a deviation from the median the CSB method was activated to obtain the parameter intervals.

	Rango		Nominal	Mejor	Index
\lambda_{fq}	'0.6488'	'1'	'0.002'	'0.9948'	'0.092'
\vartheta_E	'0.8707'	'0.9535'	'0.9587'	'0.9305'	'0.1631'
\gamma_L	'0.0811'	'0.1664'	'0.2627'	'0.1137'	'0.1101'
k_L	'1.5725'	'10'	'5.4922'	'6.33'	'0.0407'
\lambda_{qf}	'0.8539'	'0.9869'	'0.1865'	'0.9672'	'0.1123'
\delta	'0'	'0.0106'	'0.0024'	'0.0047'	'0.1615'
\eta_L	'0.0904'	'0.9271'	'0.6709'	'0.4124'	'0.1295'
\vartheta_P	'0'	'0.0034'	'0.3617'	'0.0015'	'0.125'
\gamma_H	'0.0919'	'0.3903'	'0.1178'	'0.1735'	'0.0777'
z	'12.0845'	'28.2757'	'29.559'	'22.1833'	'0.164'
\eta_{\vartheta}	'0.2419'	'1'	'0.3364'	'0.9748'	'0.0894'
a_L	'1.0339'	'1.7982'	'1.1584'	'1.2874'	'0.0738'
b_L	'1'	'7.5159'	'14.2183'	'1.3491'	'0.1166'
a_{\mu}	'1.35'	'15'	'6.7462'	'13.8933'	'0.0872'
b_{\mu}	'1.28'	'15'	'2.5098'	'7.7549'	'0.1013'
\mu	'0.0263'	'0.0617'	'0.2483'	'0.0612'	'0.0979'
a_H	'1.336'	'12.3308'	'8.714'	'5.1104'	'0.1251'
b_H	'1.28'	'15'	'14.0561'	'12.1062'	'0.1584'
\nu	'292.3138'	'500'	'210.3159'	'493.2133'	'0.0631'
BP	'160.0443'	'166.8354'	'158.5'	'162.5'	'0.0698'

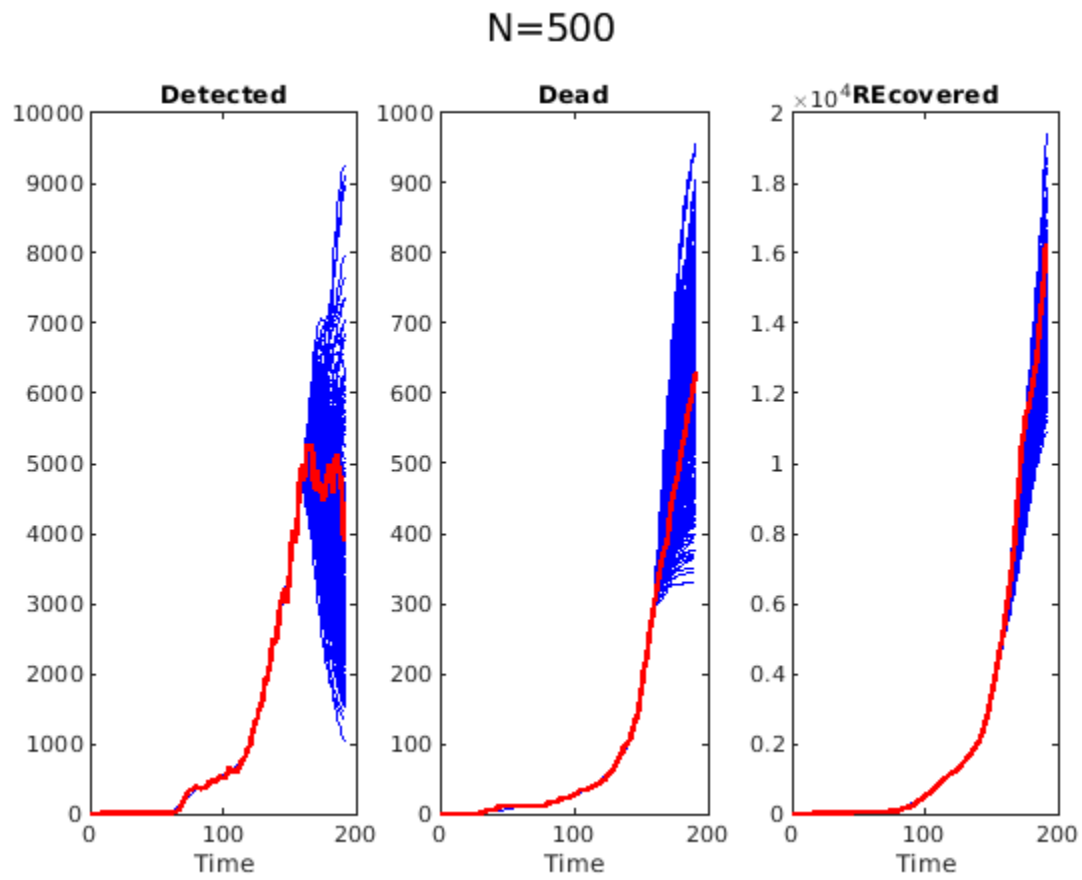
### 4.3. Identifiability analysis







#### 4.4. Uncertainty analysys



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## Chapter 5. Extension number5

### 5.1. Basic information

The extension to be validated consists of the time series from the data192 to the 243. The status of the validation is: COMPLETED.

The number of estimations needed to perform the validation was1000.

### 5.2. Estimated parameters with their intervals

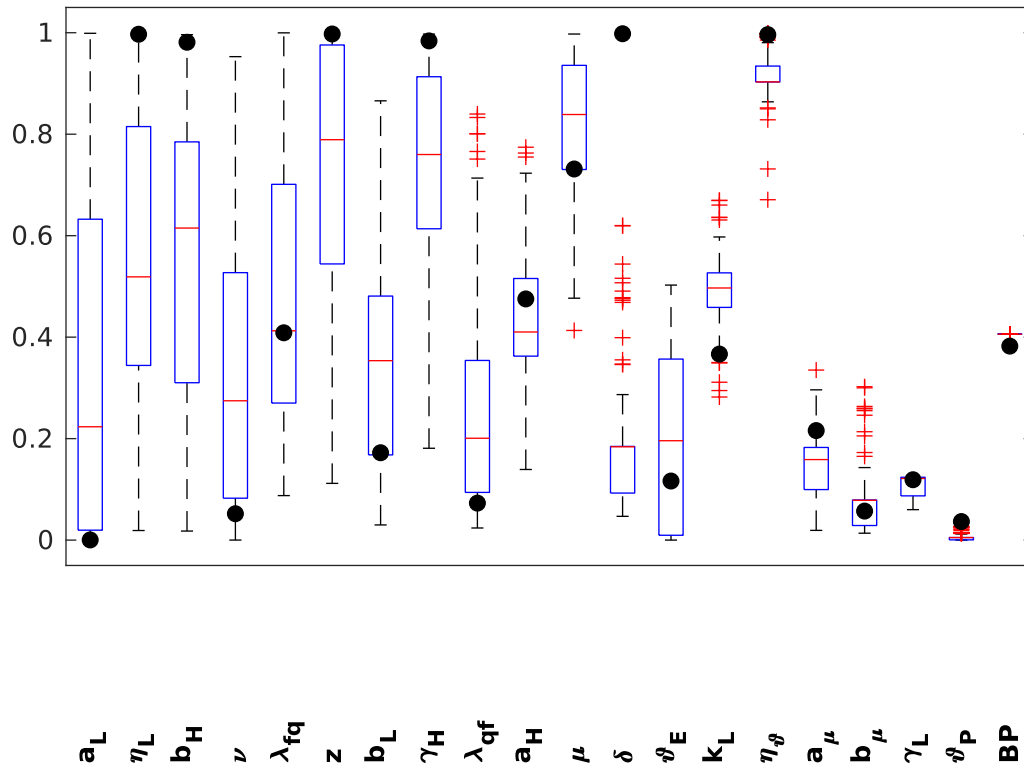
It was necessary to fix 0 parameters of 10 that could be fixed to complete validation.

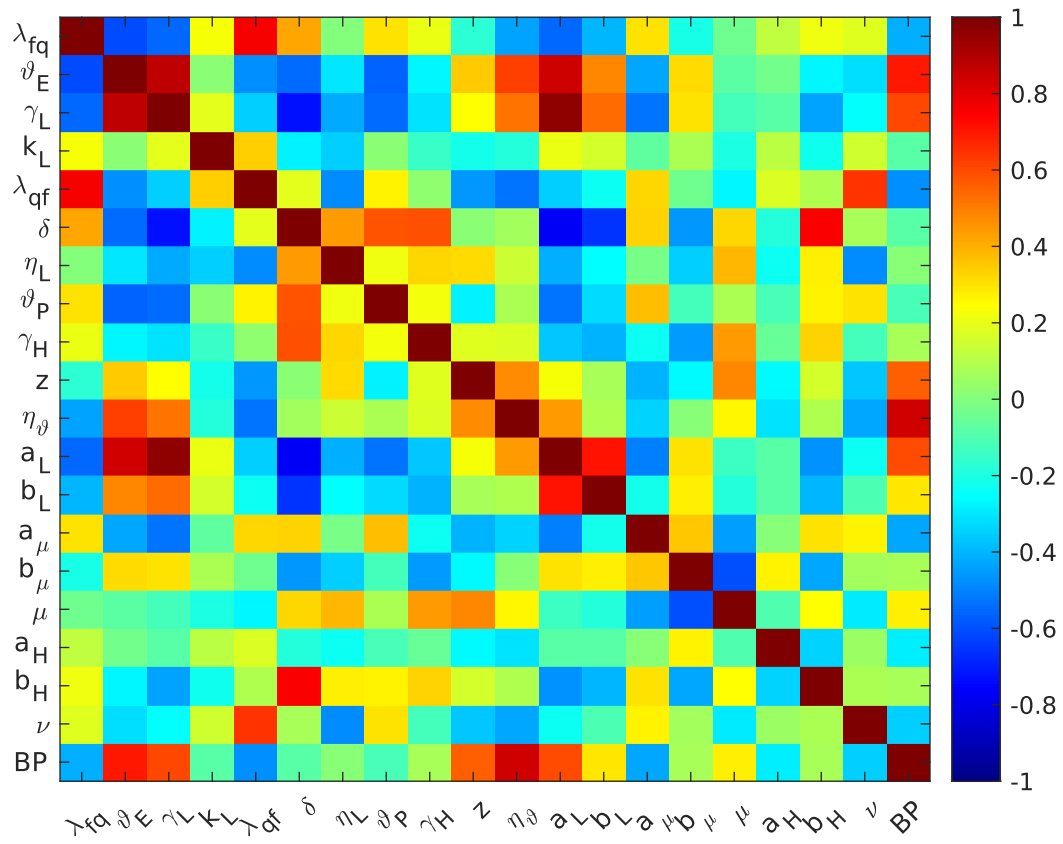
Due to a deviation from the median the CSB method was activated to obtain the parameter intervals.

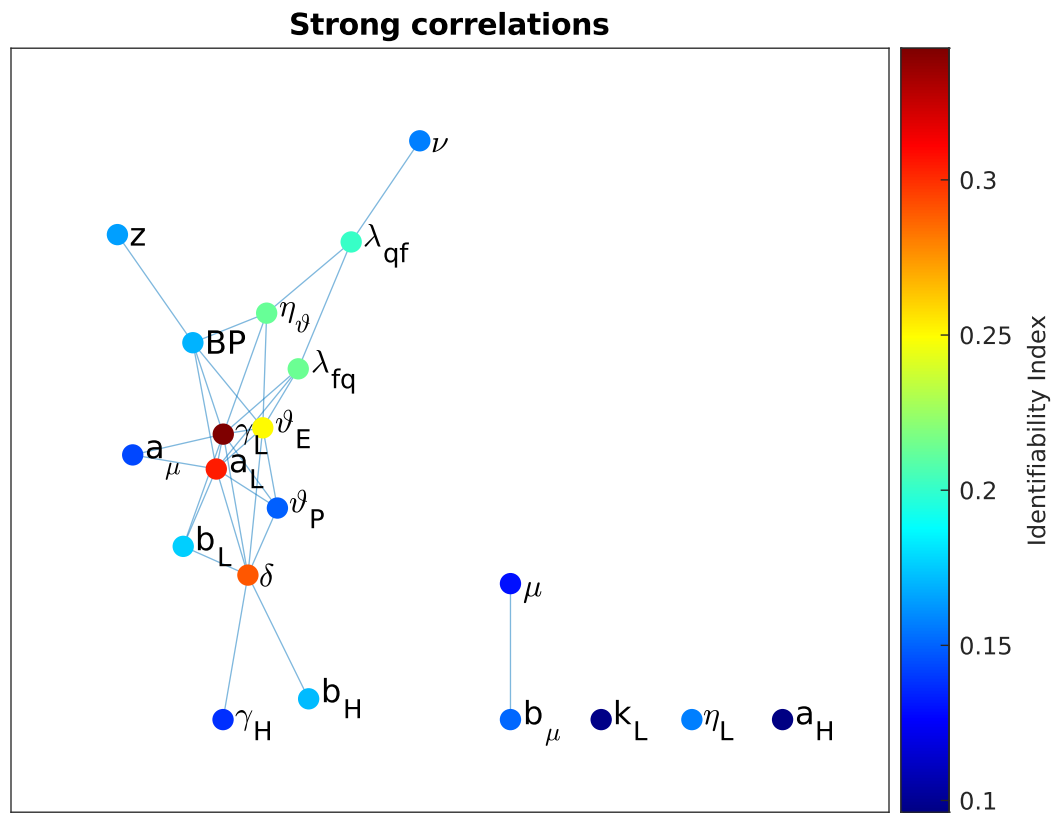
	Rango		Nominal	Mejor	Index
$\lambda_{fq}$	'0.3544'	'0.4265'	'0.4125'	'0.4086'	'0.2141'
$\vartheta_E$	'0.0763'	'0.2525'	'0.1958'	'0.1164'	'0.2509'
$\gamma_L$	'0.1088'	'0.1201'	'0.1239'	'0.119'	'0.3424'
$k_L$	'1.5228'	'6.739'	'5.4721'	'4.2999'	'0.0975'
$\lambda_{qf}$	'0.068'	'0.0862'	'0.2011'	'0.0729'	'0.2016'
$\delta$	'0.0671'	'0.15'	'0.0277'	'0.1497'	'0.2897'
$\eta_L$	'0.7279'	'1'	'0.5188'	'0.997'	'0.1575'
$\vartheta_P$	'0.0358'	'0.065'	'0.0051'	'0.0366'	'0.1492'
$\gamma_H$	'0.4164'	'1'	'0.7599'	'0.9839'	'0.1385'
$z$	'20.1624'	'30'	'23.6744'	'29.9249'	'0.1652'
$\eta_{\vartheta}$	'0.904'	'1'	'0.9029'	'0.9962'	'0.2136'
$a_L$	'1'	'5.6221'	'4.1272'	'1.0046'	'0.3041'
$b_L$	'3.1305'	'6.5251'	'5.951'	'3.4106'	'0.1766'
$a_{\mu}$	'3.1331'	'13.0817'	'3.2332'	'4.022'	'0.1437'
$b_{\mu}$	'1.1175'	'2.9844'	'2.1077'	'1.8005'	'0.1518'
$\mu$	'0'	'0.7776'	'0.8388'	'0.7314'	'0.1301'
$a_H$	'1.2439'	'10.7563'	'6.7466'	'7.6543'	'0.0962'
$b_H$	'9.2108'	'15'	'9.61'	'14.737'	'0.1716'
$\nu$	'20.0306'	'34.9759'	'137.293'	'25.9954'	'0.1576'
BP	'190.1264'	'193.6904'	'192.5'	'190.5'	'0.1696'



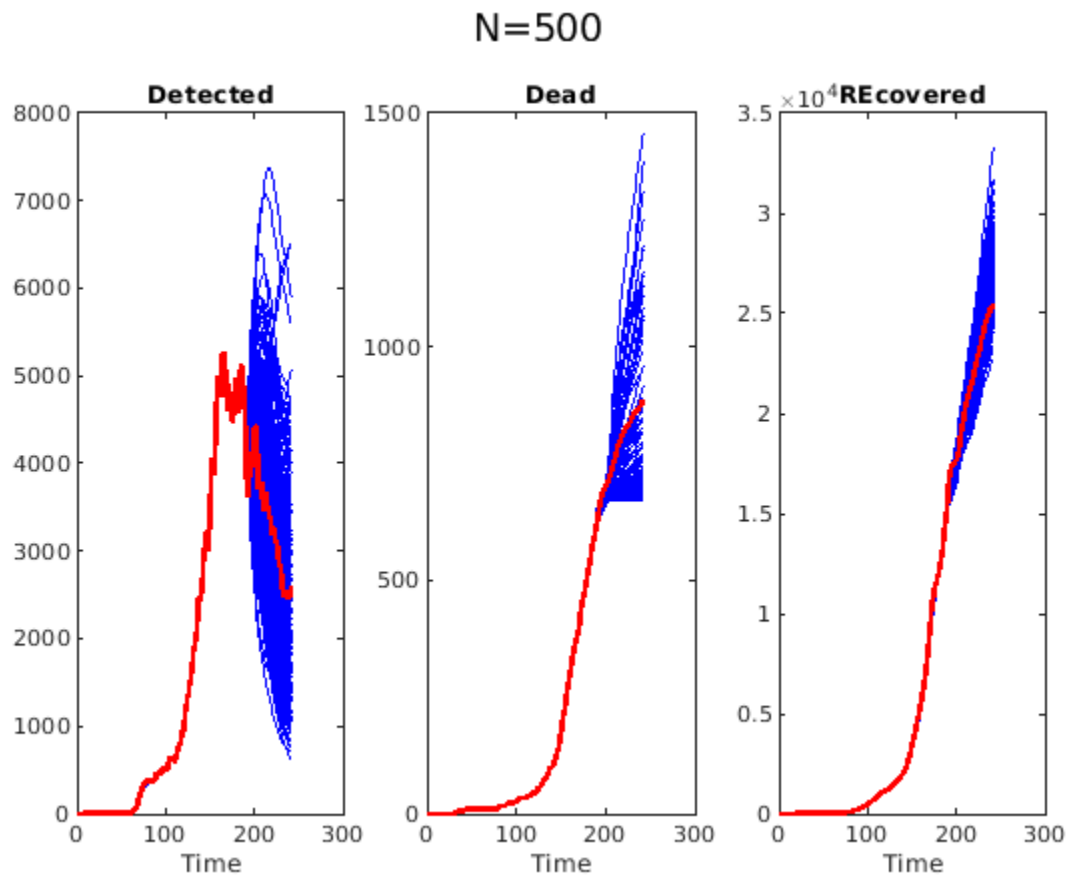
### 5.3. Identifiability analysys







## 5.4. Uncertainty analysis



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## Chapter 6. Extension number6

### 6.1. Basic information

The extension to be validated consists of the time series from the data243 to the 280. The status of the validation is: COMPLETED.

The number of estimations needed to perform the validation was1000.

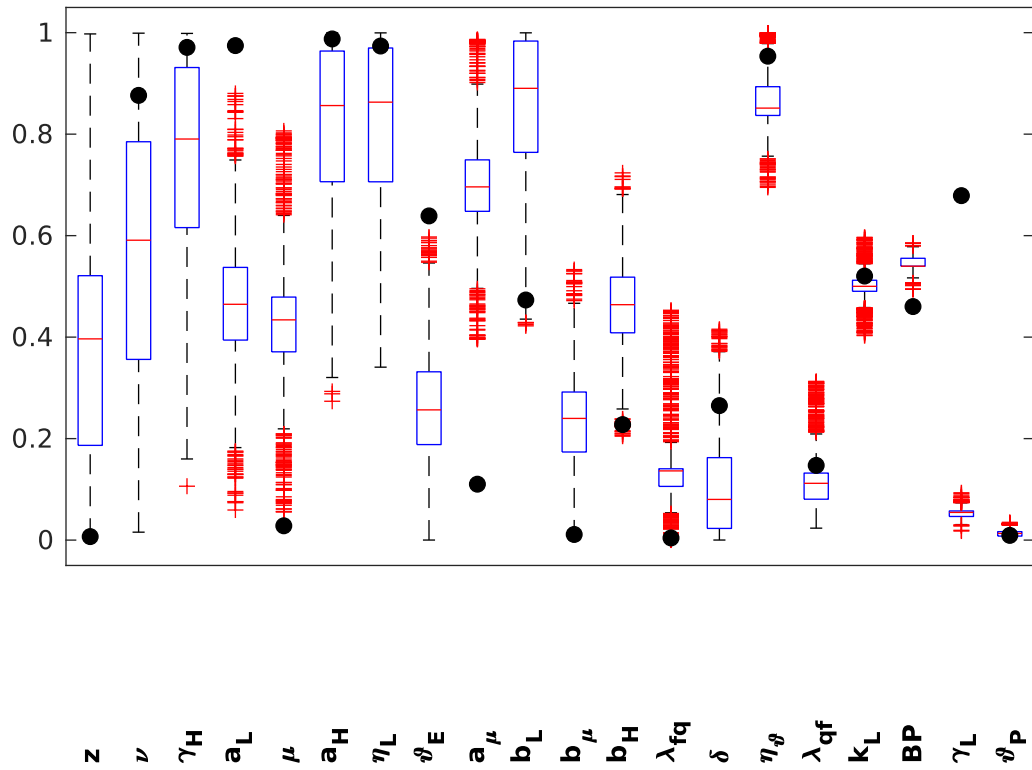
### 6.2. Estimated parameters with their intervals

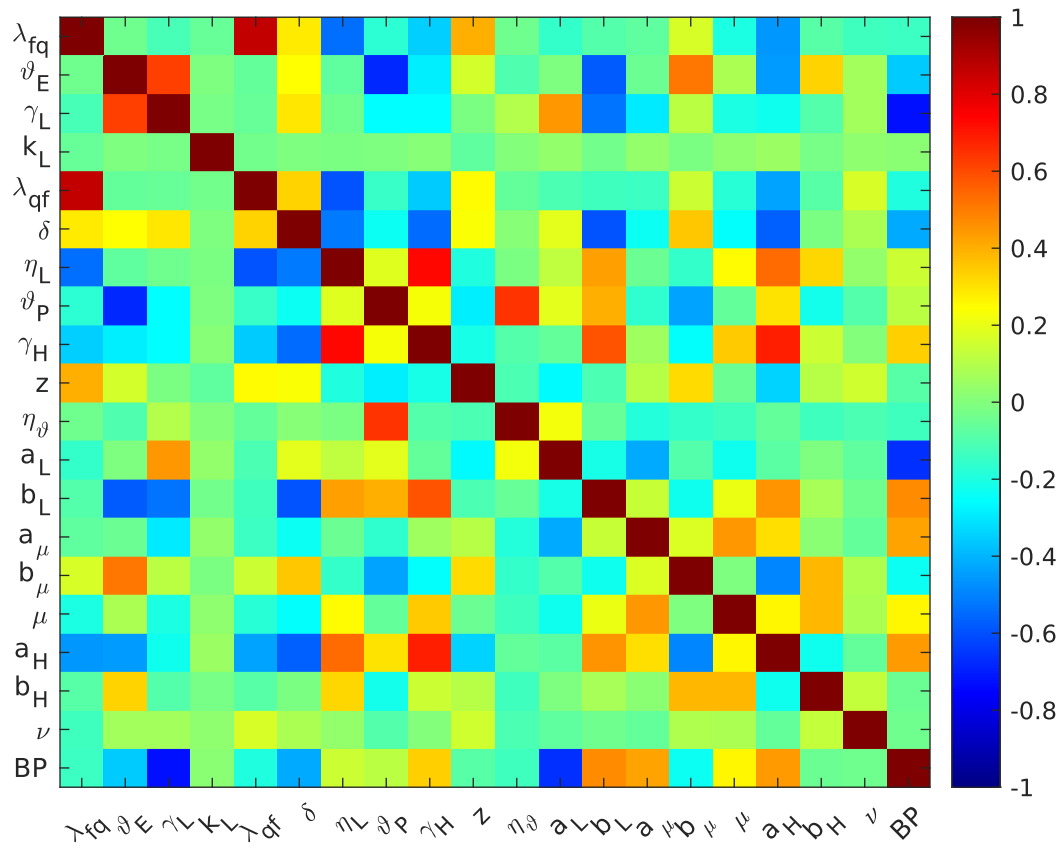
It was necessary to fix 0 parameters of 10 that could be fixed to complete validation.

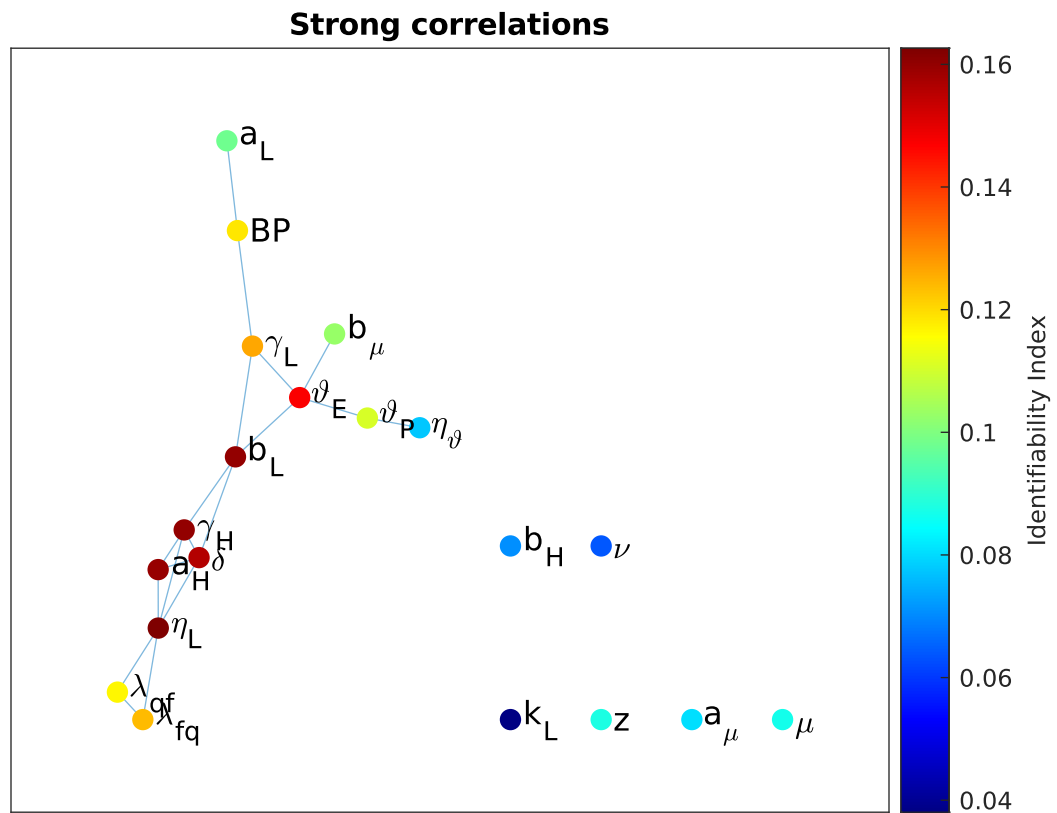
Due to a deviation from the median the CSB method was activated to obtain the parameter intervals.

	Rango		Nominal	Mejor	Index
$\lambda_{fq}$	'0'	'0.0086'	'0.1364'	'0.0043'	'0.1239'
$\vartheta_E$	'0.4175'	'0.7561'	'0.2566'	'0.6389'	'0.1474'
$\gamma_L$	'0.2767'	'0.7685'	'0.0545'	'0.6788'	'0.1261'
$k_L$	'1'	'10'	'5.5011'	'5.6832'	'0.0381'
$\lambda_{qf}$	'0.1278'	'0.2134'	'0.1119'	'0.1472'	'0.1168'
$\delta$	'0'	'0.0894'	'0.012'	'0.0398'	'0.1563'
$\eta_L$	'0.6173'	'0.9847'	'0.8631'	'0.9737'	'0.1626'
$\vartheta_P$	'0.0024'	'0.021'	'0.0132'	'0.0093'	'0.1108'
$\gamma_H$	'0.025'	'1'	'0.7904'	'0.971'	'0.1601'
$z$	'0.1474'	'0.2275'	'11.8963'	'0.2069'	'0.088'
$\eta_{\vartheta}$	'0.6226'	'0.9802'	'0.8513'	'0.9536'	'0.0776'
$a_L$	'11.0933'	'14.8399'	'7.5058'	'14.6433'	'0.0984'
$b_L$	'5.7108'	'9.4712'	'13.4643'	'7.6243'	'0.1601'
$a_{\mu}$	'1'	'14.3'	'10.7452'	'2.5426'	'0.0808'
$b_{\mu}$	'1'	'12.34'	'4.3572'	'1.1554'	'0.1031'
$\mu$	'0.0013'	'0.0634'	'0.434'	'0.0282'	'0.0872'
$a_H$	'1.28'	'15'	'12.9889'	'14.8266'	'0.1597'
$b_H$	'1.9308'	'13.6691'	'7.495'	'4.1866'	'0.0711'
$\nu$	'87.2479'	'500'	'295.4931'	'438.2098'	'0.0639'
BP	'231.9362'	'244.0996'	'239.5'	'232.4999'	'0.1185'

### 6.3. Identifiability analysys

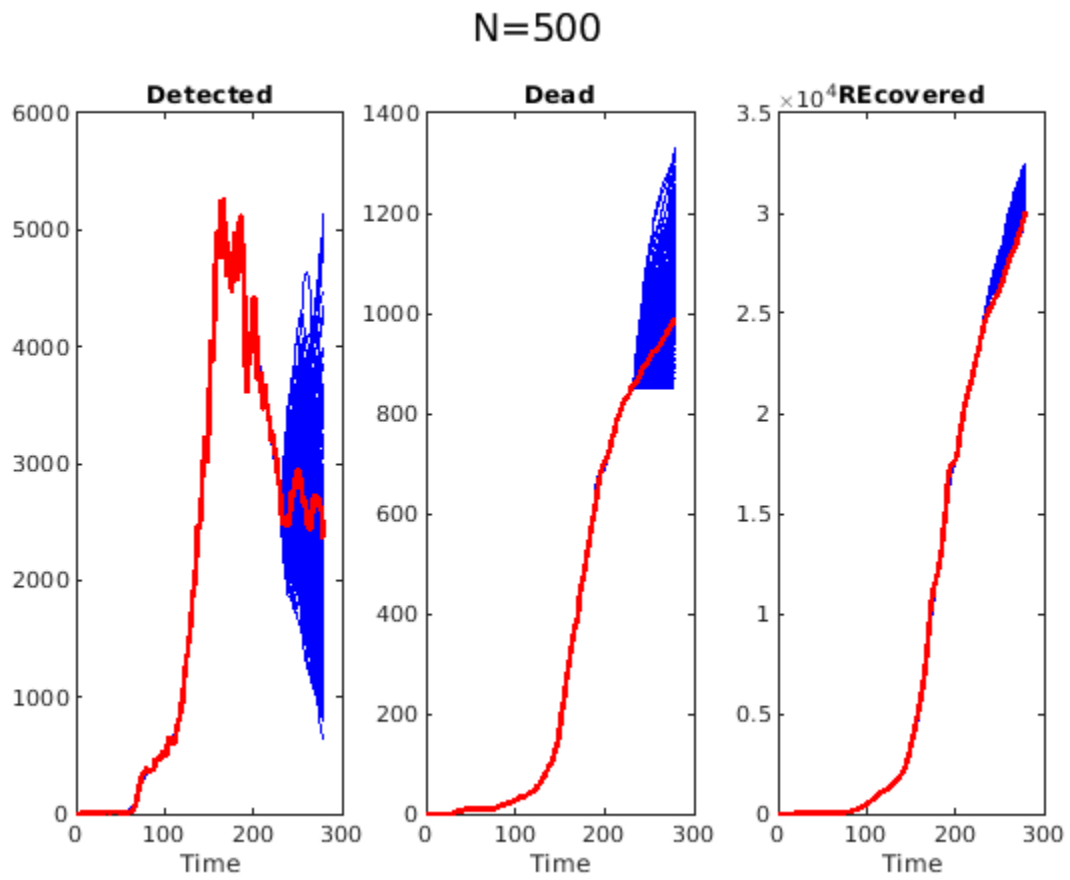








## 6.4. Uncertainty analysis



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## Chapter 7. Extension number7

### 7.1. Basic information

The extension to be validated consists of the time series from the data280 to the 302. The status of the validation is: COMPLETED.

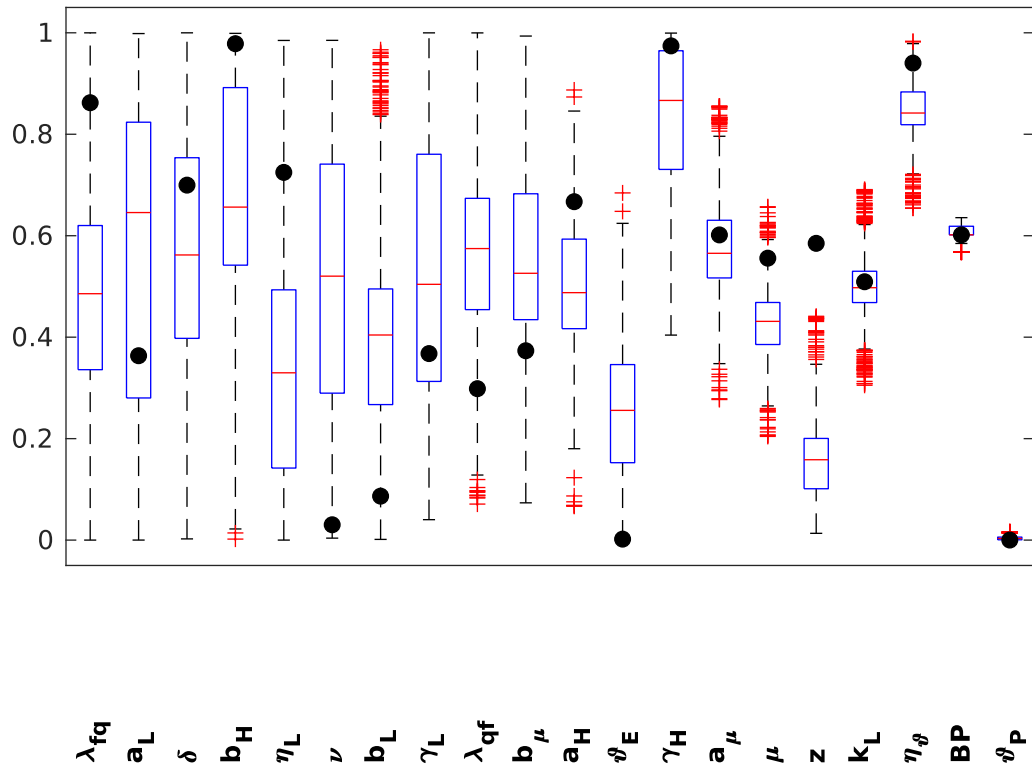
The number of estimations needed to perform the validation was1000.

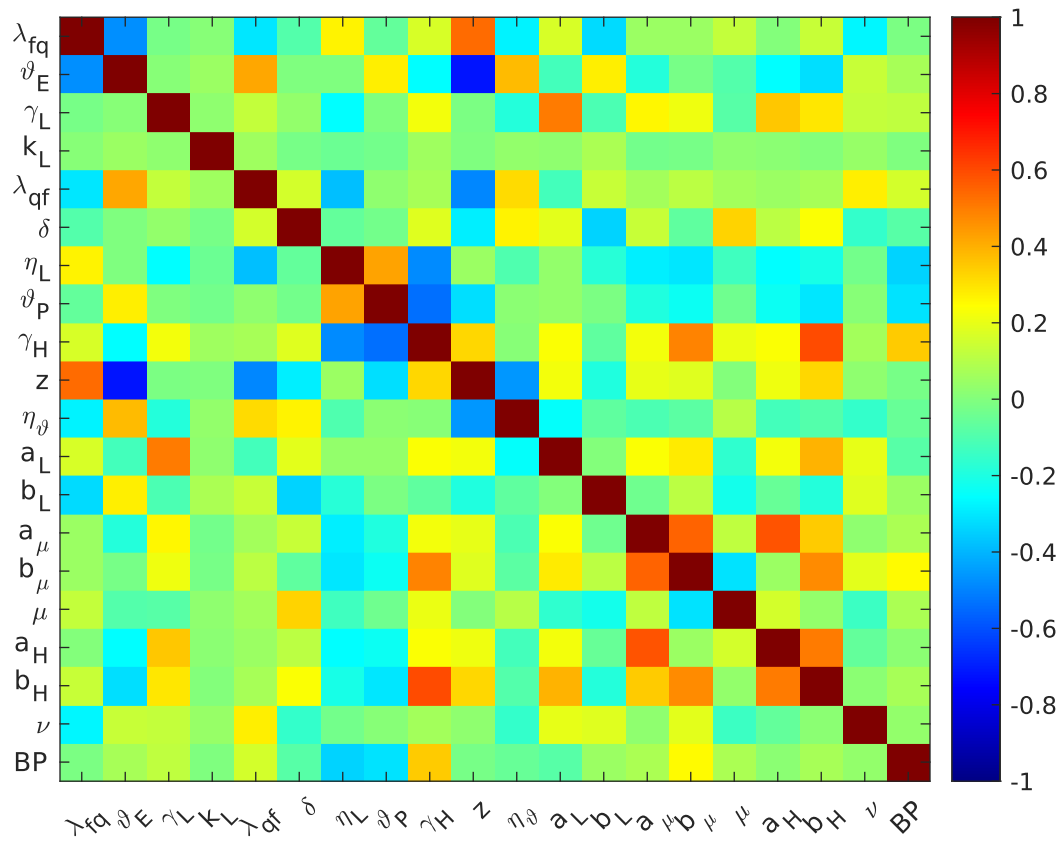
### 7.2. Estimated parameters with their intervals

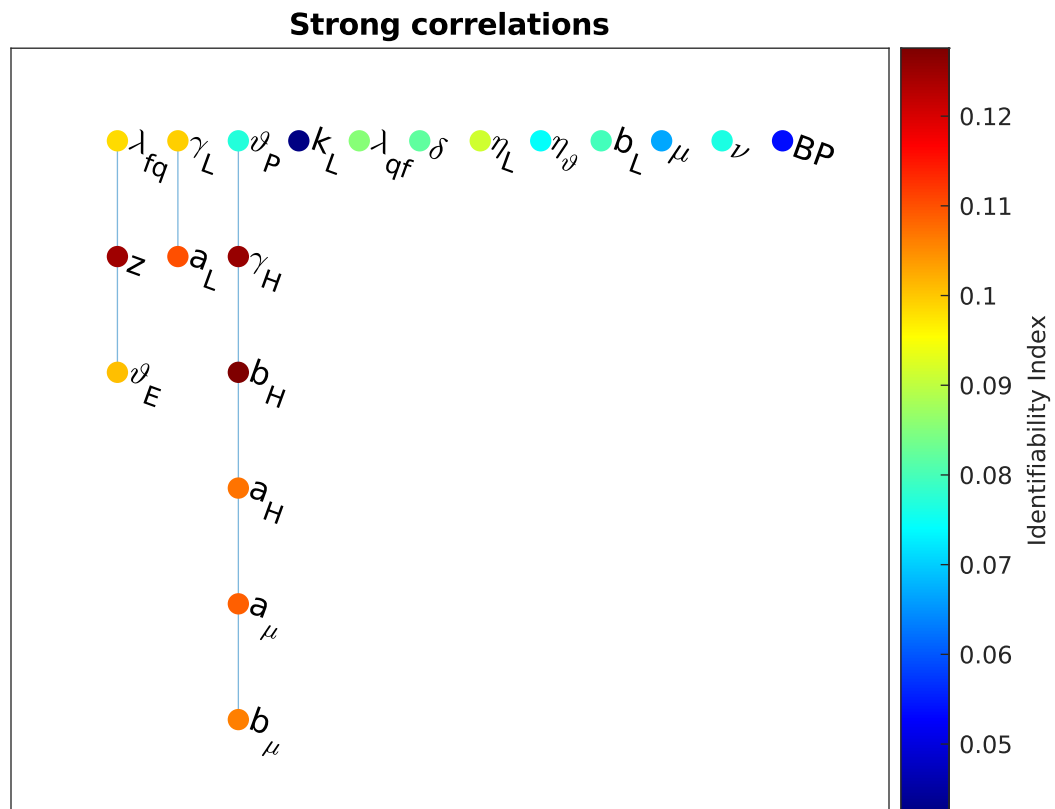
It was necessary to fix 0 parameters of 10 that could be fixed to complete validation.

	Rango		Nominal	Mejor	Index
$\lambda_{fq}$	'0.4663'	'0.5051'	'0.4857'	'0.8622'	'0.0985'
$\vartheta_E$	'0.243'	'0.2688'	'0.2559'	'0.0019'	'0.1009'
$\gamma_L$	'0.4792'	'0.5292'	'0.5042'	'0.3677'	'0.0995'
$k_L$	'5.3854'	'5.5697'	'5.4776'	'5.5832'	'0.0424'
$\lambda_{qf}$	'0.557'	'0.5921'	'0.5746'	'0.2985'	'0.0853'
$\delta$	'0.0809'	'0.0877'	'0.0843'	'0.105'	'0.0821'
$\eta_L$	'0.3108'	'0.3487'	'0.3298'	'0.7248'	'0.0916'
$\vartheta_P$	'0.002'	'0.0045'	'0.0033'	'0.0001'	'0.0773'
$\gamma_H$	'0.8508'	'0.8823'	'0.8666'	'0.9742'	'0.1255'
$z$	'4.2324'	'5.2779'	'4.7551'	'17.5489'	'0.1246'
$\eta_{\vartheta}$	'0.8307'	'0.853'	'0.8418'	'0.9403'	'0.0744'
$a_L$	'9.6354'	'10.4427'	'10.0391'	'6.0883'	'0.11'
$b_L$	'6.3509'	'6.9753'	'6.6631'	'2.2131'	'0.0798'
$a_{\mu}$	'8.7427'	'9.0866'	'8.9146'	'9.4221'	'0.1088'
$b_{\mu}$	'8.0983'	'8.6281'	'8.3632'	'6.2256'	'0.1062'
$\mu$	'0.4196'	'0.4428'	'0.4312'	'0.5558'	'0.0669'
$a_H$	'7.6416'	'8.0158'	'7.8287'	'10.3391'	'0.1072'
$b_H$	'9.9094'	'10.4697'	'10.1895'	'14.6989'	'0.1276'
$\nu$	'247.7257'	'272.5566'	'260.1411'	'15.1134'	'0.0766'
BP	'278.4251'	'278.5749'	'278.5'	'278.5'	'0.0538'

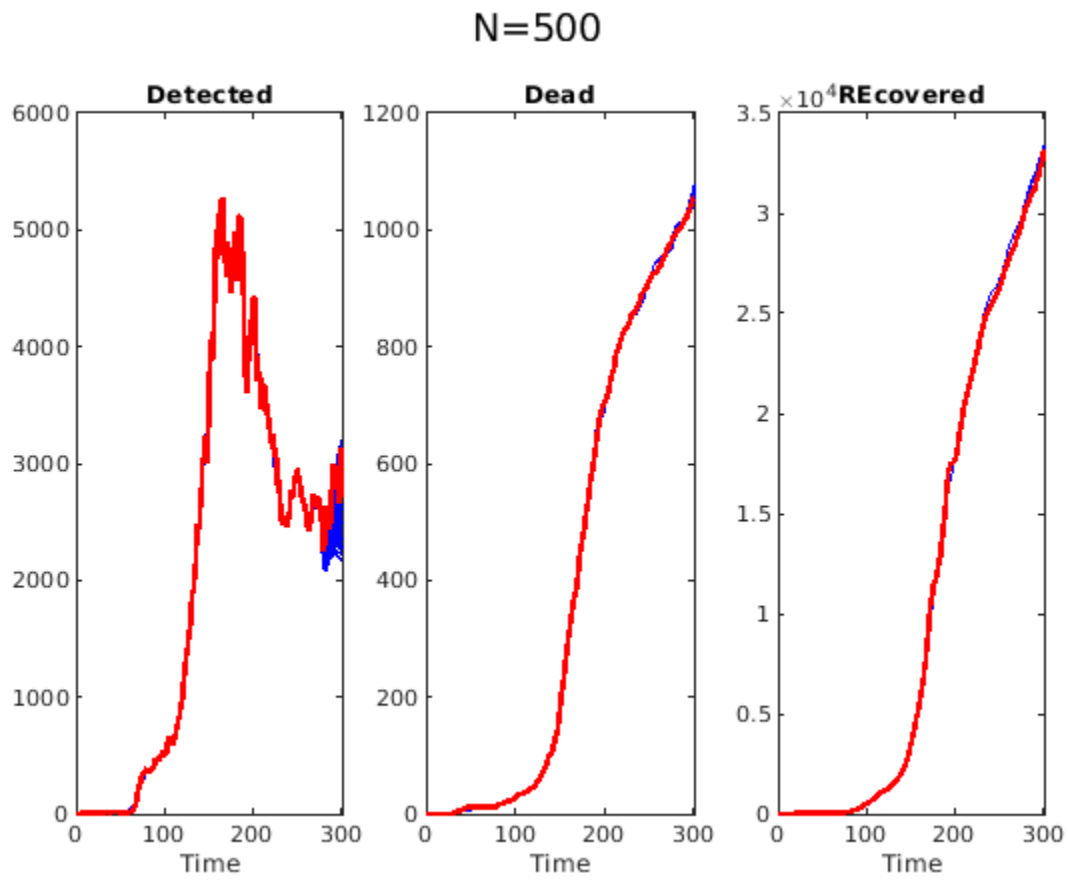
### 7.3. Identifiability analysis







## 7.4. Uncertainty analysis



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## Chapter 8. Extension number8

### 8.1. Basic information

The extension to be validated consists of the time series from the data302 to the 327. The status of the validation is: COMPLETED.

The number of estimations needed to perform the validation was1000.

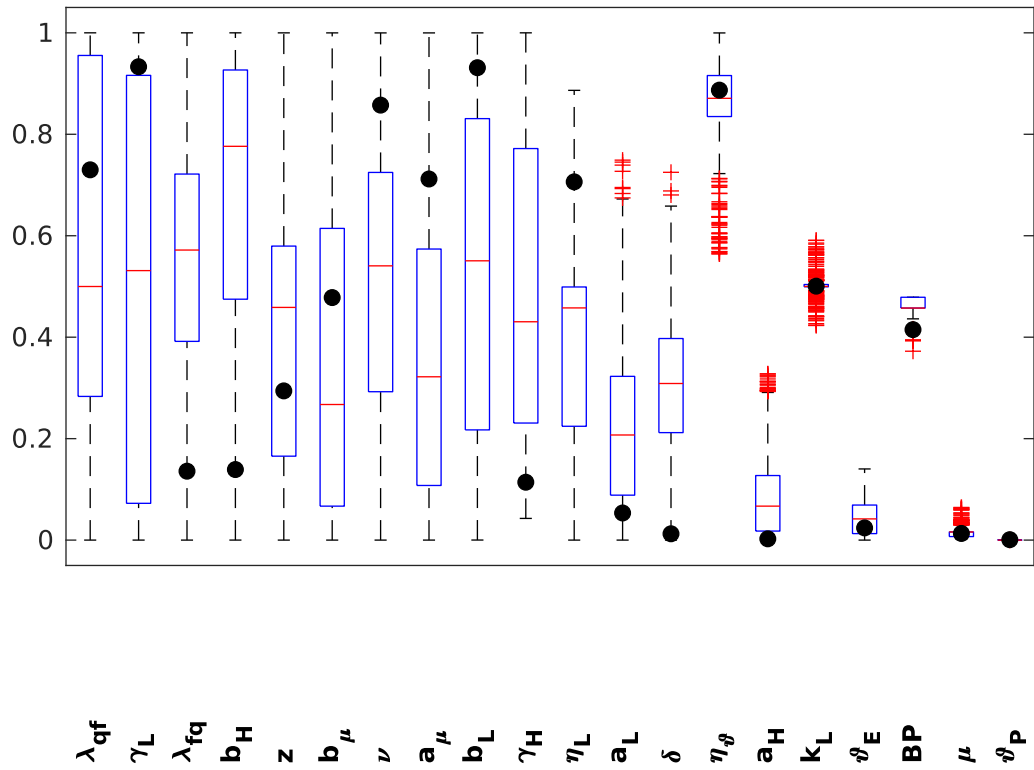
### 8.2. Estimated parameters with their intervals

It was necessary to fix 0 parameters of 10 that could be fixed to complete validation.

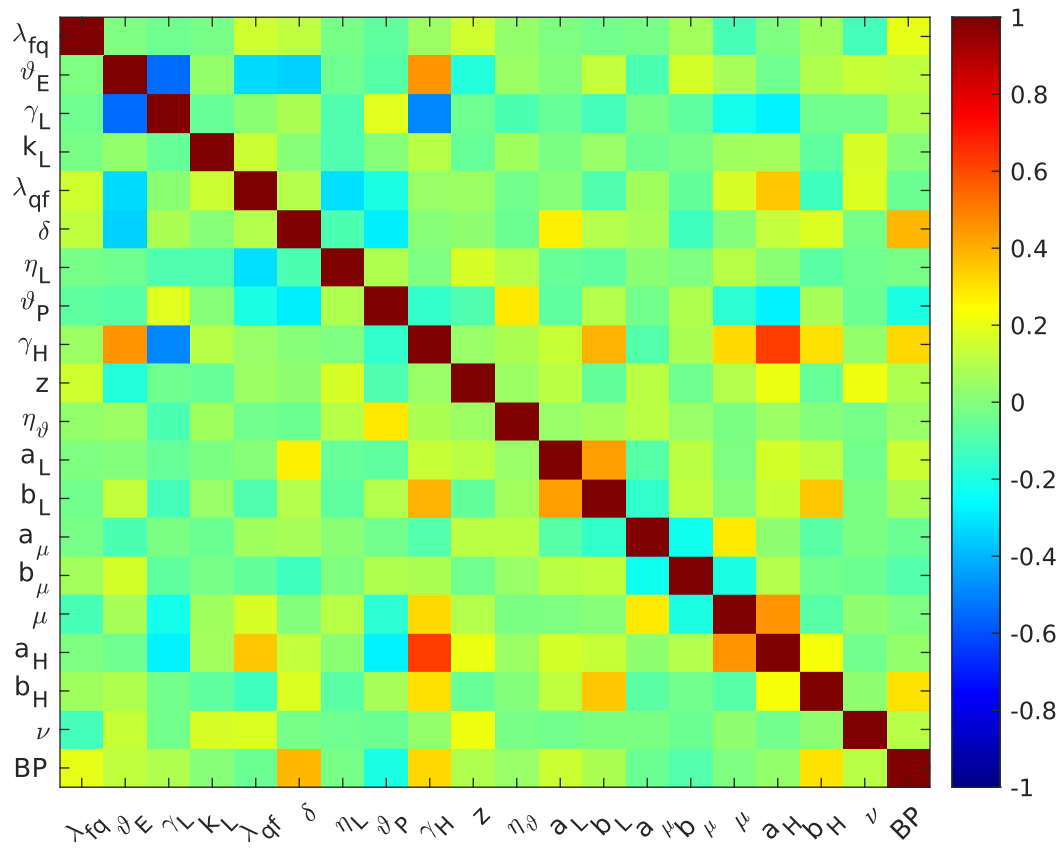
Due to a deviation from the median the CSB method was activated to obtain the parameter intervals.

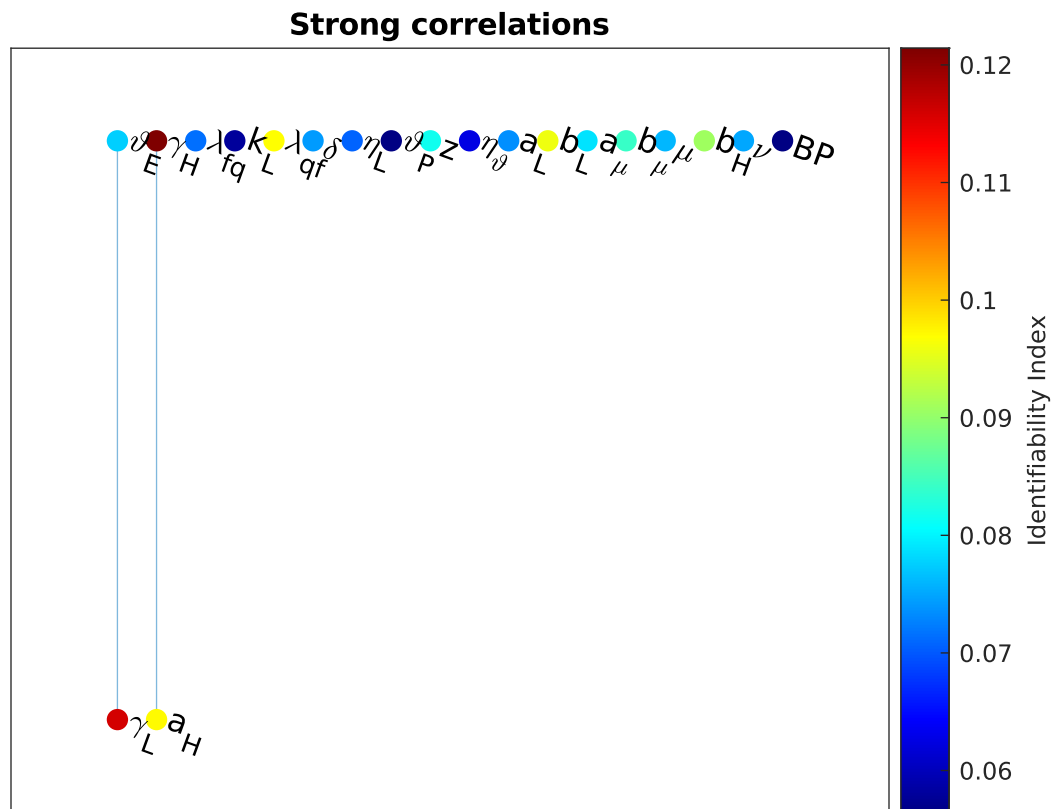
	Rango		Nominal	Mejor	Index
$\lambda_{fq}$	'0.1177'	'0.3056'	'0.5718'	'0.1358'	'0.0715'
$\vartheta_E$	'0.0055'	'0.0483'	'0.0418'	'0.0241'	'0.0778'
$\gamma_L$	'0.2039'	'0.9682'	'0.5313'	'0.9332'	'0.116'
$k_L$	'1'	'10'	'5.501'	'5.5054'	'0.0581'
$\lambda_{qf}$	'0.2107'	'0.7716'	'0.4999'	'0.7299'	'0.097'
$\delta$	'0.0002'	'0.0035'	'0.0464'	'0.0019'	'0.0742'
$\eta_L$	'0'	'0.96'	'0.4578'	'0.7062'	'0.0708'
$\vartheta_P$	'0.0001'	'0.0012'	'0.0001'	'0.0008'	'0.0565'
$\gamma_H$	'0.0849'	'0.1482'	'0.4304'	'0.1141'	'0.1214'
$z$	'0'	'19.0607'	'13.761'	'8.8244'	'0.0817'
$\eta_{\vartheta}$	'0.7931'	'1'	'0.8703'	'0.887'	'0.0626'
$a_L$	'1'	'15'	'3.9062'	'1.7484'	'0.0736'
$b_L$	'3.7339'	'15'	'8.708'	'14.0377'	'0.096'
$a_{\mu}$	'1'	'15'	'5.5073'	'10.9662'	'0.0788'
$b_{\mu}$	'1.966'	'14.3483'	'4.7422'	'7.6934'	'0.0843'
$\mu$	'0.0012'	'0.0244'	'0.0161'	'0.0131'	'0.0762'
$a_H$	'1.0352'	'2.7577'	'1.9376'	'1.0353'	'0.0971'
$b_H$	'2.6688'	'6.888'	'11.8677'	'2.9471'	'0.0909'
$\nu$	'187.1291'	'487.2402'	'270.3153'	'428.7442'	'0.0751'
BP	'299.4311'	'307.1286'	'301.5'	'299.5'	'0.0565'

## 8.3. Identifiability analysis

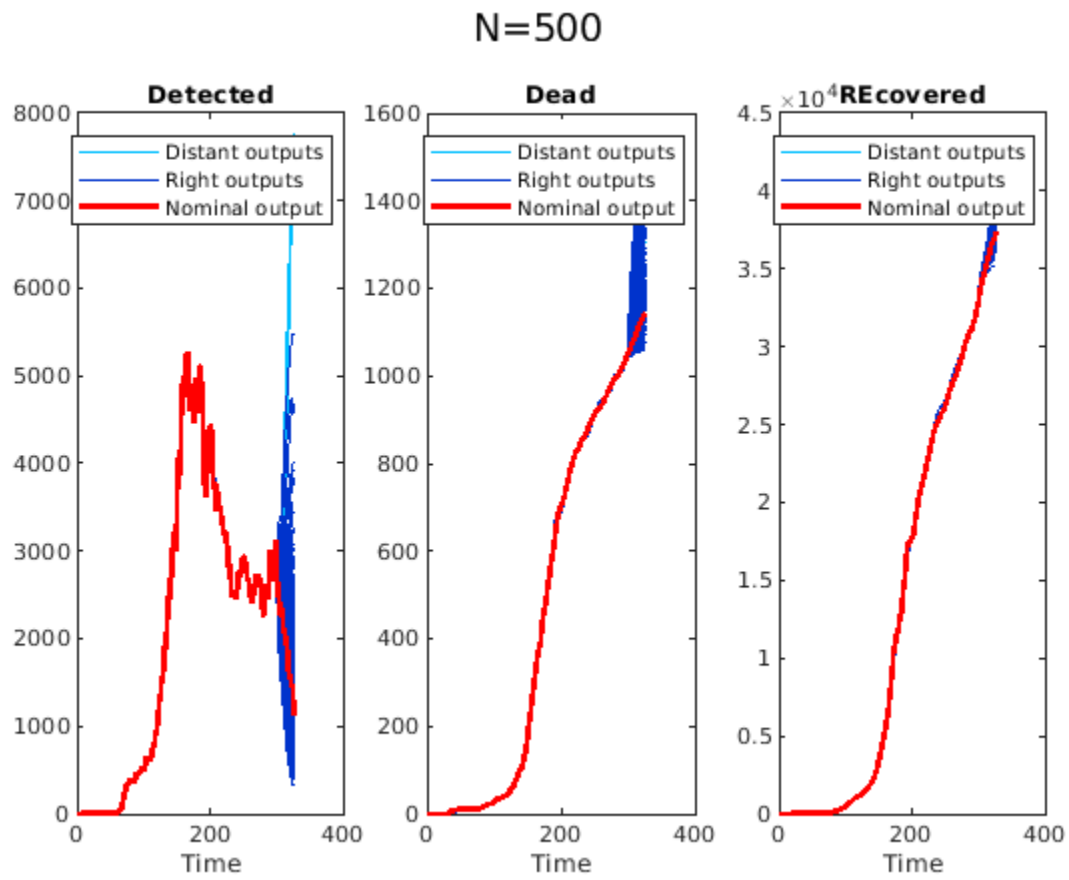








## 8.4. Uncertainty analysis



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## Chapter 9. Extension number9

### 9.1. Basic information

The extension to be validated consists of the time series from the data327 to the 345. The status of the validation is: COMPLETED.

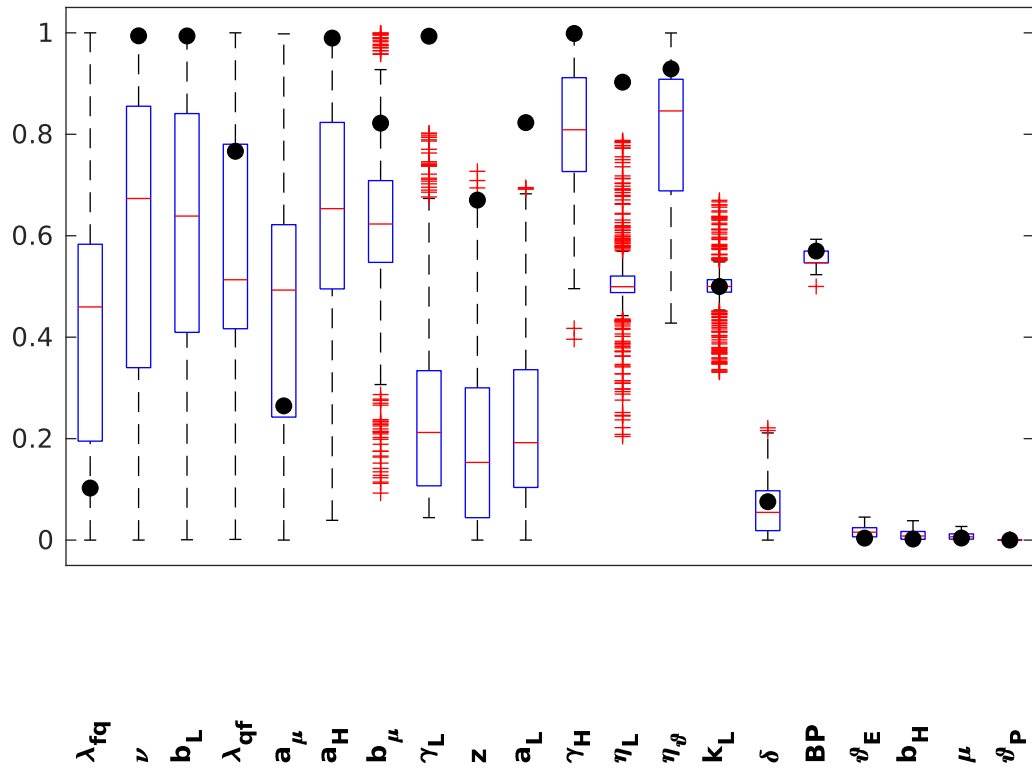
The number of estimations needed to perform the validation was1000.

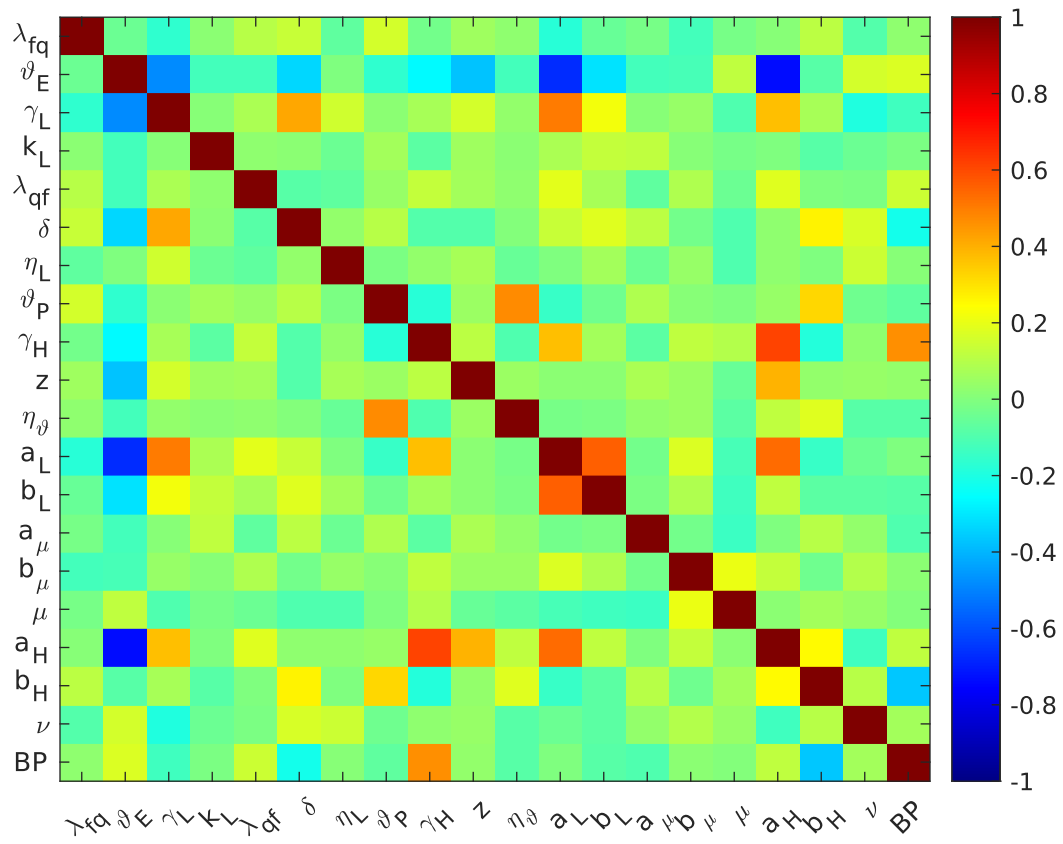
### 9.2. Estimated parameters with their intervals

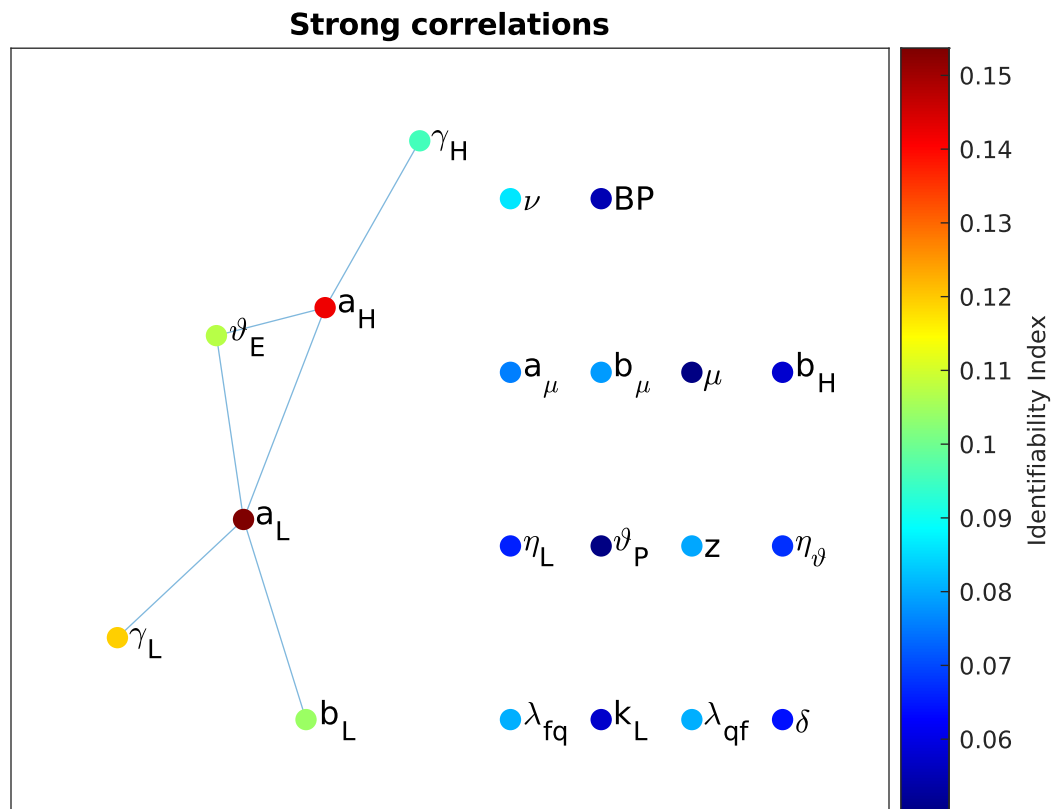
It was necessary to fix 0 parameters of 10 that could be fixed to complete validation.

	Rango		Nominal	Mejor	Index
$\lambda_{fq}$	'0.4221'	'0.4973'	'0.4597'	'0.1026'	'0.0805'
$\vartheta_E$	'0.0142'	'0.017'	'0.0156'	'0.0039'	'0.1075'
$\gamma_L$	'0.1703'	'0.254'	'0.2122'	'0.9934'	'0.1197'
$k_L$	'5.3131'	'5.6867'	'5.4999'	'5.4988'	'0.0577'
$\lambda_{qf}$	'0.477'	'0.5494'	'0.5132'	'0.7665'	'0.0808'
$\delta$	'0.0071'	'0.0093'	'0.0082'	'0.0114'	'0.0643'
$\eta_L$	'0.4707'	'0.5283'	'0.4995'	'0.9027'	'0.0662'
$\vartheta_P$	'0'	'0.0001'	'0.0001'	'0'	'0.0501'
$\gamma_H$	'0.7895'	'0.8283'	'0.8089'	'0.9987'	'0.0956'
$z$	'3.6356'	'5.5522'	'4.5939'	'20.1094'	'0.0798'
$\eta_{\vartheta}$	'0.8232'	'0.8689'	'0.846'	'0.9289'	'0.0676'
$a_L$	'3.2689'	'4.108'	'3.6884'	'12.5222'	'0.1537'
$b_L$	'9.4106'	'10.4752'	'9.9429'	'14.9136'	'0.1043'
$a_{\mu}$	'7.4004'	'8.3995'	'7.9'	'4.7047'	'0.0759'
$b_{\mu}$	'9.231'	'10.2167'	'9.7239'	'12.507'	'0.0784'
$\mu$	'0'	'0.0146'	'0.0065'	'0.0041'	'0.0503'
$a_H$	'9.7021'	'10.5935'	'10.1478'	'14.855'	'0.1422'
$b_H$	'1.0855'	'1.1395'	'1.1125'	'1.0299'	'0.0581'
$\nu$	'316.0196'	'357.4074'	'336.7135'	'497.0391'	'0.0864'
BP	'325.3621'	'325.6735'	'325.5178'	'326.4999'	'0.055'

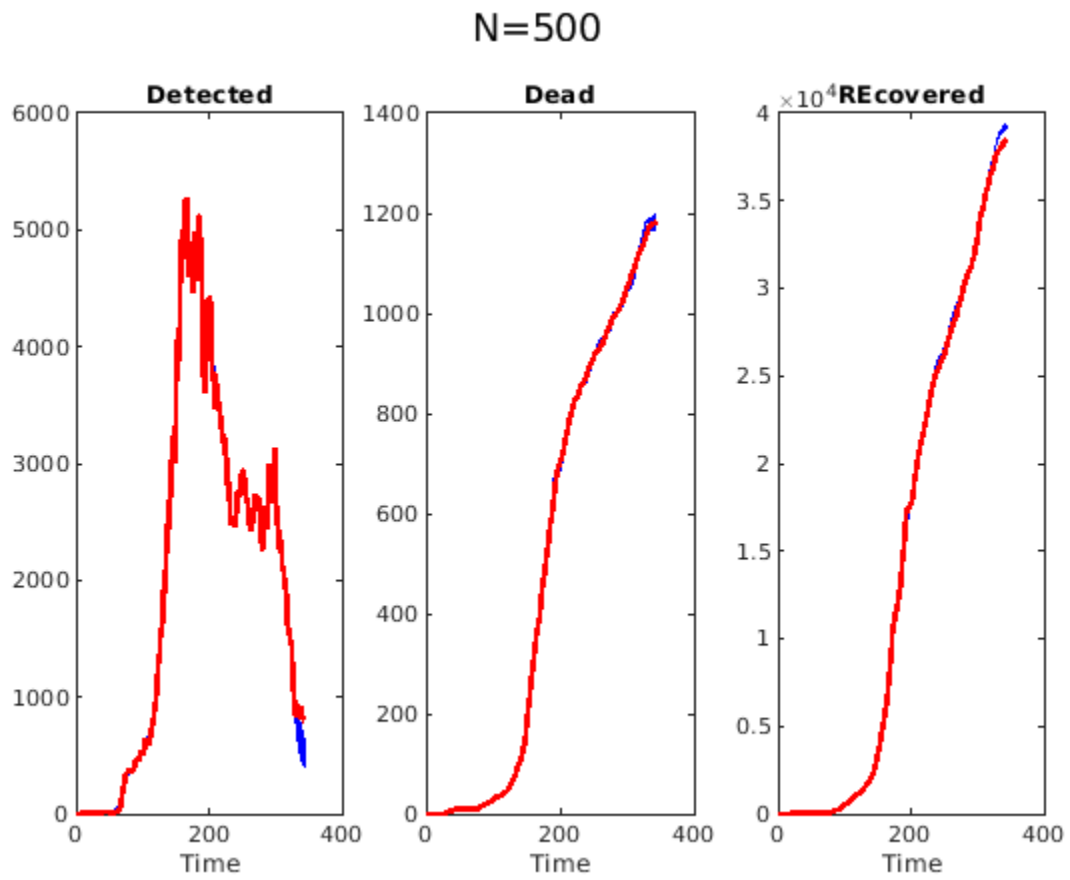
### 9.3. Identifiability analysis







## 9.4. Uncertainty analysis





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## Chapter 10. Extension number10

### 10.1. Basic information

The extension to be validated consists of the time series from the data345 to the 398. The status of the validation is: COMPLETED.

The number of estimations needed to perform the validation was1000.

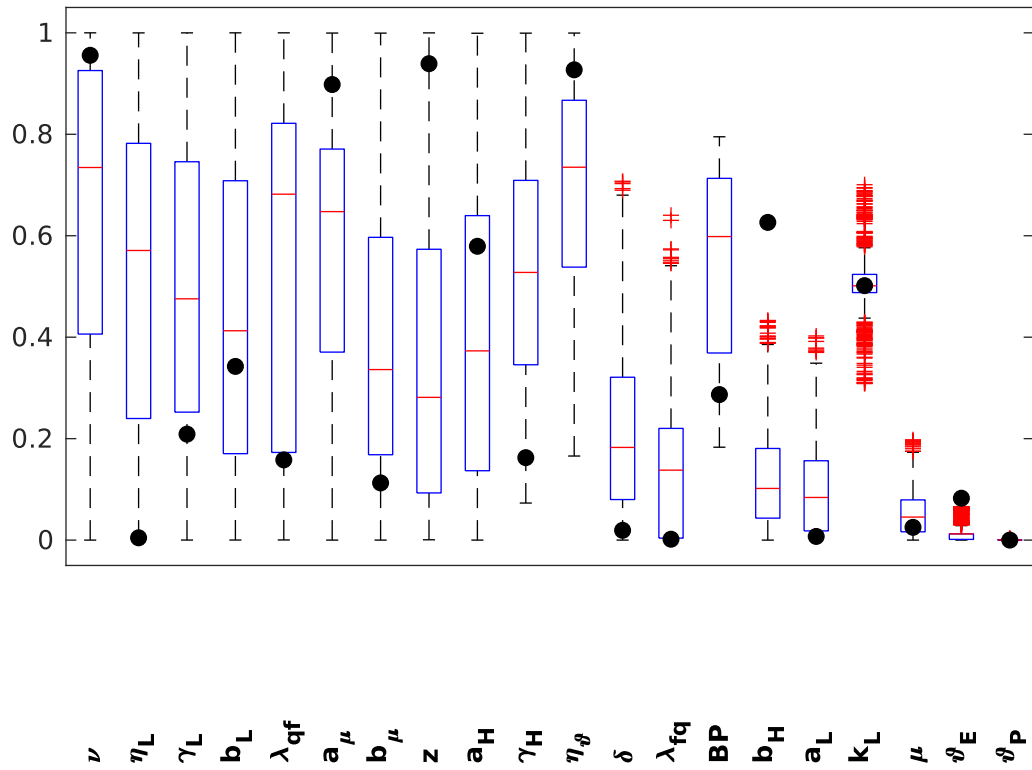
### 10.2. Estimated parameters with their intervals

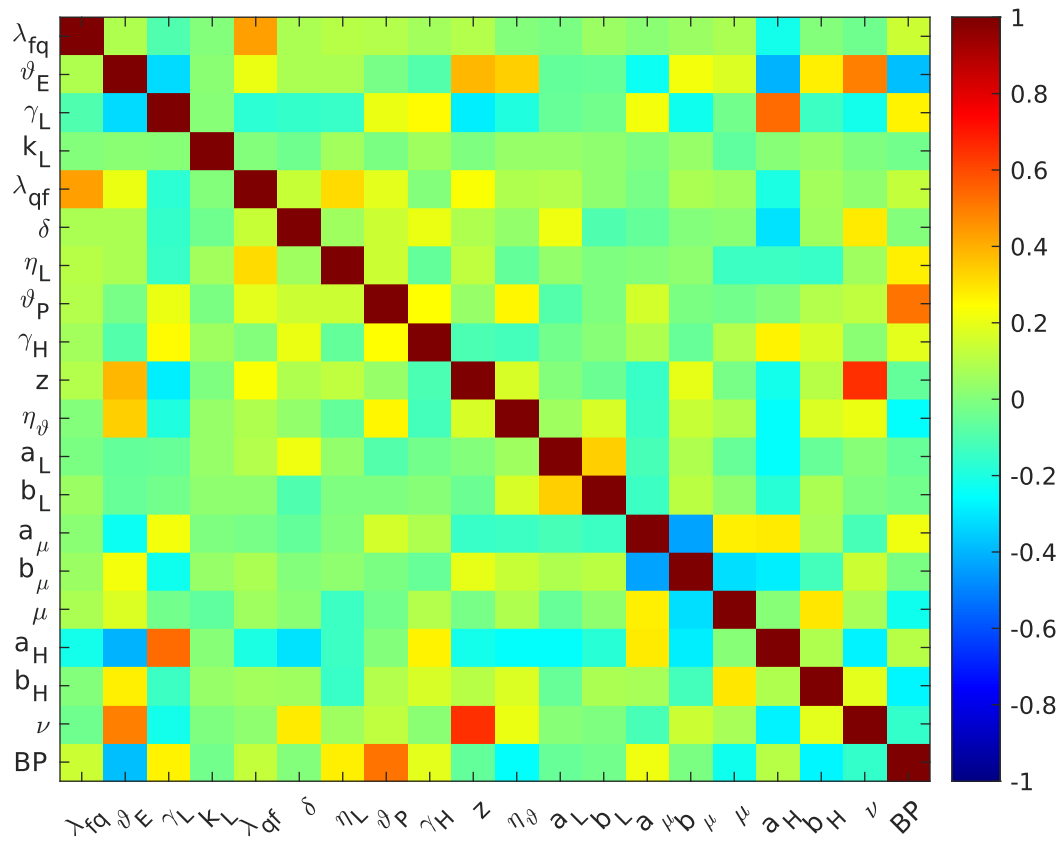
It was necessary to fix 0 parameters of 10 that could be fixed to complete validation.

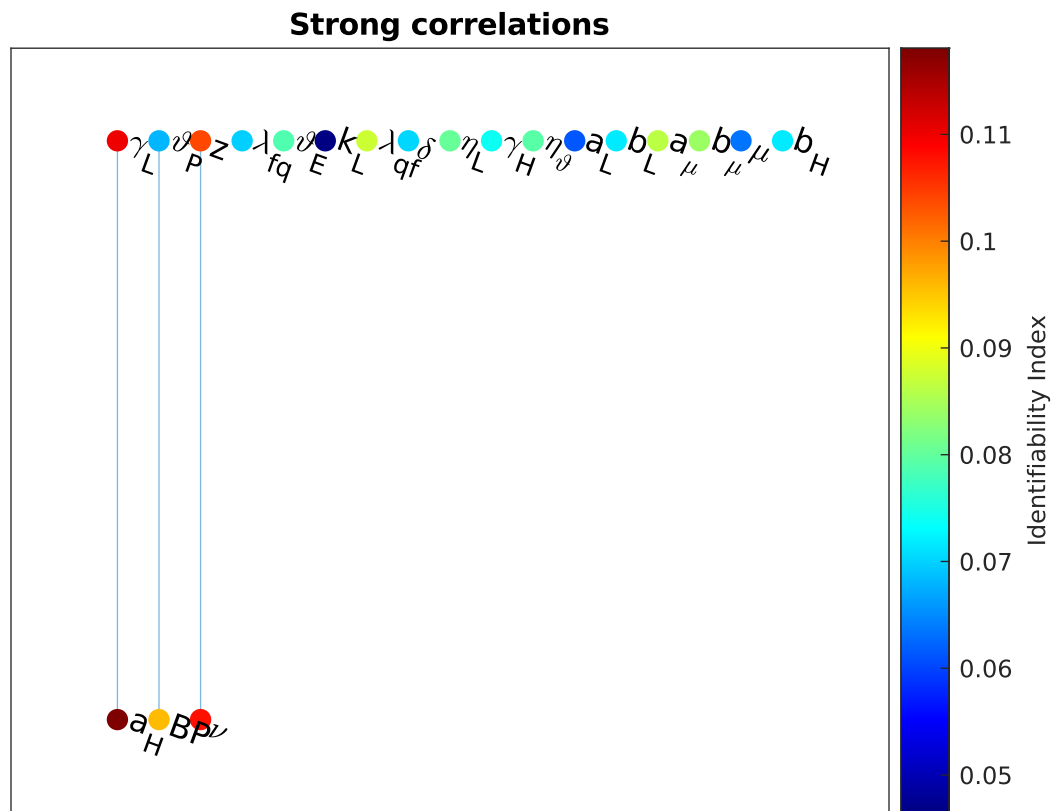
Due to a deviation from the median the CSB method was activated to obtain the parameter intervals.

	Rango		Nominal	Mejor	Index
$\lambda_{fq}$	'0.0001'	'0.0033'	'0.1381'	'0.0017'	'0.0699'
$\vartheta_E$	'0.0667'	'0.0937'	'0.0123'	'0.0826'	'0.0788'
$\gamma_L$	'0.1067'	'0.2936'	'0.4757'	'0.2089'	'0.1101'
$k_L$	'1.9972'	'10'	'5.5114'	'5.5145'	'0.0465'
$\lambda_{qf}$	'0.1057'	'0.2453'	'0.6819'	'0.1581'	'0.0876'
$\delta$	'0.0005'	'0.0059'	'0.0274'	'0.0029'	'0.0704'
$\eta_L$	'0.0002'	'0.0097'	'0.5709'	'0.0045'	'0.0805'
$\vartheta_P$	'0'	'0'	'0.0005'	'0'	'0.0681'
$\gamma_H$	'0.1242'	'0.3656'	'0.5277'	'0.1625'	'0.074'
$z$	'17.6055'	'28.3149'	'8.4412'	'28.1747'	'0.104'
$\eta_{\vartheta}$	'0.6328'	'1'	'0.7351'	'0.9271'	'0.0793'
$a_L$	'1'	'1.4217'	'2.1794'	'1.1014'	'0.0614'
$b_L$	'5.6921'	'9.6261'	'6.7775'	'5.7938'	'0.0719'
$a_{\mu}$	'2.232'	'13.9786'	'10.066'	'13.5735'	'0.0863'
$b_{\mu}$	'1'	'15'	'5.7064'	'2.5783'	'0.0841'
$\mu$	'0.0028'	'0.0566'	'0.0454'	'0.0252'	'0.0633'
$a_H$	'2.365'	'12.5246'	'6.2225'	'9.1091'	'0.1181'
$b_H$	'3.0228'	'10.5592'	'2.4284'	'9.7683'	'0.0719'
$\nu$	'387.8784'	'480.8889'	'367.2646'	'477.8485'	'0.1078'
BP	'343.9304'	'349.2726'	'363.5'	'344.4999'	'0.0957'

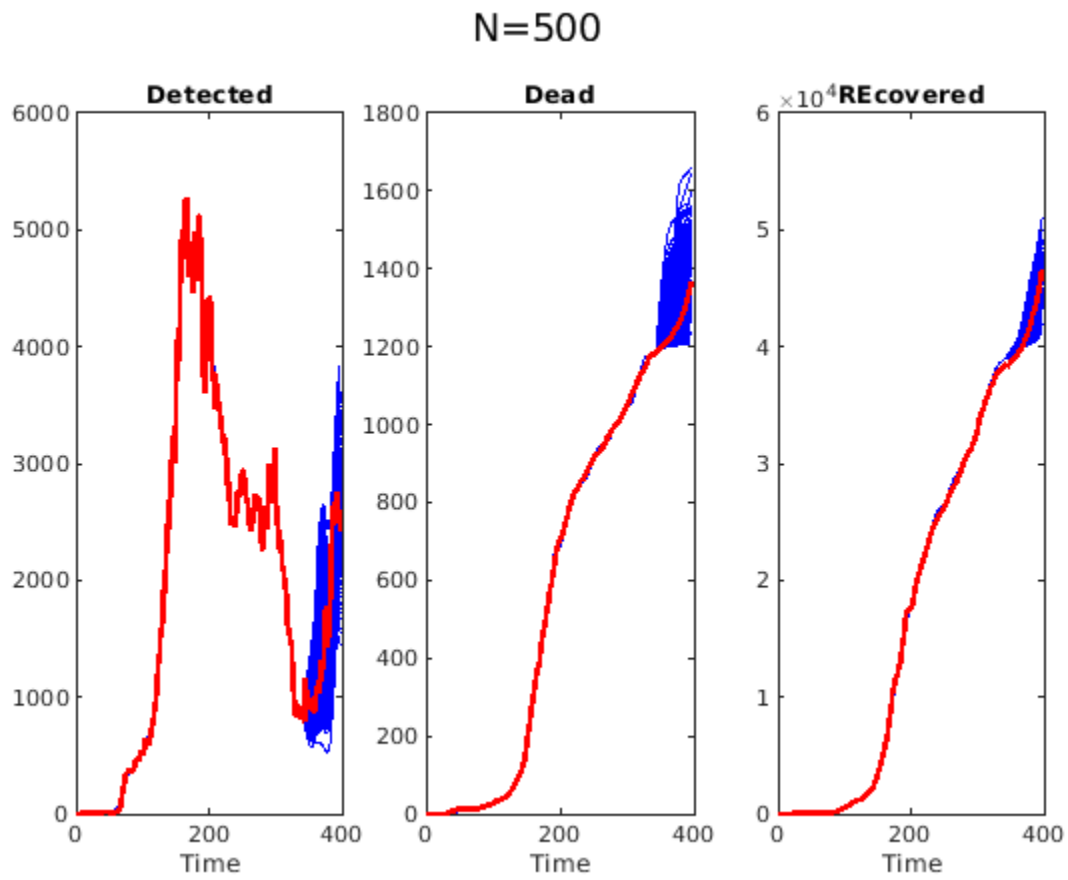
### 10.3. Identifiability analysis







## 10.4. Uncertainty analysis



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## Chapter 11. Extension number11

### 11.1. Basic information

The extension to be validated consists of the time series from the data398 to the 428. The status of the validation is: COMPLETED.

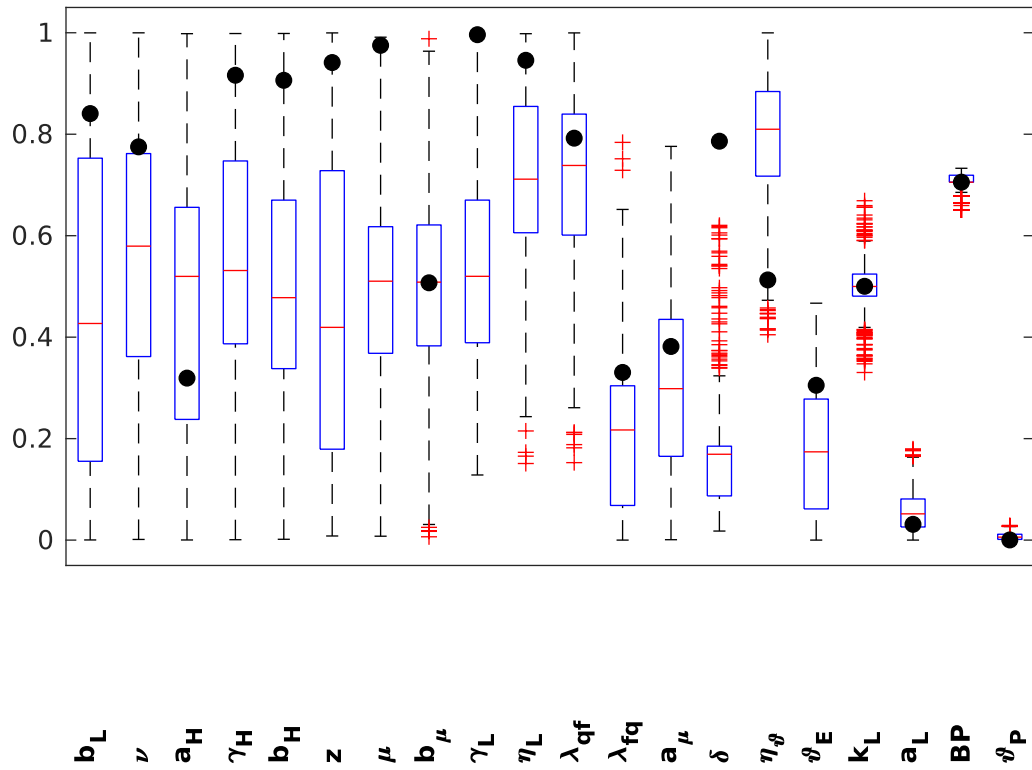
The number of estimations needed to perform the validation was1000.

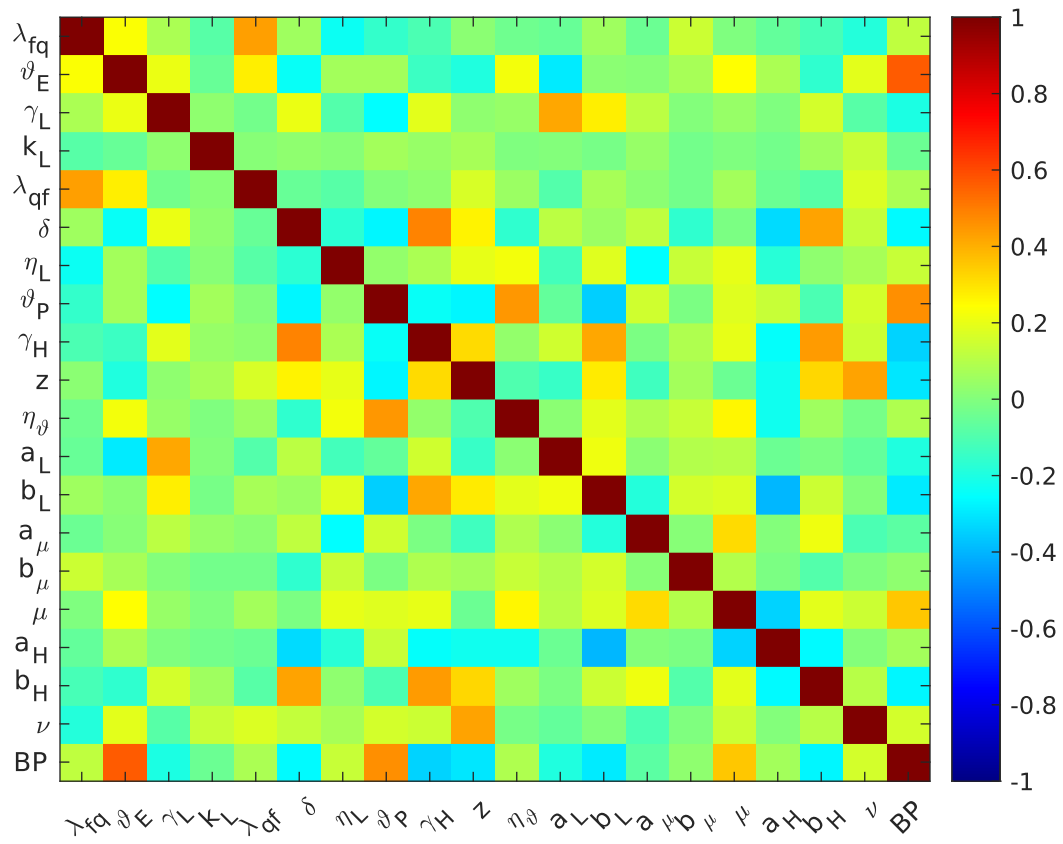
### 11.2. Estimated parameters with their intervals

It was necessary to fix 0 parameters of 10 that could be fixed to complete validation.

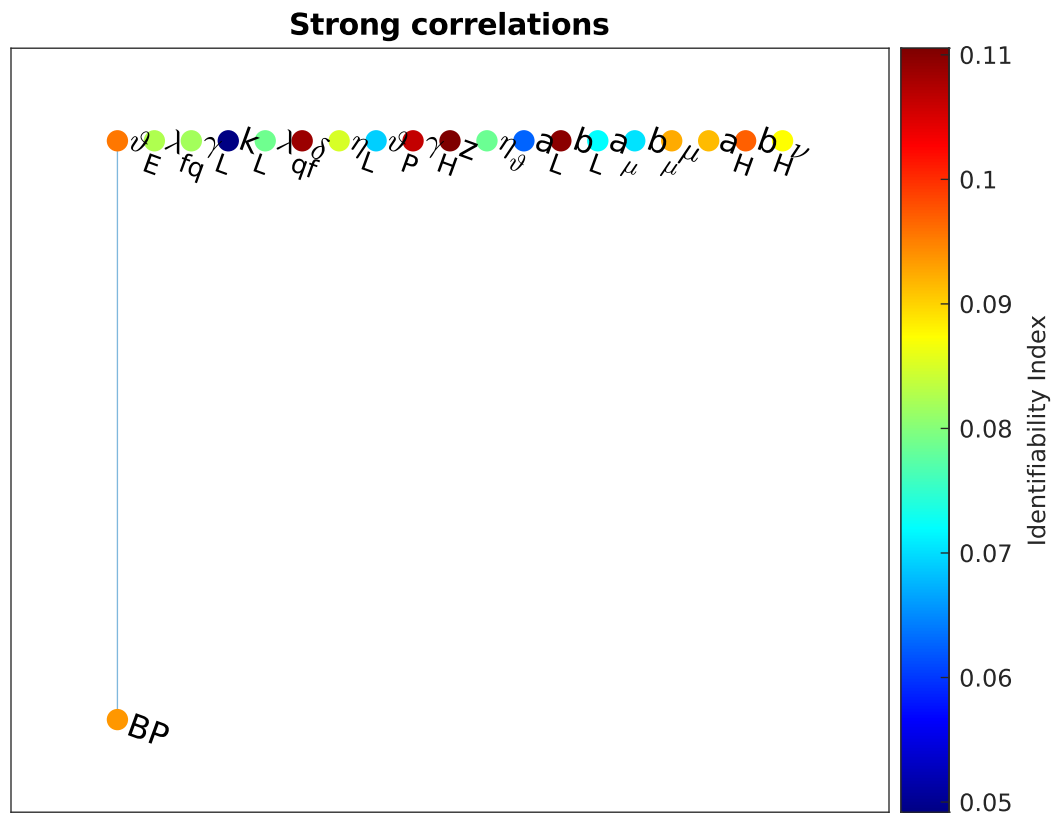
	Rango		Nominal	Mejor	Index
$\lambda_{fq}$	'0.1872'	'0.247'	'0.2171'	'0.3305'	'0.0825'
$\vartheta_E$	'0.1578'	'0.1902'	'0.174'	'0.3052'	'0.0955'
$\gamma_L$	'0.4939'	'0.5459'	'0.5199'	'0.9962'	'0.0819'
$k_L$	'5.3669'	'5.6317'	'5.4993'	'5.5023'	'0.0492'
$\lambda_{qf}$	'0.7062'	'0.7689'	'0.7376'	'0.7922'	'0.0787'
$\delta$	'0.0196'	'0.0315'	'0.0256'	'0.1179'	'0.1086'
$\eta_L$	'0.6824'	'0.7403'	'0.7114'	'0.9457'	'0.0851'
$\vartheta_P$	'0.0046'	'0.0071'	'0.0059'	'0.0003'	'0.0693'
$\gamma_H$	'0.4963'	'0.5664'	'0.5314'	'0.9163'	'0.1064'
$z$	'11.3556'	'13.8036'	'12.5796'	'28.2382'	'0.1105'
$\eta_{\vartheta}$	'0.7862'	'0.833'	'0.8096'	'0.5128'	'0.0786'
$a_L$	'1.5812'	'1.8708'	'1.726'	'1.4354'	'0.0628'
$b_L$	'6.4013'	'7.5537'	'6.9775'	'12.7698'	'0.1098'
$a_{\mu}$	'4.8557'	'5.5038'	'5.1797'	'6.3431'	'0.0722'
$b_{\mu}$	'7.7215'	'8.5149'	'8.1182'	'8.1002'	'0.0705'
$\mu$	'0.4801'	'0.5406'	'0.5103'	'0.9752'	'0.0925'
$a_H$	'7.8155'	'8.7385'	'8.277'	'5.4701'	'0.0914'
$b_H$	'7.2508'	'8.1293'	'7.69'	'13.6879'	'0.0969'
$\nu$	'272.8971'	'306.5065'	'289.7018'	'387.5559'	'0.0874'
BP	'396.1041'	'396.8959'	'396.5'	'396.4999'	'0.0936'

### 11.3. Identifiability analysis

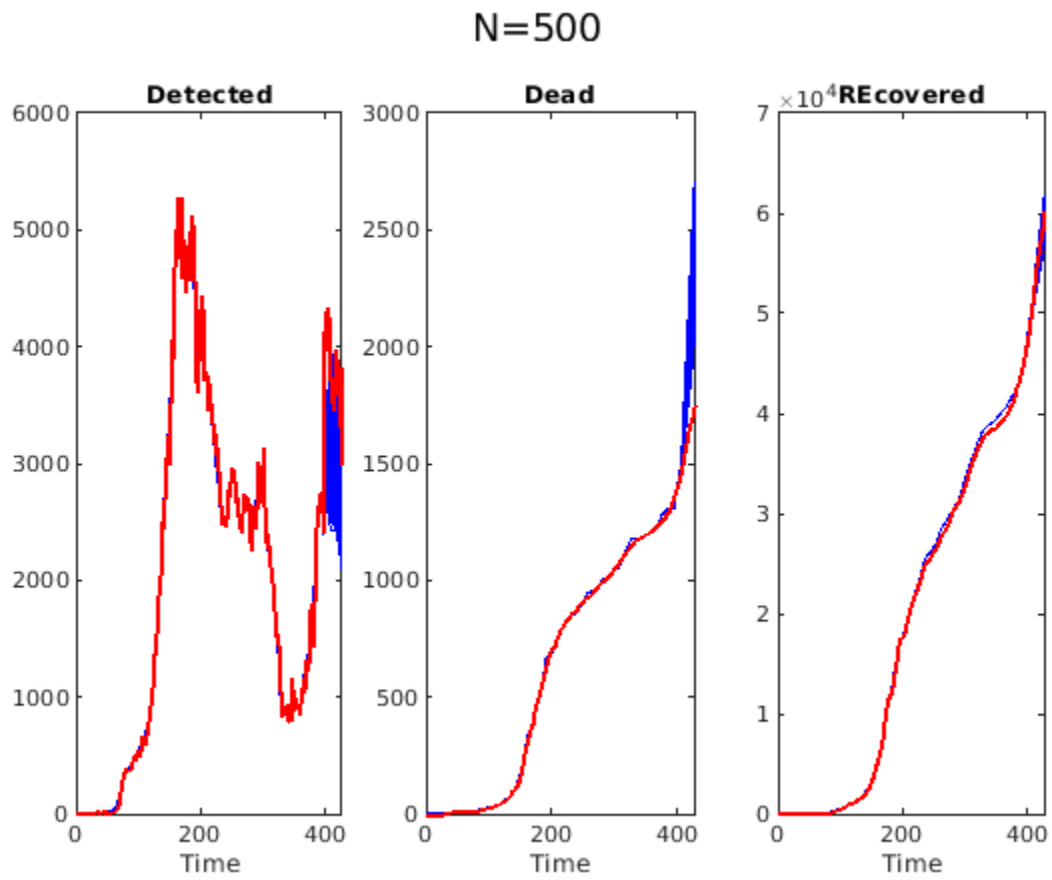








## 11.4. Uncertainty analysis



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## Chapter 12. Extension number12

### 12.1. Basic information

The extension to be validated consists of the time series from the data428 to the 449. The status of the validation is: COMPLETED.

The number of estimations needed to perform the validation was1000.

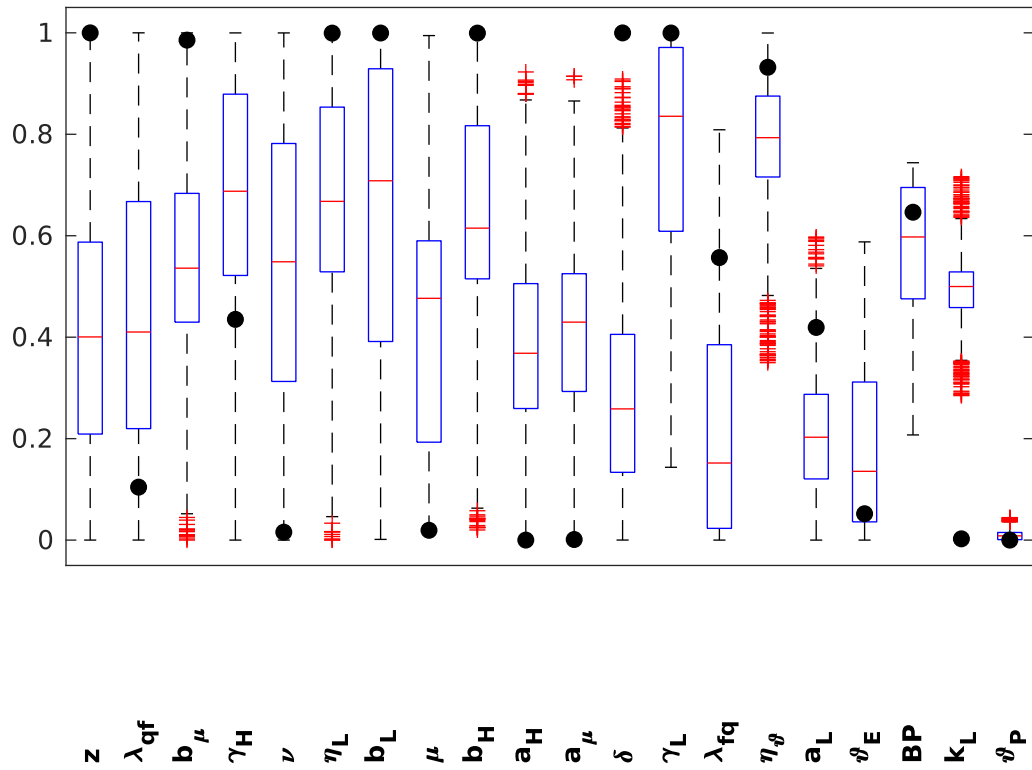
### 12.2. Estimated parameters with their intervals

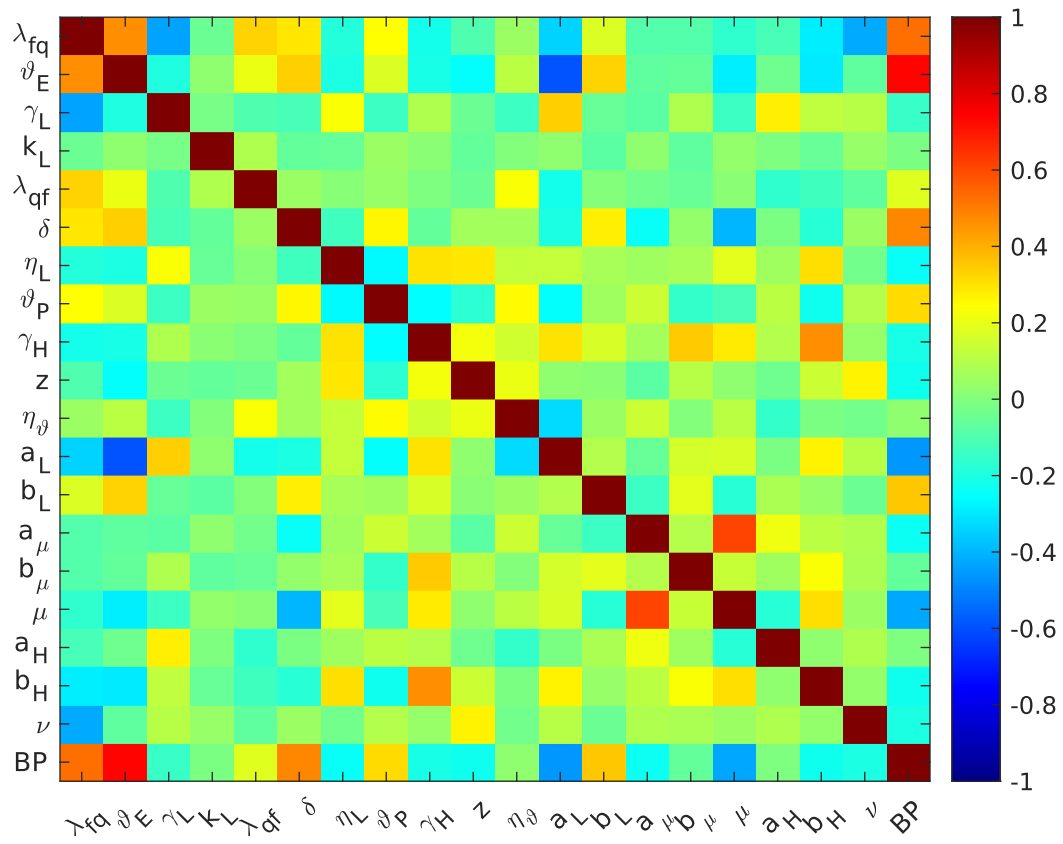
It was necessary to fix 0 parameters of 10 that could be fixed to complete validation.

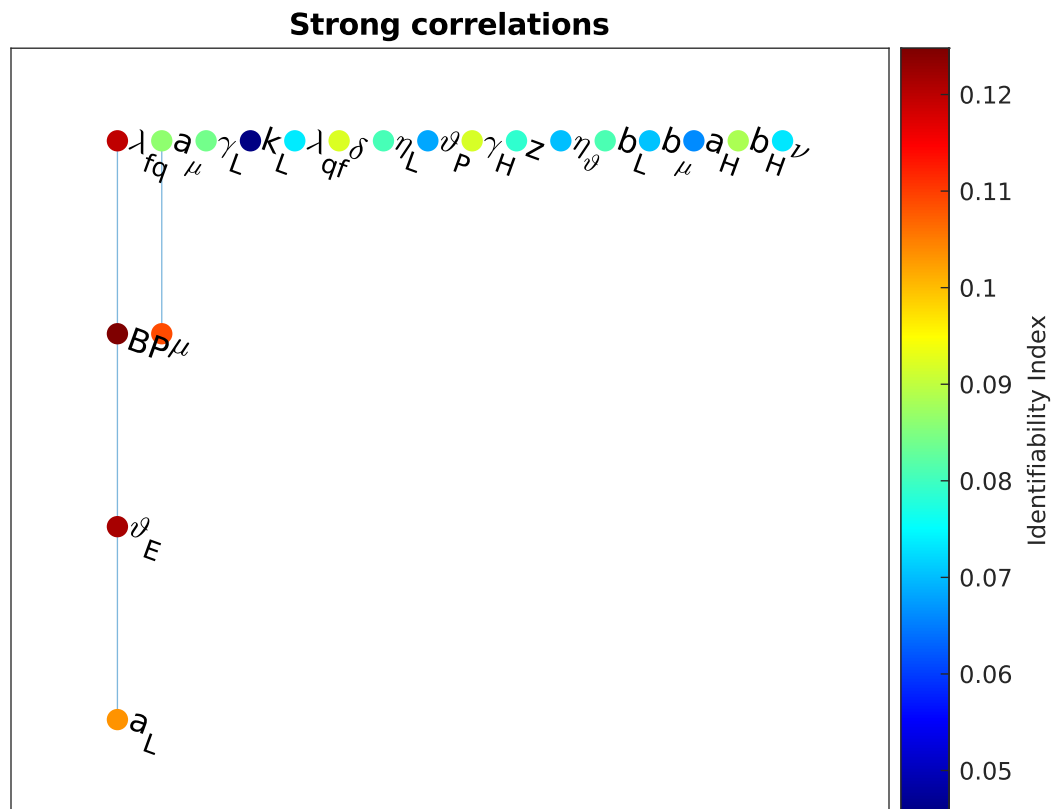
Due to a deviation from the median the CSB method was activated to obtain the parameter intervals.

	Rango		Nominal	Mejor	Index
$\lambda_{fq}$	'0.4218'	'0.6524'	'0.1524'	'0.557'	'0.1198'
$\vartheta_E$	'0.0501'	'0.069'	'0.1356'	'0.052'	'0.1217'
$\gamma_L$	'0.6439'	'1'	'0.8353'	'0.9996'	'0.0841'
$k_L$	'1'	'9.64'	'5.499'	'1.0225'	'0.0457'
$\lambda_{qf}$	'0.097'	'0.1972'	'0.4102'	'0.1044'	'0.0735'
$\delta$	'0.1076'	'0.15'	'0.0388'	'0.15'	'0.0923'
$\eta_L$	'0.3313'	'1'	'0.6678'	'0.9994'	'0.0808'
$\vartheta_P$	'0'	'0'	'0.0084'	'0'	'0.0684'
$\gamma_H$	'0.3308'	'0.4423'	'0.6877'	'0.4351'	'0.0919'
$z$	'23.7816'	'30'	'12.0156'	'29.9971'	'0.0789'
$\eta_{\vartheta}$	'0.4822'	'0.9635'	'0.7933'	'0.932'	'0.0701'
$a_L$	'6.7534'	'8.8702'	'3.8393'	'6.8694'	'0.1032'
$b_L$	'12.9286'	'15'	'10.9163'	'14.9943'	'0.0809'
$a_{\mu}$	'1'	'11.8864'	'7.0155'	'1.0162'	'0.0865'
$b_{\mu}$	'1'	'15'	'8.5052'	'14.7988'	'0.0707'
$\mu$	'0'	'0.0413'	'0.4766'	'0.0193'	'0.1088'
$a_H$	'1'	'3.7022'	'6.1567'	'1.0006'	'0.0662'
$b_H$	'4.2327'	'15'	'9.6082'	'14.9924'	'0.0885'
$\nu$	'5.3609'	'16.4857'	'274.3289'	'7.8281'	'0.0734'
BP	'423.1601'	'426.1508'	'422.5'	'424.4998'	'0.1248'

### 12.3. Identifiability analysis

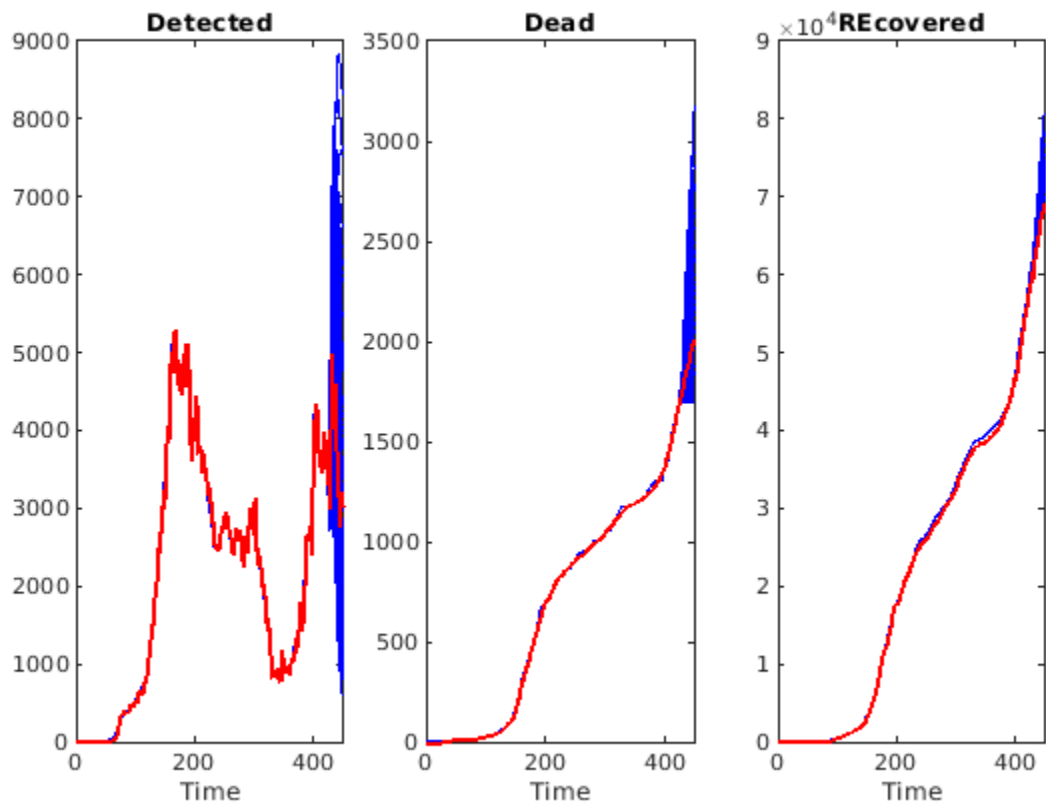






## 12.4. Uncertainty analysis

N=500



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## Chapter 13. Extension number13

### 13.1. Basic information

The extension to be validated consists of the time series from the data449 to the 477. The status of the validation is: COMPLETED.

The number of estimations needed to perform the validation was1000.

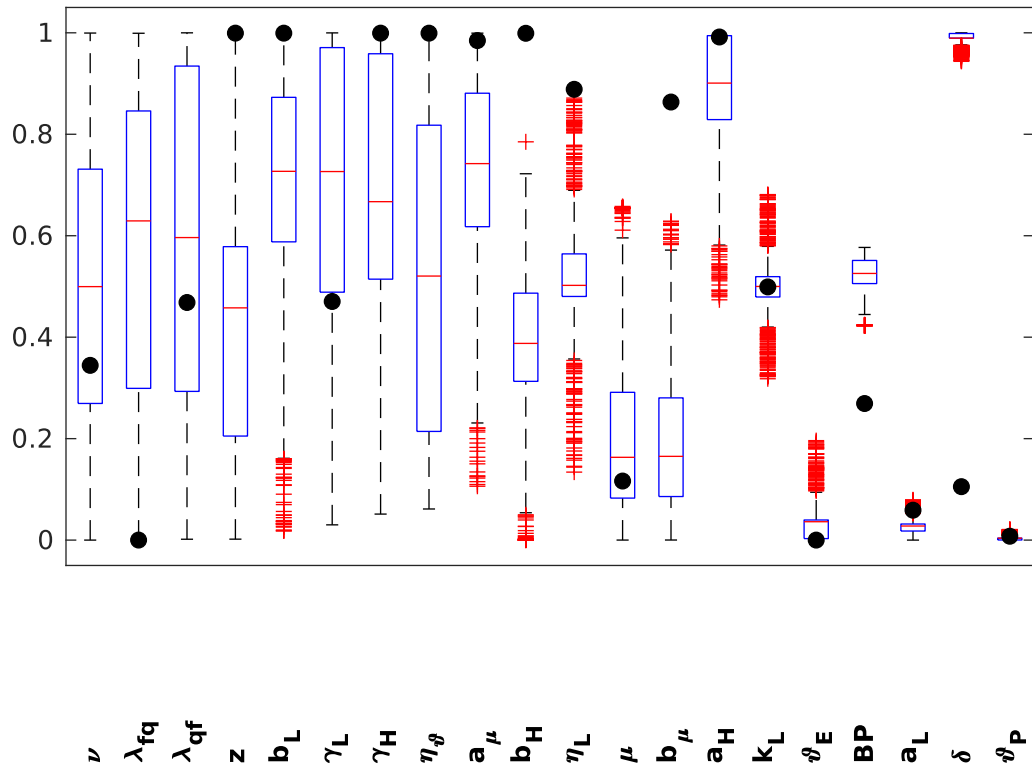
### 13.2. Estimated parameters with their intervals

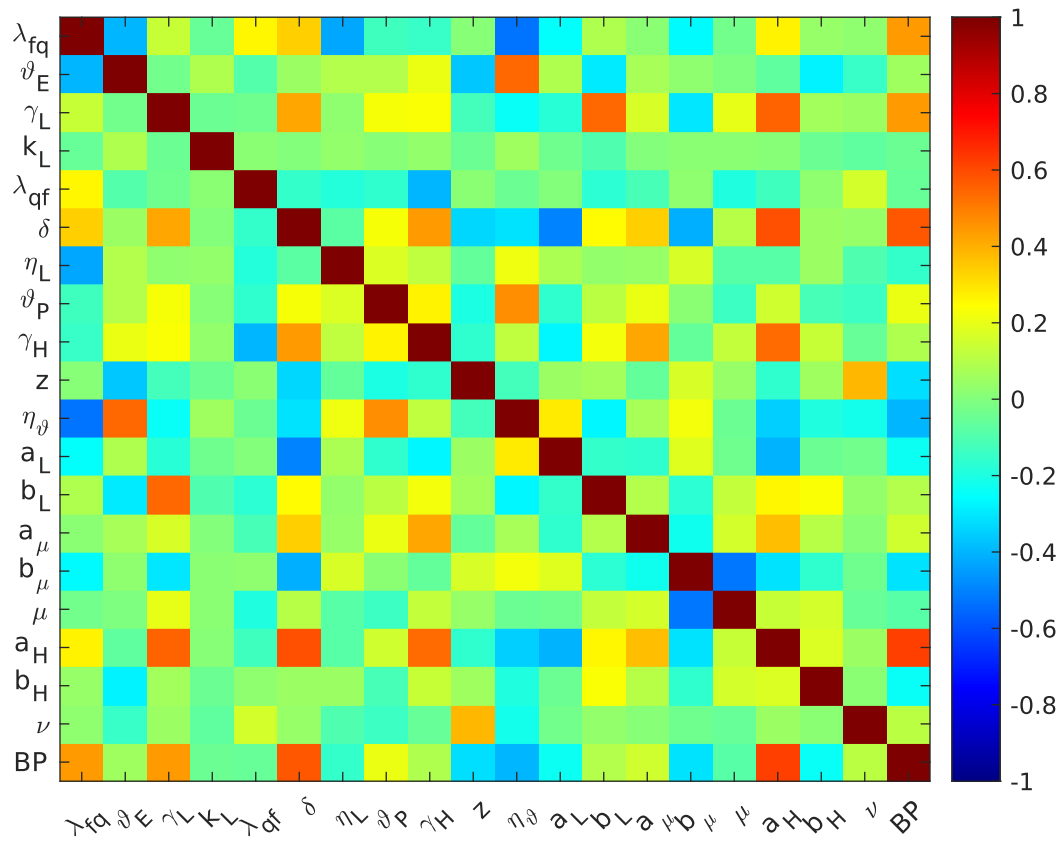
It was necessary to fix 0 parameters of 10 that could be fixed to complete validation.

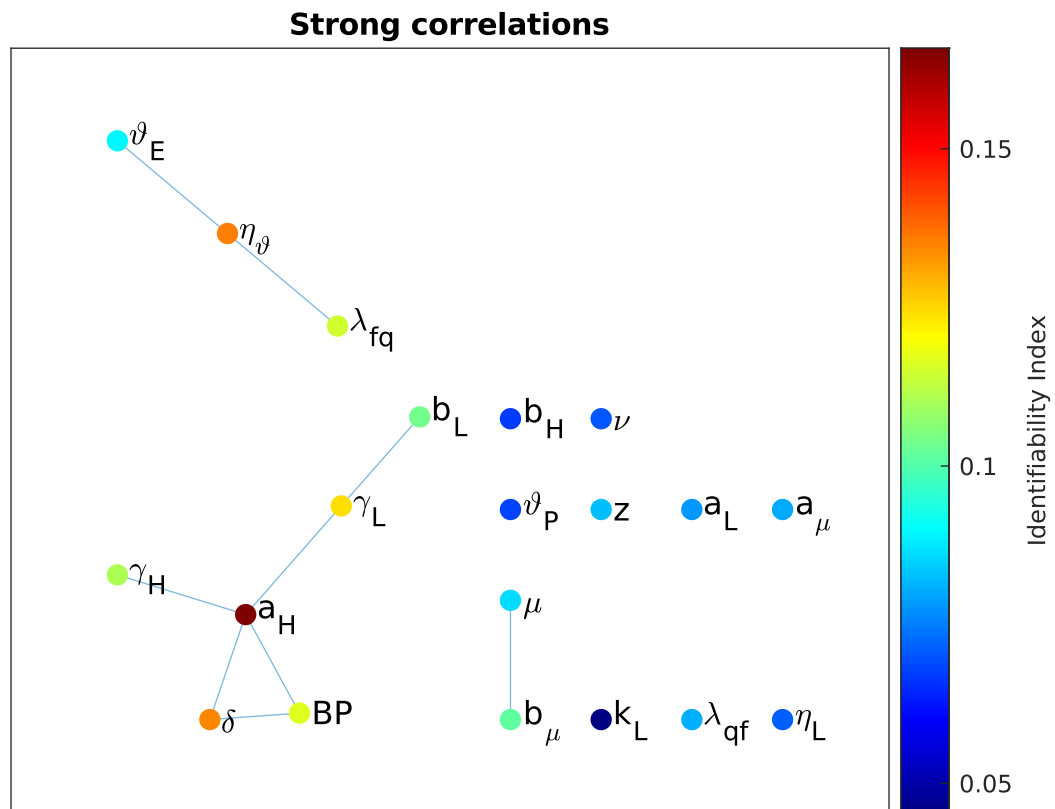
	Rango		Nominal	Mejor	Index
$\lambda_{fq}$	'0.6002'	'0.6583'	'0.6292'	'0.0001'	'0.1147'
$\vartheta_E$	'0.0216'	'0.0508'	'0.0362'	'0'	'0.0896'
$\gamma_L$	'0.7024'	'0.7506'	'0.7265'	'0.4704'	'0.1242'
$k_L$	'5.3967'	'5.603'	'5.4998'	'5.4919'	'0.0454'
$\lambda_{qf}$	'0.5681'	'0.6246'	'0.5964'	'0.4684'	'0.0811'
$\delta$	'0.1441'	'0.15'	'0.1484'	'0.0158'	'0.1347'
$\eta_L$	'0.4832'	'0.5211'	'0.5021'	'0.8886'	'0.0715'
$\vartheta_P$	'0.0008'	'0.007'	'0.0039'	'0.0076'	'0.0681'
$\gamma_H$	'0.6446'	'0.6896'	'0.6671'	'0.9993'	'0.1107'
$z$	'13.0308'	'14.4365'	'13.7336'	'29.9806'	'0.0826'
$\eta_{\vartheta}$	'0.4935'	'0.5475'	'0.5205'	'0.9993'	'0.1355'
$a_L$	'1.1933'	'1.5837'	'1.3885'	'1.8254'	'0.0779'
$b_L$	'10.8288'	'11.5255'	'11.1771'	'14.9903'	'0.104'
$a_{\mu}$	'11.1043'	'11.6758'	'11.39'	'14.7858'	'0.0805'
$b_{\mu}$	'3.044'	'3.5783'	'3.3112'	'13.0896'	'0.1015'
$\mu$	'0.1427'	'0.1837'	'0.1632'	'0.1164'	'0.0862'
$a_H$	'13.2543'	'13.9695'	'13.6119'	'14.8843'	'0.1658'
$b_H$	'6.2145'	'6.6421'	'6.4283'	'14.9867'	'0.0675'
$\nu$	'237.8684'	'261.7923'	'249.8303'	'172.2321'	'0.0704'
BP	'448.1481'	'448.8519'	'448.5'	'438.4998'	'0.1166'



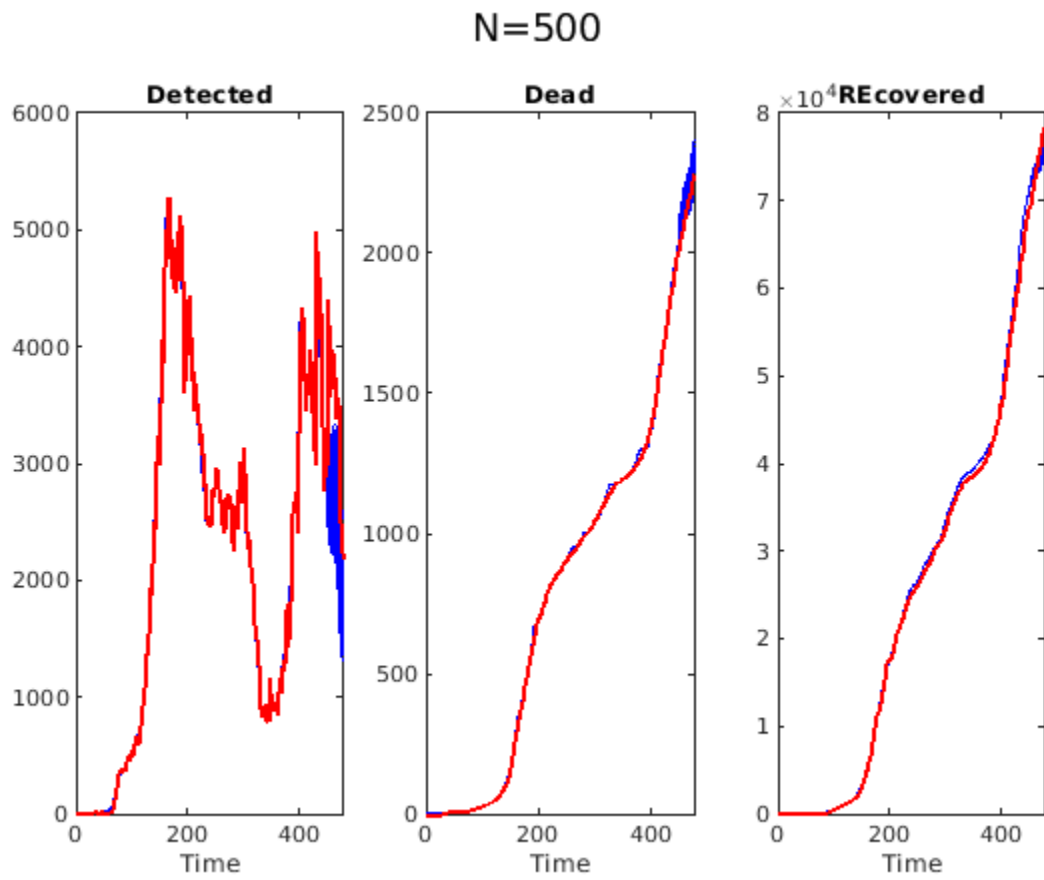
### 13.3. Identifiability analysis







### 13.4. Uncertainty analysis



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## Chapter 14. Extension number14

### 14.1. Basic information

The extension to be validated consists of the time series from the data477 to the 530. The status of the validation is: COMPLETED.

The number of estimations needed to perform the validation was1000.

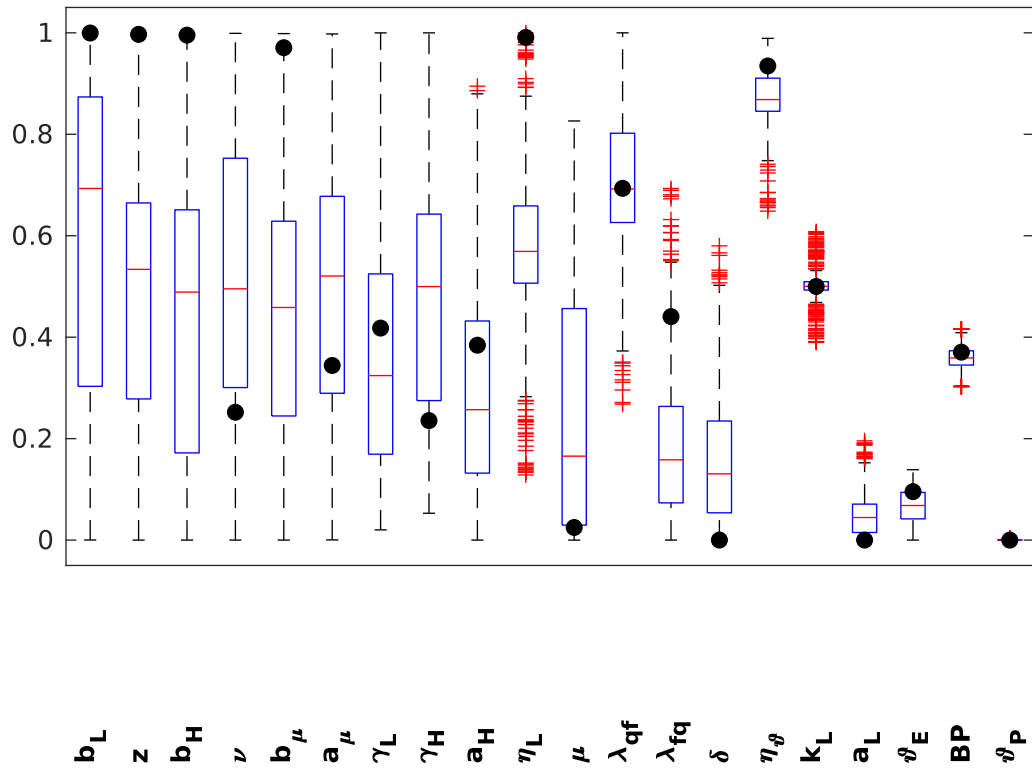
### 14.2. Estimated parameters with their intervals

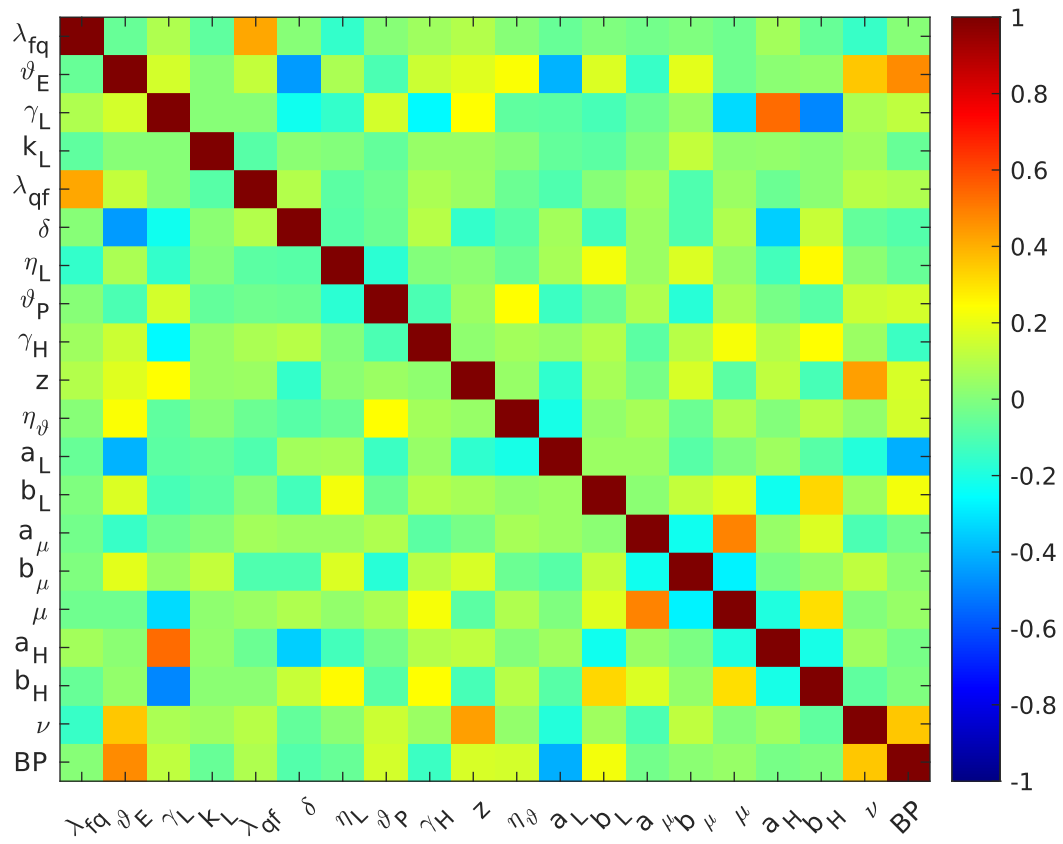
It was necessary to fix 0 parameters of 10 that could be fixed to complete validation.

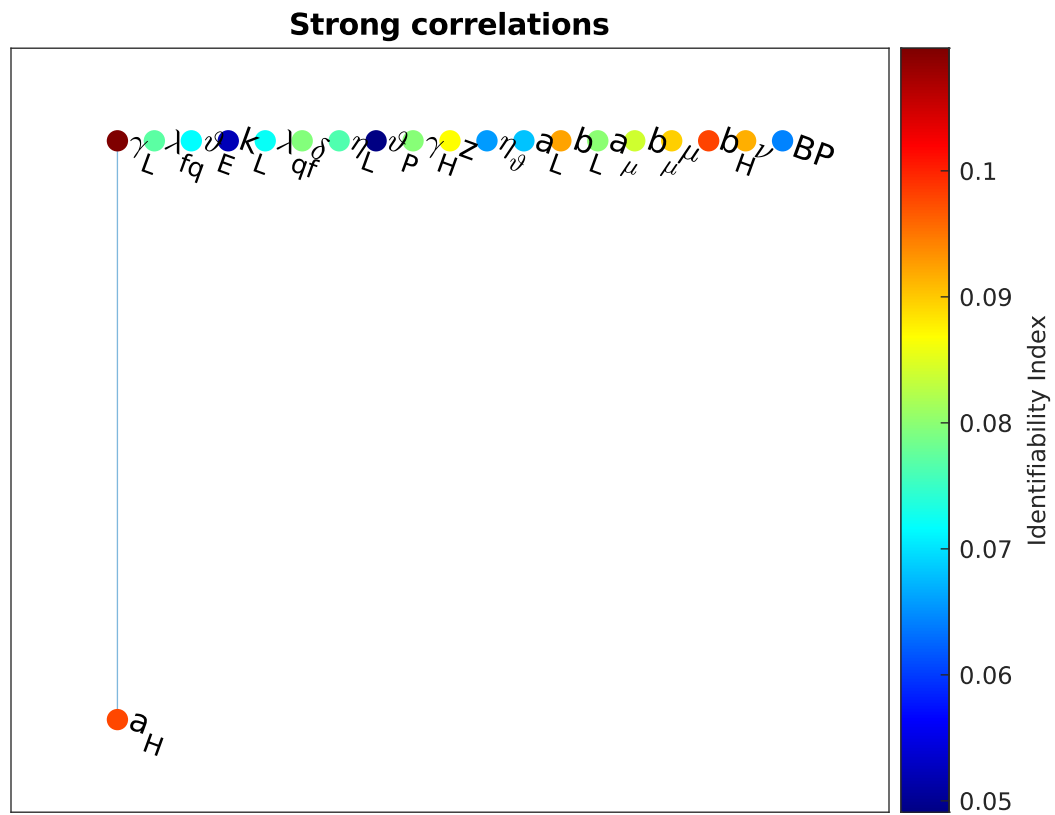
Due to a deviation from the median the CSB method was activated to obtain the parameter intervals.

	Rango		Nominal	Mejor	Index
$\lambda_{fq}$	'0.2037'	'0.4805'	'0.1591'	'0.4406'	'0.0772'
$\vartheta_E$	'0.0611'	'0.0999'	'0.0682'	'0.0955'	'0.0717'
$\gamma_L$	'0.2514'	'1'	'0.3243'	'0.418'	'0.1097'
$k_L$	'1'	'10'	'5.503'	'5.4999'	'0.0523'
$\lambda_{qf}$	'0.572'	'1'	'0.6916'	'0.6934'	'0.0723'
$\delta$	'0'	'0'	'0.0196'	'0'	'0.0796'
$\eta_L$	'0.1201'	'1'	'0.569'	'0.9909'	'0.0766'
$\vartheta_P$	'0'	'0'	'0.0006'	'0'	'0.0491'
$\gamma_H$	'0.0805'	'0.2484'	'0.4998'	'0.2356'	'0.0799'
$z$	'6.8998'	'30'	'16.012'	'29.9095'	'0.087'
$\eta_{\vartheta}$	'0.4145'	'1'	'0.8683'	'0.9347'	'0.0659'
$a_L$	'1'	'4.6853'	'1.6241'	'1.0004'	'0.0682'
$b_L$	'2.9607'	'15'	'10.7045'	'14.9948'	'0.0923'
$a_{\mu}$	'1'	'15'	'8.289'	'5.8197'	'0.0801'
$b_{\mu}$	'1'	'15'	'7.4202'	'14.5889'	'0.0841'
$\mu$	'0'	'0.0559'	'0.1656'	'0.0249'	'0.0898'
$a_H$	'1'	'15'	'4.6005'	'6.3791'	'0.0979'
$b_H$	'1'	'15'	'7.8448'	'14.9362'	'0.098'
$\nu$	'84.0205'	'204.4196'	'247.6718'	'126.0169'	'0.0917'
BP	'474.1895'	'485.9685'	'474.5'	'475.3037'	'0.0644'

### 14.3. Identifiability analysis



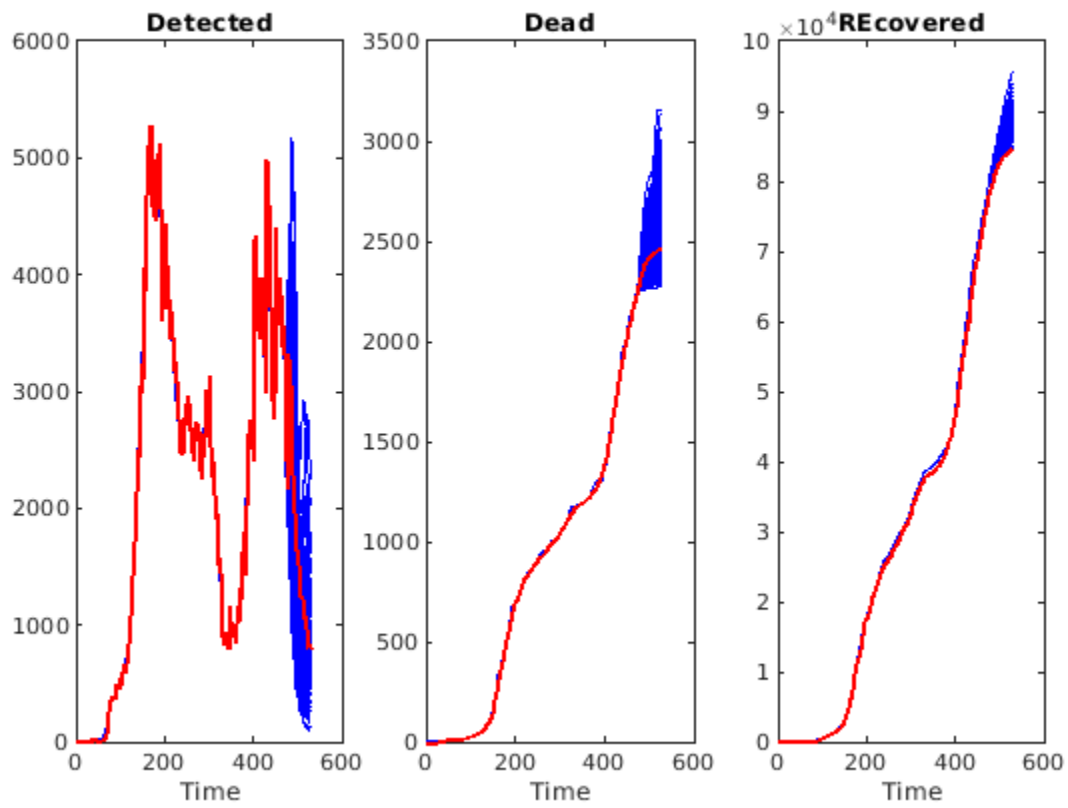






## 14.4. Uncertainty analysis

N=500



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## Chapter 15. Extension number15

### 15.1. Basic information

The extension to be validated consists of the time series from the data530 to the 591. The status of the validation is: COMPLETED.

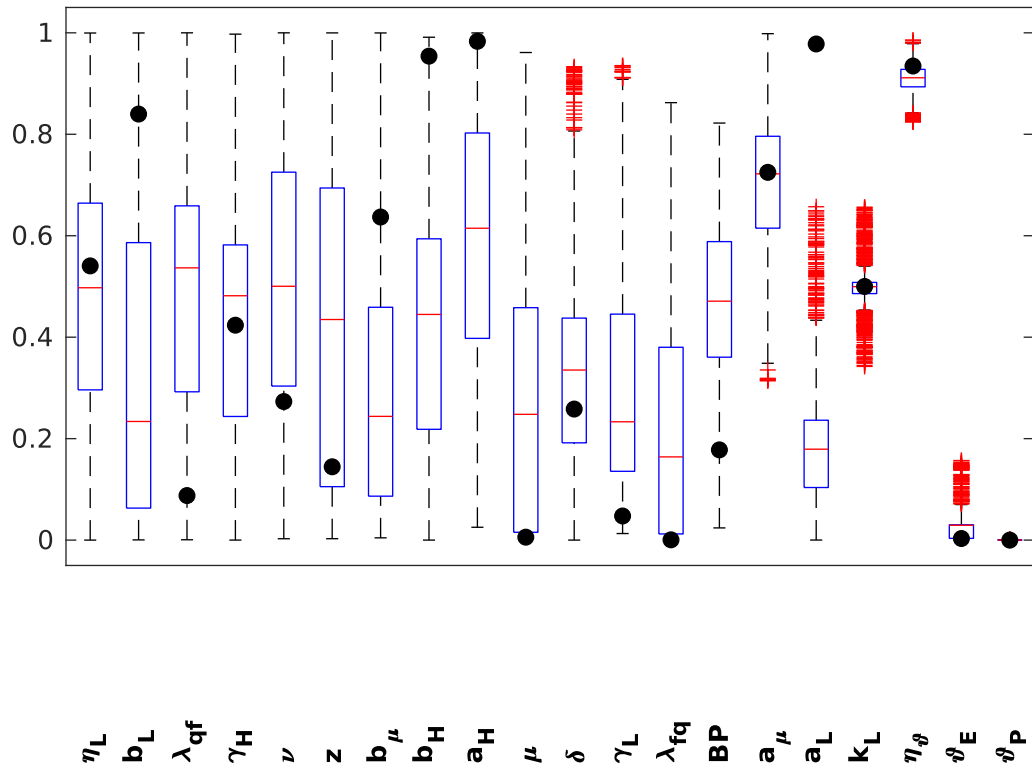
The number of estimations needed to perform the validation was1000.

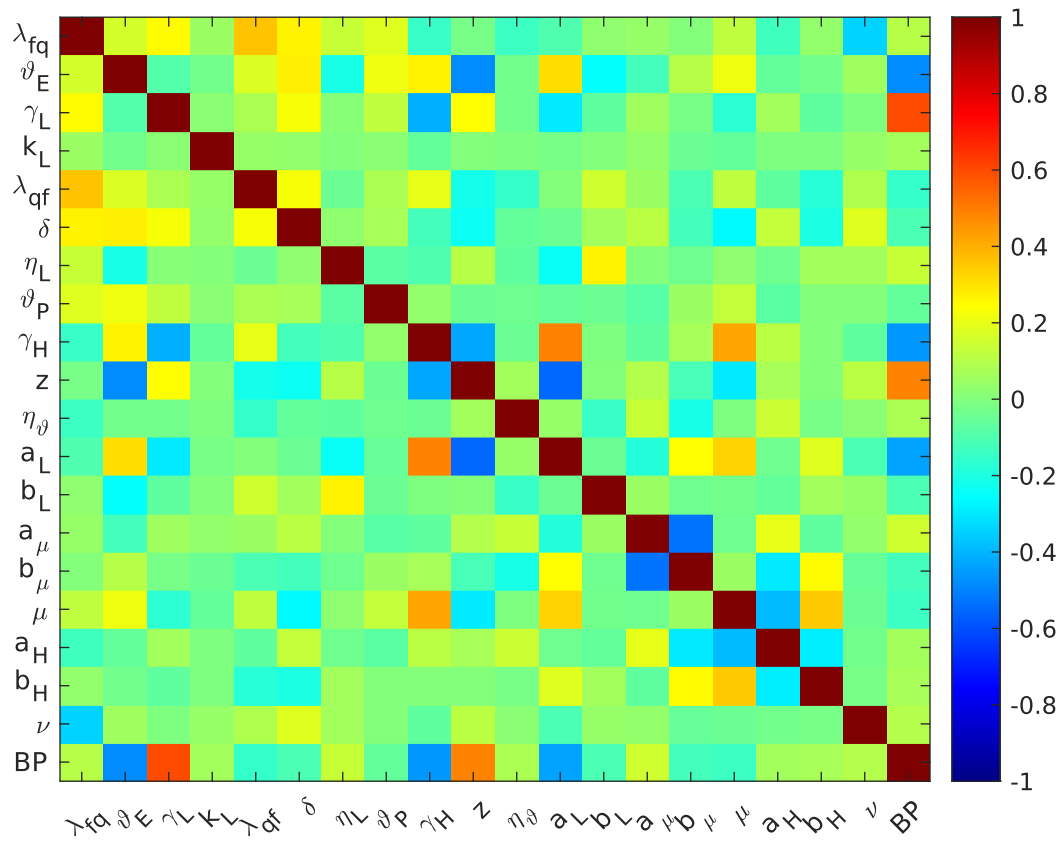
### 15.2. Estimated parameters with their intervals

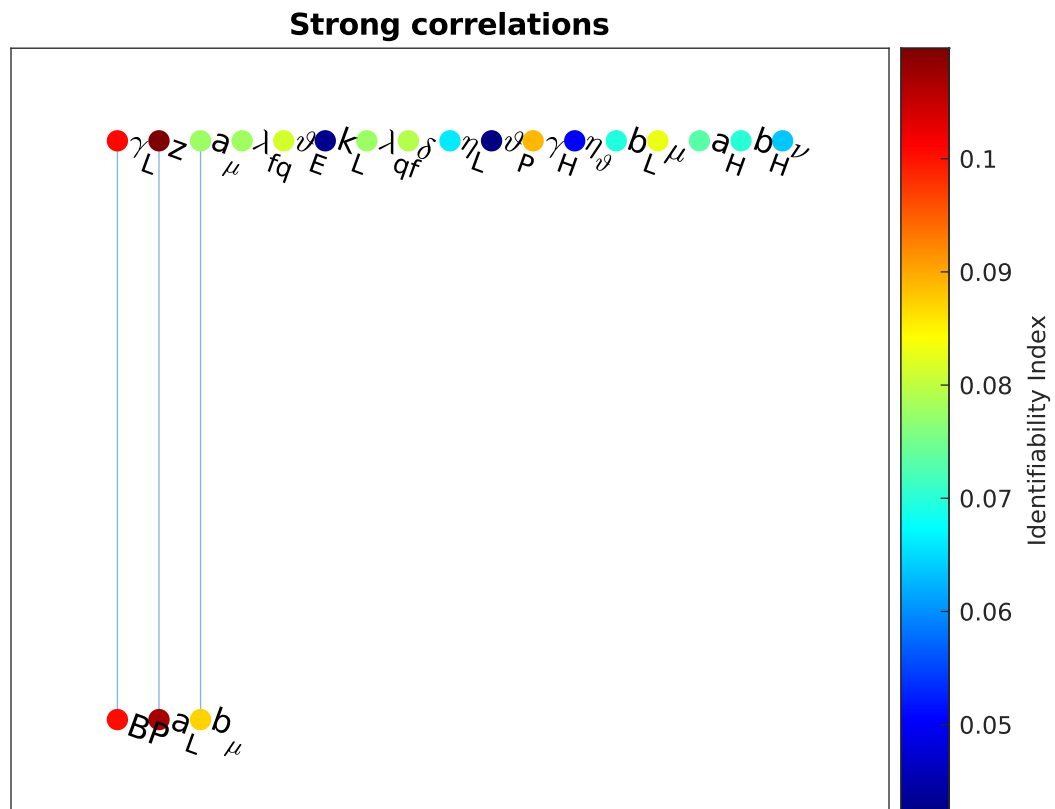
It was necessary to fix 0 parameters of 10 that could be fixed to complete validation.

	Rango		Nominal	Mejor	Index
\lambda_{fq}	'0.1439'	'0.1843'	'0.1641'	'0.0006'	'0.0781'
\vartheta_E	'0.0173'	'0.0413'	'0.0293'	'0.0031'	'0.0815'
\gamma_L	'0.2057'	'0.2612'	'0.2335'	'0.0475'	'0.1007'
k_L	'5.3944'	'5.5982'	'5.4963'	'5.4998'	'0.0432'
\lambda_{qf}	'0.5153'	'0.5581'	'0.5367'	'0.0878'	'0.0777'
\delta	'0.0474'	'0.0532'	'0.0503'	'0.0387'	'0.0793'
\eta_L	'0.4768'	'0.5181'	'0.4974'	'0.5405'	'0.0662'
\vartheta_P	'0'	'0.0004'	'0.0001'	'0'	'0.0423'
\gamma_H	'0.4612'	'0.5022'	'0.4817'	'0.4236'	'0.0892'
z	'12.2169'	'13.8737'	'13.0453'	'4.3353'	'0.1098'
\eta_{\vartheta}	'0.9035'	'0.9192'	'0.9114'	'0.9345'	'0.0505'
a_L	'3.1853'	'3.8404'	'3.5129'	'14.6924'	'0.1071'
b_L	'3.905'	'4.643'	'4.274'	'12.7578'	'0.0696'
a_{\mu}	'10.9044'	'11.3115'	'11.108'	'11.1494'	'0.0777'
b_{\mu}	'4.1504'	'4.6789'	'4.4147'	'9.9165'	'0.0873'
\mu	'0.2296'	'0.2662'	'0.2479'	'0.0058'	'0.0829'
a_H	'9.3218'	'9.8918'	'9.6068'	'14.766'	'0.0732'
b_H	'6.9269'	'7.5291'	'7.228'	'14.3567'	'0.0701'
\nu	'239.6745'	'260.7056'	'250.19'	'136.5663'	'0.0637'
BP	'524.553'	'527.4149'	'525.9839'	'495.4999'	'0.1004'

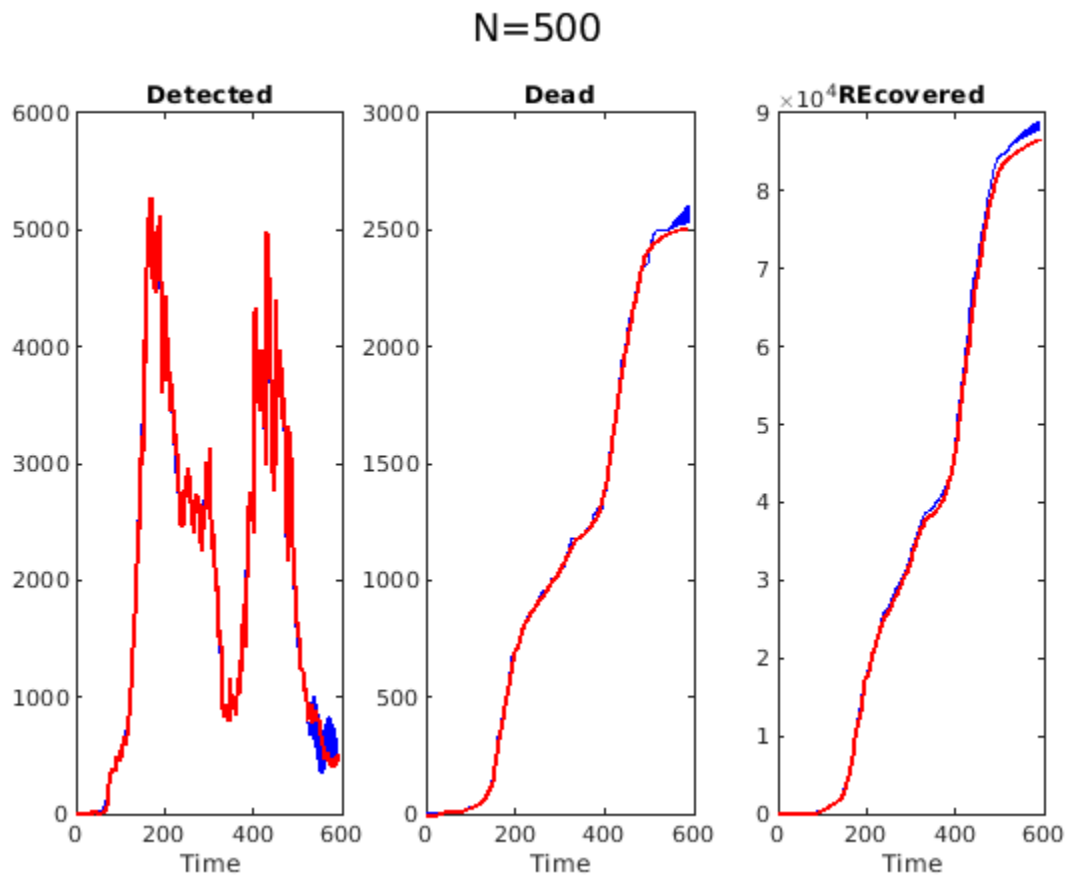
### 15.3. Identifiability analysis







## 15.4. Uncertainty analysis



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## Chapter 16. Extension number16

### 16.1. Basic information

The extension to be validated consists of the time series from the data591 to the 712. The status of the validation is: COMPLETED.

The number of estimations needed to perform the validation was1000.

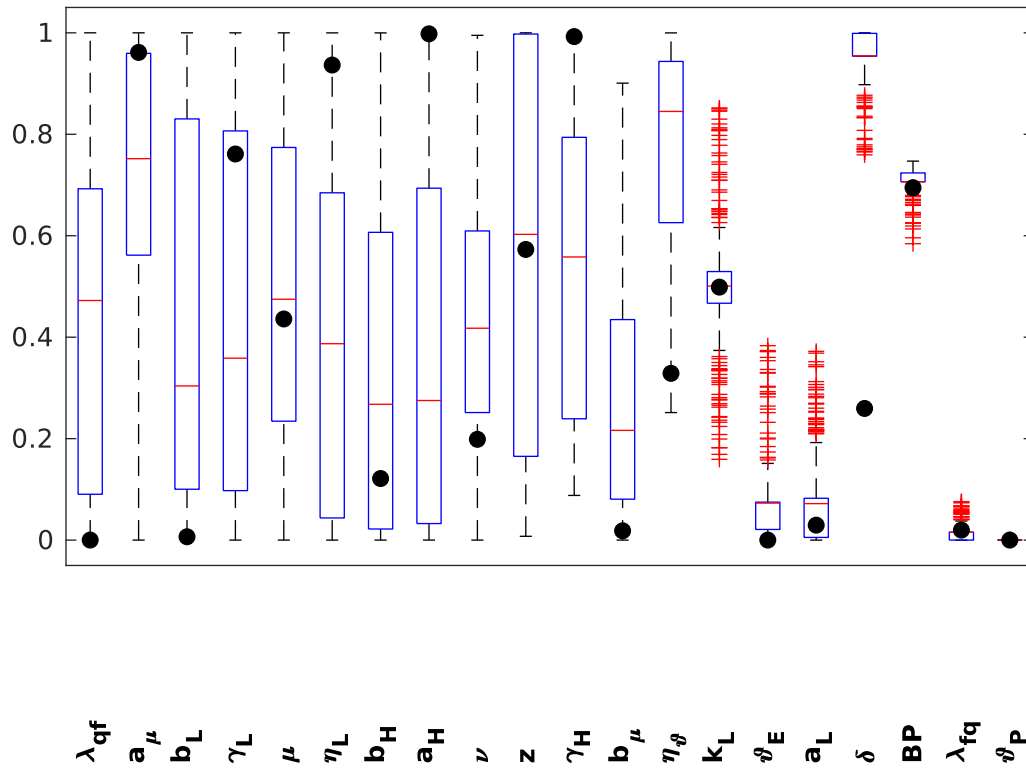
### 16.2. Estimated parameters with their intervals

It was necessary to fix 0 parameters of 10 that could be fixed to complete validation.

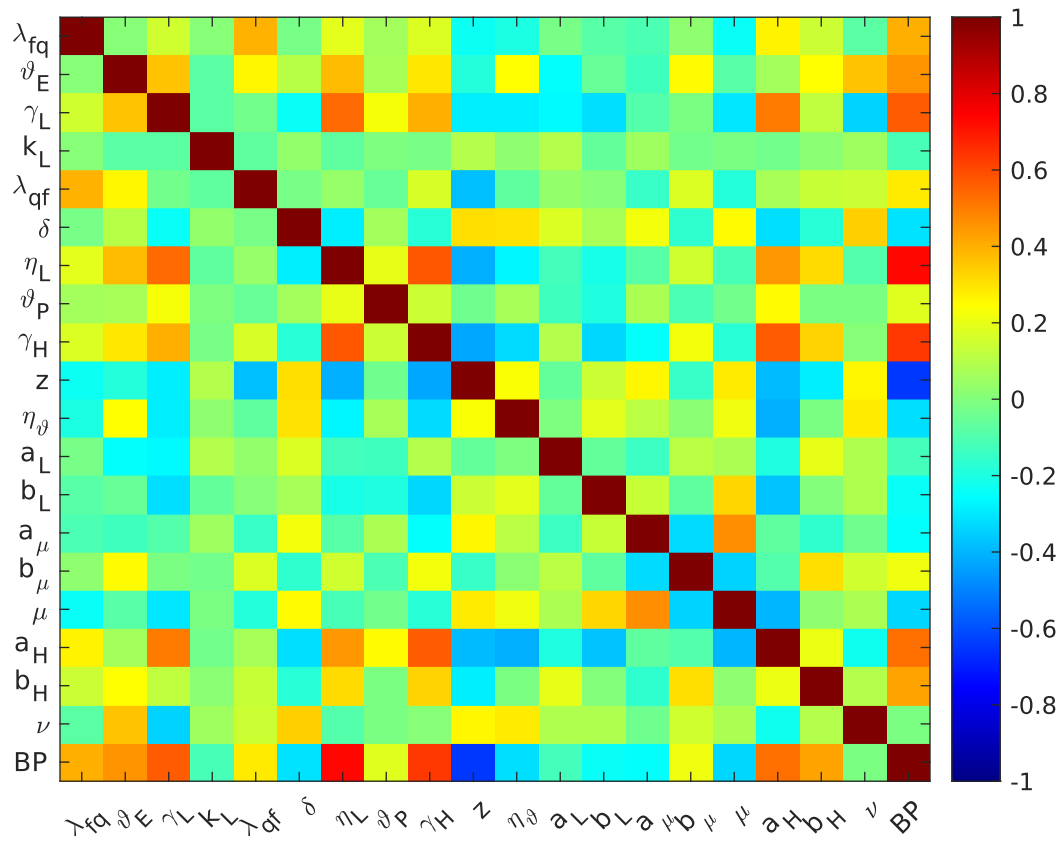
Due to a deviation from the median the CSB method was activated to obtain the parameter intervals.

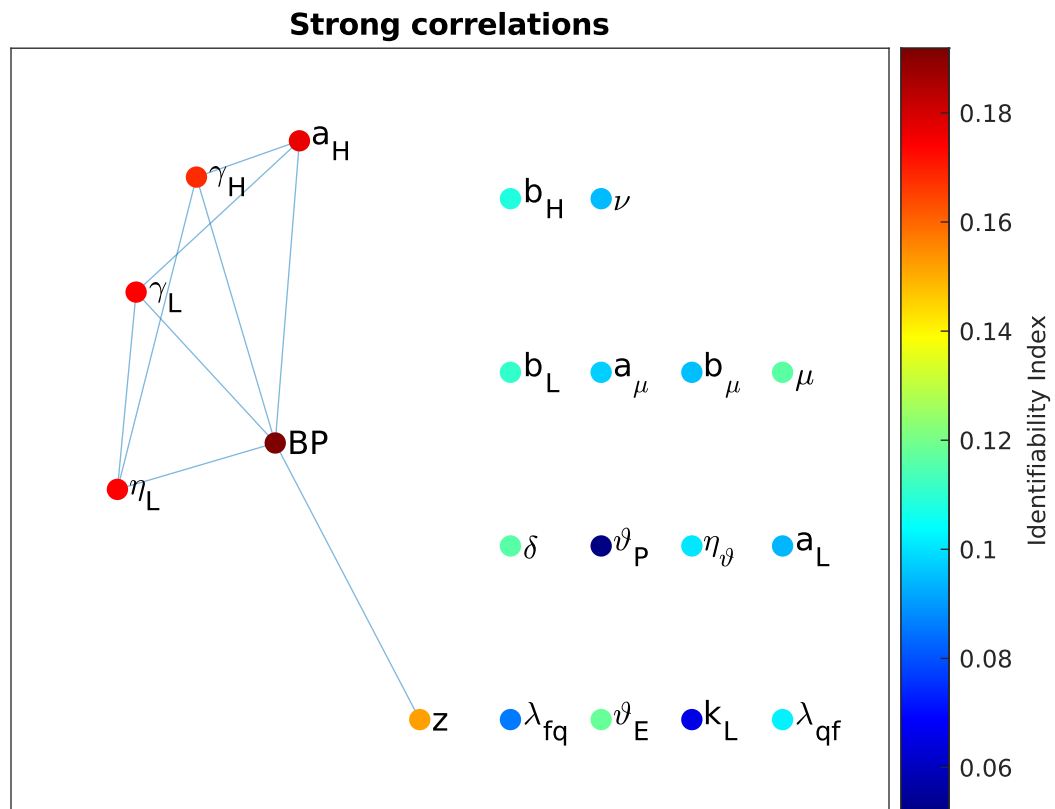
	Rango		Nominal	Mejor	Index
$\lambda_{fq}$	'0.013'	'0.0235'	'0.0157'	'0.0197'	'0.0859'
$\vartheta_E$	'0'	'0.0002'	'0.0732'	'0.0001'	'0.1181'
$\gamma_L$	'0.33'	'0.9002'	'0.3586'	'0.7611'	'0.1739'
$k_L$	'1'	'10'	'5.507'	'5.4882'	'0.0659'
$\lambda_{qf}$	'0'	'0.0002'	'0.4723'	'0.0001'	'0.1023'
$\delta$	'0.0343'	'0.0532'	'0.1431'	'0.0389'	'0.1162'
$\eta_L$	'0.2571'	'1'	'0.3871'	'0.9365'	'0.1741'
$\vartheta_P$	'0'	'0.0001'	'0.0001'	'0.0001'	'0.0518'
$\gamma_H$	'0.1846'	'1'	'0.5582'	'0.9926'	'0.1682'
$z$	'15.5562'	'28.7053'	'18.0815'	'17.19'	'0.152'
$\eta_{\vartheta}$	'0.2977'	'0.4089'	'0.8436'	'0.3287'	'0.1006'
$a_L$	'1.0411'	'1.7231'	'2.0067'	'1.4128'	'0.0941'
$b_L$	'1.0333'	'2.6675'	'5.2543'	'1.0921'	'0.1109'
$a_{\mu}$	'9.7945'	'15'	'11.5269'	'14.4592'	'0.0978'
$b_{\mu}$	'1.1789'	'3.9685'	'4.0395'	'1.2565'	'0.0952'
$\mu$	'0'	'0.8474'	'0.4748'	'0.4359'	'0.1167'
$a_H$	'9.7483'	'15'	'4.8529'	'14.9723'	'0.1771'
$b_H$	'2.4403'	'6.9528'	'4.7484'	'2.6994'	'0.1083'
$\nu$	'81.3709'	'114.046'	'208.8327'	'99.3366'	'0.0948'
BP	'648.9731'	'653.3101'	'651.5'	'649.4999'	'0.1919'

### 16.3. Identifiability analysis









## 16.4. Uncertainty analysis

