

# **Validation process for MEDELLIN**

**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 108. The status of the validation is: COMPLETED.

The number of estimations needed to perform the validation was1000.

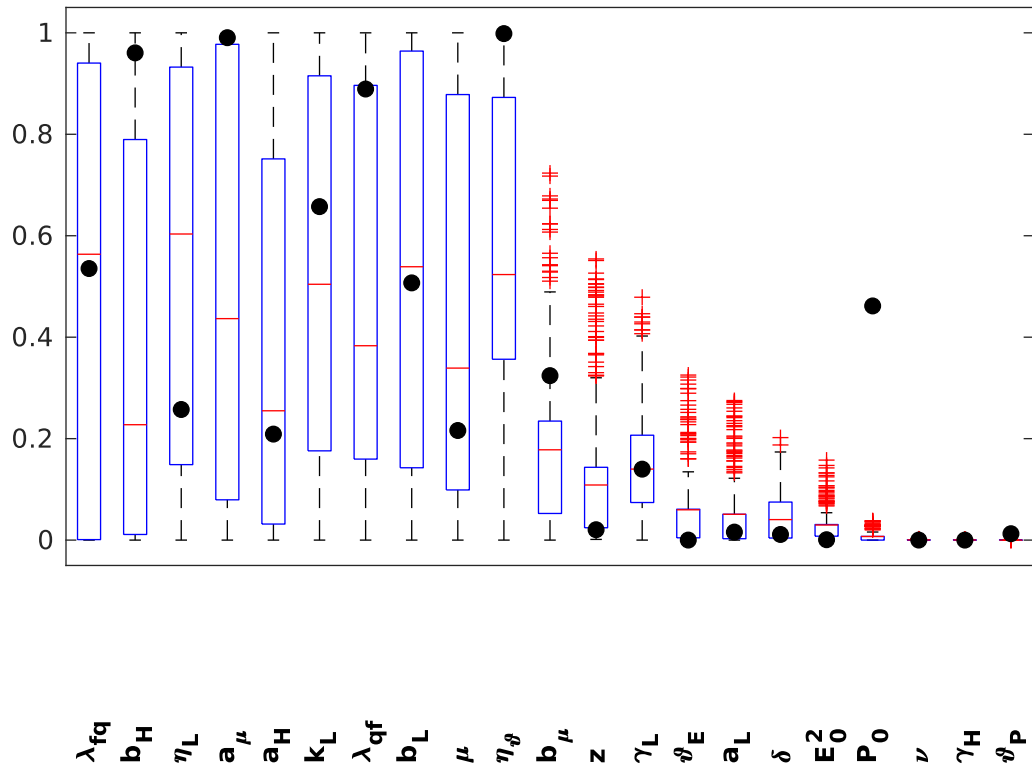
### 1.2. Estimated parameters with their intervals

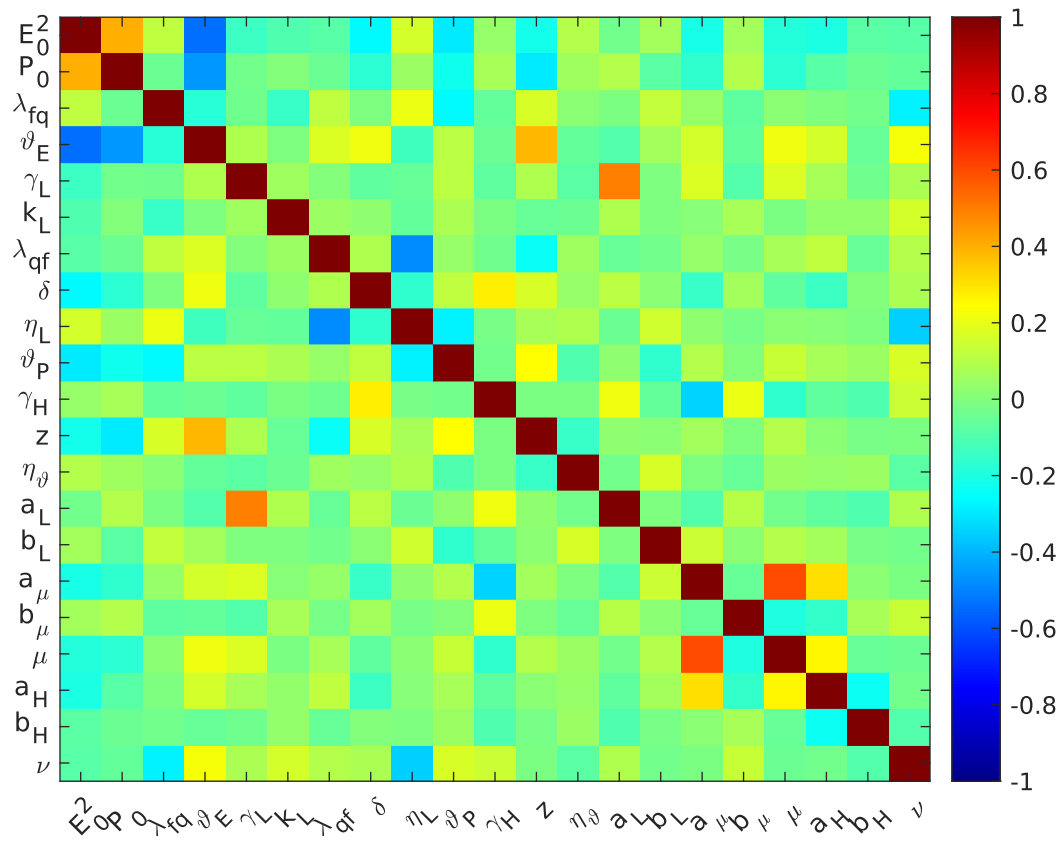
It was necessary to fix 0 parameters of 11 that could be fixed to complete validation.

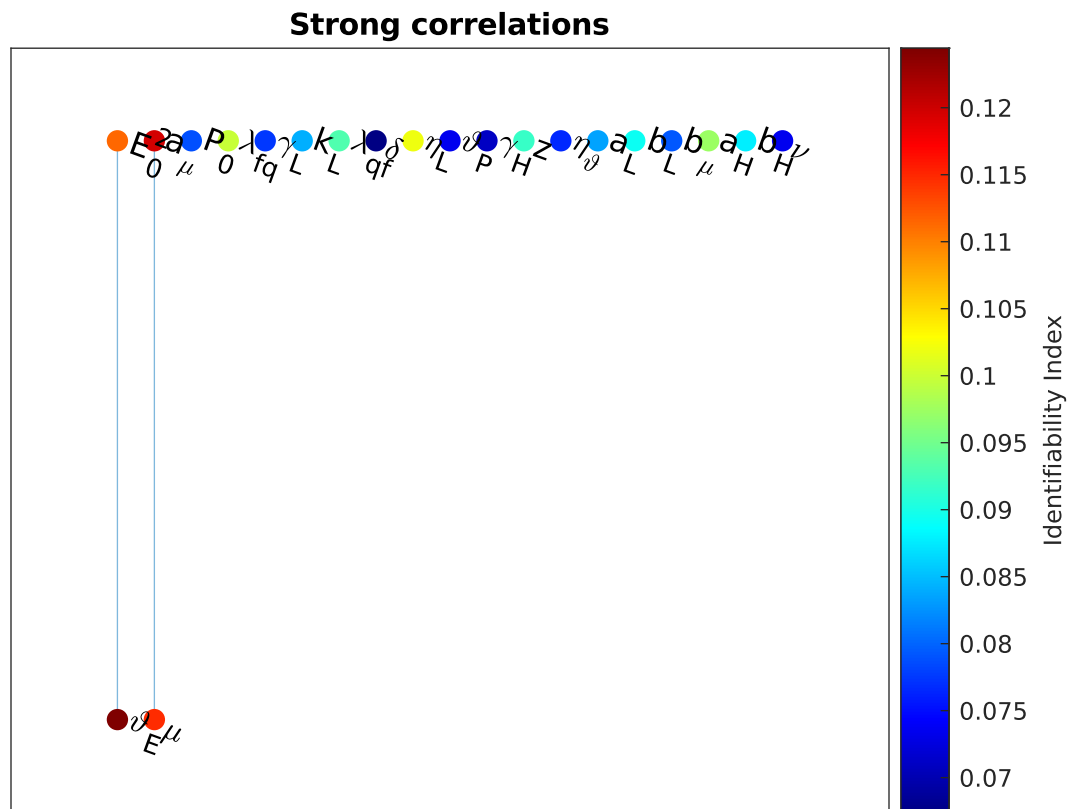
Due to a deviation from the median the CSB method was activated to obtain the parameter intervals.

	Rango		Nominal	Mejor	Index
E^2_0	'0.3146'	'3.2267'	'61.4312'	'1.5076'	'0.1113'
P_0	'149.7269'	'184.7667'	'2.908'	'184.6478'	'0.079'
\lambda_{fq}	'0.5235'	'0.5908'	'0.5635'	'0.5353'	'0.0997'
\vartheta_E	'0'	'0.0001'	'0.0609'	'0.0001'	'0.1244'
\gamma_L	'0.1289'	'0.144'	'0.1401'	'0.1399'	'0.0777'
k_L	'1.6275'	'8.5491'	'5.5389'	'6.9166'	'0.0842'
\lambda_{qf}	'0.8663'	'0.892'	'0.3832'	'0.8892'	'0.0932'
\delta	'0.0015'	'0.0021'	'0.0061'	'0.0017'	'0.0674'
\eta_L	'0.2443'	'0.3008'	'0.6034'	'0.2575'	'0.102'
\vartheta_P	'0.011'	'0.0173'	'0'	'0.0126'	'0.0734'
\gamma_H	'0'	'0'	'0.0003'	'0'	'0.0712'
z	'0.5694'	'0.6143'	'3.2797'	'0.6133'	'0.0918'
\eta_{\vartheta}	'0.8674'	'1'	'0.5235'	'0.9985'	'0.0767'
a_L	'1.1203'	'1.2243'	'1.7133'	'1.221'	'0.0835'
b_L	'7.5442'	'8.7056'	'8.5442'	'8.0987'	'0.0895'
a_{\mu}	'9.8551'	'15'	'7.1124'	'14.8658'	'0.1197'
b_{\mu}	'3.6067'	'10.4583'	'3.4921'	'5.5387'	'0.0794'
\mu	'0.1056'	'0.4453'	'0.3391'	'0.2161'	'0.1149'
a_H	'1.315'	'13.6'	'4.5691'	'3.9254'	'0.0973'
b_H	'3.3293'	'15'	'4.1845'	'14.447'	'0.0878'
\nu	'0.0067'	'0.0616'	'0.2127'	'0.0369'	'0.0736'

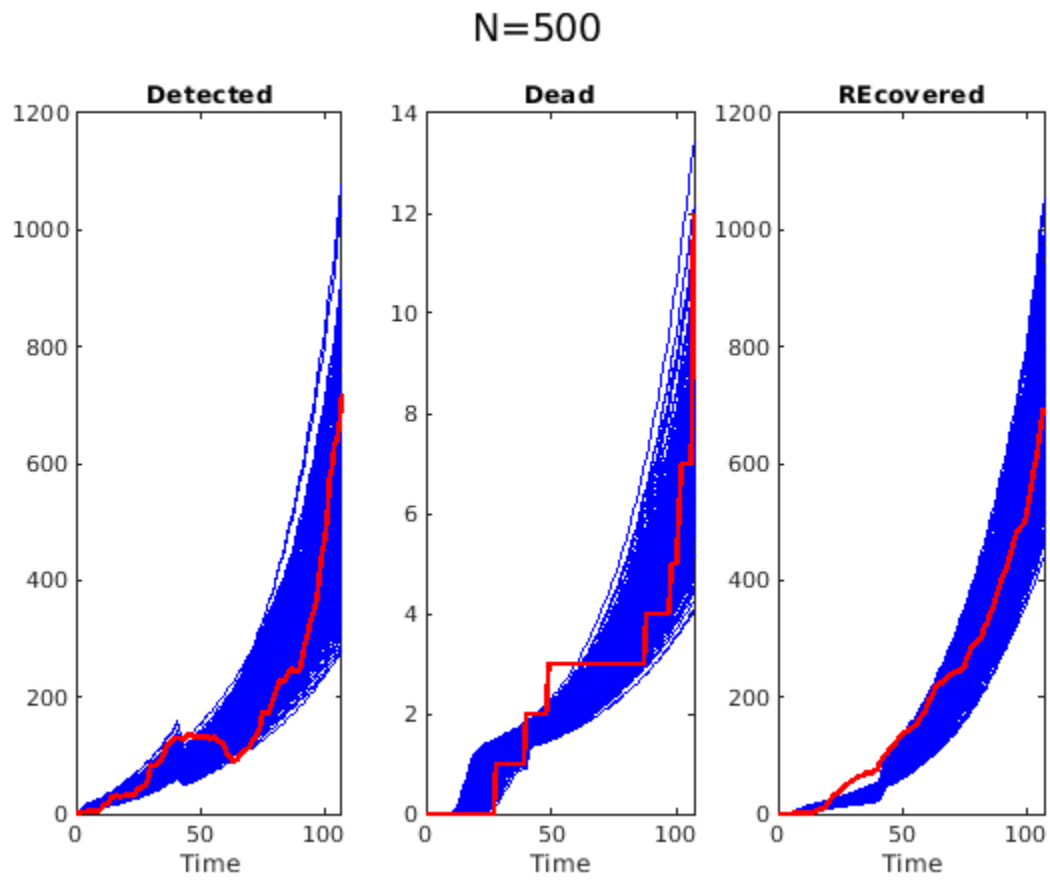
### 1.3. Identifiability analysis







## 1.4. Uncertainty analysis





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## Chapter 2. Extension number2

### 2.1. Basic information

The extension to be validated consists of the time series from the data108 to the 154. The status of the validation is: COMPLETED.

The number of estimations needed to perform the validation was1000.

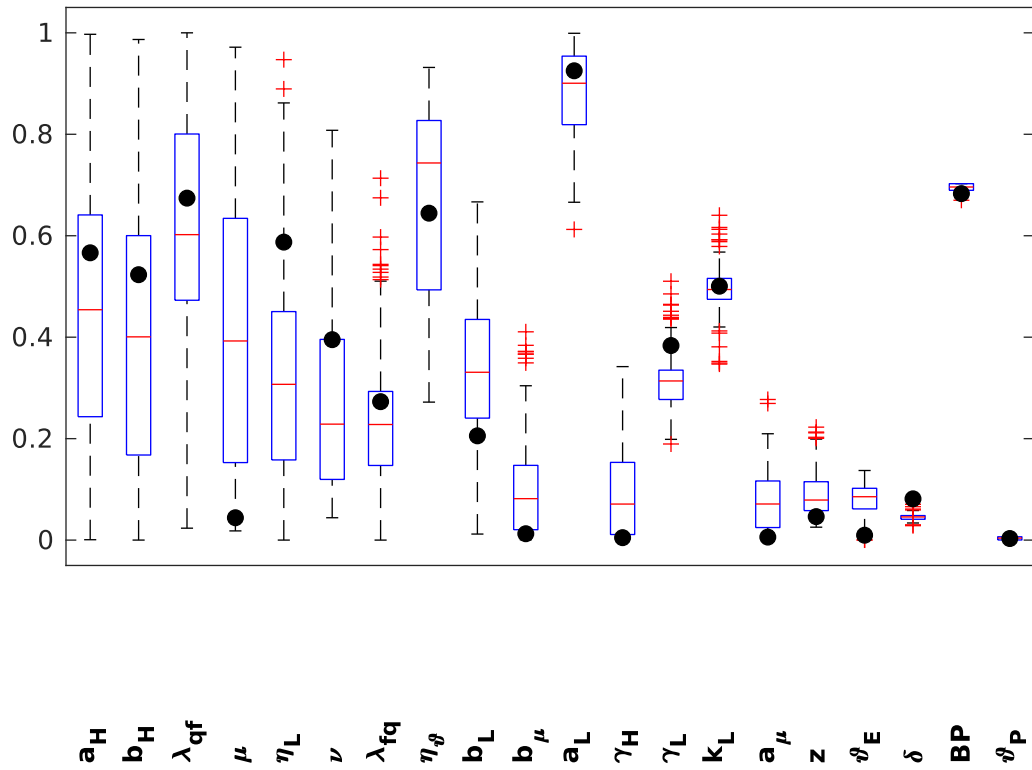
### 2.2. Estimated parameters with their intervals

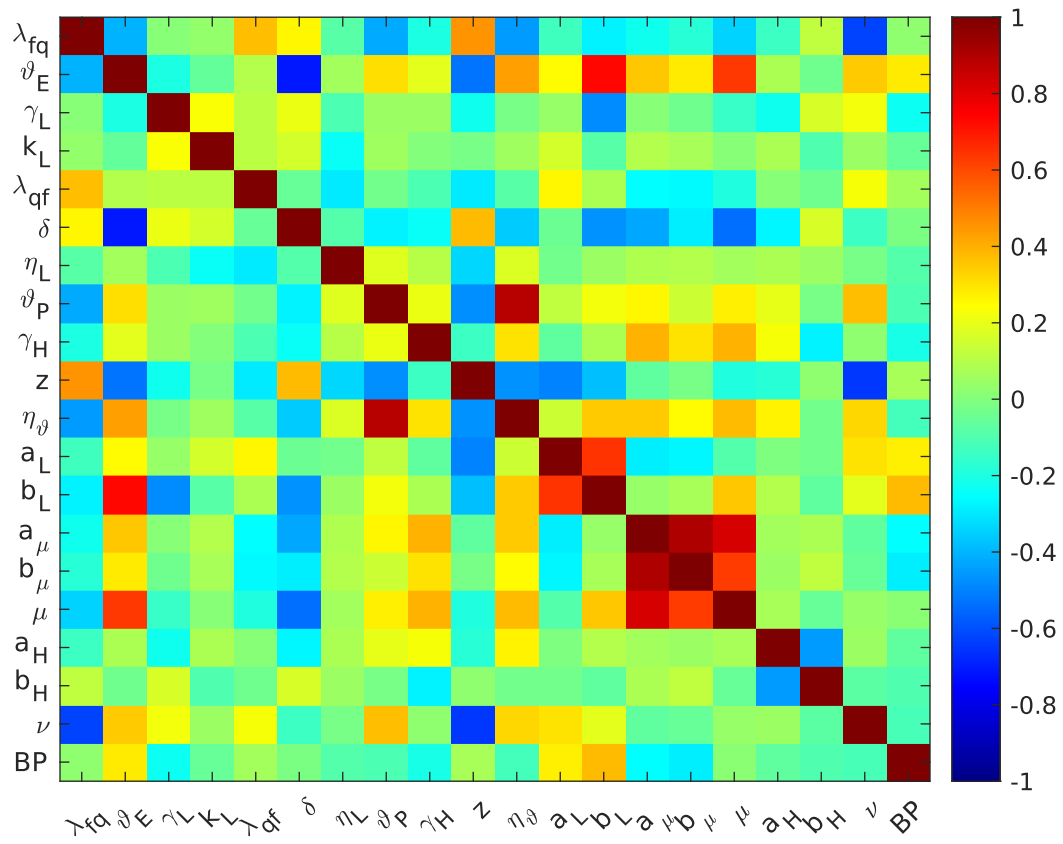
It was necessary to fix 0 parameters of 10 that could be fixed to complete validation.

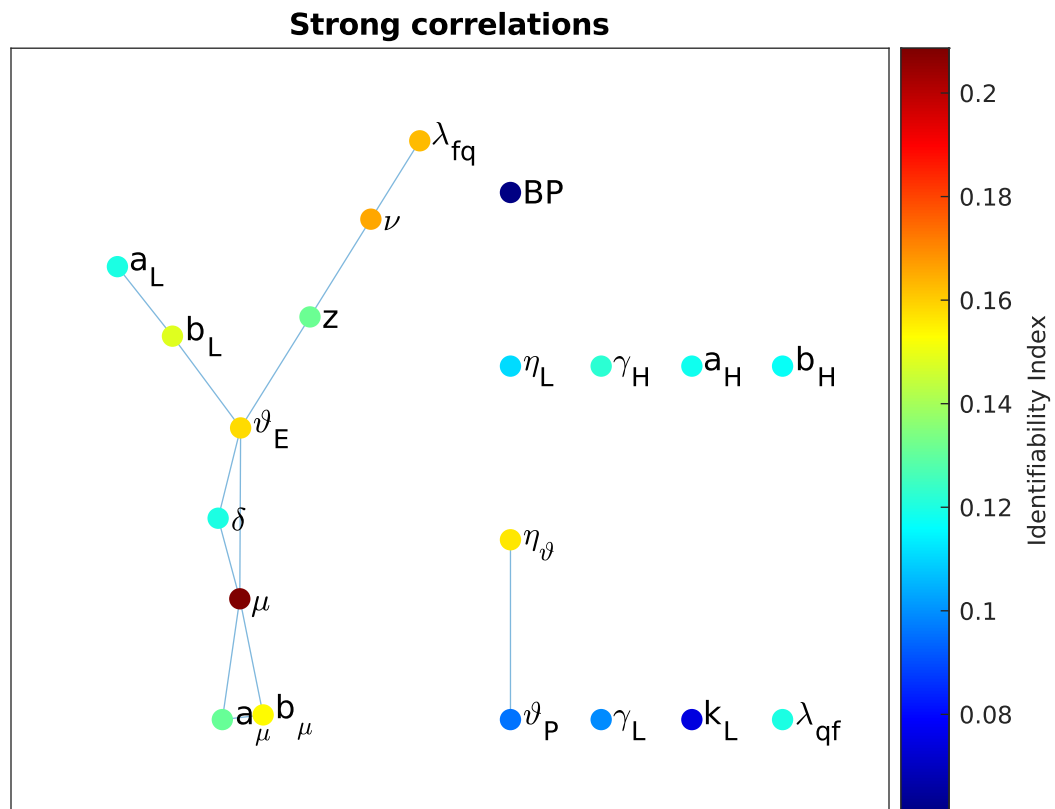
Due to a deviation from the median the CSB method was activated to obtain the parameter intervals.

	Rango		Nominal	Mejor	Index
$\lambda_{fq}$	'0.2519'	'0.3086'	'0.2286'	'0.2729'	'0.1631'
$\vartheta_E$	'0.0038'	'0.0196'	'0.0855'	'0.0097'	'0.1582'
$\gamma_L$	'0.2678'	'0.7527'	'0.3139'	'0.3836'	'0.0992'
$k_L$	'2.7326'	'9.6101'	'5.4459'	'5.5045'	'0.0745'
$\lambda_{qf}$	'0.647'	'0.7635'	'0.6022'	'0.6741'	'0.1203'
$\delta$	'0.0111'	'0.0154'	'0.0069'	'0.0122'	'0.1202'
$\eta_L$	'0.5029'	'0.8966'	'0.3071'	'0.5874'	'0.1109'
$\vartheta_P$	'0.0031'	'0.0053'	'0.004'	'0.0031'	'0.096'
$\gamma_H$	'0.0004'	'0.0104'	'0.0715'	'0.0048'	'0.1224'
$z$	'1.1652'	'1.5416'	'2.3726'	'1.3884'	'0.1316'
$\eta_{\vartheta}$	'0.6211'	'0.6889'	'0.7418'	'0.6445'	'0.1563'
$a_L$	'11.2265'	'14.2681'	'13.6066'	'13.9525'	'0.1204'
$b_L$	'2.6192'	'4.2246'	'5.632'	'3.8777'	'0.1484'
$a_{\mu}$	'1.0757'	'1.6766'	'2.0077'	'1.083'	'0.1314'
$b_{\mu}$	'1.1254'	'3.5391'	'2.1914'	'1.1758'	'0.1538'
$\mu$	'0.0438'	'0.0695'	'0.3926'	'0.0441'	'0.2087'
$a_H$	'1.966'	'14.3483'	'7.3579'	'8.9289'	'0.1182'
$b_H$	'1.2576'	'12.8702'	'6.6091'	'8.3248'	'0.1175'
$\nu$	'184.1338'	'264.4047'	'115.2942'	'197.5578'	'0.1655'
BP	'105.4381'	'110.1554'	'107.5'	'105.5'	'0.0611'

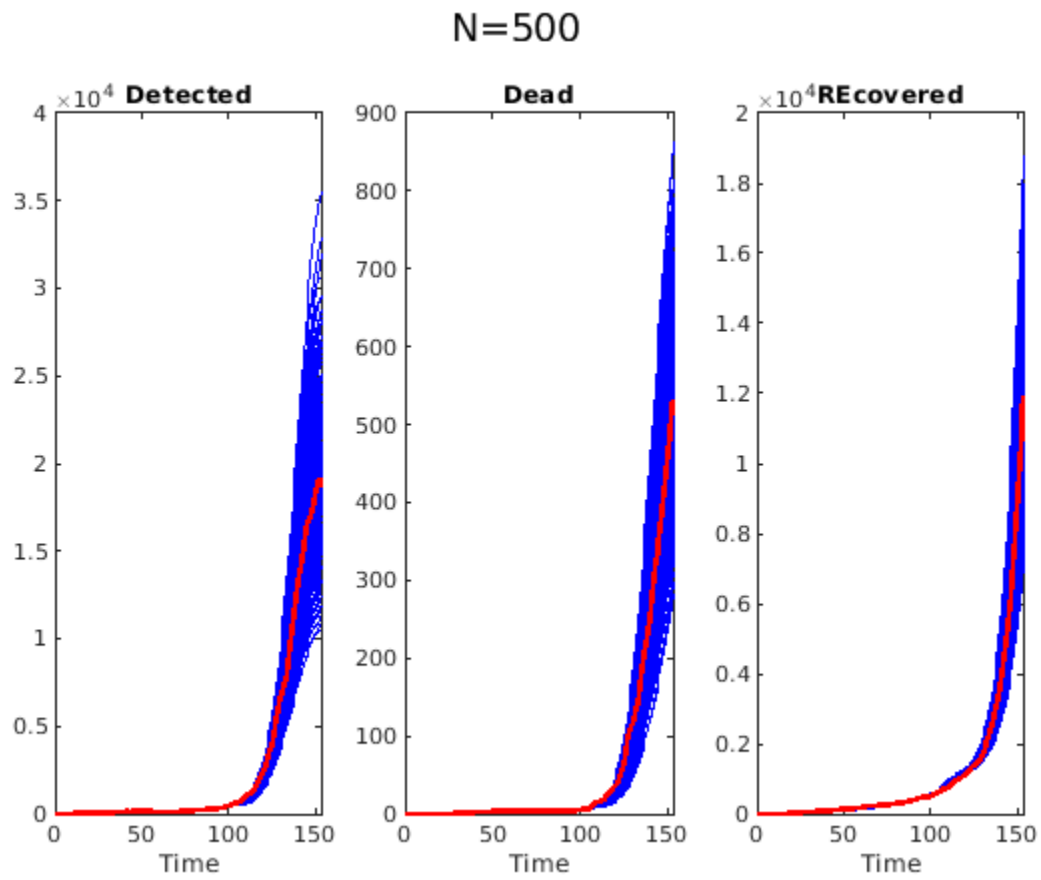
## 2.3. Identifiability analysis







## 2.4. Uncertainty analysys



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## Chapter 3. Extension number3

### 3.1. Basic information

The extension to be validated consists of the time series from the data154 to the 191. The status of the validation is: COMPLETED.

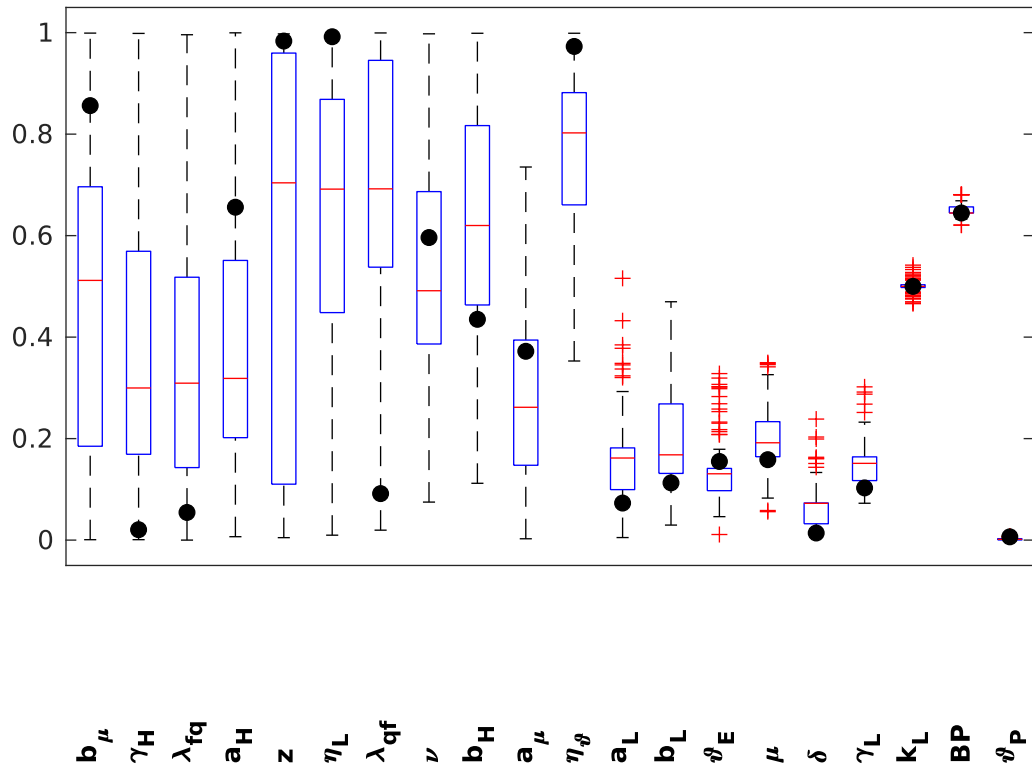
The number of estimations needed to perform the validation was1000.

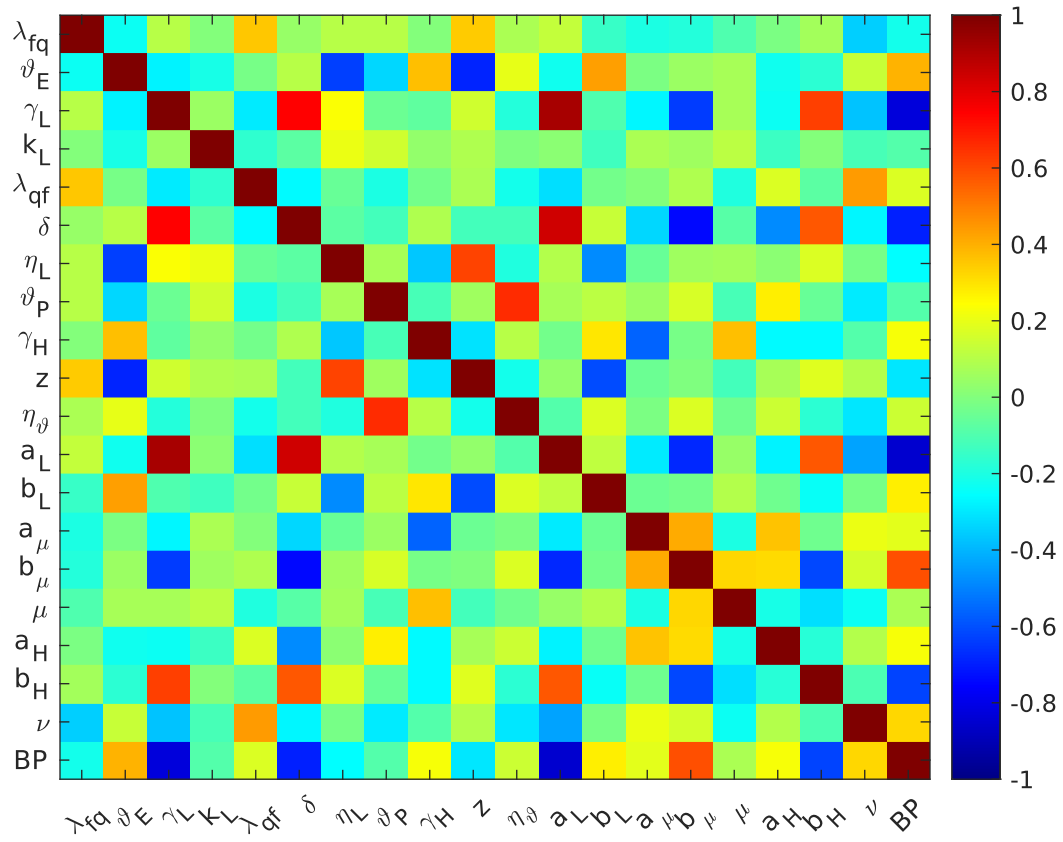
### 3.2. Estimated parameters with their intervals

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

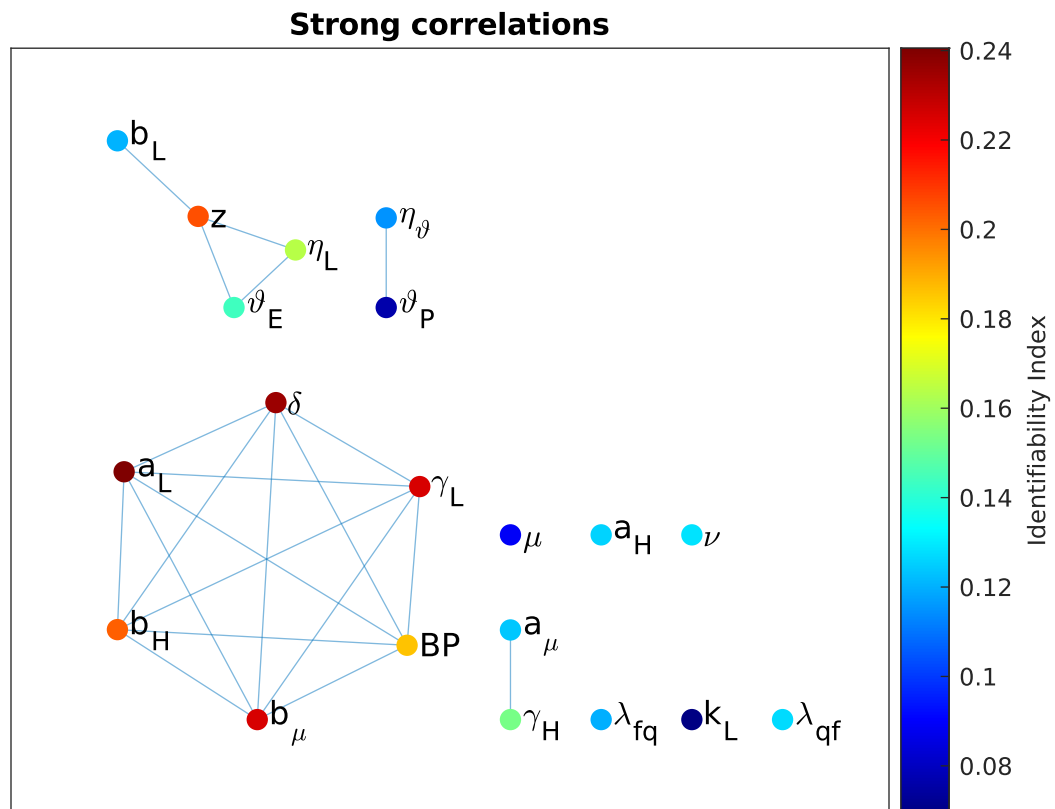
	Rango		Nominal	Mejor	Index
$\lambda_{fq}$	'0.2496'	'0.3689'	'0.3093'	'0.0545'	'0.1197'
$\vartheta_E$	'0.0966'	'0.1651'	'0.1308'	'0.1549'	'0.1439'
$\gamma_L$	'0.0909'	'0.2116'	'0.1513'	'0.1029'	'0.2253'
$k_L$	'5.2916'	'5.7085'	'5.5'	'5.5'	'0.0696'
$\lambda_{qf}$	'0.6297'	'0.7546'	'0.6922'	'0.0916'	'0.1271'
$\delta$	'0'	'0.0222'	'0.011'	'0.0021'	'0.2354'
$\eta_L$	'0.6249'	'0.7584'	'0.6916'	'0.9919'	'0.1639'
$\vartheta_P$	'0.0009'	'0.0021'	'0.0015'	'0.0064'	'0.0767'
$\gamma_H$	'0.2287'	'0.3709'	'0.2998'	'0.0205'	'0.1536'
$z$	'18.369'	'23.8727'	'21.1209'	'29.5028'	'0.2058'
$\eta_{\vartheta}$	'0.7639'	'0.8387'	'0.8013'	'0.9728'	'0.1153'
$a_L$	'2.1788'	'4.3506'	'3.2647'	'2.0218'	'0.2405'
$b_L$	'2.8015'	'3.9035'	'3.3525'	'2.5793'	'0.1206'
$a_{\mu}$	'4.0525'	'5.2995'	'4.676'	'6.2088'	'0.124'
$b_{\mu}$	'7.1586'	'9.1707'	'8.1647'	'12.9866'	'0.2258'
$\mu$	'0.164'	'0.2212'	'0.1926'	'0.1585'	'0.0893'
$a_H$	'4.6961'	'6.2257'	'5.4609'	'10.1837'	'0.1263'
$b_H$	'8.9442'	'10.4138'	'9.679'	'7.0911'	'0.2029'
$\nu$	'219.0627'	'272.3386'	'245.7006'	'298.1134'	'0.1289'
BP	'160.121'	'162.879'	'161.5'	'161.5'	'0.1863'

### 3.3. Identifiability analysis

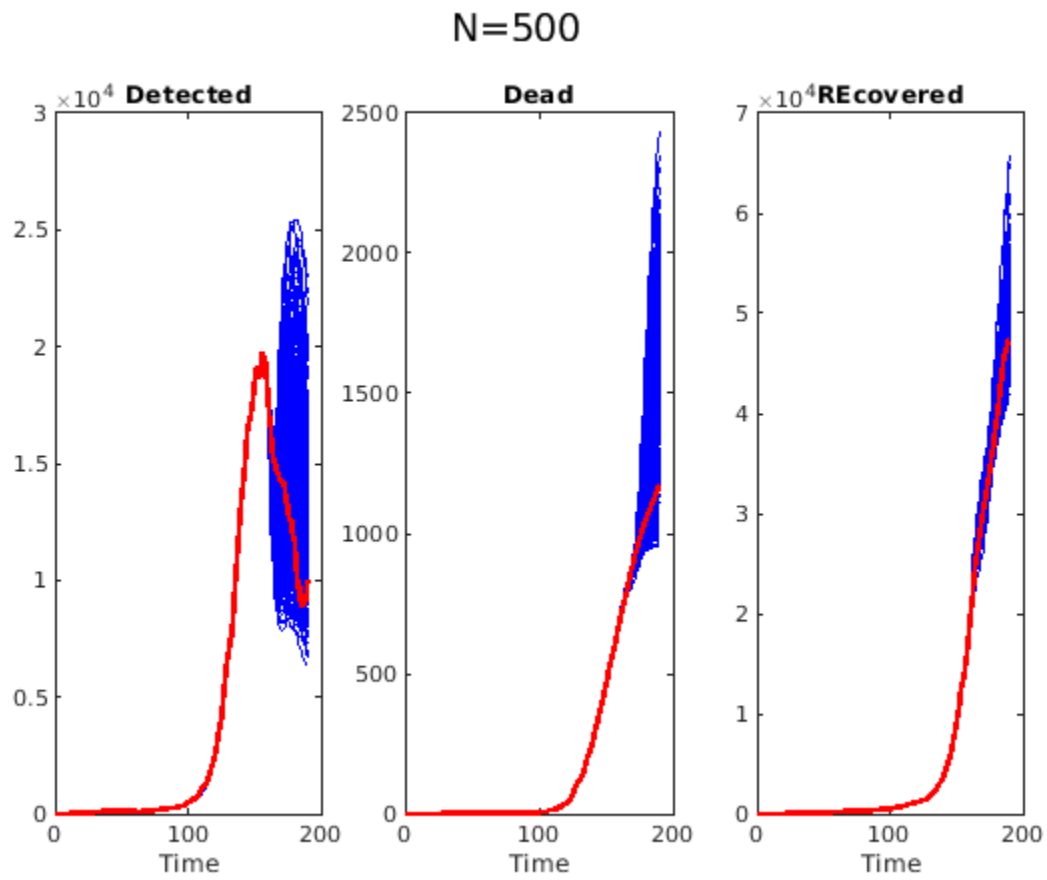








### 3.4. Uncertainty analysis



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## Chapter 4. Extension number4

### 4.1. Basic information

The extension to be validated consists of the time series from the data191 to the 215. The status of the validation is: COMPLETED.

The number of estimations needed to perform the validation was1000.

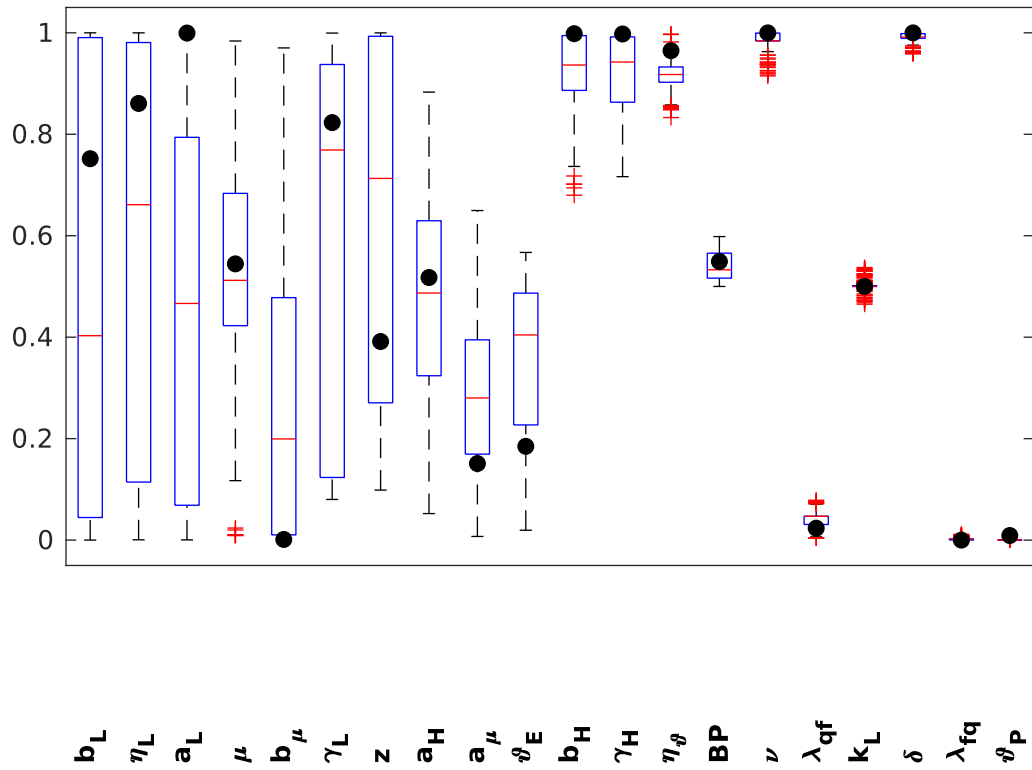
### 4.2. Estimated parameters with their intervals

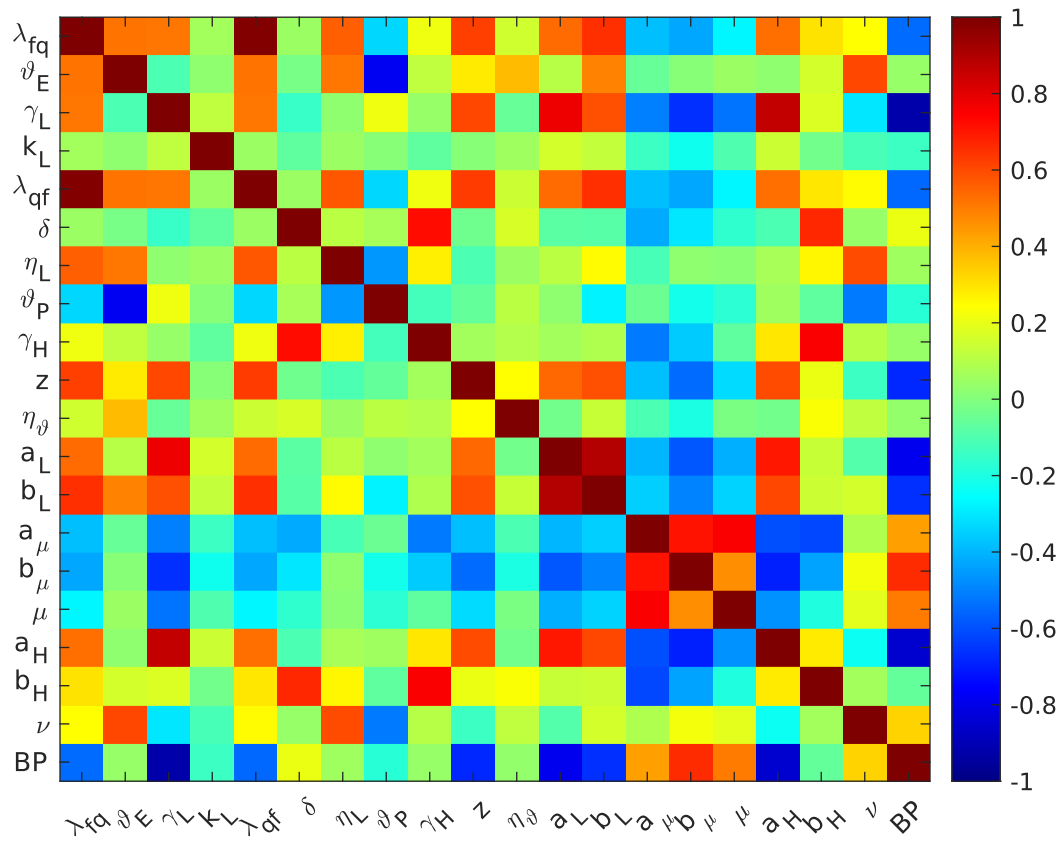
It was necessary to fix 0 parameters of 10 that could be fixed to complete validation.

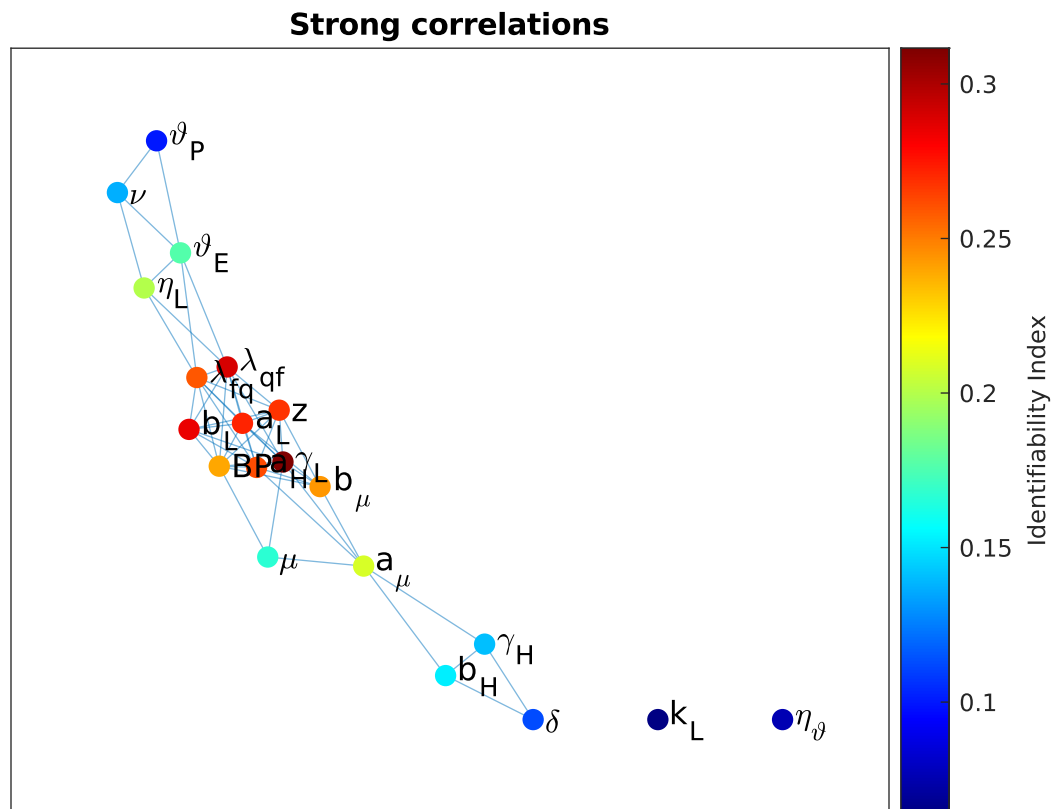
Due to a deviation from the median the CSB method was activated to obtain the parameter intervals.

	Rango		Nominal	Mejor	Index
$\lambda_{fq}$	'0'	'0'	'0.0022'	'0'	'0.2587'
$\vartheta_E$	'0.1112'	'0.2071'	'0.4045'	'0.1849'	'0.1765'
$\gamma_L$	'0.2836'	'0.9713'	'0.769'	'0.823'	'0.3116'
$k_L$	'1.3605'	'9.1'	'5.5005'	'5.5003'	'0.0644'
$\lambda_{qf}$	'0.0194'	'0.0313'	'0.047'	'0.0235'	'0.2898'
$\delta$	'0.065'	'0.15'	'0.1488'	'0.15'	'0.1129'
$\eta_L$	'0.2501'	'0.9625'	'0.6612'	'0.8608'	'0.1996'
$\vartheta_P$	'0.0019'	'0.0098'	'0.0001'	'0.009'	'0.1009'
$\gamma_H$	'0.1147'	'1'	'0.9424'	'0.9977'	'0.1413'
$z$	'9.8302'	'23.6563'	'21.3884'	'11.7445'	'0.2673'
$\eta_{\vartheta}$	'0.8327'	'1'	'0.9178'	'0.9648'	'0.0762'
$a_L$	'8.8341'	'15'	'7.5312'	'14.9932'	'0.272'
$b_L$	'7.2211'	'14.6888'	'6.6409'	'11.5257'	'0.2854'
$a_{\mu}$	'2.8828'	'5.8159'	'4.9225'	'3.1129'	'0.2091'
$b_{\mu}$	'1'	'1.7158'	'3.7923'	'1.018'	'0.2434'
$\mu$	'0'	'0.7174'	'0.5121'	'0.5445'	'0.1668'
$a_H$	'1.35'	'11.9624'	'7.8194'	'8.2466'	'0.262'
$b_H$	'4.0272'	'15'	'14.1117'	'14.9755'	'0.1523'
$\nu$	'392.5656'	'500'	'492.0212'	'499.928'	'0.1373'
BP	'187.2892'	'192.0384'	'186.5'	'187.5'	'0.2394'

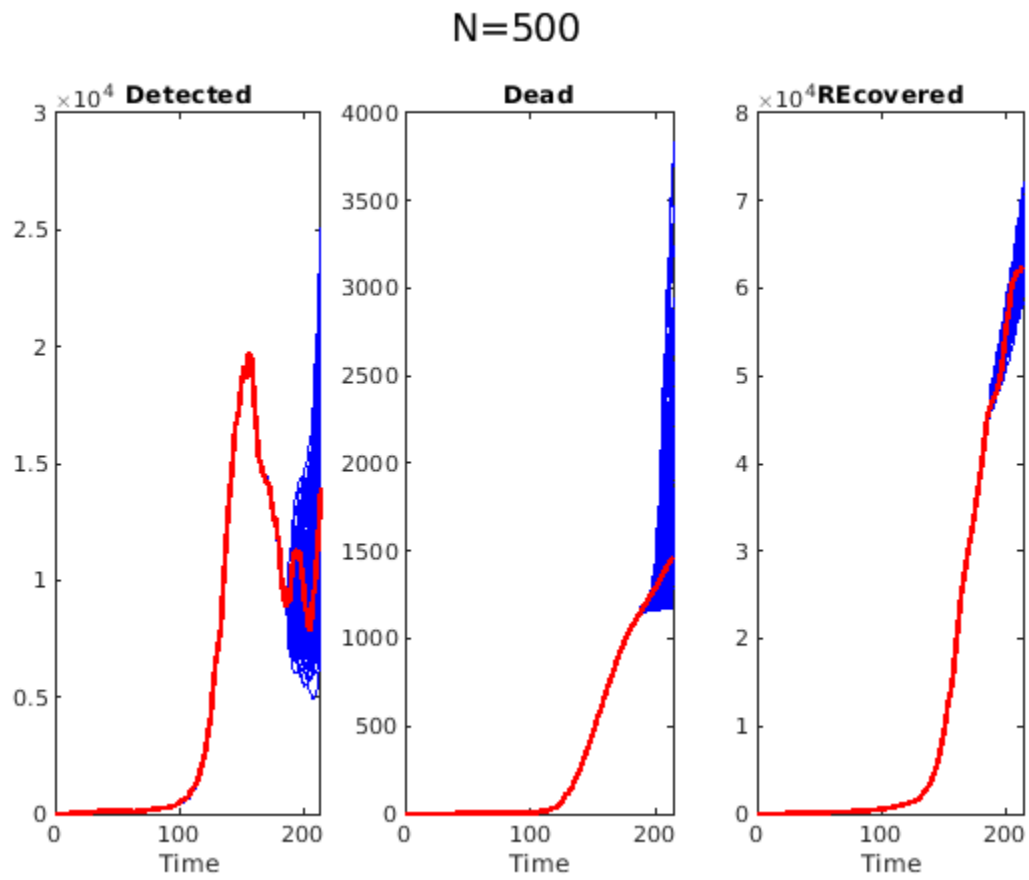
### 4.3. Identifiability analysis







#### 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 data215 to the 253. The status of the validation is: COMPLETED.

The number of estimations needed to perform the validation was1000.

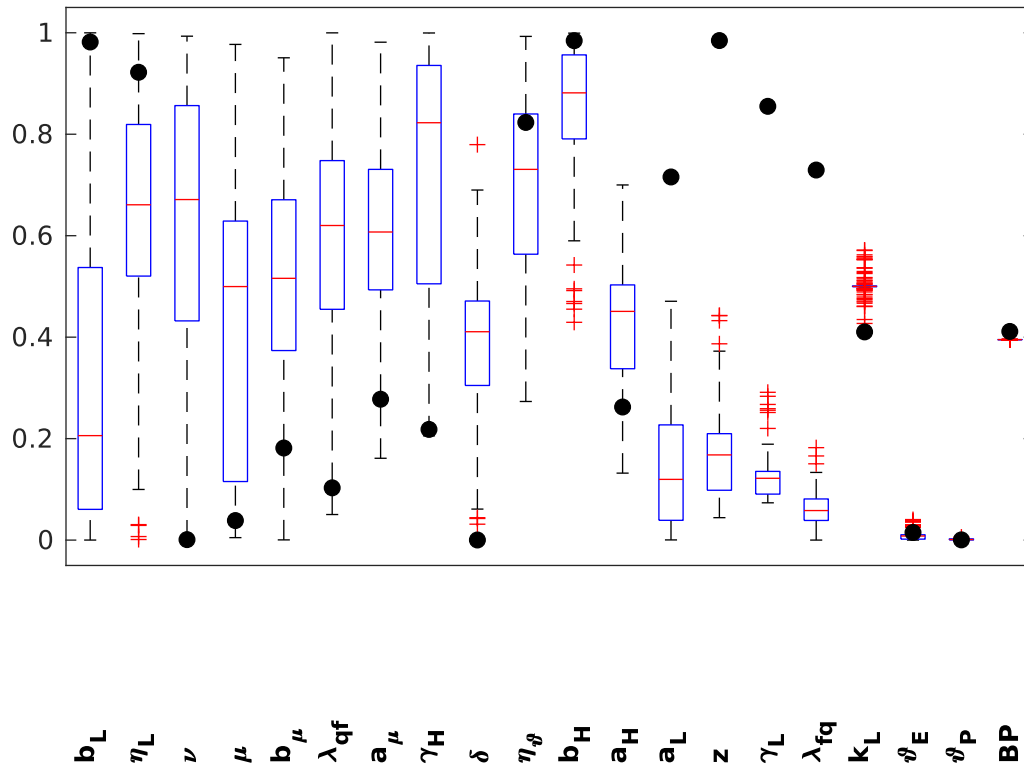
### 5.2. Estimated parameters with their intervals

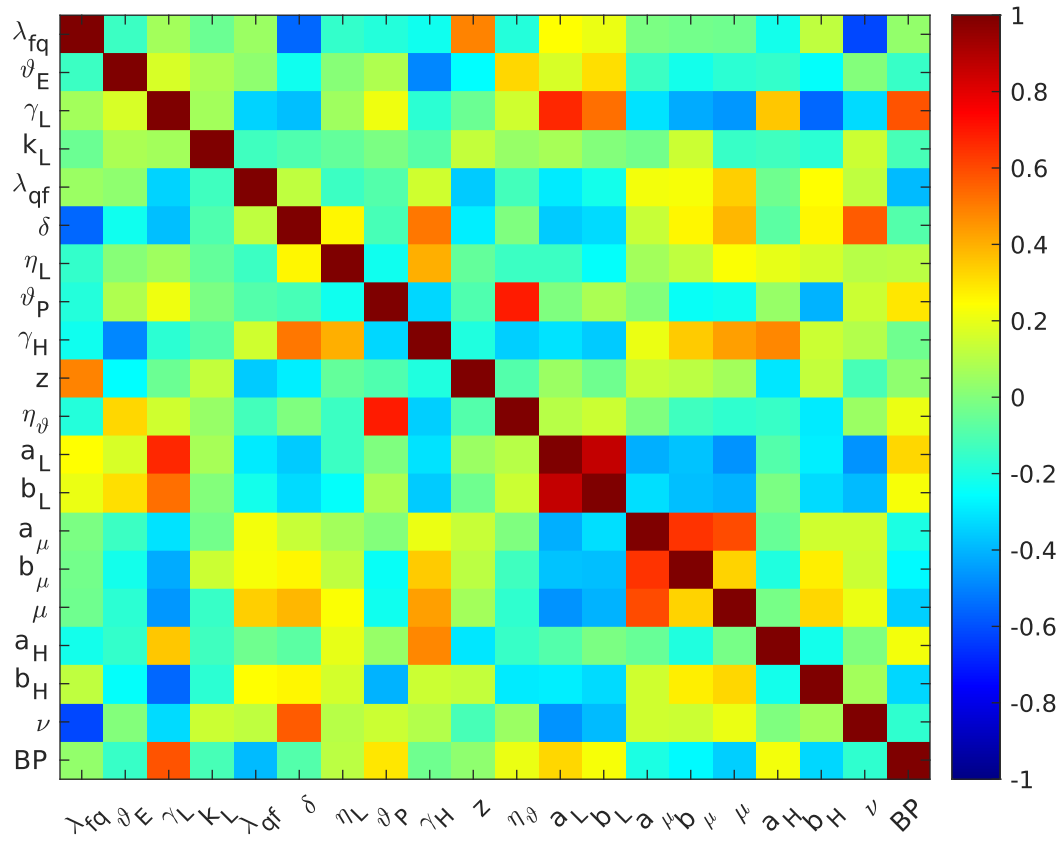
It was necessary to fix 0 parameters of 10 that could be fixed to complete validation.

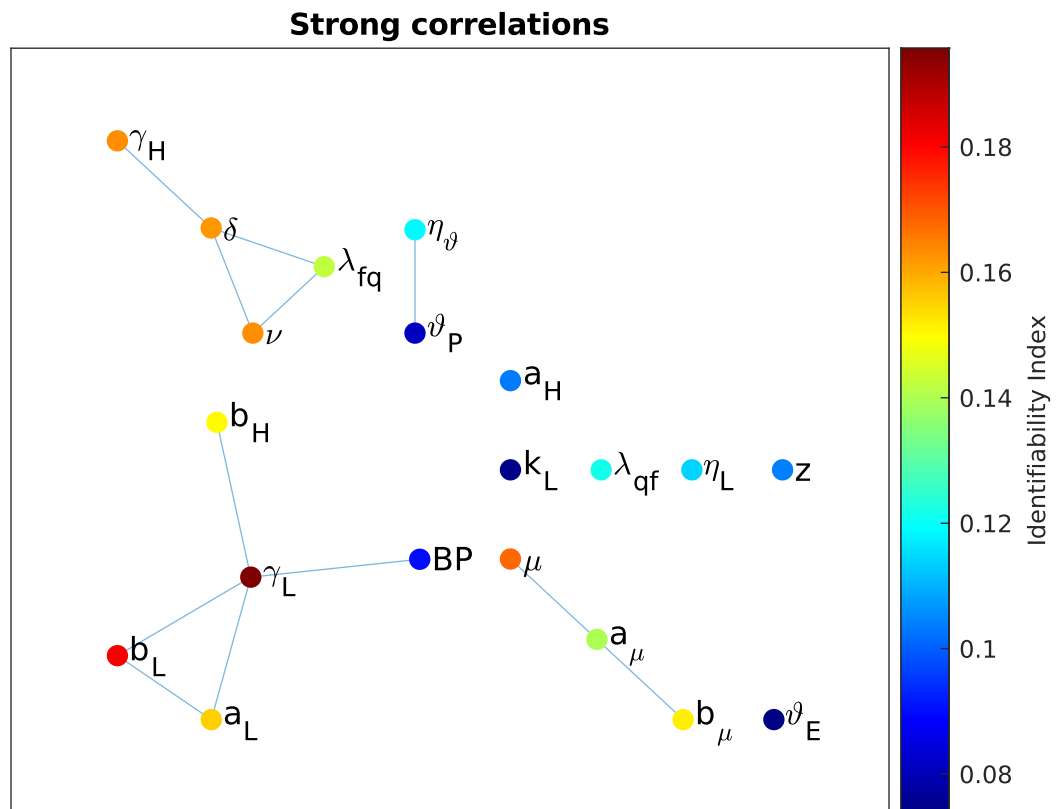
	Rango		Nominal	Mejor	Index
$\lambda_{fq}$	'0.0108'	'0.1059'	'0.0583'	'0.7294'	'0.1424'
$\vartheta_E$	'0.0012'	'0.0152'	'0.0082'	'0.015'	'0.0739'
$\gamma_L$	'0.0749'	'0.1701'	'0.1225'	'0.855'	'0.1957'
$k_L$	'5.2396'	'5.7609'	'5.5002'	'4.6933'	'0.075'
$\lambda_{qf}$	'0.5685'	'0.6716'	'0.6201'	'0.103'	'0.1217'
$\delta$	'0.056'	'0.0671'	'0.0616'	'0'	'0.162'
$\eta_L$	'0.6079'	'0.714'	'0.6609'	'0.9221'	'0.1141'
$\vartheta_P$	'0.0007'	'0.0016'	'0.0011'	'0.0005'	'0.0815'
$\gamma_H$	'0.7633'	'0.8821'	'0.8227'	'0.2182'	'0.1631'
$z$	'3.7733'	'6.3076'	'5.0404'	'29.5391'	'0.1041'
$\eta_{\vartheta}$	'0.6909'	'0.7705'	'0.7307'	'0.8233'	'0.119'
$a_L$	'2.2015'	'3.1712'	'2.6863'	'11.0206'	'0.1557'
$b_L$	'2.984'	'4.782'	'3.883'	'14.7452'	'0.1812'
$a_{\mu}$	'8.9035'	'10.0986'	'9.501'	'4.8877'	'0.1396'
$b_{\mu}$	'7.4737'	'8.9735'	'8.2236'	'3.5412'	'0.1517'
$\mu$	'0.4364'	'0.5631'	'0.4997'	'0.0385'	'0.1677'
$a_H$	'6.7328'	'7.9075'	'7.3202'	'4.6726'	'0.1037'
$b_H$	'12.5822'	'14.0935'	'13.3379'	'14.7814'	'0.1502'
$\nu$	'303.211'	'368.0349'	'335.623'	'0.4738'	'0.1631'
BP	'215.393'	'215.607'	'215.5'	'216.5'	'0.0905'



### 5.3. Identifiability analysys

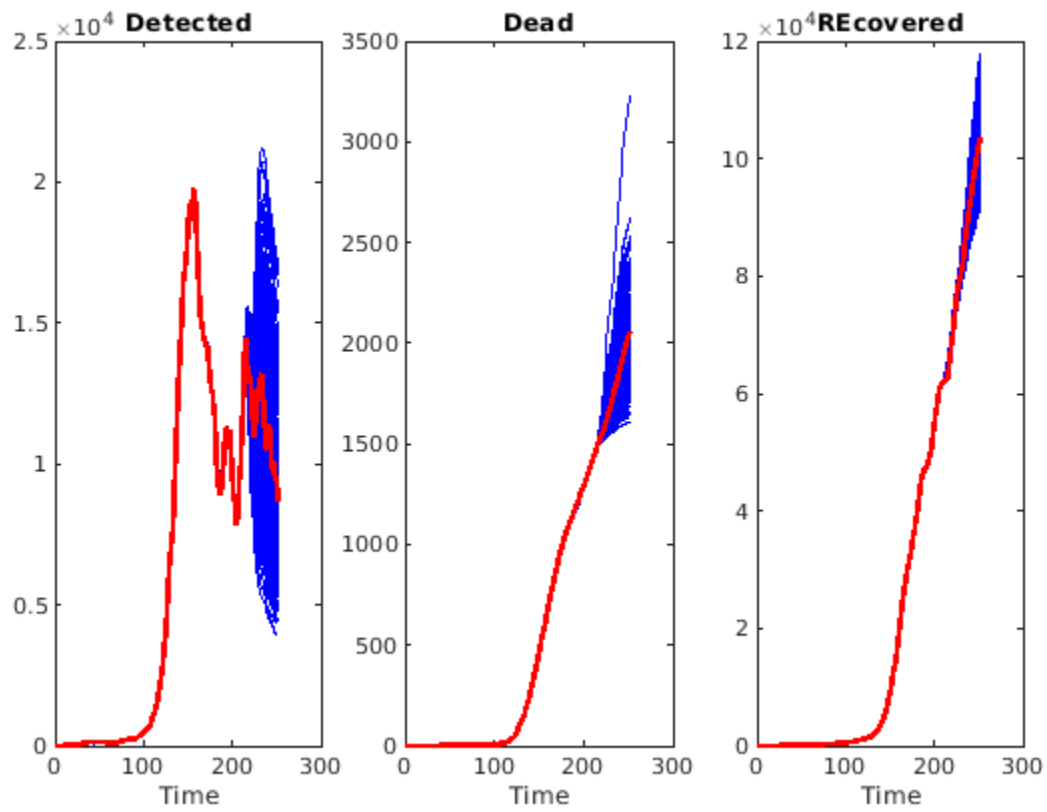






## 5.4. Uncertainty analysis

N=500



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## Chapter 6. Extension number6

### 6.1. Basic information

The extension to be validated consists of the time series from the data253 to the 306. The status of the validation is: COMPLETED.

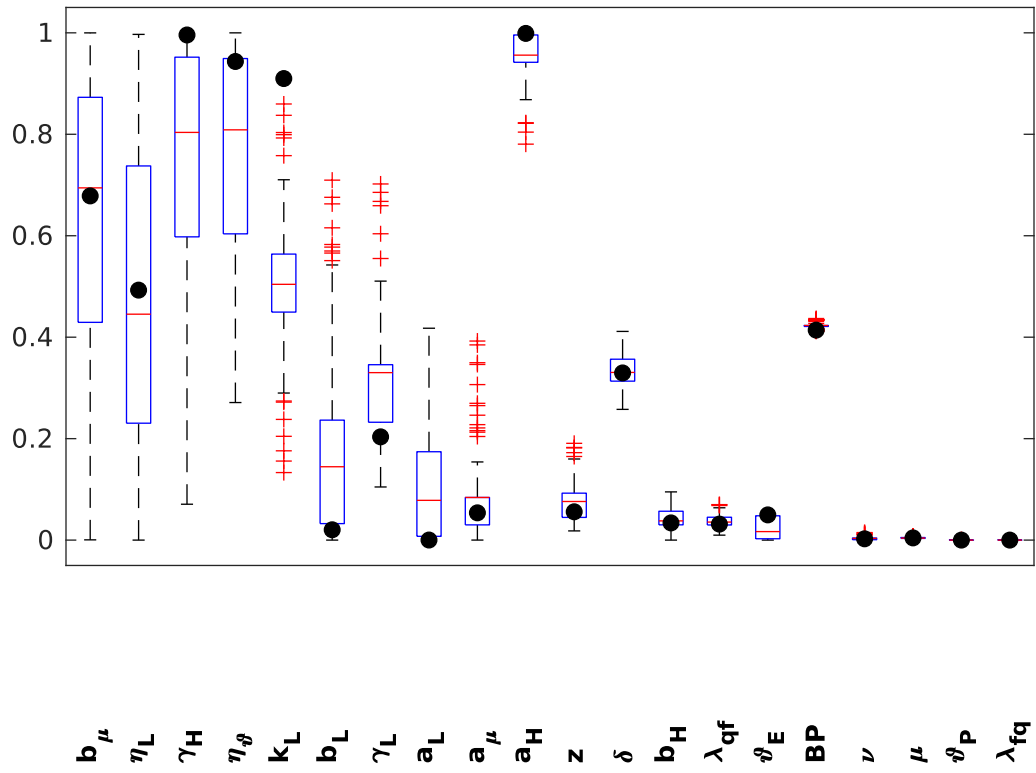
The number of estimations needed to perform the validation was2000.

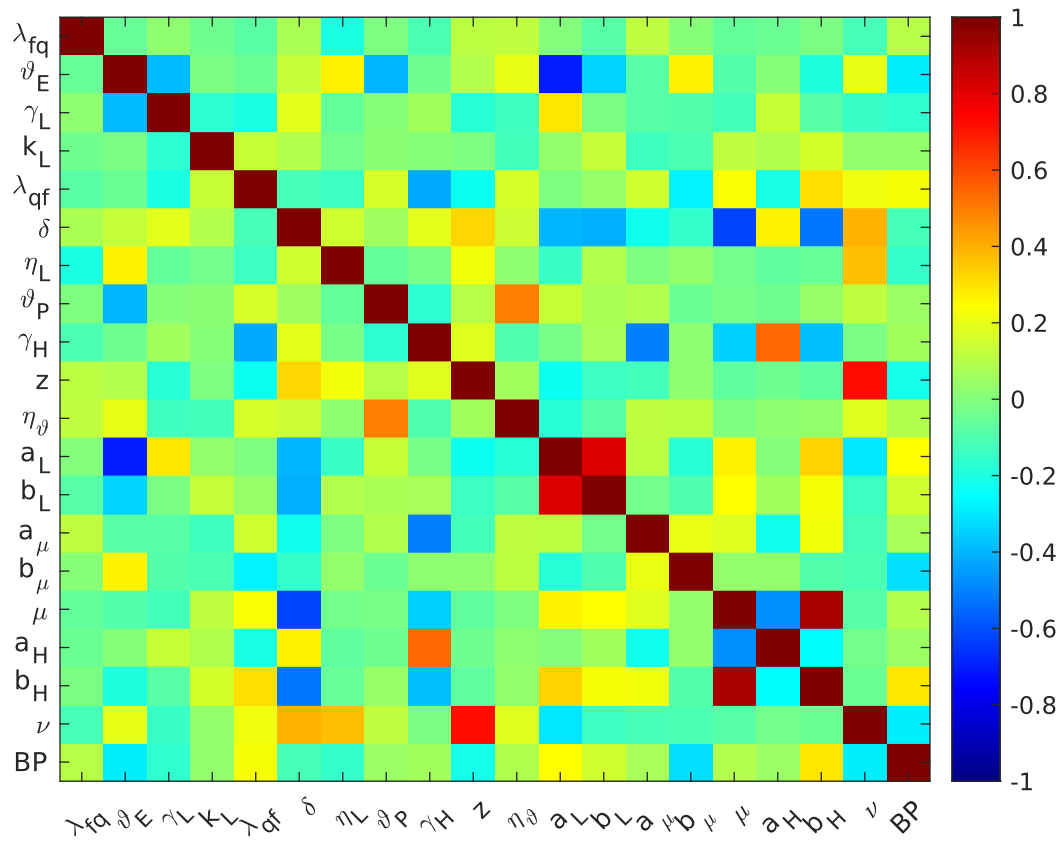
### 6.2. Estimated parameters with their intervals

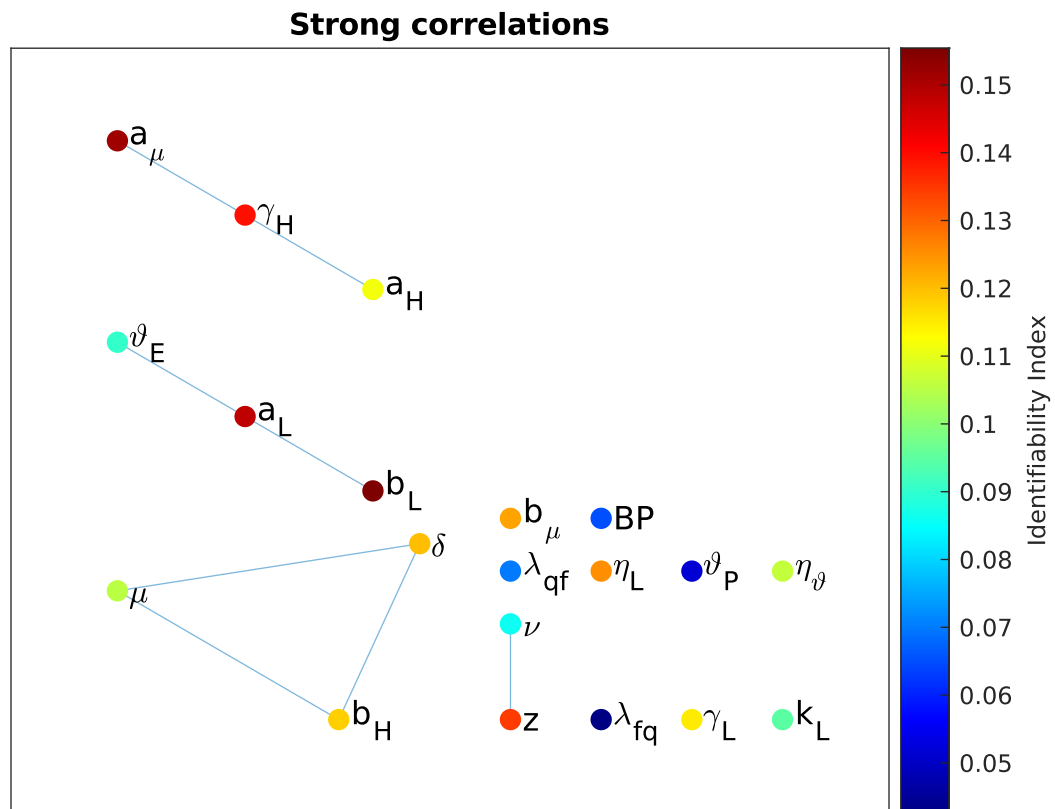
It was necessary to fix 0 parameters of 10 that could be fixed to complete validation.

	Rango		Nominal	Mejor	Index
$\lambda_{fq}$	'0'	'0.0012'	'0.0001'	'0'	'0.0427'
$\vartheta_E$	'0.0114'	'0.0221'	'0.0168'	'0.0497'	'0.0904'
$\gamma_L$	'0.2717'	'0.3886'	'0.3301'	'0.2036'	'0.1153'
$k_L$	'5.0736'	'6.0023'	'5.5379'	'9.1887'	'0.095'
$\lambda_{qf}$	'0.0324'	'0.0386'	'0.0355'	'0.0315'	'0.0703'
$\delta$	'0.0476'	'0.0515'	'0.0496'	'0.0494'	'0.1201'
$\eta_L$	'0.3713'	'0.5194'	'0.4454'	'0.4928'	'0.1255'
$\vartheta_P$	'0'	'0.0002'	'0.0001'	'0'	'0.0516'
$\gamma_H$	'0.7552'	'0.8522'	'0.8037'	'0.9958'	'0.1393'
$z$	'0.547'	'4.0196'	'2.2833'	'1.6746'	'0.1347'
$\eta_{\vartheta}$	'0.7575'	'0.86'	'0.8088'	'0.9435'	'0.1063'
$a_L$	'1.4926'	'2.7018'	'2.0972'	'1.0018'	'0.1482'
$b_L$	'1.9467'	'4.1024'	'3.0246'	'1.2851'	'0.1554'
$a_{\mu}$	'1.0682'	'3.2848'	'2.1765'	'1.7527'	'0.1516'
$b_{\mu}$	'9.7321'	'11.7101'	'10.7211'	'10.4992'	'0.1232'
$\mu$	'0'	'0.0099'	'0.004'	'0.0043'	'0.1053'
$a_H$	'13.8024'	'14.9657'	'14.384'	'14.9839'	'0.1117'
$b_H$	'1.3163'	'1.7444'	'1.5303'	'1.4745'	'0.1183'
$\nu$	'0'	'3.3555'	'1.6122'	'1.2663'	'0.086'
BP	'253.244'	'253.756'	'253.5'	'252.6696'	'0.0656'

### 6.3. Identifiability analysis

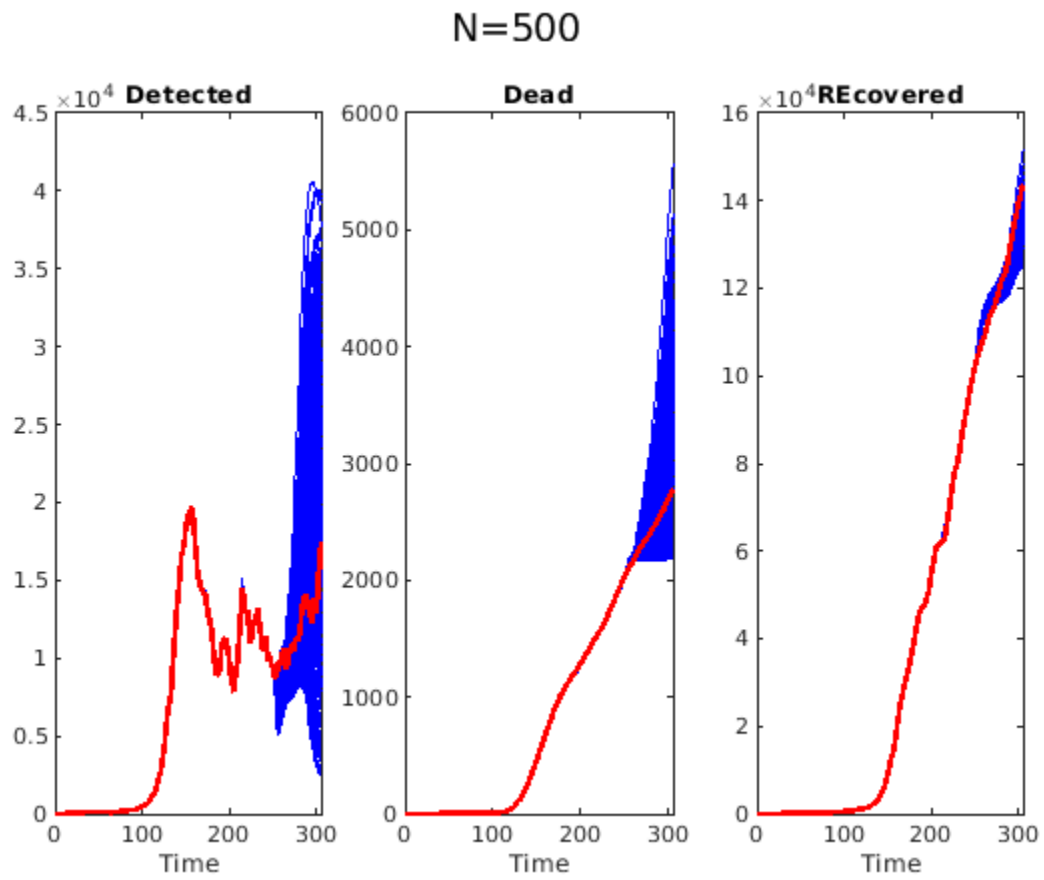








## 6.4. Uncertainty analysys



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## Chapter 7. Extension number7

### 7.1. Basic information

The extension to be validated consists of the time series from the data306 to the 331. The status of the validation is: COMPLETED.

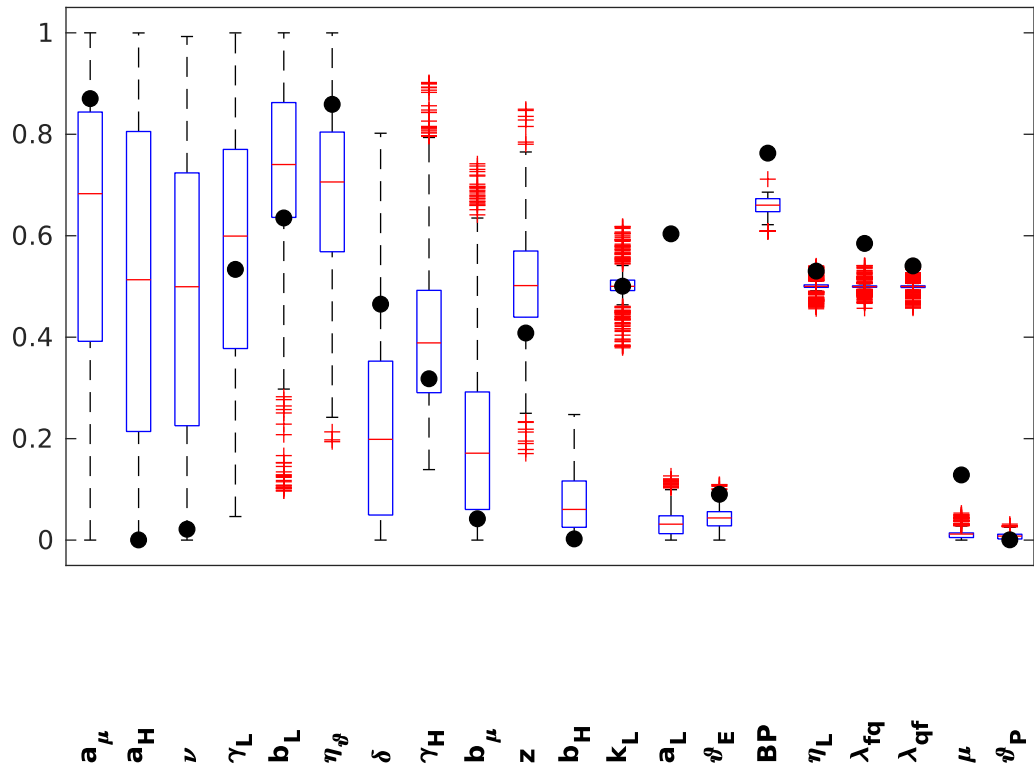
The number of estimations needed to perform the validation was1000.

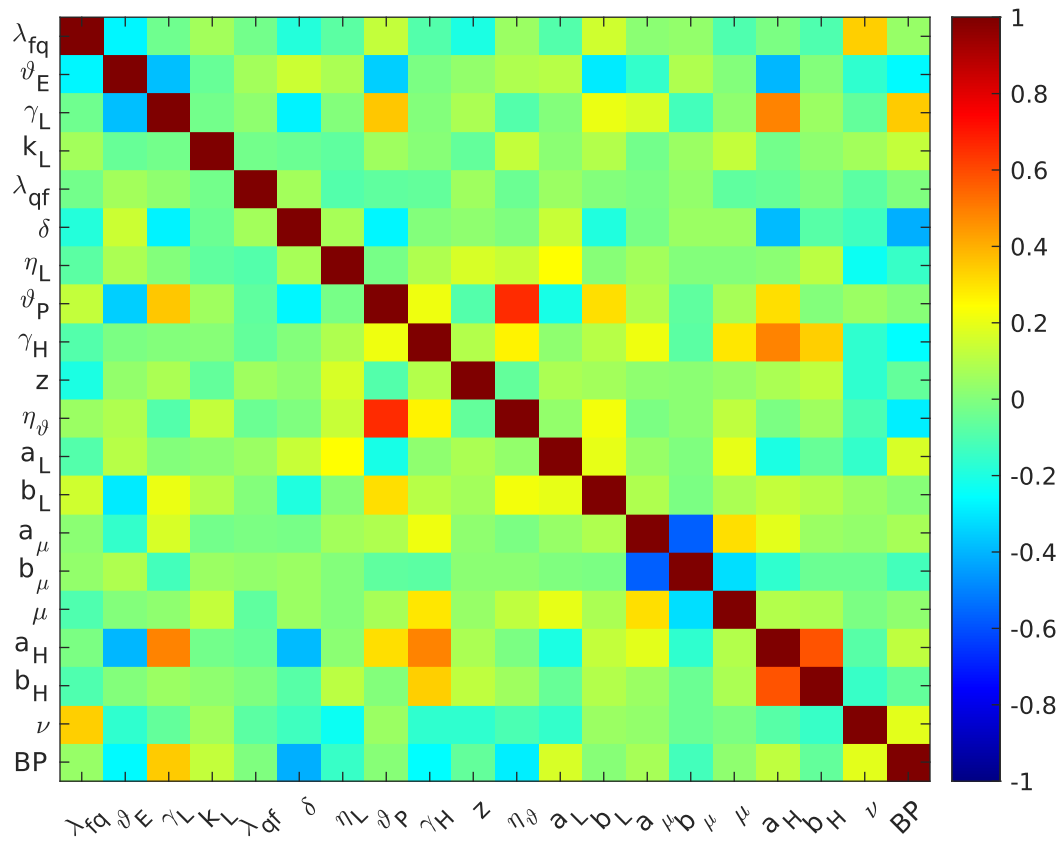
### 7.2. Estimated parameters with their intervals

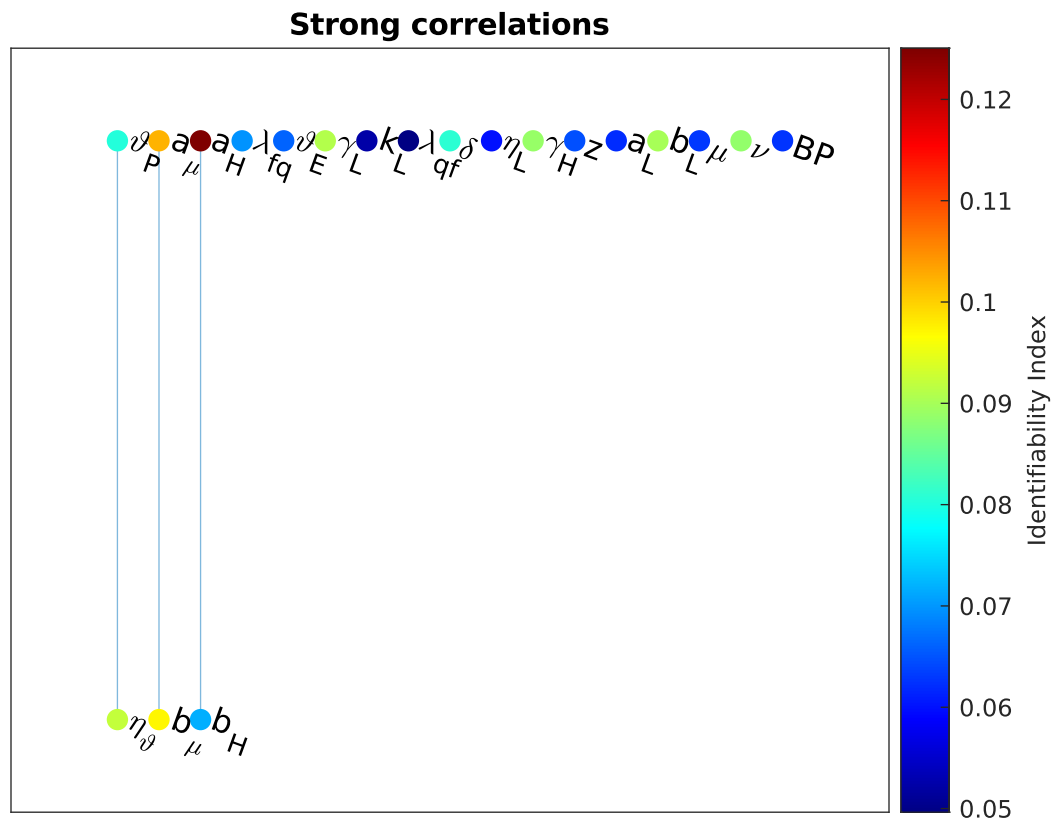
It was necessary to fix 0 parameters of 10 that could be fixed to complete validation.

	Rango		Nominal	Mejor	Index
$\lambda_{fq}$	'0.4799'	'0.5193'	'0.4996'	'0.5849'	'0.0697'
$\vartheta_E$	'0.0391'	'0.0483'	'0.0437'	'0.0903'	'0.0664'
$\gamma_L$	'0.5675'	'0.6311'	'0.5993'	'0.5337'	'0.0911'
$k_L$	'5.3807'	'5.6246'	'5.5027'	'5.5048'	'0.0525'
$\lambda_{qf}$	'0.4857'	'0.5139'	'0.4998'	'0.5406'	'0.0496'
$\delta$	'0.0263'	'0.0336'	'0.0299'	'0.0698'	'0.0811'
$\eta_L$	'0.4853'	'0.5152'	'0.5002'	'0.5303'	'0.0602'
$\vartheta_P$	'0.0066'	'0.0092'	'0.0079'	'0.0005'	'0.0803'
$\gamma_H$	'0.3597'	'0.4179'	'0.3888'	'0.3181'	'0.089'
$z$	'14.4304'	'15.6725'	'15.0514'	'12.2472'	'0.0647'
$\eta_{\vartheta}$	'0.6808'	'0.7303'	'0.7055'	'0.859'	'0.0922'
$a_L$	'1.2748'	'1.6076'	'1.4412'	'9.4527'	'0.0622'
$b_L$	'10.8561'	'11.8576'	'11.3569'	'9.8905'	'0.0902'
$a_{\mu}$	'10.0286'	'11.092'	'10.5603'	'13.1842'	'0.1024'
$b_{\mu}$	'2.8837'	'3.9141'	'3.3989'	'1.5889'	'0.0973'
$\mu$	'0'	'0.0253'	'0.0119'	'0.1285'	'0.063'
$a_H$	'7.6294'	'8.7423'	'8.1859'	'1.0048'	'0.1251'
$b_H$	'1.7163'	'1.977'	'1.8466'	'1.033'	'0.0719'
$\nu$	'231.8182'	'267.6532'	'249.7357'	'10.7372'	'0.0888'
BP	'304.1937'	'304.8063'	'304.5'	'312.5'	'0.0629'

### 7.3. Identifiability analysis

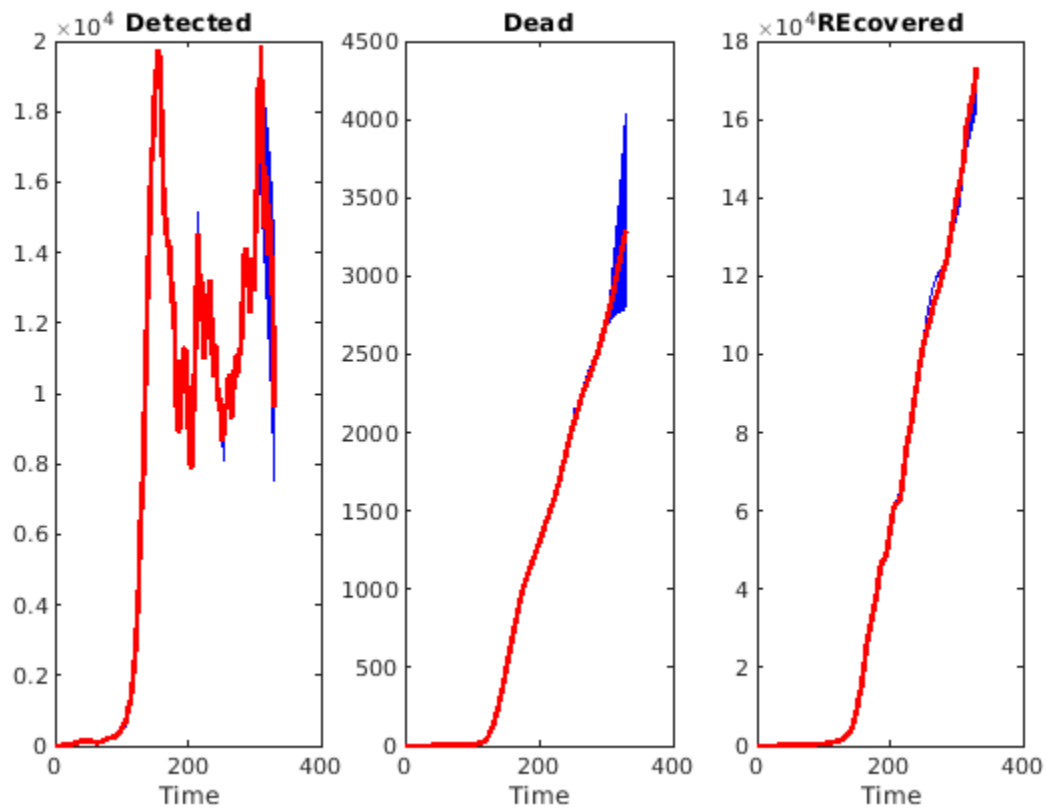






## 7.4. Uncertainty analysis

N=500



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## Chapter 8. Extension number8

### 8.1. Basic information

The extension to be validated consists of the time series from the data331 to the 358. The status of the validation is: COMPLETED.

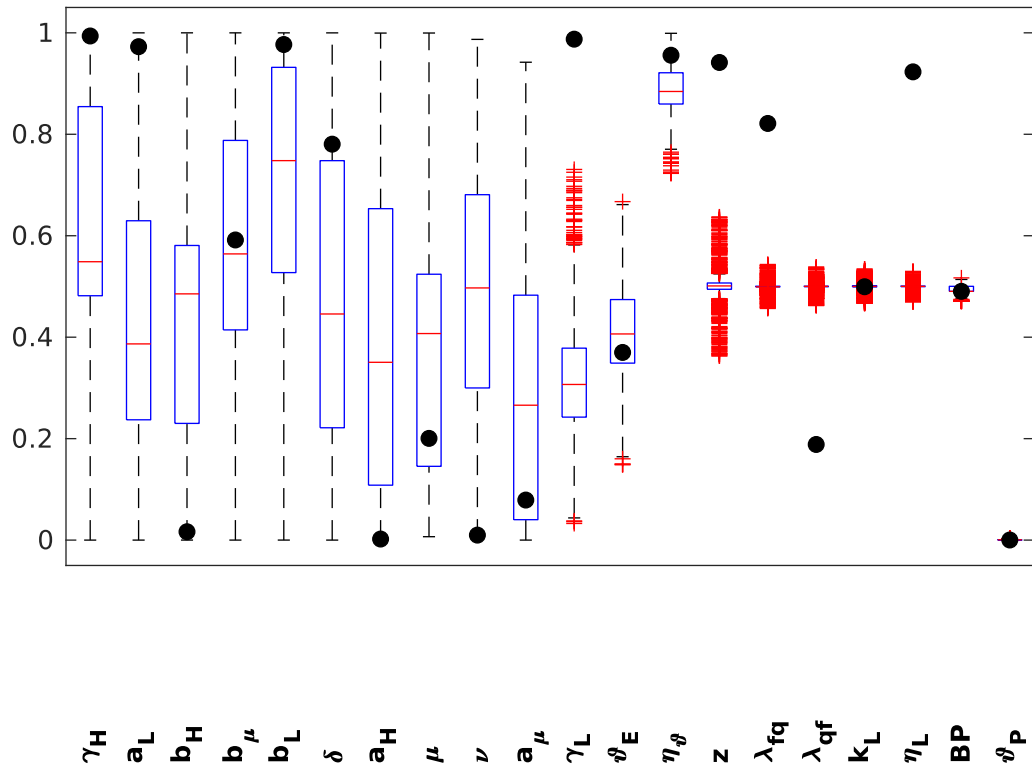
The number of estimations needed to perform the validation was1000.

### 8.2. Estimated parameters with their intervals

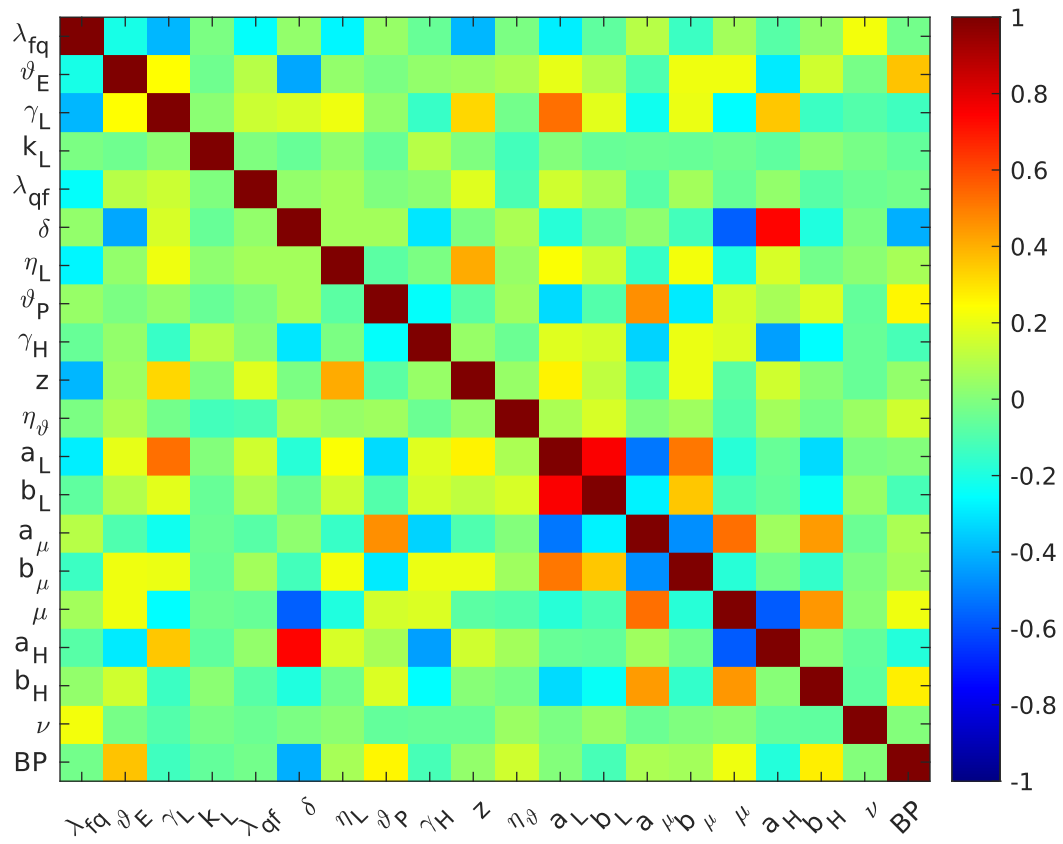
It was necessary to fix 0 parameters of 10 that could be fixed to complete validation.

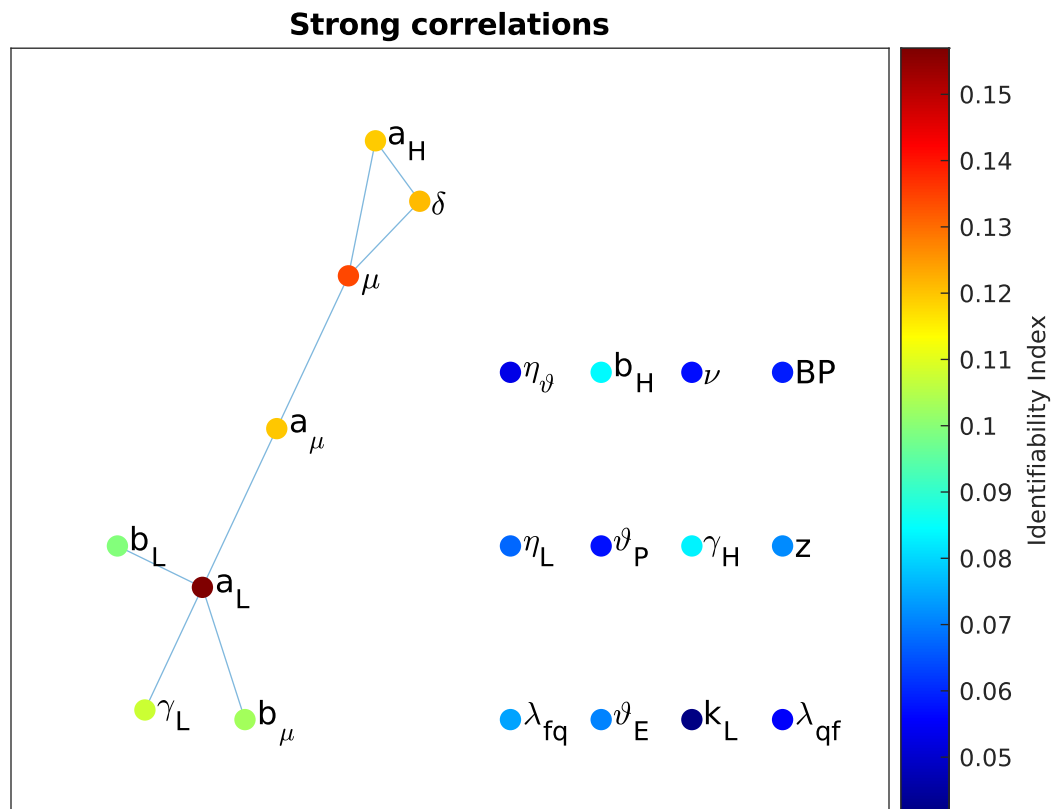
	Rango		Nominal	Mejor	Index
$\lambda_{fq}$	'0.484'	'0.5145'	'0.4993'	'0.8213'	'0.0742'
$\vartheta_E$	'0.3968'	'0.416'	'0.4064'	'0.3699'	'0.0705'
$\gamma_L$	'0.2849'	'0.3287'	'0.3068'	'0.9875'	'0.1075'
$k_L$	'5.4365'	'5.5644'	'5.5005'	'5.495'	'0.0417'
$\lambda_{qf}$	'0.489'	'0.5114'	'0.5002'	'0.1885'	'0.0554'
$\delta$	'0.0628'	'0.0709'	'0.0669'	'0.1171'	'0.1211'
$\eta_L$	'0.4879'	'0.5124'	'0.5002'	'0.9231'	'0.0678'
$\vartheta_P$	'0.0001'	'0.001'	'0.0005'	'0.0002'	'0.0578'
$\gamma_H$	'0.5271'	'0.5704'	'0.5488'	'0.9938'	'0.0833'
$z$	'14.5912'	'15.4715'	'15.0313'	'28.2464'	'0.0716'
$\eta_{\vartheta}$	'0.8725'	'0.8963'	'0.8844'	'0.9558'	'0.0532'
$a_L$	'6.105'	'6.7244'	'6.4147'	'14.6175'	'0.157'
$b_L$	'11.1582'	'11.7873'	'11.4727'	'14.6772'	'0.0994'
$a_{\mu}$	'4.4525'	'4.9929'	'4.7227'	'2.1051'	'0.1199'
$b_{\mu}$	'8.5998'	'9.1971'	'8.8984'	'9.2831'	'0.1031'
$\mu$	'0.3872'	'0.4272'	'0.4072'	'0.2005'	'0.1341'
$a_H$	'5.5496'	'6.2644'	'5.907'	'1.0291'	'0.1195'
$b_H$	'7.4984'	'8.0928'	'7.7956'	'1.2308'	'0.0845'
$\nu$	'237.9556'	'259.1449'	'248.5502'	'4.9153'	'0.0572'
BP	'331.4191'	'331.5809'	'331.5'	'331.5'	'0.0591'

## 8.3. Identifiability analysis



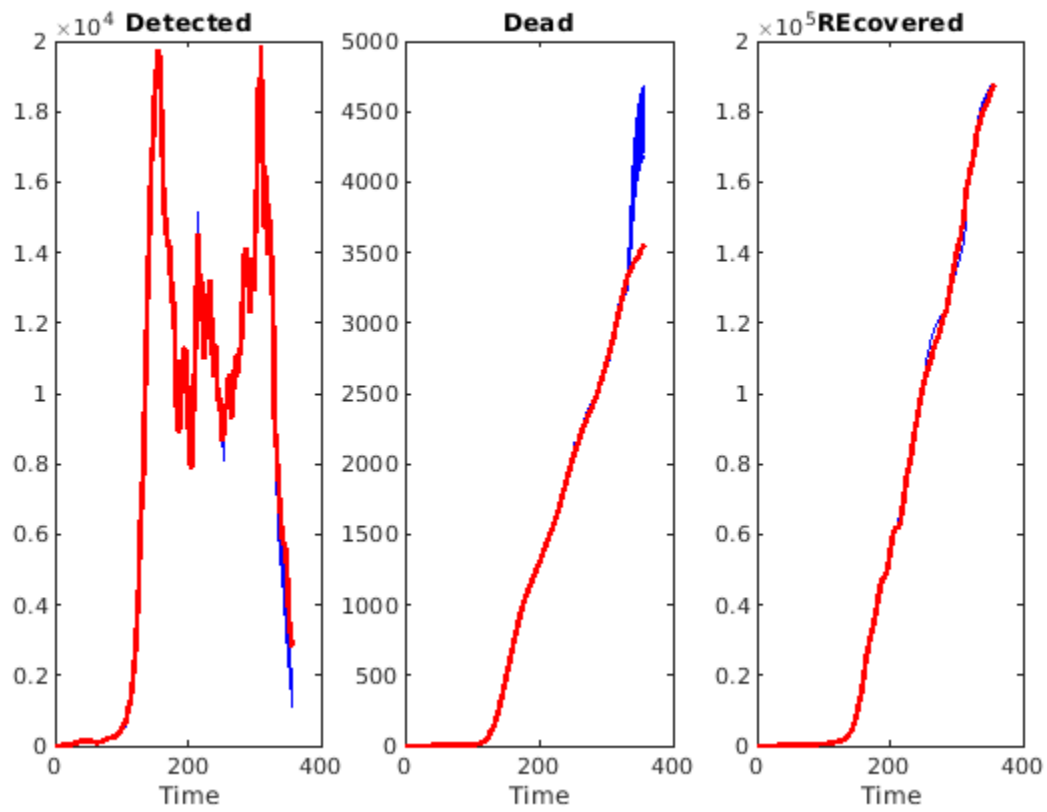






## 8.4. Uncertainty analysis

N=500



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## Chapter 9. Extension number9

### 9.1. Basic information

The extension to be validated consists of the time series from the data358 to the 390. The status of the validation is: COMPLETED.

The number of estimations needed to perform the validation was1000.

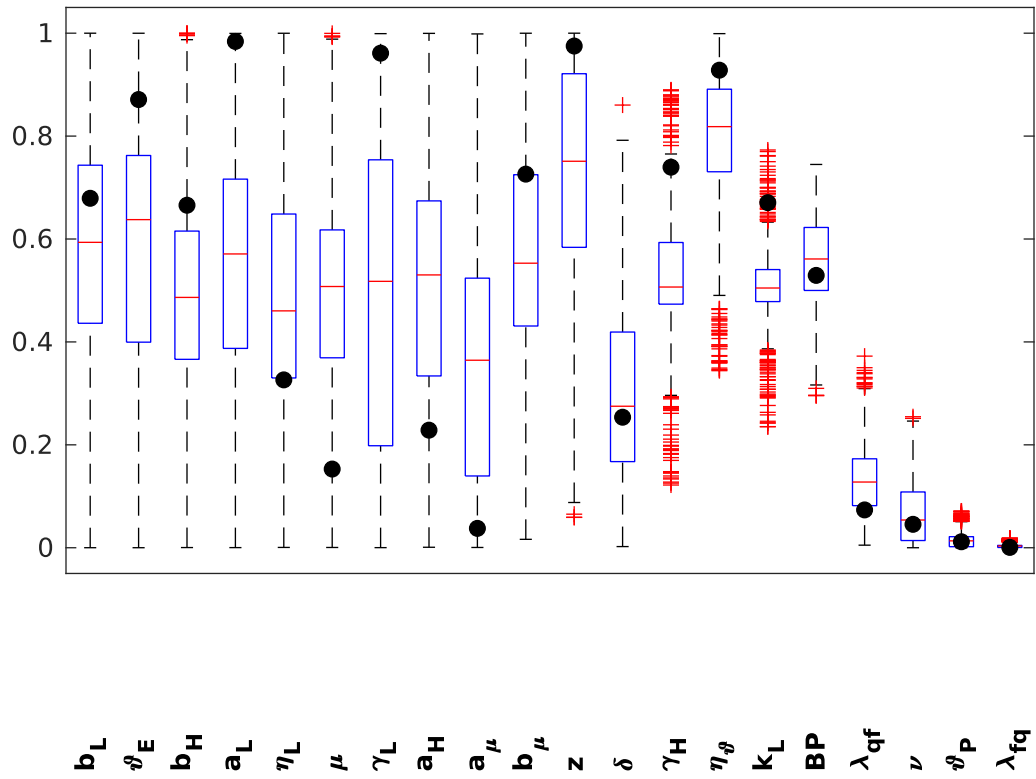
### 9.2. Estimated parameters with their intervals

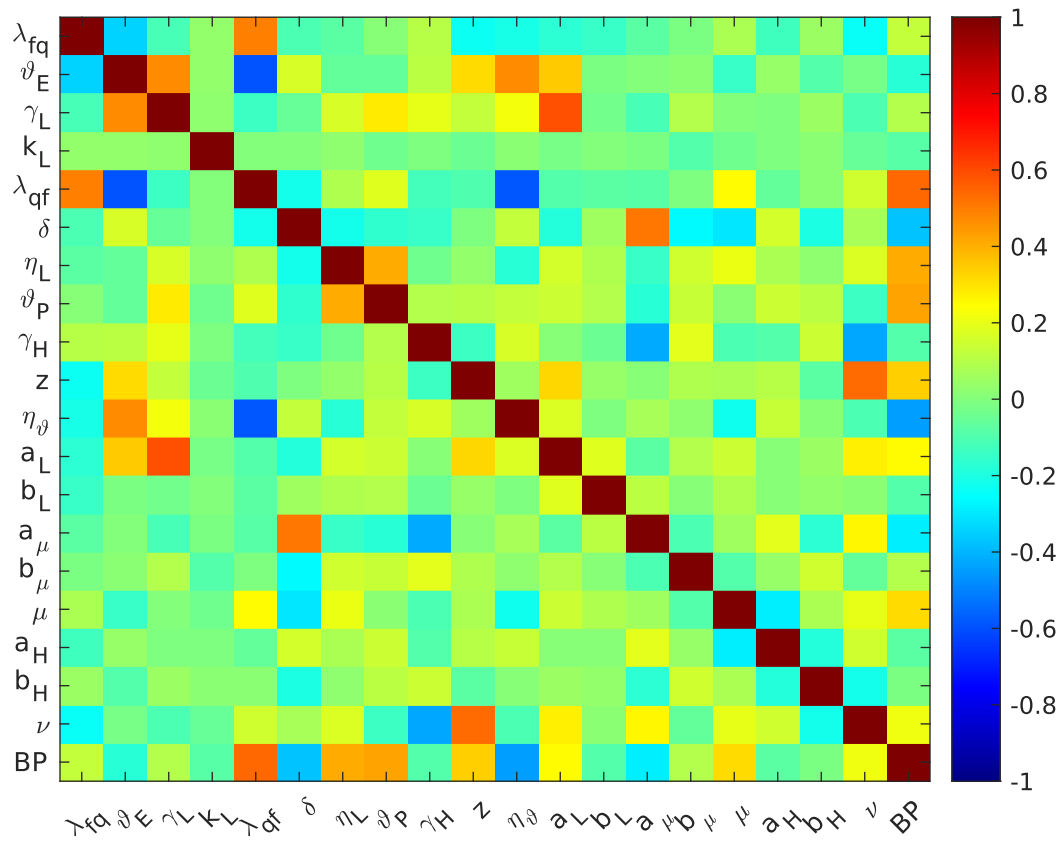
It was necessary to fix 0 parameters of 10 that could be fixed to complete validation.

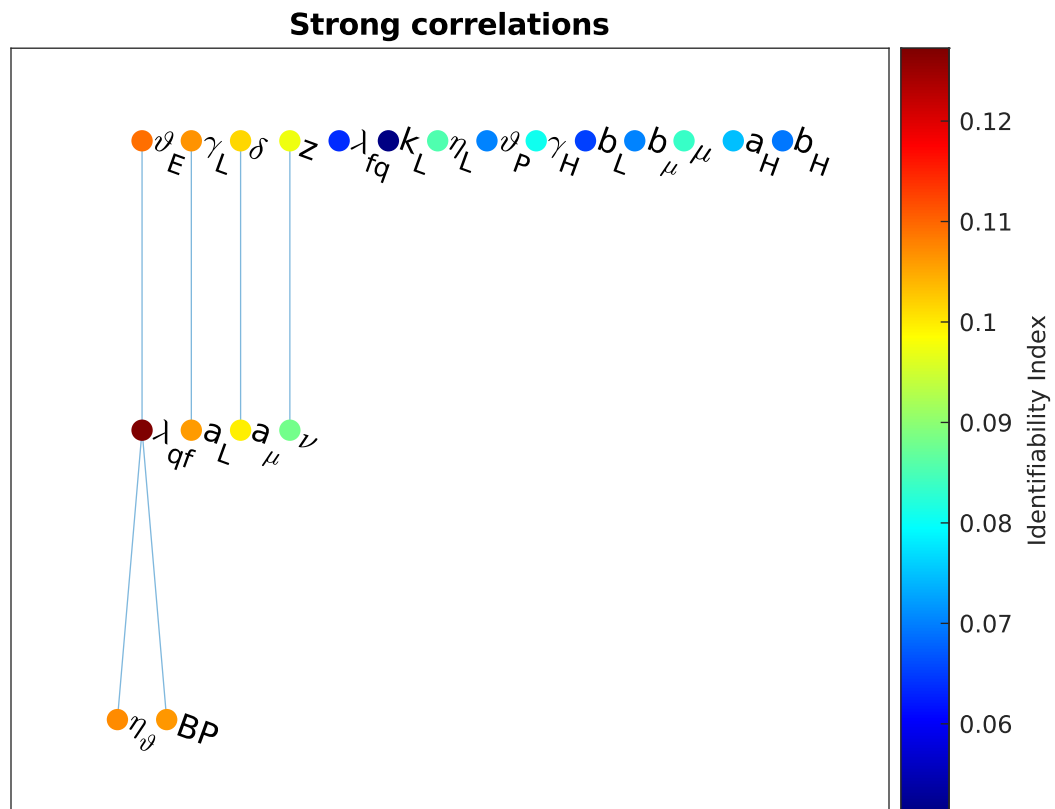
Due to a deviation from the median the CSB method was activated to obtain the parameter intervals.

	Rango		Nominal	Mejor	Index
$\lambda_{fq}$	'0.0007'	'0.0037'	'0.0035'	'0.0007'	'0.0638'
$\vartheta_E$	'0.7892'	'0.8723'	'0.6377'	'0.8711'	'0.1092'
$\gamma_L$	'0.228'	'1'	'0.5177'	'0.9612'	'0.1066'
$k_L$	'1'	'10'	'5.5429'	'7.0358'	'0.0512'
$\lambda_{qf}$	'0.0713'	'0.0943'	'0.1277'	'0.0735'	'0.1273'
$\delta$	'0'	'0.0822'	'0.0412'	'0.038'	'0.1016'
$\eta_L$	'0.3176'	'0.4249'	'0.4603'	'0.3262'	'0.0855'
$\vartheta_P$	'0'	'0.0197'	'0.0134'	'0.0116'	'0.0704'
$\gamma_H$	'0'	'0.912'	'0.5067'	'0.7396'	'0.0808'
$z$	'21.9054'	'29.2877'	'22.5334'	'29.2508'	'0.0975'
$\eta_{\vartheta}$	'0.6212'	'1'	'0.8184'	'0.9281'	'0.1073'
$a_L$	'8.5519'	'15'	'8.9935'	'14.7759'	'0.1062'
$b_L$	'2.6077'	'10.7098'	'9.3094'	'10.5078'	'0.0654'
$a_{\mu}$	'1.2576'	'13.3751'	'6.1017'	'1.527'	'0.0998'
$b_{\mu}$	'1'	'15'	'8.7419'	'11.1652'	'0.0705'
$\mu$	'0.0237'	'0.3441'	'0.5077'	'0.1529'	'0.0836'
$a_H$	'1.6384'	'13.768'	'8.4229'	'4.1992'	'0.0747'
$b_H$	'1'	'12.7466'	'7.8109'	'10.3191'	'0.0694'
$\nu$	'18.0857'	'29.3842'	'26.9465'	'22.7544'	'0.0881'
BP	'356.6243'	'361.3869'	'358.4989'	'356.9356'	'0.1064'

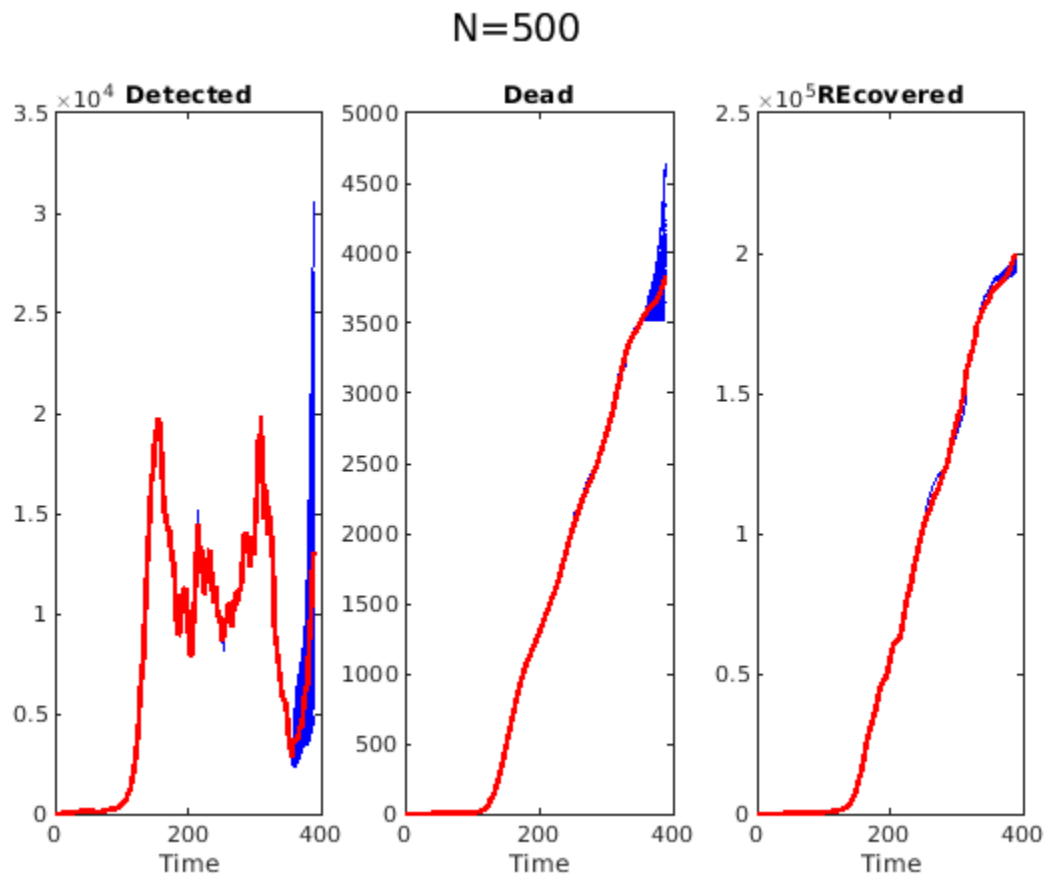
### 9.3. Identifiability analysis







## 9.4. Uncertainty analysys





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## Chapter 10. Extension number10

### 10.1. Basic information

The extension to be validated consists of the time series from the data390 to the 411. The status of the validation is: COMPLETED.

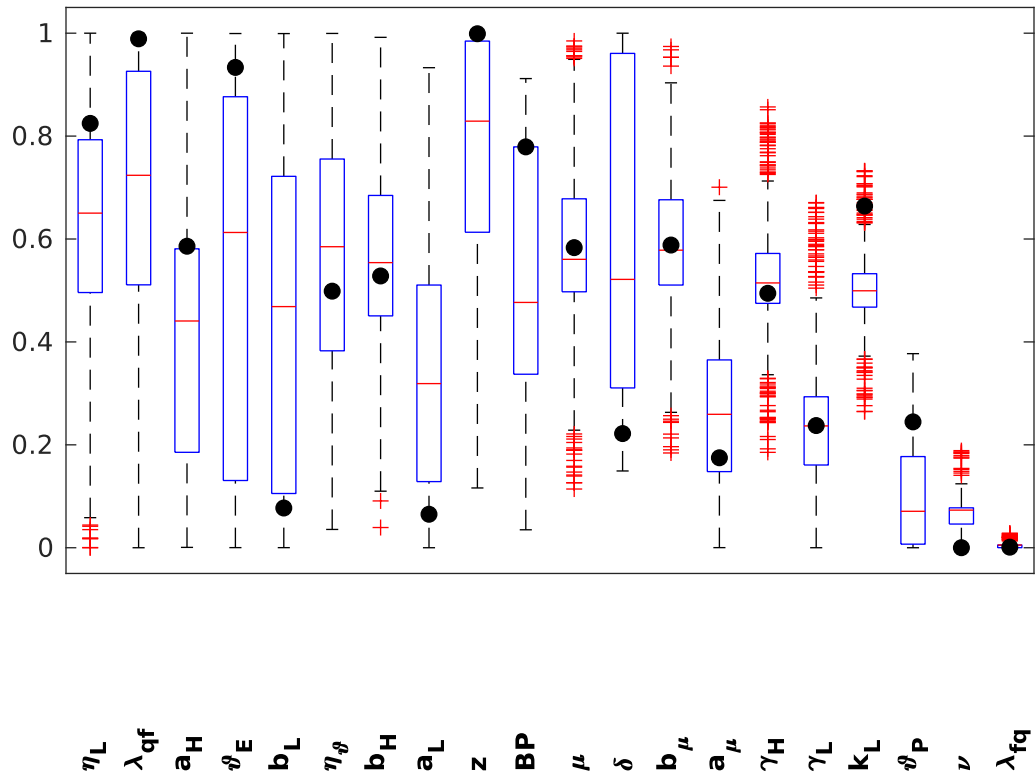
The number of estimations needed to perform the validation was1000.

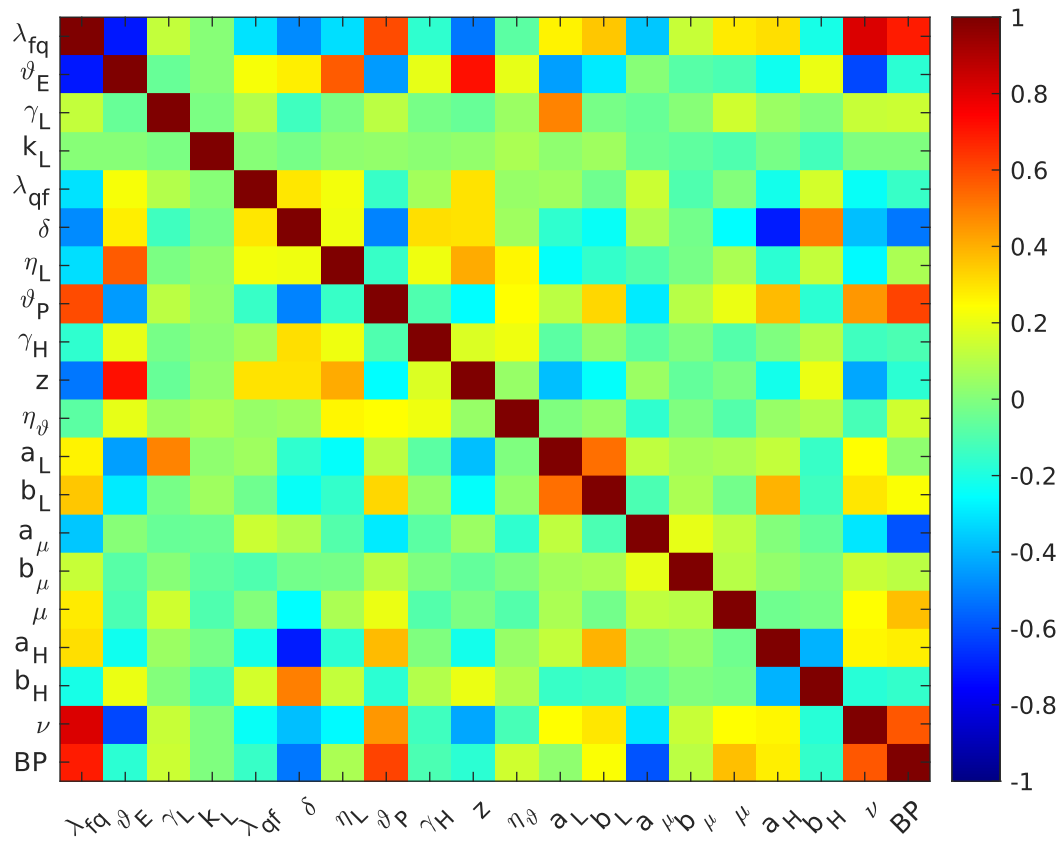
### 10.2. Estimated parameters with their intervals

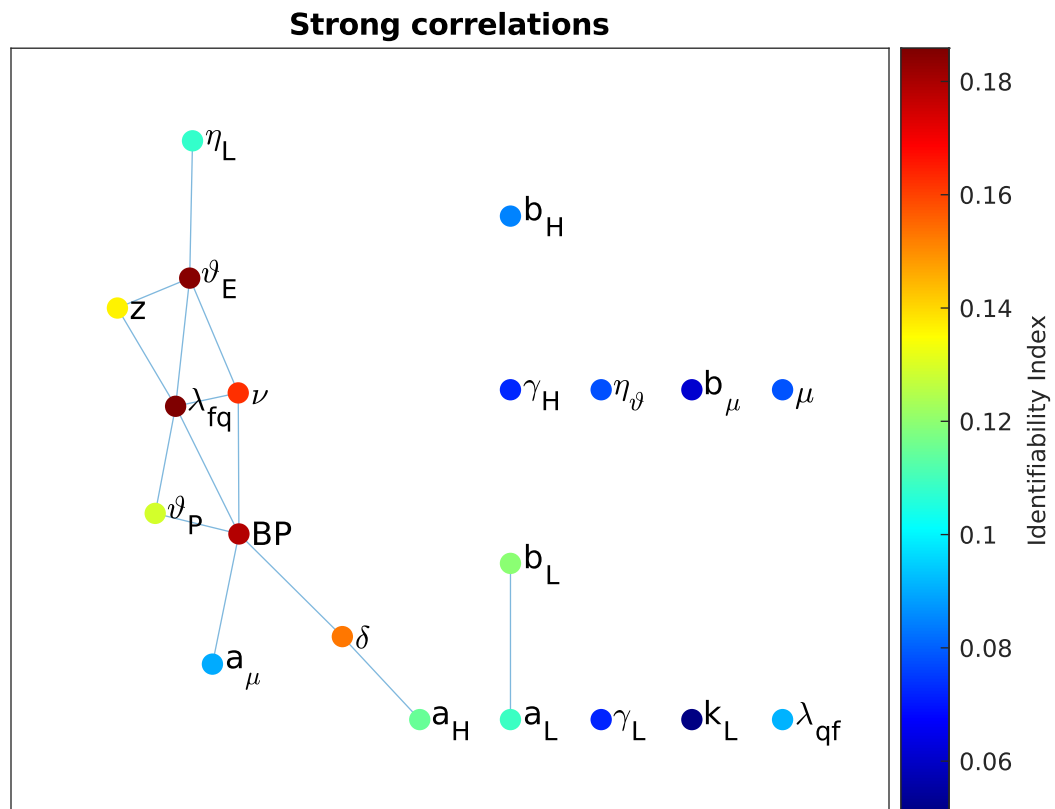
It was necessary to fix 0 parameters of 10 that could be fixed to complete validation.

	Rango		Nominal	Mejor	Index
$\lambda_{fq}$	'0'	'0.0286'	'0.0053'	'0.0011'	'0.1859'
$\vartheta_E$	'0.5725'	'0.6529'	'0.6127'	'0.9335'	'0.1848'
$\gamma_L$	'0.2107'	'0.2628'	'0.2367'	'0.2375'	'0.0724'
$k_L$	'5.3411'	'5.6477'	'5.4944'	'6.9758'	'0.051'
$\lambda_{qf}$	'0.6925'	'0.7552'	'0.7238'	'0.9891'	'0.0915'
$\delta$	'0.073'	'0.0834'	'0.0782'	'0.0333'	'0.1529'
$\eta_L$	'0.6251'	'0.6755'	'0.6503'	'0.8247'	'0.1082'
$\vartheta_P$	'0.0572'	'0.0845'	'0.0708'	'0.2446'	'0.1291'
$\gamma_H$	'0.4927'	'0.5366'	'0.5146'	'0.4945'	'0.073'
$z$	'23.9831'	'25.7603'	'24.8717'	'29.9677'	'0.1368'
$\eta_{\vartheta}$	'0.5567'	'0.6133'	'0.585'	'0.4986'	'0.0779'
$a_L$	'5.0897'	'5.8421'	'5.4659'	'1.911'	'0.1094'
$b_L$	'7.0344'	'8.0875'	'7.5609'	'2.0808'	'0.1199'
$a_{\mu}$	'4.3911'	'4.8697'	'4.6304'	'3.4477'	'0.0905'
$b_{\mu}$	'8.8253'	'9.3669'	'9.0961'	'9.2358'	'0.0612'
$\mu$	'0.5364'	'0.5846'	'0.5605'	'0.5832'	'0.0789'
$a_H$	'6.762'	'7.5769'	'7.1695'	'9.2035'	'0.1149'
$b_H$	'8.4383'	'9.0768'	'8.7575'	'8.3946'	'0.0848'
$\nu$	'22.7981'	'50.2905'	'36.5443'	'0.0343'	'0.1626'
BP	'377.3301'	'379.6699'	'378.5'	'391.5'	'0.1789'

### 10.3. Identifiability analysis

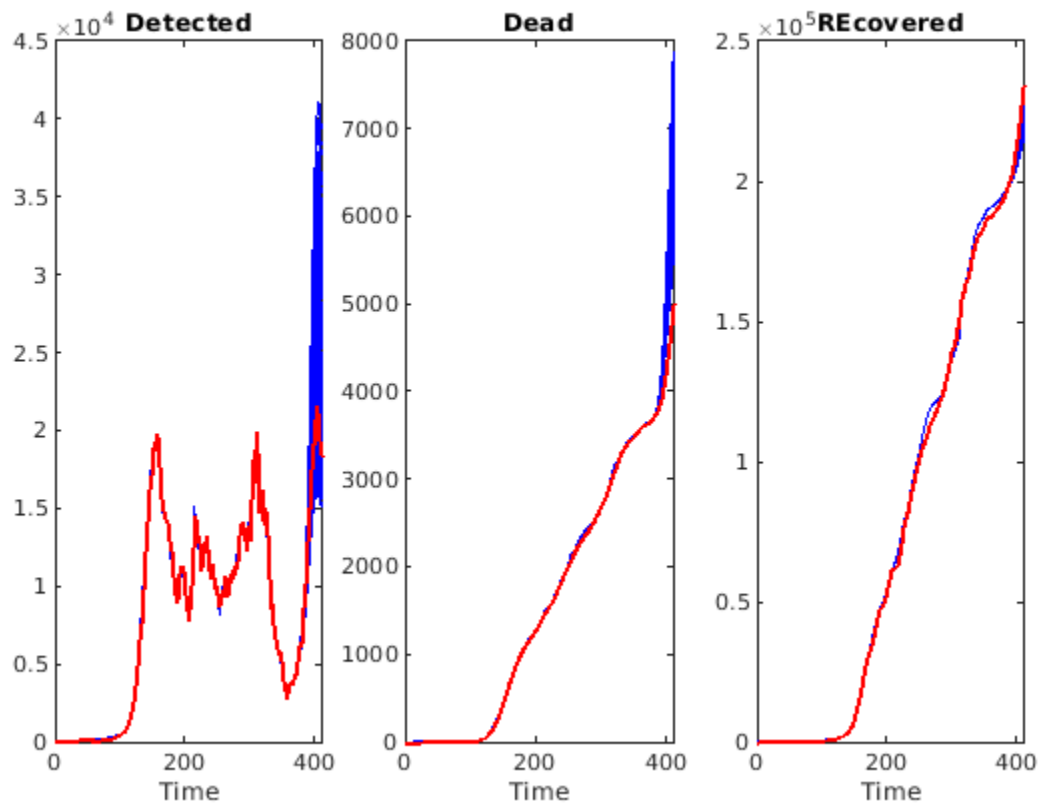






## 10.4. Uncertainty analysis

N=500



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## Chapter 11. Extension number11

### 11.1. Basic information

The extension to be validated consists of the time series from the data411 to the 441. The status of the validation is: COMPLETED.

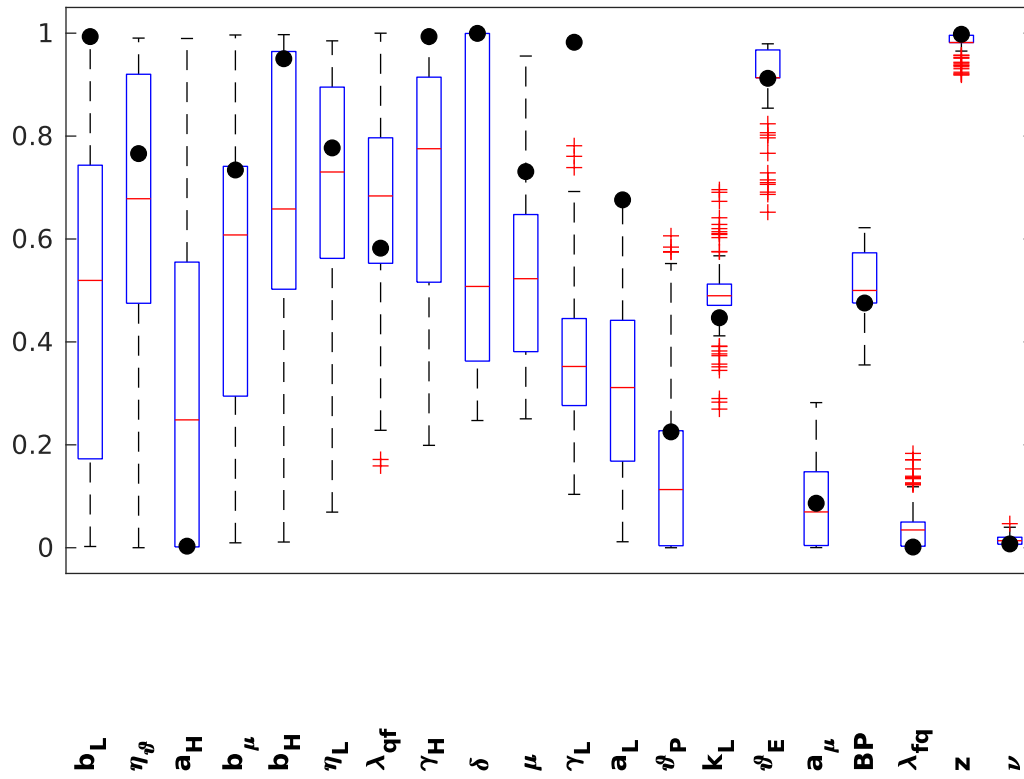
The number of estimations needed to perform the validation was1000.

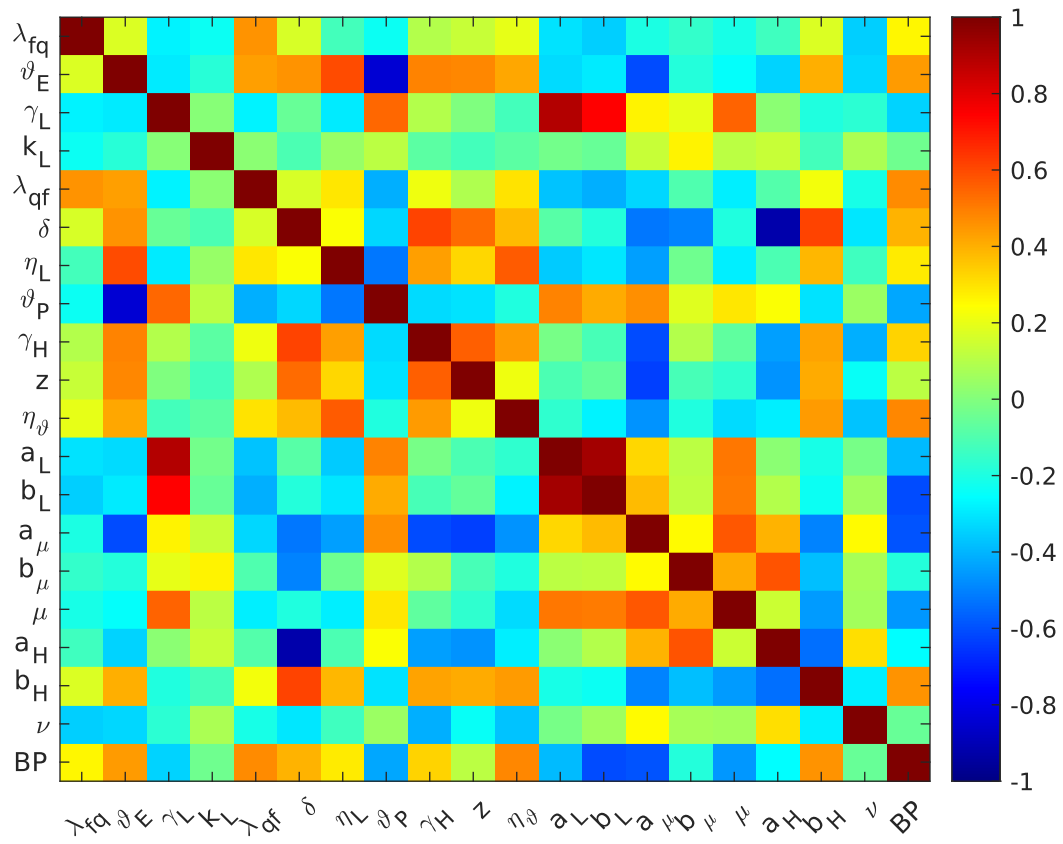
### 11.2. Estimated parameters with their intervals

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

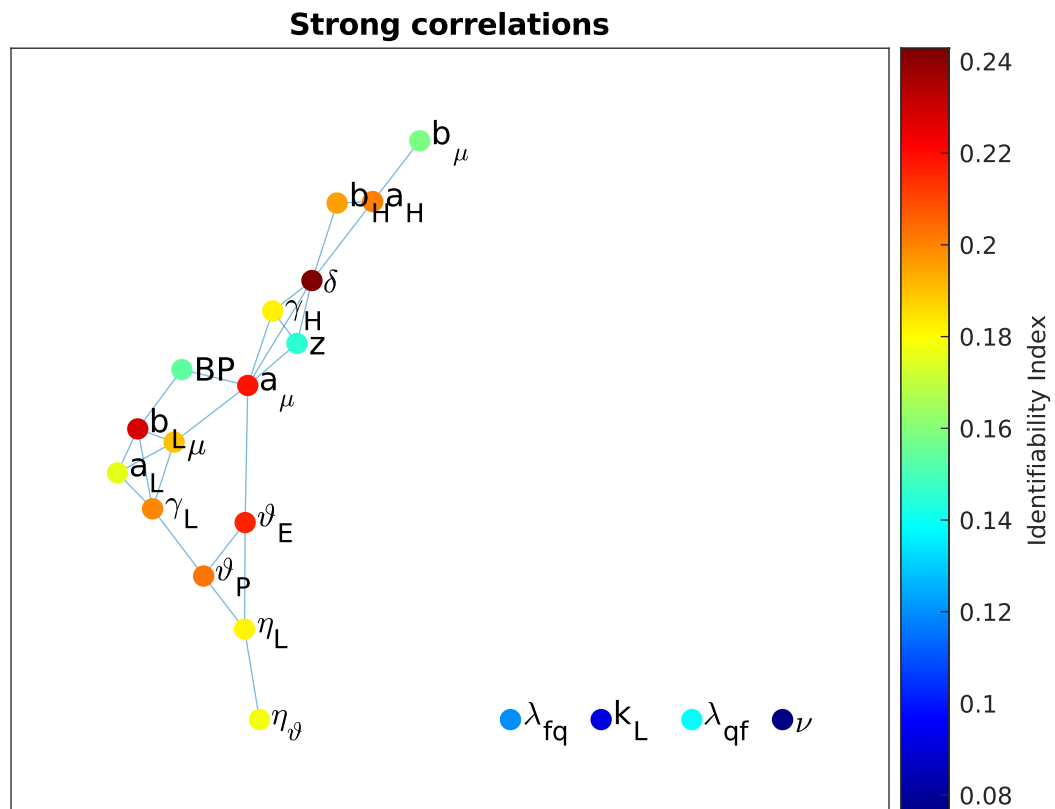
	Rango		Nominal	Mejor	Index
\lambda_{fq}	'0'	'0.0839'	'0.0346'	'0.0014'	'0.1199'
\vartheta_E	'0.8544'	'0.9721'	'0.9133'	'0.9123'	'0.2156'
\gamma_L	'0.2961'	'0.4113'	'0.3537'	'0.9823'	'0.1995'
k_L	'5.0265'	'5.7882'	'5.4074'	'5.0228'	'0.0916'
\lambda_{qf}	'0.6334'	'0.7333'	'0.6833'	'0.5822'	'0.1392'
\delta	'0.0655'	'0.0868'	'0.0762'	'0.1499'	'0.2429'
\eta_L	'0.6835'	'0.777'	'0.7302'	'0.7771'	'0.1814'
\vartheta_P	'0.0571'	'0.1709'	'0.114'	'0.2252'	'0.2028'
\gamma_H	'0.7287'	'0.8221'	'0.7754'	'0.9934'	'0.1823'
z	'28.7975'	'30'	'29.4518'	'29.9355'	'0.1458'
\eta_{\vartheta}	'0.6115'	'0.745'	'0.6783'	'0.766'	'0.178'
a_L	'4.7508'	'5.9652'	'5.358'	'10.4653'	'0.1764'
b_L	'7.2009'	'9.3452'	'8.273'	'14.9073'	'0.2282'
a_{\mu}	'1.7059'	'2.2427'	'1.9743'	'2.211'	'0.2186'
b_{\mu}	'8.5344'	'10.4861'	'9.5103'	'11.2777'	'0.1589'
\mu	'0.481'	'0.5647'	'0.5228'	'0.731'	'0.1899'
a_H	'3.5085'	'5.449'	'4.4788'	'1.0429'	'0.2006'
b_H	'9.3567'	'11.0776'	'10.2171'	'14.3051'	'0.1955'
\nu	'4.5774'	'9.0769'	'6.8271'	'3.6959'	'0.0763'
BP	'409.6085'	'411.3915'	'410.5'	'409.4998'	'0.1539'

### 11.3. Identifiability analysis



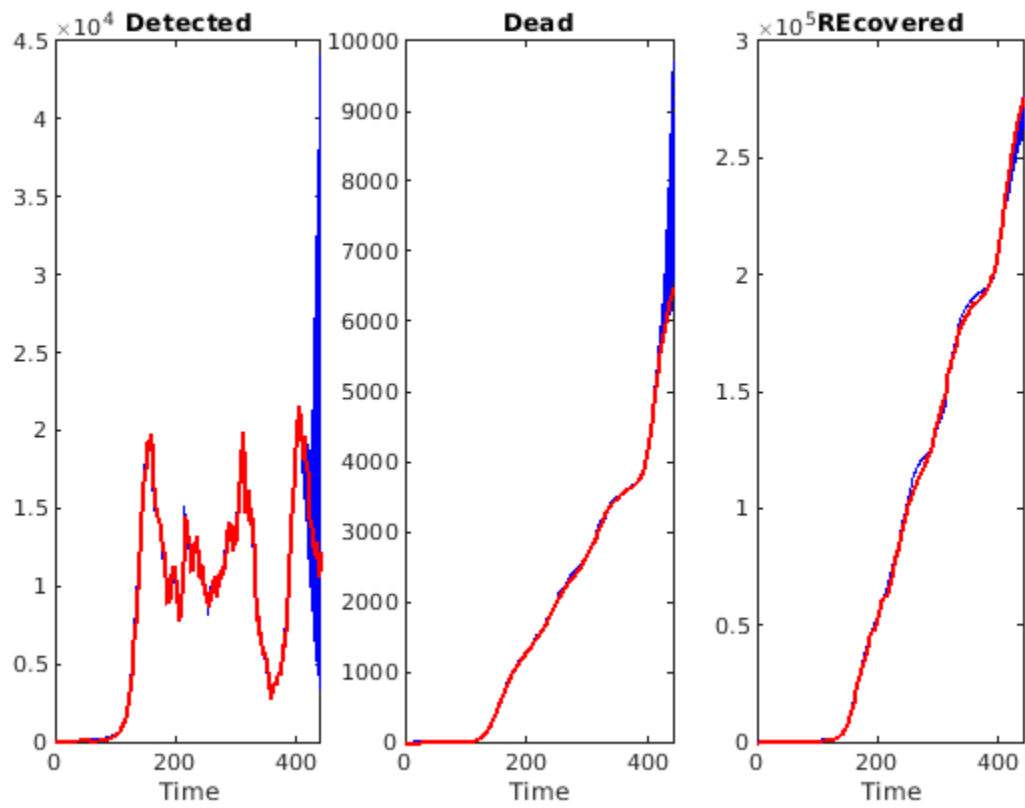






## 11.4. Uncertainty analysys

N=500



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## Chapter 12. Extension number12

### 12.1. Basic information

The extension to be validated consists of the time series from the data441 to the 461. The status of the validation is: COMPLETED.

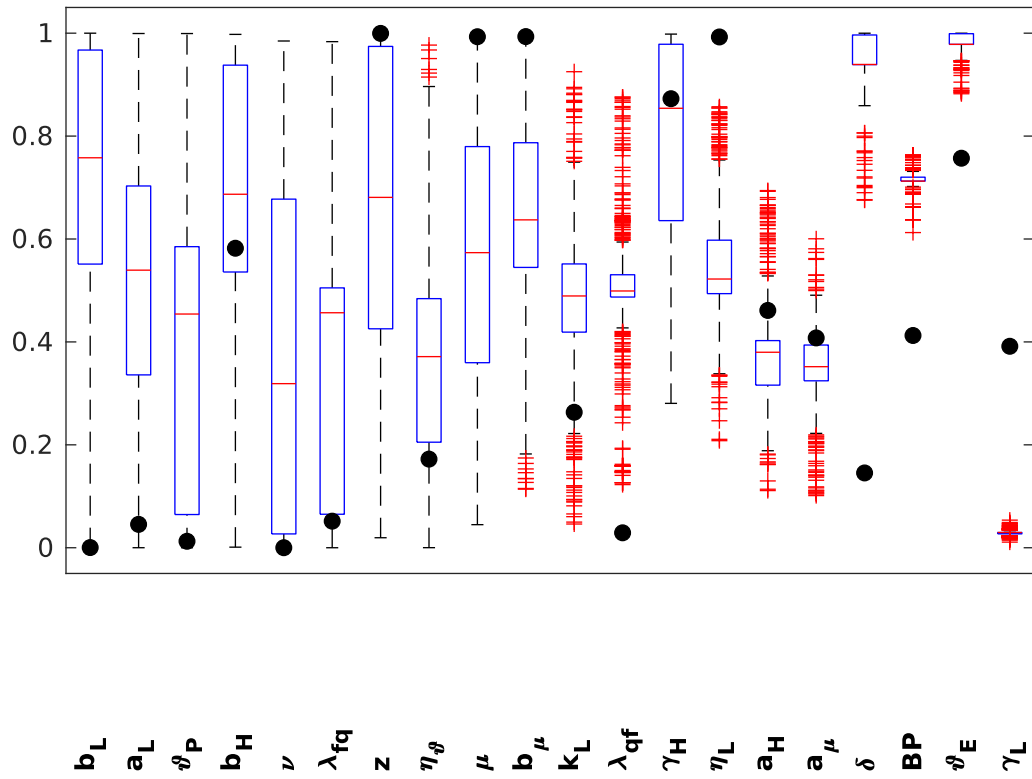
The number of estimations needed to perform the validation was1000.

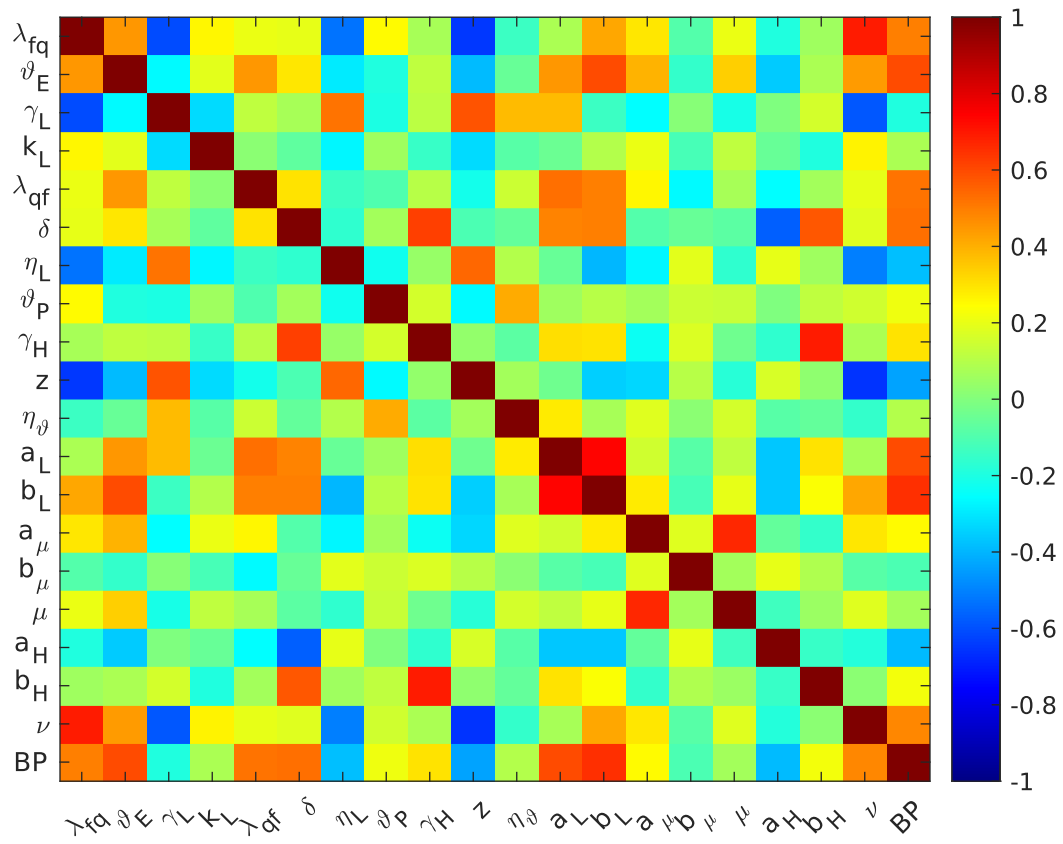
### 12.2. Estimated parameters with their intervals

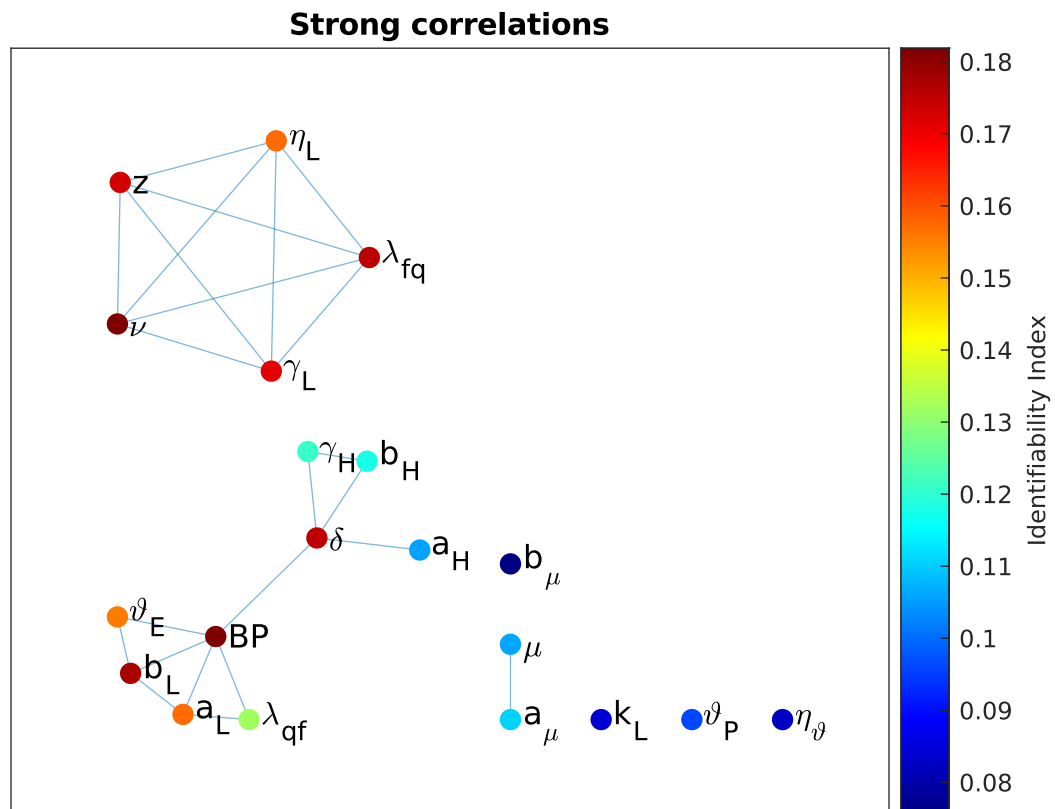
It was necessary to fix 0 parameters of 10 that could be fixed to complete validation.

	Rango		Nominal	Mejor	Index
$\lambda_{fq}$	'0.4304'	'0.4839'	'0.4572'	'0.0516'	'0.1753'
$\vartheta_E$	'0.9413'	'1'	'0.9782'	'0.757'	'0.1556'
$\gamma_L$	'0'	'0.0647'	'0.0296'	'0.3915'	'0.1714'
$k_L$	'5.1972'	'5.6104'	'5.4038'	'3.3696'	'0.0845'
$\lambda_{qf}$	'0.4731'	'0.5249'	'0.499'	'0.029'	'0.1318'
$\delta$	'0.1352'	'0.1465'	'0.1408'	'0.0218'	'0.175'
$\eta_L$	'0.5029'	'0.5416'	'0.5222'	'0.9926'	'0.1573'
$\vartheta_P$	'0.4193'	'0.4891'	'0.4542'	'0.0126'	'0.0965'
$\gamma_H$	'0.8296'	'0.8779'	'0.8537'	'0.8726'	'0.1213'
$z$	'19.5236'	'21.3294'	'20.4265'	'29.9879'	'0.1732'
$\eta_{\vartheta}$	'0.3467'	'0.3963'	'0.3715'	'0.1723'	'0.0826'
$a_L$	'8.1227'	'8.9819'	'8.5523'	'1.6359'	'0.1574'
$b_L$	'11.1391'	'12.0811'	'11.6101'	'1.005'	'0.1771'
$a_{\mu}$	'5.7113'	'6.1408'	'5.926'	'6.7088'	'0.1107'
$b_{\mu}$	'9.5997'	'10.2389'	'9.9193'	'14.9075'	'0.0759'
$\mu$	'0.5444'	'0.6025'	'0.5735'	'0.9931'	'0.1064'
$a_H$	'6.039'	'6.5987'	'6.3189'	'7.4566'	'0.1057'
$b_H$	'10.2475'	'10.9877'	'10.6176'	'9.1486'	'0.1178'
$\nu$	'141.5038'	'177.3894'	'159.4466'	'0.028'	'0.1816'
BP	'439.0327'	'439.9673'	'439.5'	'427.5'	'0.1819'

### 12.3. Identifiability analysis

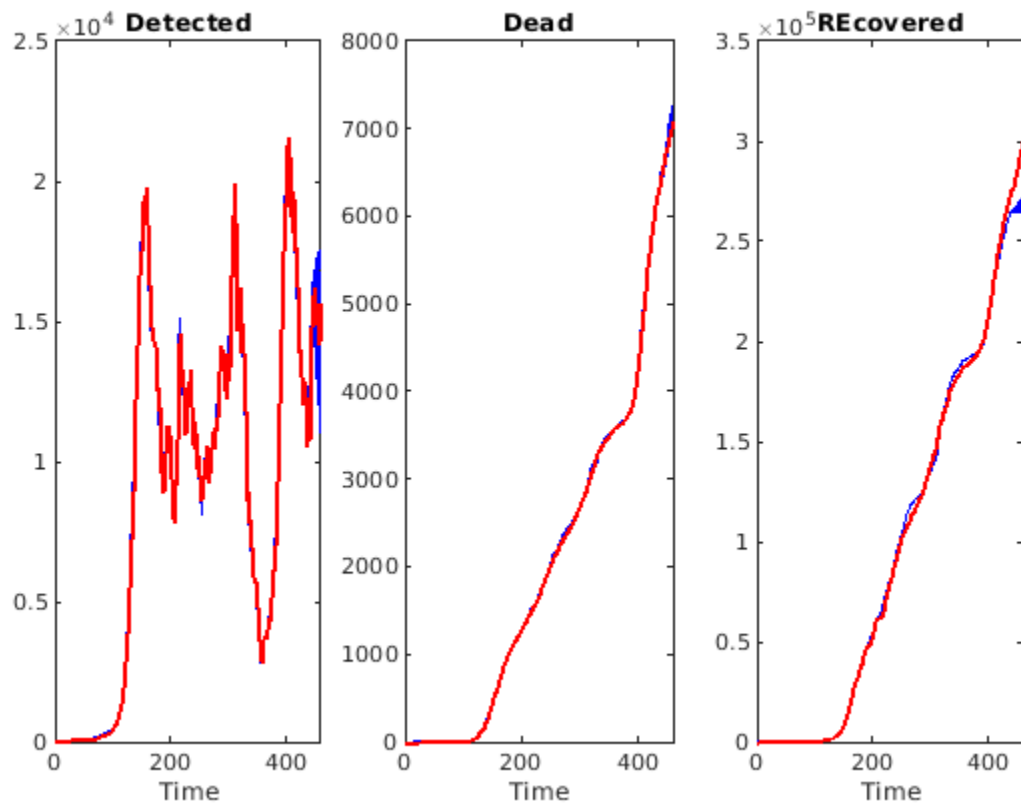






## 12.4. Uncertainty analysys

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 data461 to the 462. The status of the validation is: COMPLETED.

The number of estimations needed to perform the validation was1000.

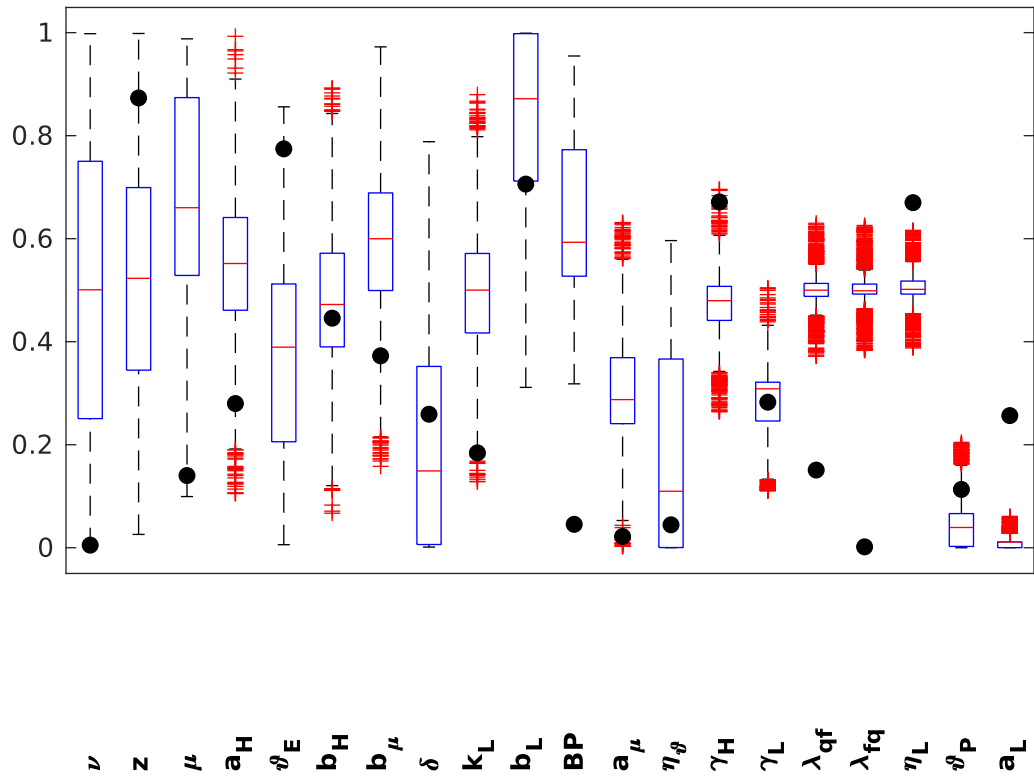
### 13.2. Estimated parameters with their intervals

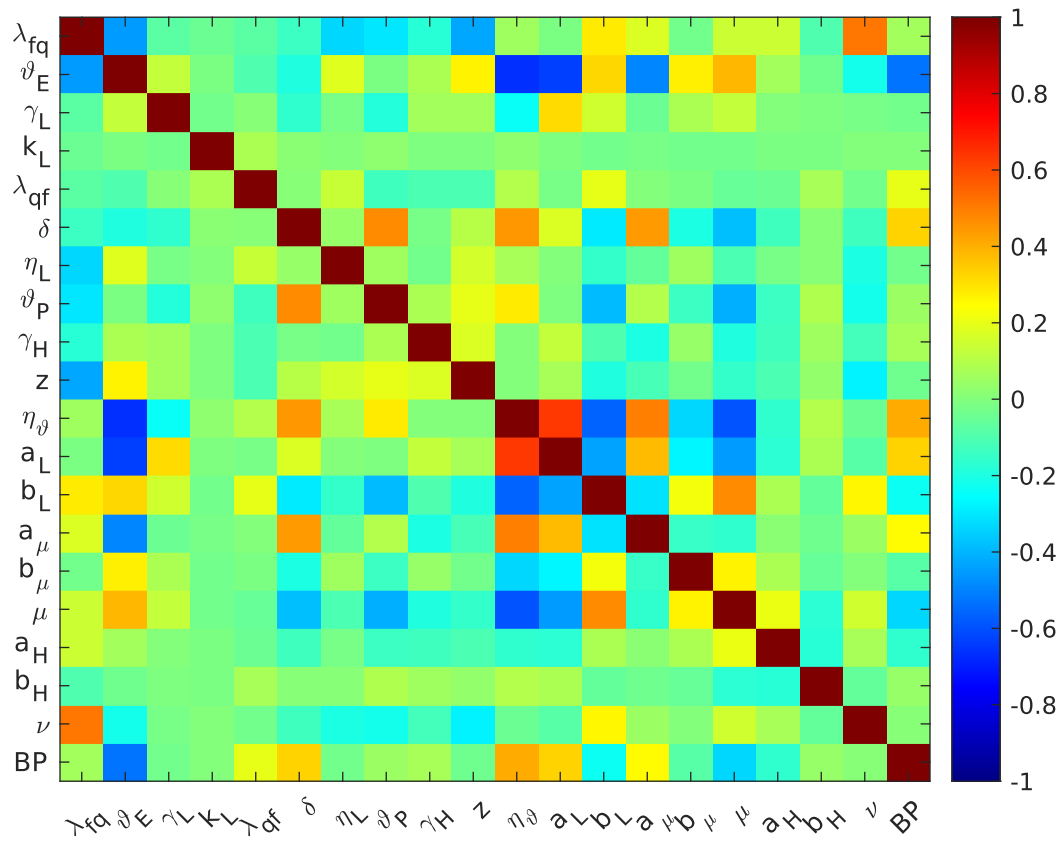
It was necessary to fix 0 parameters of 10 that could be fixed to complete validation.

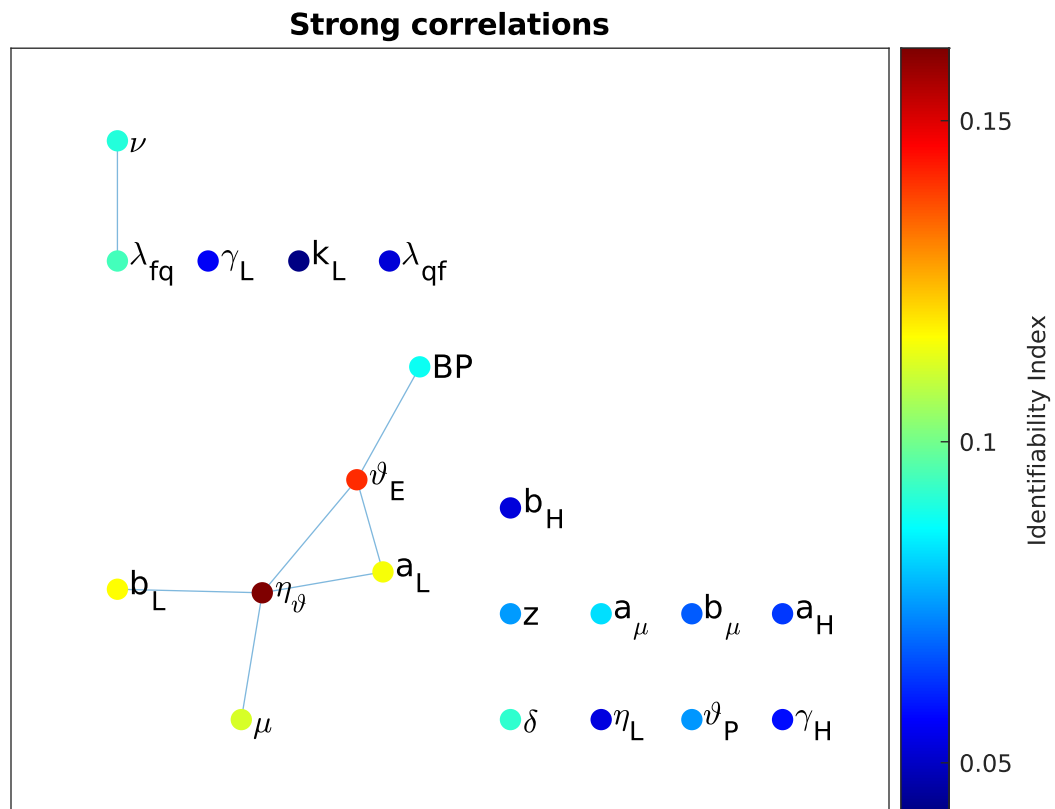
	Rango		Nominal	Mejor	Index
$\lambda_{fq}$	'0.4857'	'0.512'	'0.4988'	'0.0017'	'0.0947'
$\vartheta_E$	'0.3739'	'0.4051'	'0.3895'	'0.7744'	'0.1409'
$\gamma_L$	'0.2994'	'0.3177'	'0.3086'	'0.2826'	'0.056'
$k_L$	'5.3907'	'5.6128'	'5.5018'	'2.658'	'0.0423'
$\lambda_{qf}$	'0.4913'	'0.5088'	'0.5001'	'0.1508'	'0.0522'
$\delta$	'0.0192'	'0.0255'	'0.0224'	'0.0389'	'0.0923'
$\eta_L$	'0.4947'	'0.5086'	'0.5017'	'0.67'	'0.053'
$\vartheta_P$	'0.0308'	'0.0479'	'0.0393'	'0.1132'	'0.0746'
$\gamma_H$	'0.4689'	'0.4904'	'0.4797'	'0.6713'	'0.0582'
$z$	'15.1449'	'16.2431'	'15.694'	'26.1988'	'0.0749'
$\eta_{\vartheta}$	'0.0886'	'0.1308'	'0.1097'	'0.0445'	'0.1613'
$a_L$	'1'	'1.373'	'1.158'	'4.5918'	'0.1156'
$b_L$	'12.9309'	'13.4743'	'13.2026'	'10.8836'	'0.1162'
$a_{\mu}$	'4.8285'	'5.2252'	'5.0268'	'1.306'	'0.0829'
$b_{\mu}$	'9.2077'	'9.588'	'9.3979'	'6.2164'	'0.0678'
$\mu$	'0.6458'	'0.6745'	'0.6601'	'0.1402'	'0.1117'
$a_H$	'8.5191'	'8.924'	'8.7215'	'4.9191'	'0.0635'
$b_H$	'7.4328'	'7.7908'	'7.6118'	'7.2392'	'0.0529'
$\nu$	'238.951'	'261.8353'	'250.3932'	'2.5416'	'0.091'
BP	'447.4045'	'447.6423'	'447.5234'	'441.5'	'0.0883'



### 13.3. Identifiability analysis

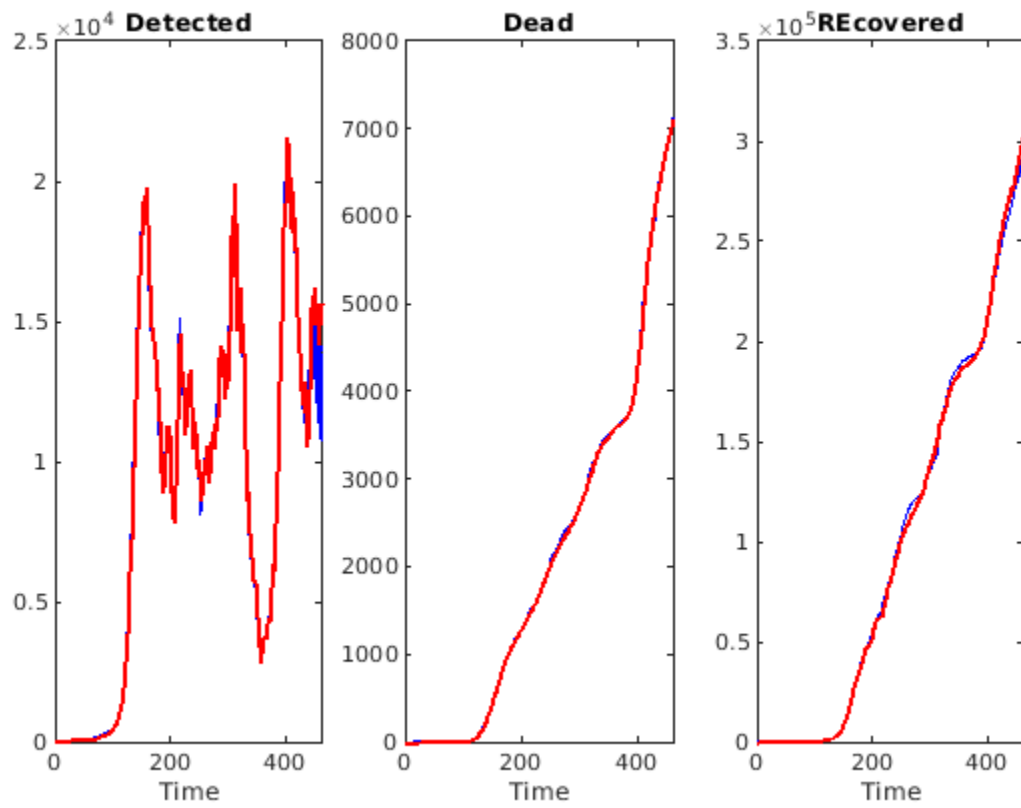






### 13.4. Uncertainty analysis

N=500



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## Chapter 14. Extension number14

### 14.1. Basic information

The extension to be validated consists of the time series from the data462 to the 474. The status of the validation is: COMPLETED.

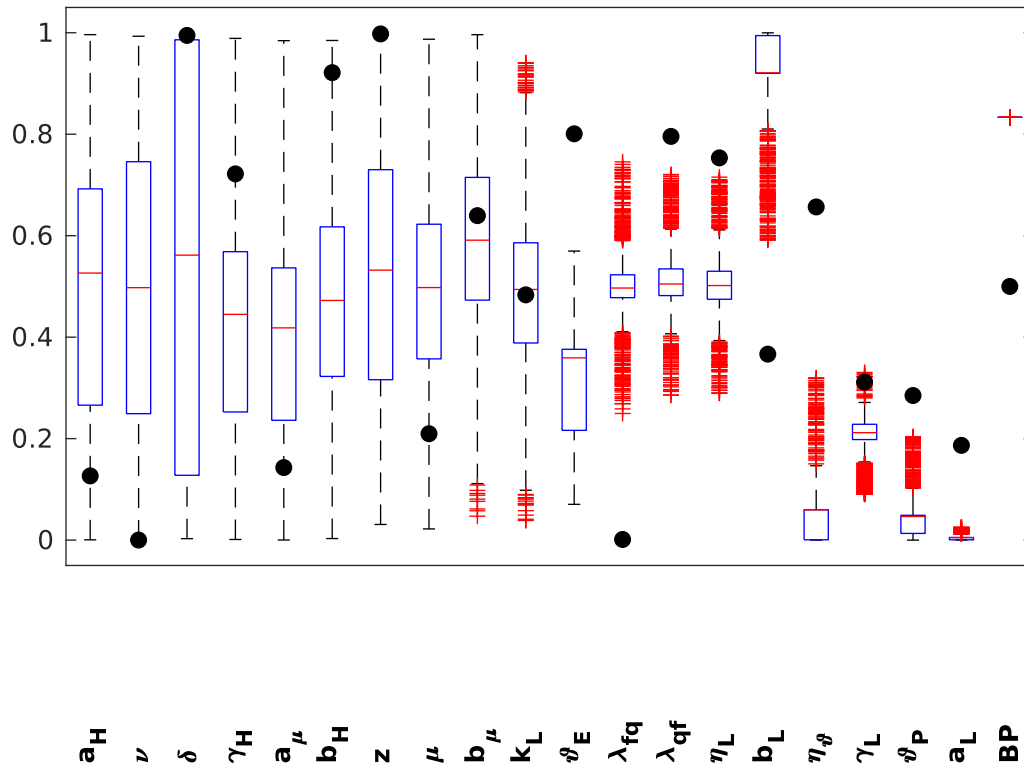
The number of estimations needed to perform the validation was1000.

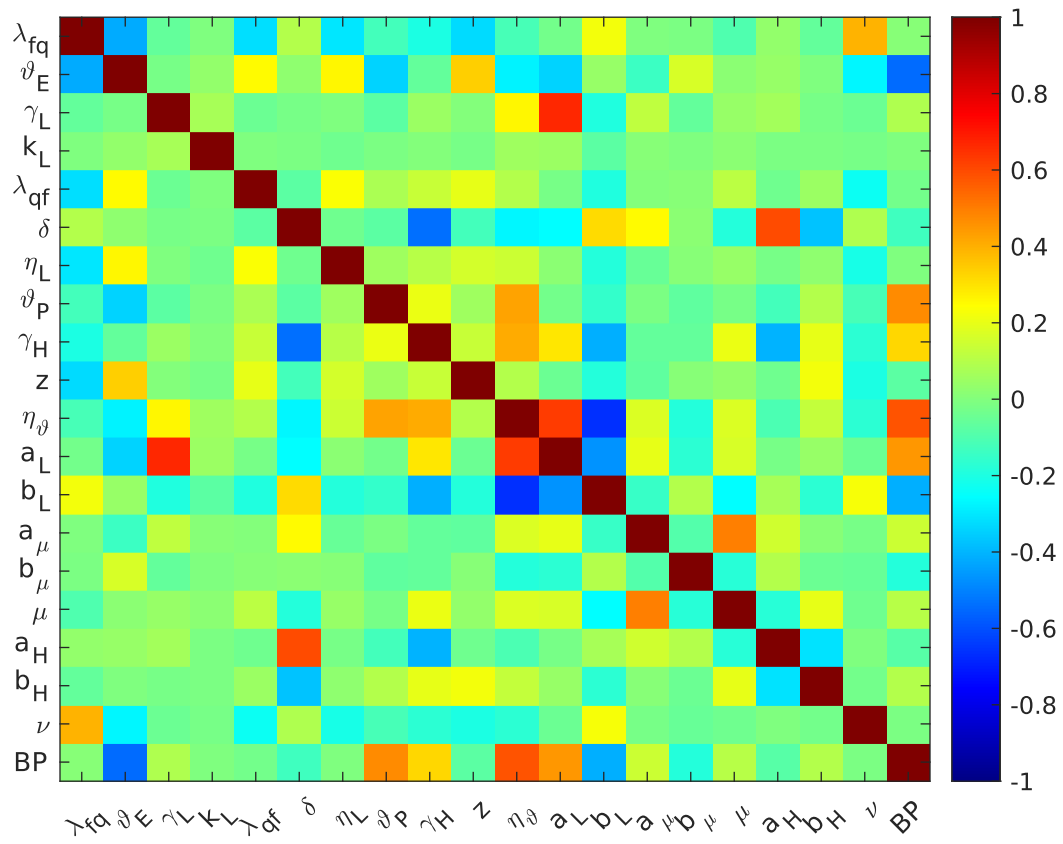
### 14.2. Estimated parameters with their intervals

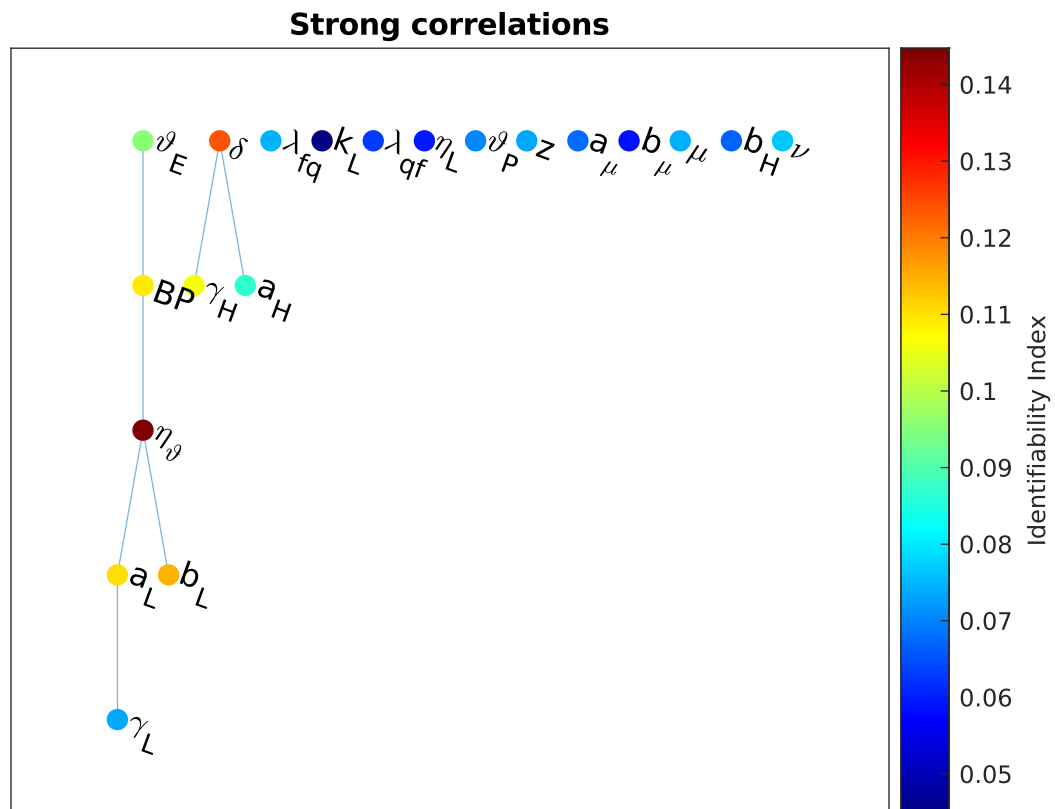
It was necessary to fix 0 parameters of 10 that could be fixed to complete validation.

	Rango		Nominal	Mejor	Index
\lambda_{fq}	'0.4822'	'0.5115'	'0.4968'	'0.0013'	'0.0748'
\vartheta_E	'0.3458'	'0.3727'	'0.3593'	'0.8008'	'0.0959'
\gamma_L	'0.1993'	'0.2242'	'0.2118'	'0.3116'	'0.0738'
k_L	'5.3182'	'5.5743'	'5.4463'	'5.3505'	'0.045'
\lambda_{qf}	'0.4936'	'0.5159'	'0.5047'	'0.7957'	'0.063'
\delta	'0.0797'	'0.0888'	'0.0843'	'0.1492'	'0.1239'
\eta_L	'0.4911'	'0.5124'	'0.5017'	'0.7534'	'0.0596'
\vartheta_P	'0.0326'	'0.0605'	'0.0466'	'0.285'	'0.0707'
\gamma_H	'0.4259'	'0.464'	'0.445'	'0.7219'	'0.1061'
z	'15.3873'	'16.5368'	'15.962'	'29.9314'	'0.0735'
\eta_{\vartheta}	'0.0396'	'0.08'	'0.0598'	'0.6567'	'0.1448'
a_L	'1'	'1.307'	'1.071'	'3.6143'	'0.1103'
b_L	'13.5982'	'14.1873'	'13.8928'	'6.1316'	'0.1145'
a_{\mu}	'6.6327'	'7.0797'	'6.8562'	'3.0017'	'0.0676'
b_{\mu}	'9.071'	'9.481'	'9.276'	'9.9532'	'0.0587'
\mu	'0.4804'	'0.5151'	'0.4977'	'0.2097'	'0.0743'
a_H	'8.0963'	'8.6406'	'8.3684'	'2.7717'	'0.0867'
b_H	'7.3905'	'7.8361'	'7.6133'	'13.899'	'0.067'
\nu	'237.4303'	'260.1234'	'248.7769'	'0.0421'	'0.0768'
BP	'463.4627'	'463.5373'	'463.5'	'462.5'	'0.1092'

### 14.3. Identifiability analysis



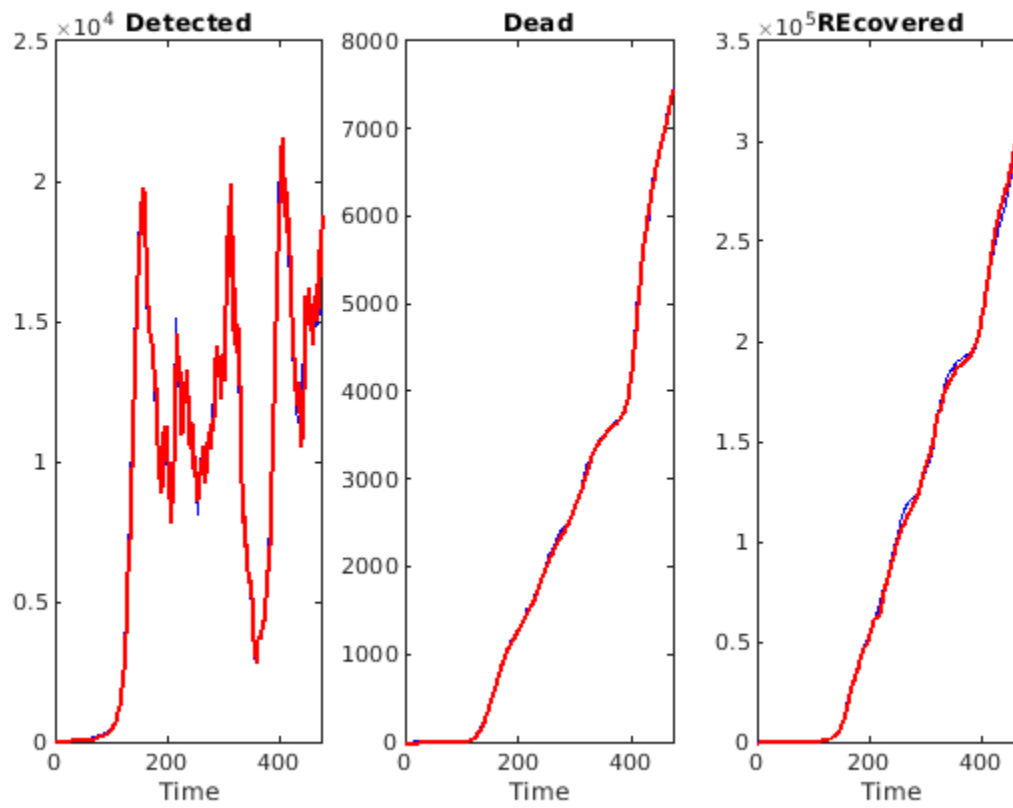






## 14.4. Uncertainty analysis

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 data474 to the 498. The status of the validation is: COMPLETED.

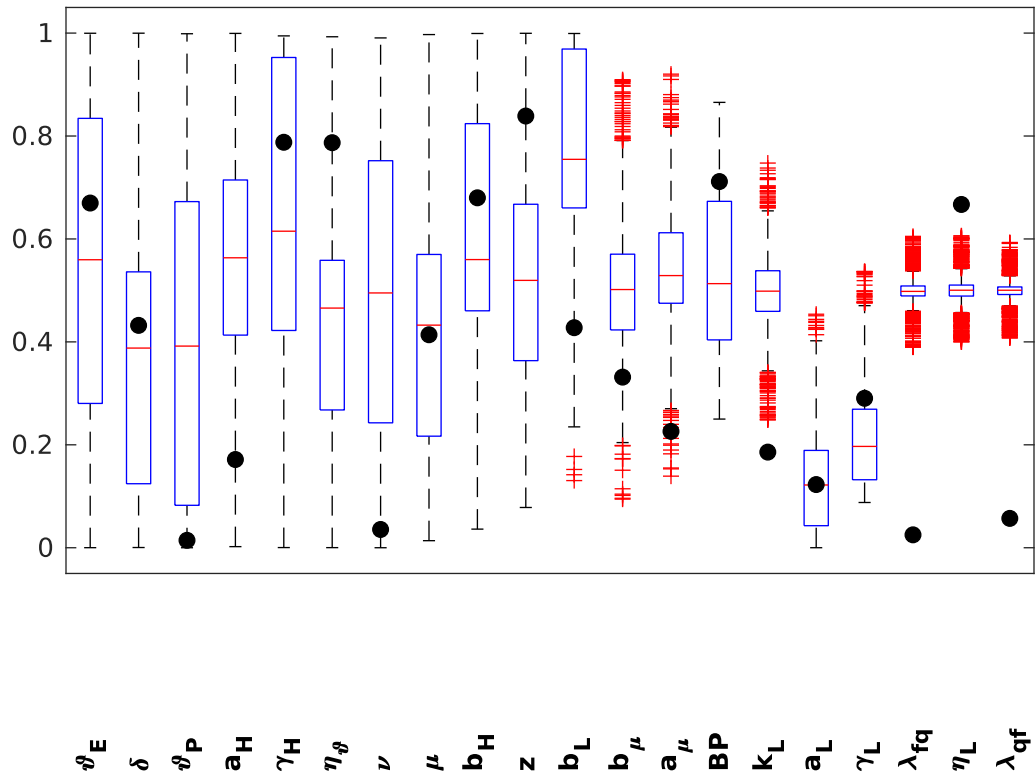
The number of estimations needed to perform the validation was1000.

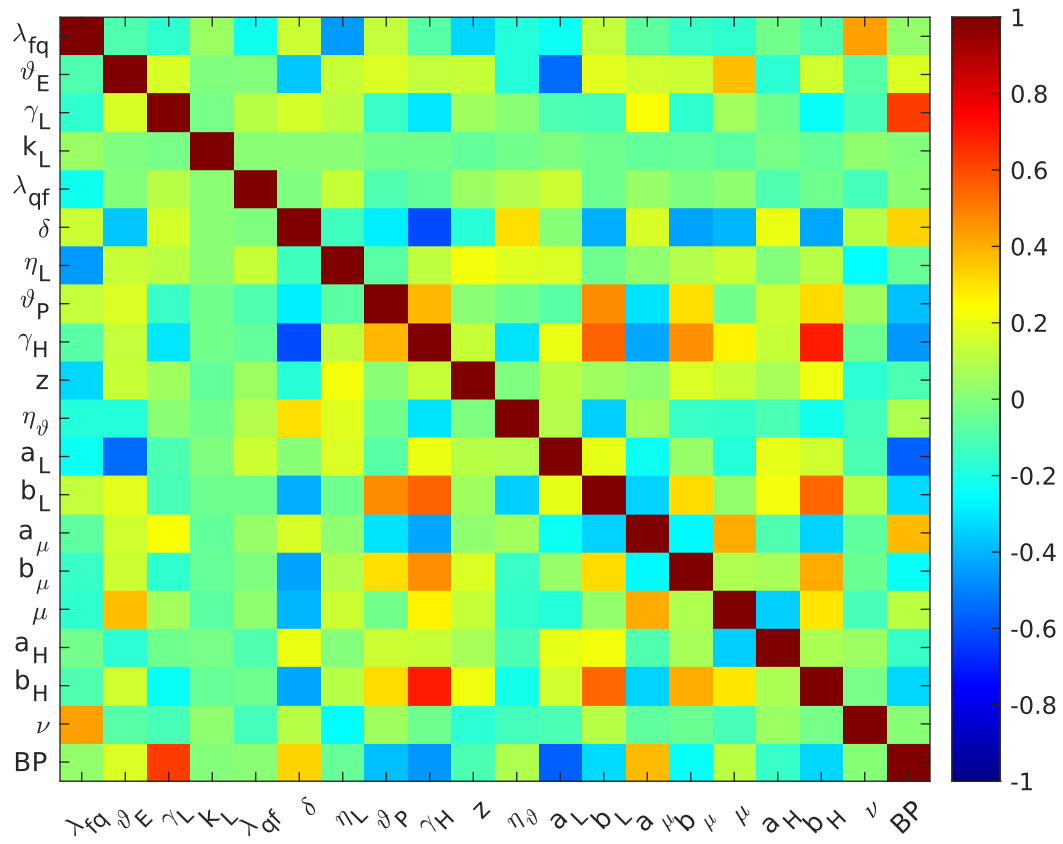
### 15.2. Estimated parameters with their intervals

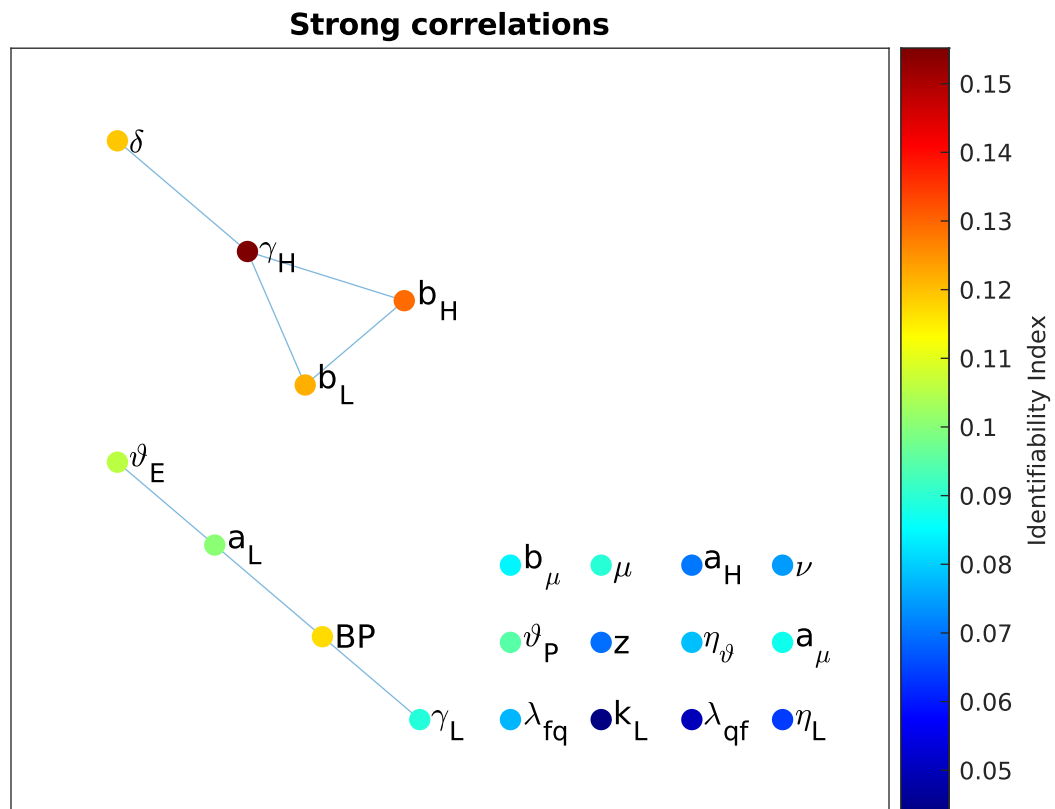
It was necessary to fix 0 parameters of 10 that could be fixed to complete validation.

	Rango		Nominal	Mejor	Index
\lambda_{fq}	'0.4854'	'0.5108'	'0.4981'	'0.0251'	'0.0777'
\vartheta_E	'0.5337'	'0.5855'	'0.5596'	'0.6698'	'0.106'
\gamma_L	'0.1821'	'0.2124'	'0.1972'	'0.2904'	'0.0894'
k_L	'5.3864'	'5.5876'	'5.487'	'2.6723'	'0.0439'
\lambda_{qf}	'0.4919'	'0.5088'	'0.5003'	'0.057'	'0.05'
\delta	'0.0547'	'0.0617'	'0.0582'	'0.0648'	'0.1194'
\eta_L	'0.4923'	'0.5084'	'0.5004'	'0.667'	'0.0642'
\vartheta_P	'0.365'	'0.4187'	'0.3918'	'0.0144'	'0.0952'
\gamma_H	'0.5898'	'0.6403'	'0.6151'	'0.7879'	'0.1552'
z	'15.0901'	'16.0793'	'15.5847'	'25.1651'	'0.0697'
\eta_{\vartheta}	'0.4461'	'0.4853'	'0.4657'	'0.787'	'0.0783'
a_L	'2.5901'	'2.8303'	'2.7102'	'2.7187'	'0.1008'
b_L	'11.3426'	'11.7886'	'11.5656'	'6.986'	'0.1218'
a_{\mu}	'8.1854'	'8.6214'	'8.4034'	'4.165'	'0.0871'
b_{\mu}	'7.8203'	'8.2273'	'8.0238'	'5.6412'	'0.0846'
\mu	'0.4103'	'0.4548'	'0.4325'	'0.4138'	'0.0899'
a_H	'8.6432'	'9.1318'	'8.8875'	'3.3998'	'0.0705'
b_H	'8.5519'	'9.1261'	'8.839'	'10.5191'	'0.1295'
\nu	'235.4898'	'259.5995'	'247.5446'	'17.7478'	'0.0747'
BP	'475.0207'	'475.664'	'475.3424'	'480.5'	'0.1172'

### 15.3. Identifiability analysis

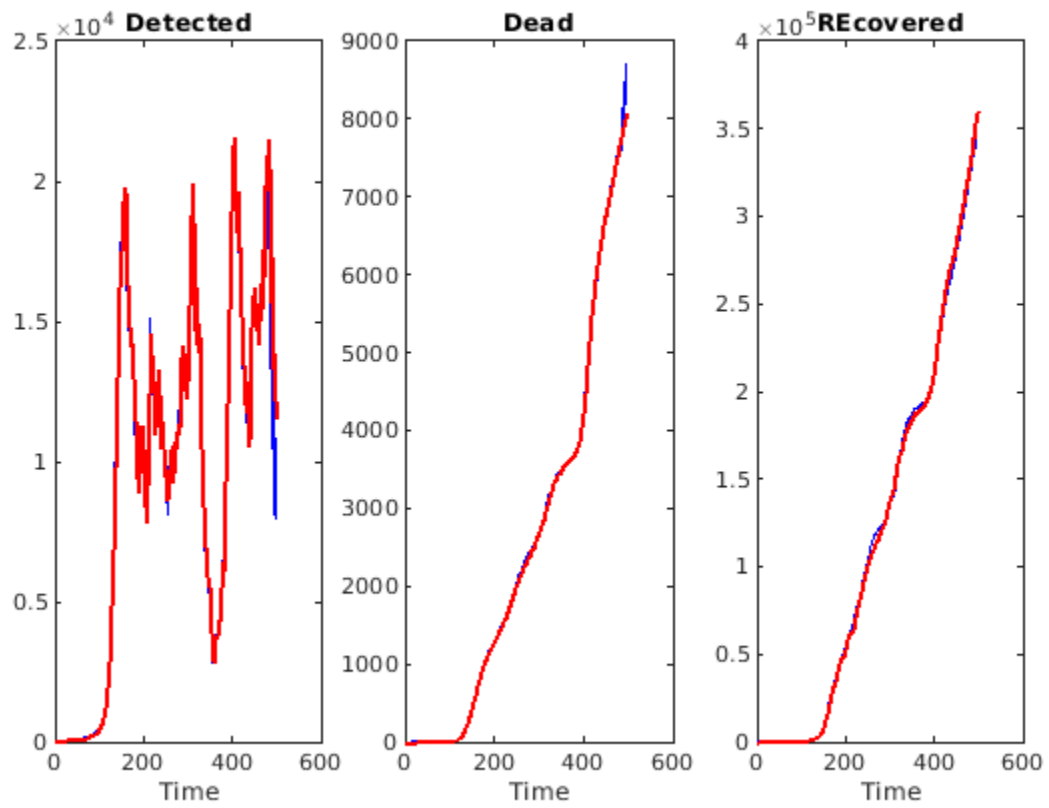






## 15.4. Uncertainty analysis

N=500



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## Chapter 16. Extension number16

### 16.1. Basic information

The extension to be validated consists of the time series from the data498 to the 563. The status of the validation is: COMPLETED.

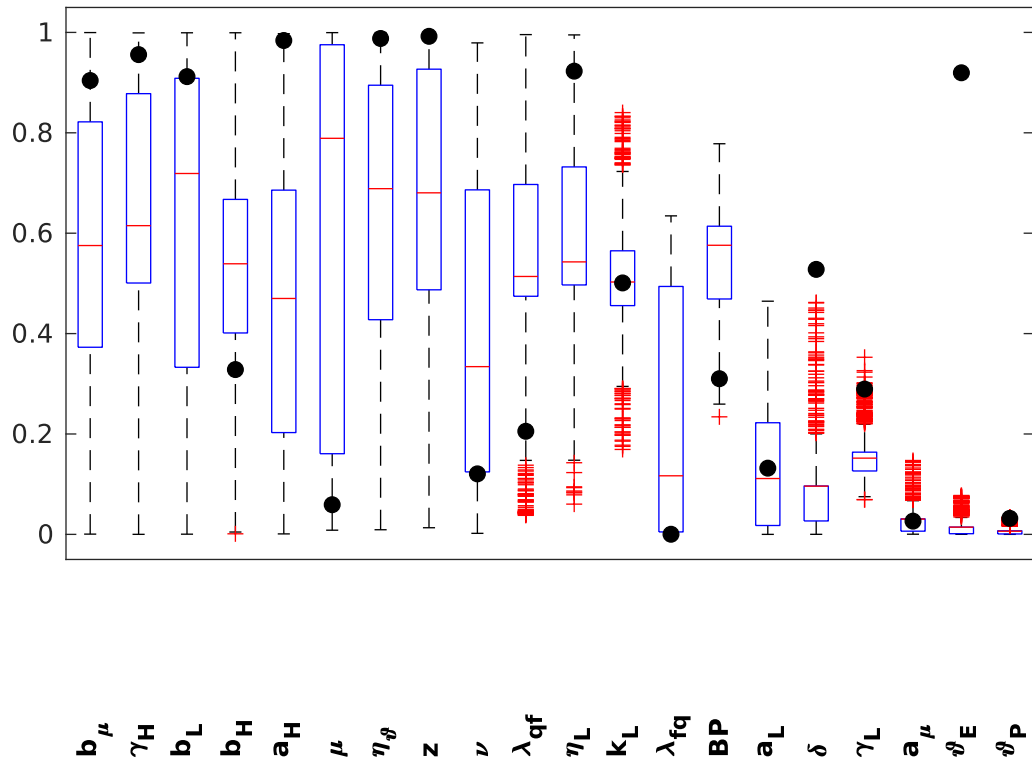
The number of estimations needed to perform the validation was1000.

### 16.2. Estimated parameters with their intervals

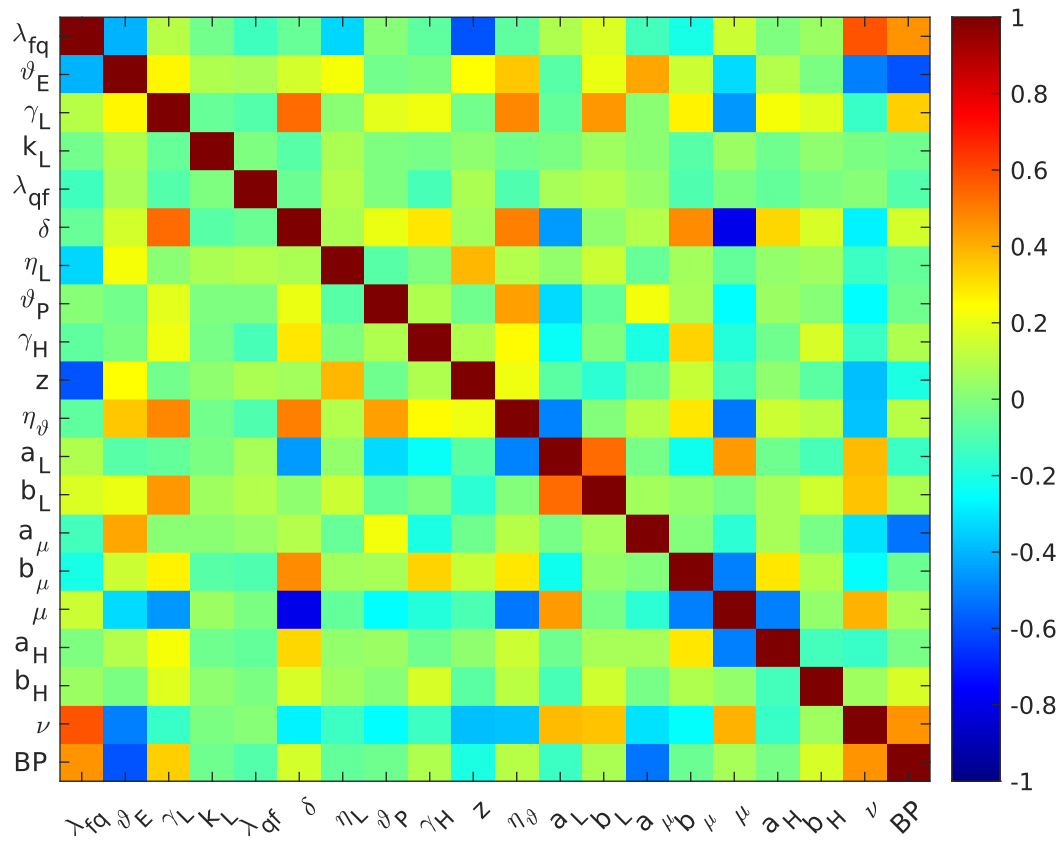
It was necessary to fix 0 parameters of 10 that could be fixed to complete validation.

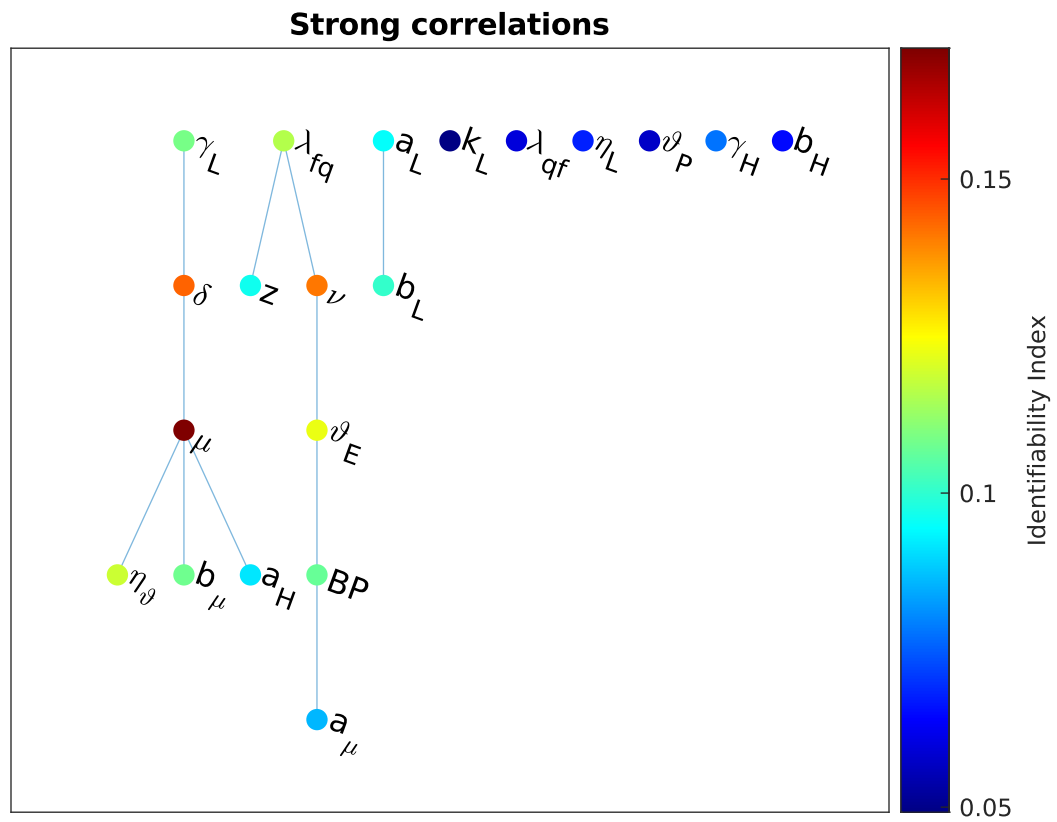
	Rango		Nominal	Mejor	Index
$\lambda_{fq}$	'0.0961'	'0.1375'	'0.1168'	'0.0002'	'0.1159'
$\vartheta_E$	'0'	'0.0397'	'0.0145'	'0.9196'	'0.1226'
$\gamma_L$	'0.132'	'0.1717'	'0.1519'	'0.2895'	'0.1088'
$k_L$	'5.3912'	'5.659'	'5.5251'	'5.5083'	'0.0492'
$\lambda_{qf}$	'0.4944'	'0.5332'	'0.5138'	'0.2054'	'0.06'
$\delta$	'0.0094'	'0.0195'	'0.0145'	'0.0792'	'0.1435'
$\eta_L$	'0.5257'	'0.5599'	'0.5428'	'0.9228'	'0.0678'
$\vartheta_P$	'0.0036'	'0.009'	'0.0063'	'0.0319'	'0.0575'
$\gamma_H$	'0.5939'	'0.6362'	'0.615'	'0.9558'	'0.0779'
$z$	'19.7594'	'21.0666'	'20.413'	'29.7668'	'0.0963'
$\eta_{\vartheta}$	'0.6658'	'0.7116'	'0.6887'	'0.9879'	'0.1188'
$a_L$	'2.4179'	'2.6966'	'2.5572'	'2.8469'	'0.0952'
$b_L$	'10.6529'	'11.4775'	'11.0652'	'13.7671'	'0.1009'
$a_{\mu}$	'1.1932'	'1.6606'	'1.4269'	'1.3689'	'0.086'
$b_{\mu}$	'8.7039'	'9.4079'	'9.0559'	'13.6582'	'0.1078'
$\mu$	'0.7559'	'0.8222'	'0.789'	'0.0591'	'0.1708'
$a_H$	'7.2204'	'7.9388'	'7.5796'	'14.7746'	'0.0919'
$b_H$	'8.2738'	'8.8203'	'8.547'	'5.5965'	'0.065'
$\nu$	'153.6862'	'180.4826'	'167.0844'	'60.2811'	'0.1412'
BP	'518.5963'	'520.4037'	'519.5'	'498.5'	'0.107'

### 16.3. Identifiability analysis



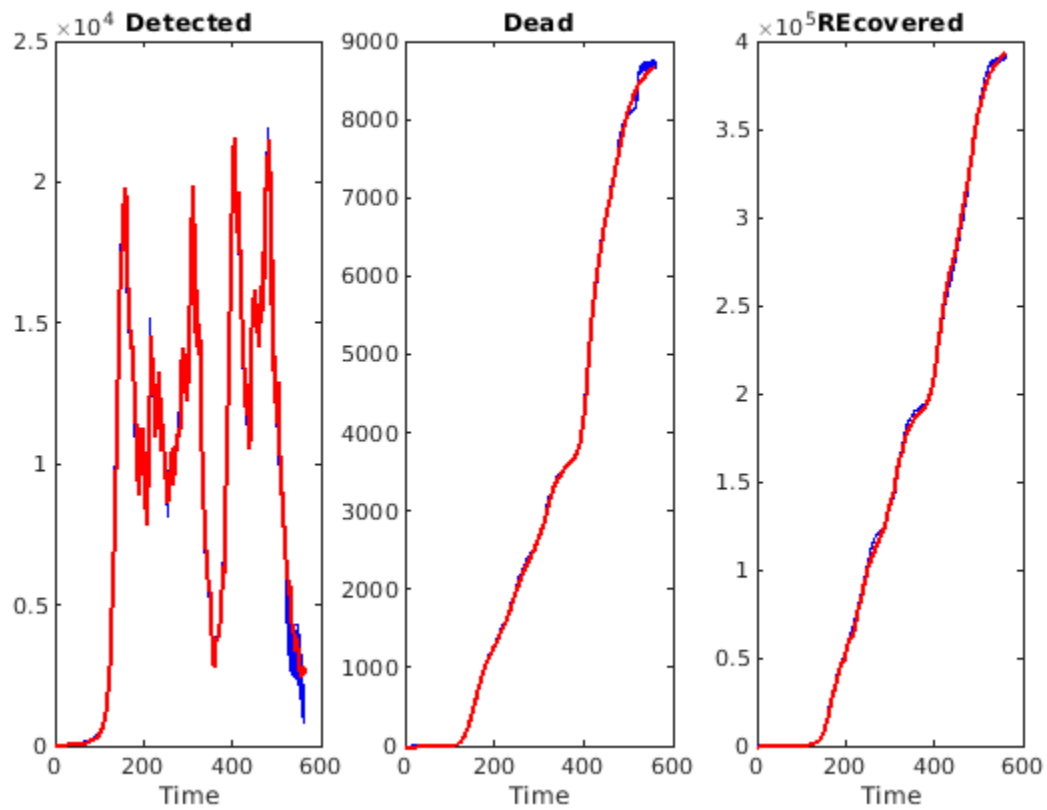






## 16.4. Uncertainty analysis

N=500



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## Chapter 17. Extension number17

### 17.1. Basic information

The extension to be validated consists of the time series from the data563 to the 725. The status of the validation is: COMPLETED.

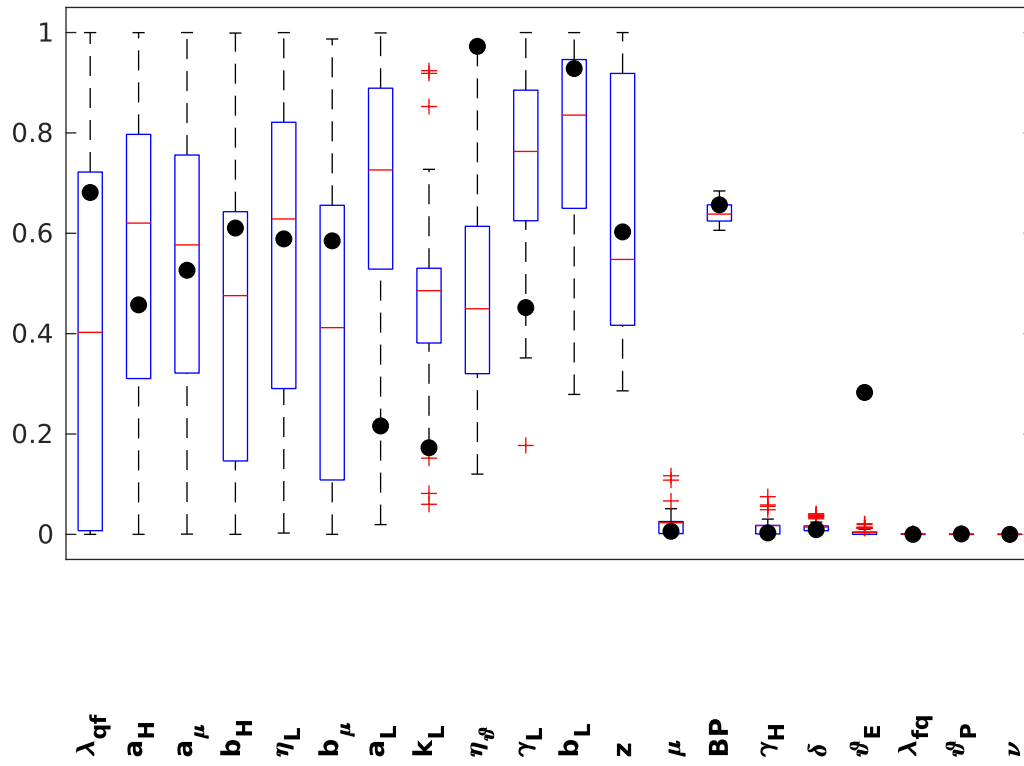
The number of estimations needed to perform the validation was2000.

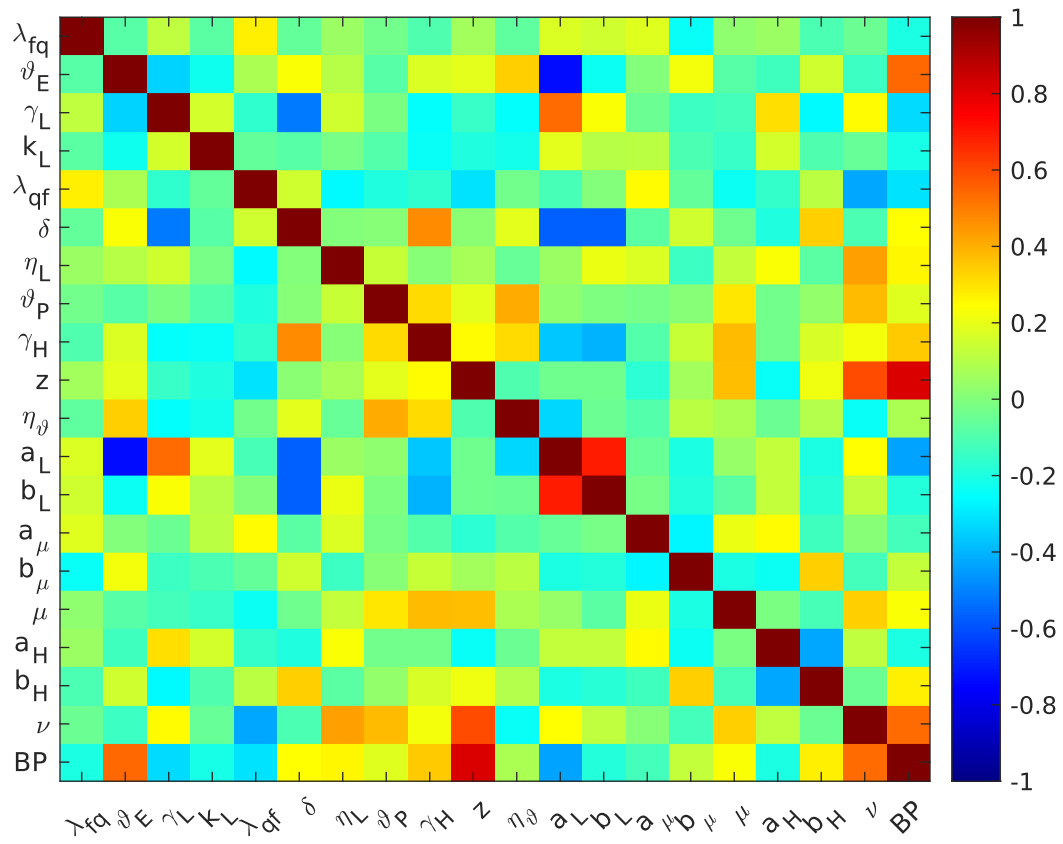
### 17.2. Estimated parameters with their intervals

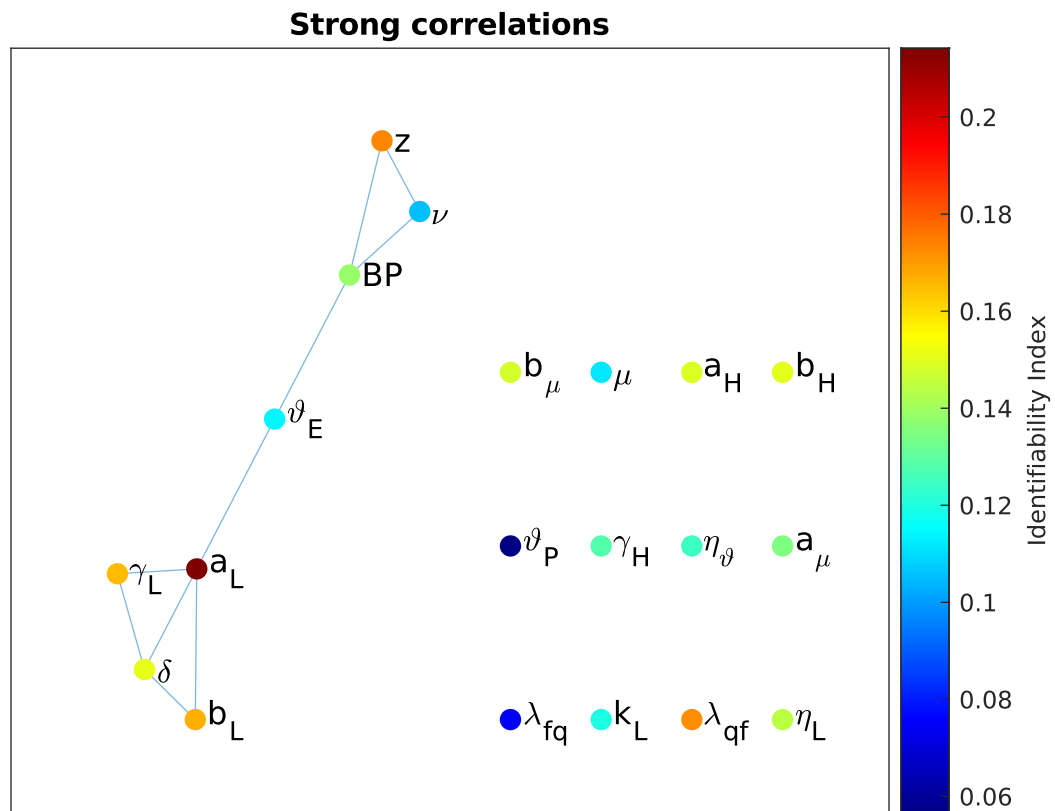
It was necessary to fix 0 parameters of 10 that could be fixed to complete validation.

	Rango		Nominal	Mejor	Index
$\lambda_{fq}$	'0'	'0.047'	'0.0004'	'0'	'0.0747'
$\vartheta_E$	'0'	'0.0264'	'0.0039'	'0.2828'	'0.1144'
$\gamma_L$	'0.7012'	'0.8234'	'0.7623'	'0.4519'	'0.1652'
$k_L$	'4.8009'	'5.9397'	'5.3703'	'2.5534'	'0.1198'
$\lambda_{qf}$	'0.2976'	'0.5077'	'0.4026'	'0.6813'	'0.1719'
$\delta$	'0'	'0.0115'	'0.0022'	'0.0014'	'0.1512'
$\eta_L$	'0.5416'	'0.7156'	'0.6286'	'0.5888'	'0.1441'
$\vartheta_P$	'0'	'0.0025'	'0.0002'	'0.0009'	'0.0567'
$\gamma_H$	'0'	'0.0962'	'0.018'	'0.0029'	'0.1285'
$z$	'14.2598'	'18.6136'	'16.4367'	'18.0824'	'0.1735'
$\eta_{\vartheta}$	'0.388'	'0.5111'	'0.4495'	'0.9725'	'0.1248'
$a_L$	'10.1118'	'12.2214'	'11.1666'	'4.0248'	'0.2142'
$b_L$	'11.675'	'13.7065'	'12.6908'	'13.9959'	'0.1672'
$a_{\mu}$	'7.9331'	'10.2181'	'9.0756'	'8.3683'	'0.1352'
$b_{\mu}$	'5.5795'	'7.955'	'6.7673'	'9.1887'	'0.1478'
$\mu$	'0'	'0.0964'	'0.0256'	'0.0062'	'0.112'
$a_H$	'8.4841'	'10.8845'	'9.6843'	'7.4037'	'0.1491'
$b_H$	'6.4913'	'8.83'	'7.6607'	'9.5464'	'0.1508'
$\nu$	'0'	'0.3144'	'0.008'	'0.0063'	'0.1057'
BP	'635.2524'	'637.7475'	'636.5'	'640.5'	'0.1387'

### 17.3. Identifiability analysis







## 17.4. Uncertainty analysis

