

ANDRÉS BISHOP FERRETTI

DEVELOPMENT OF A WEB APP FOR THE IMPACTRON AND THE POST-AWS DATA SETS

Supervised by Dr. Enric Aguilar Anfrons

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Introduction

Climatological research, applications, and user services depend on the availability of:

- Long
- Uninterrupted
- homogeneous

climate data sets.

Long term climate data sets have been affected by many non-climatic factors, such as:

- Changes in the location or the environment of weather stations,
- Changes of the instrumentation,
- Changes of averaging methods, among many others,

introduced discontinuities or inhomogeneities

Transitions

Transitions from Manual (MAN) to Automatic Weather Stations (AWS)

Very often changes from manned to automated systems take place in a whole network and to evaluate the biases they introduce widely used approaches has been to compare nearby stations, conduct a series of side by side measurements and/or perform instruments inter comparisons. These approaches have also produce valuable datasets, suitable for the study of the shape and size of the potential inhomogeneities that would affect a climate time series experiencing changes equal or similar to those studied.

The Automatic Weather Stations (AWS)

The introduction of AWS has been accompanied with a large increase in the spatial and temporal resolution of the observations and in the real time data availability but not without introducing systematic biases that compromise homogeneity and reduce robustness and reliability of temperature series. The differences between MAN and AWS systems or among different AWS types could be associated with several factors (some of them not directly related to automation itself) as the technological differences among automatic sensors, screen changes, station relocation, or different response time related to different atmospheric conditions.

The IMPACTRON and POST-AWS projects

IMPACTRON

- The Assesment of the Impact Over Air Temperature Series of the Transition Between Observation System (IMPACTRON) was a scientific network funded by the Spanish Ministry of Economics and Competitiveness (MINECO), which involved:
- the Spanish State Metereological Agengy (AEMET) ,
- the Meteorologic Service of Catalonia,
- the University of Zaragoza,
- the Cantabria Univerity,
- the Ebro Observatory, and
- the Rovira i Virgili University .

Objective: to document and analyze the effects over the air temperature series of the most relevant transitions of observing systems in the Spanish observational network.

The IMPACTRON network allows to reduce the effects of transitions over the Spanish Network temperature series making improvements for its use in climatic analyzes, contributing thus to improve the description of the climatic change and variability. It does so by offering an objective assessment of the bias introduced by transitions in climatic series

The IMPACTRON and POST-AWS projects

POST-AWS-temp

This project aims to compile a global database with parallel measurements, in order to better understand inhomogeneities that distort the climate signal and make the assessment of trends and variability more difficult.

POST have several ongoing studies:

- POST-AWS-temp. Studying the influence of automation on temperature.
- POST-AWS-precip. Studying the influence of automation on precipitation.
- POST-early. Versing about the temperature change due to the transition of early screens to Stevenson screens.
- POST-move. On the influence of relocation on temperature.

Objectives

- To develop an application that allows the interactive visualization in a web client of the database of IMPACTRON and POST-AWS datasets.
- To analyze the biases found between MAN and AWS stations in the IMPACTRON and POST-AWS datasets studies using this app.

Data and Methodology

Shiny

POSTIMPACT was built using Shiny (Chang et al., 2017), an elegant, simple and powerful extension to the R programming Language designed to create interactive applications oriented to the analysis and visualization of data. One of the main advantages of Shiny is that in order to build applications there is no need of any knowledge of HTML, CCS, or JavaScript (although enhancements can be done, if desired, through the use of those languages). Another great advantage is that Shiny can make use of all the powerful functions of R.











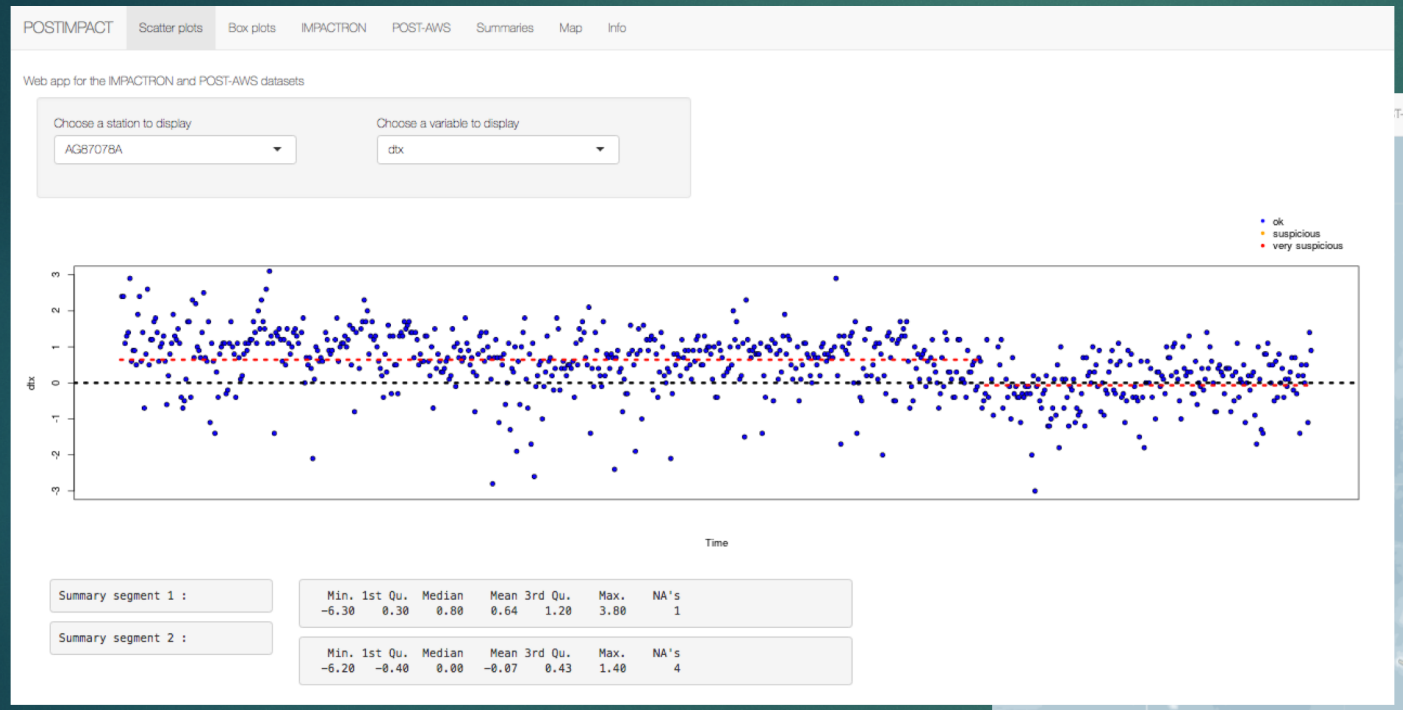


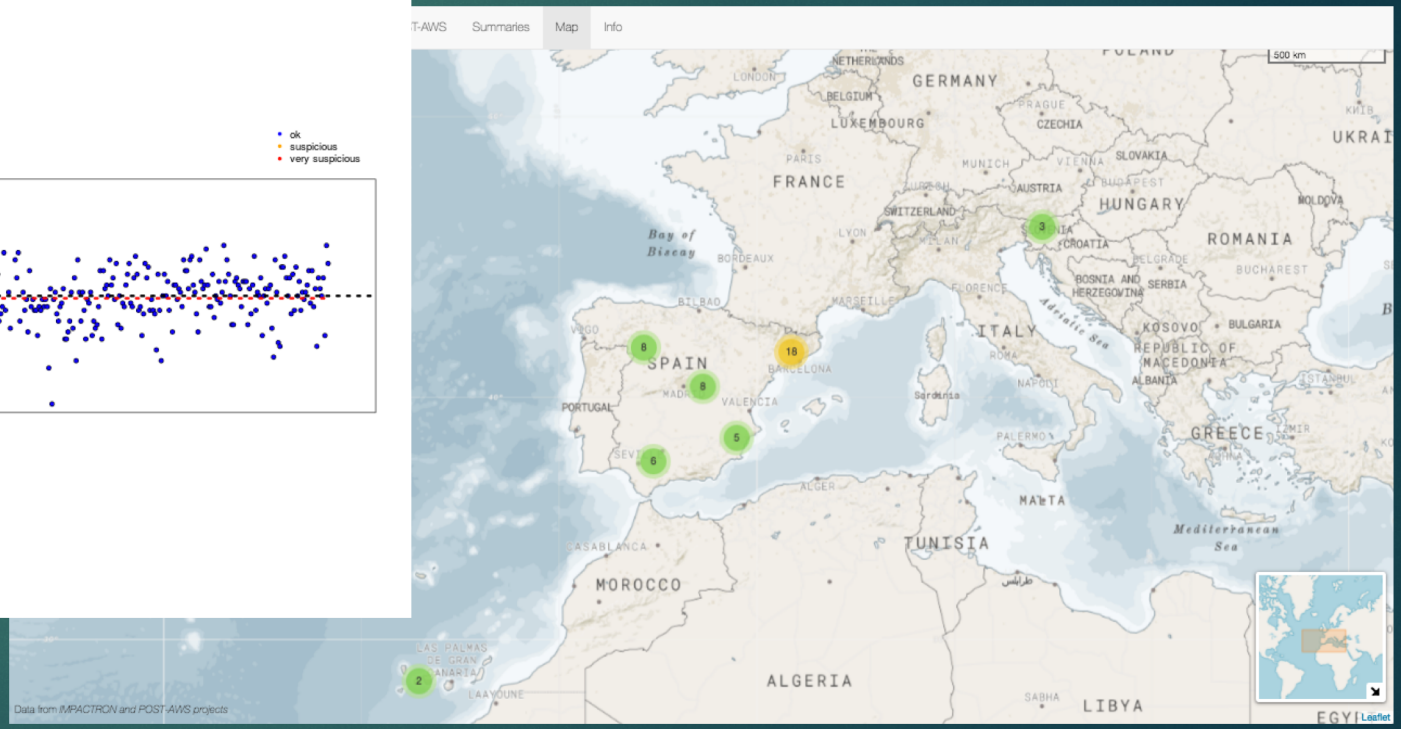
App value





Postimpact


POSTIMPACT
Scatter plots
Box plots
IMPACTRON
POST-AWS
Summaries
Map
Info
Web app for the IMPACTRON and POST-AWS datasets
Choose a station to display
AG87078A
Choose a variable to display
dtx
ok
suspicious
very suspicious
dtx
Time
Summary segment 1 :
Min. 1st Qu. Median Mean 3rd Qu. Max. NA's
-6.30 0.30 0.80 0.64 1.20 3.80 1
Summary segment 2 :
Min. 1st Qu. Median Mean 3rd Qu. Max. NA's
-6.20 -0.40 0.00 -0.07 0.43 1.40 4

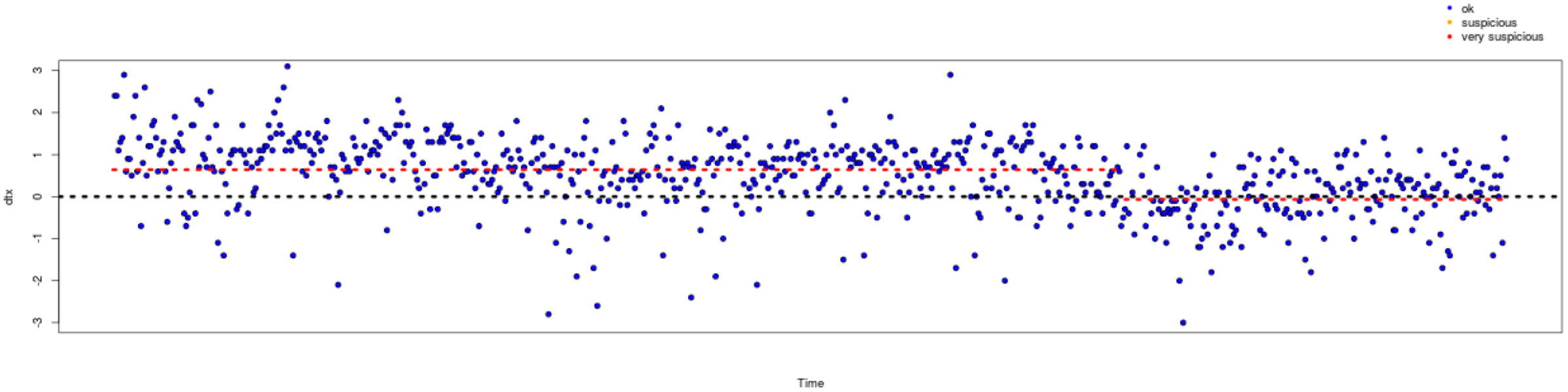

T-AWS
Summaries
Map
Info
500 km
GERMANY
FRANCE
SPAIN
PORTUGAL
ITALY
HUNGARY
ROMANIA
GREECE
TUNISIA
MOROCCO
ALGERIA
LIBYA
MALTA
Bay of Biscay
Mediterranean Sea
Data from IMPACTRON and POST-AWS projects
Leaflet

POSTIMPACT | Scatter plots | Box plots | IMPACTRON | POST-AWS | Summaries | Map | Info

Web app for the IMPACTRON and POST-AWS datasets

Choose a station to display: AG87078A

Choose a variable to display: dtx



Summary segment 1 :

Min.	1st Qu.	Median	Mean	3rd Qu.	Max.	NA's
-6.30	0.30	0.80	0.64	1.20	3.80	1

Summary segment 2 :

Min.	1st Qu.	Median	Mean	3rd Qu.	Max.	NA's
-6.20	-0.40	0.00	-0.07	0.43	1.40	4

POSTIMPACT | Scatter plots | Box plots | IMPACTRON | POST-AWS | Summaries | Map | Info

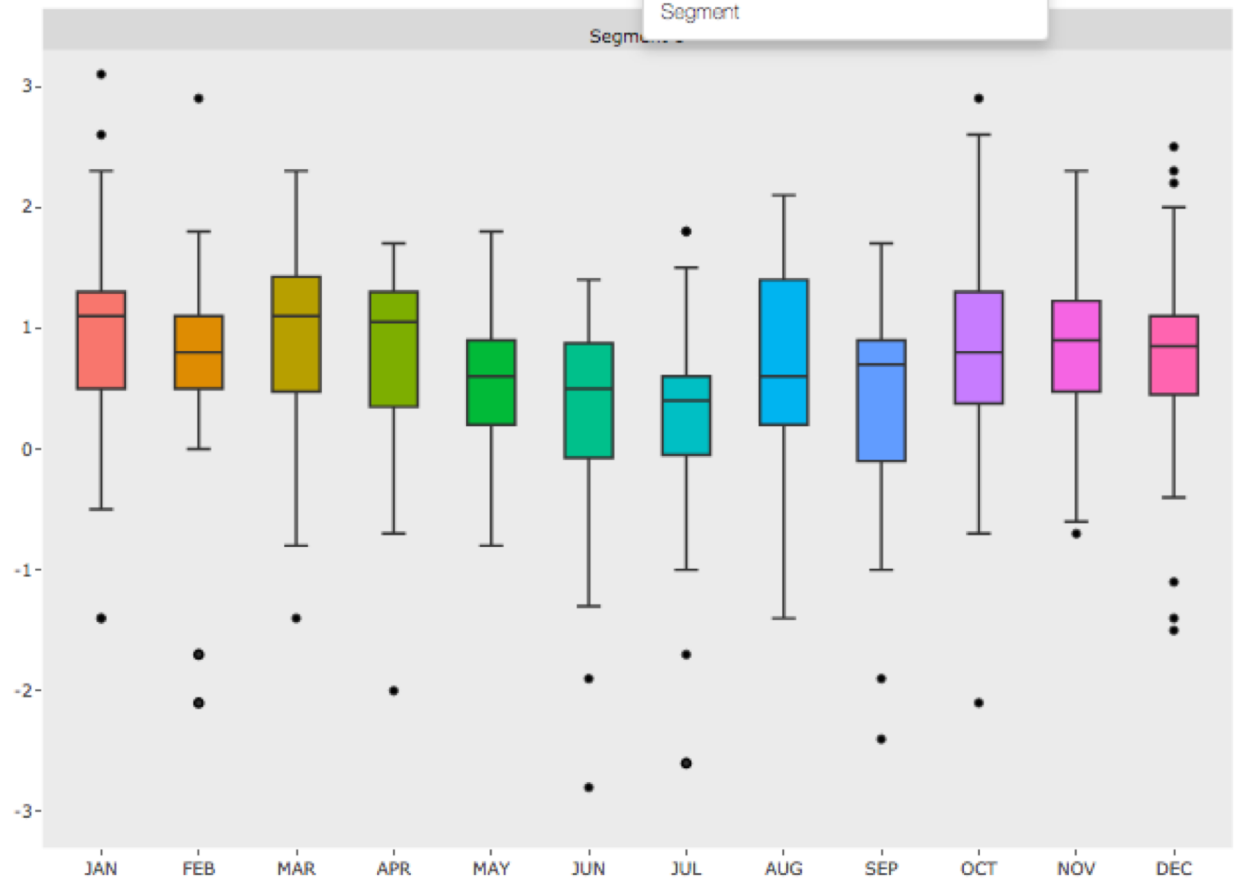
Web app for the IMPACTRON and POST-AWS datasets

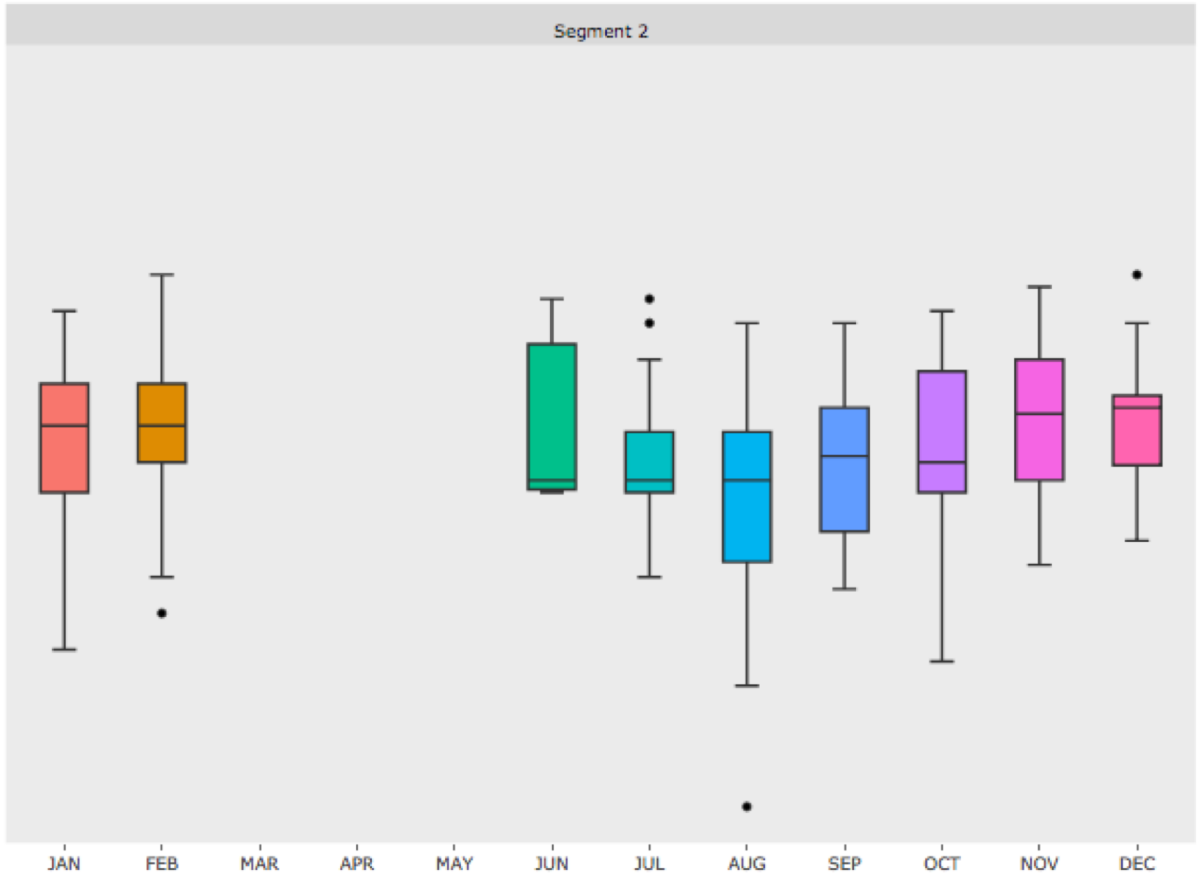
Choose a station to display: AG87078A

Show by: Month

- Season
- Month
- Segment

Choose a variable to display: dtx





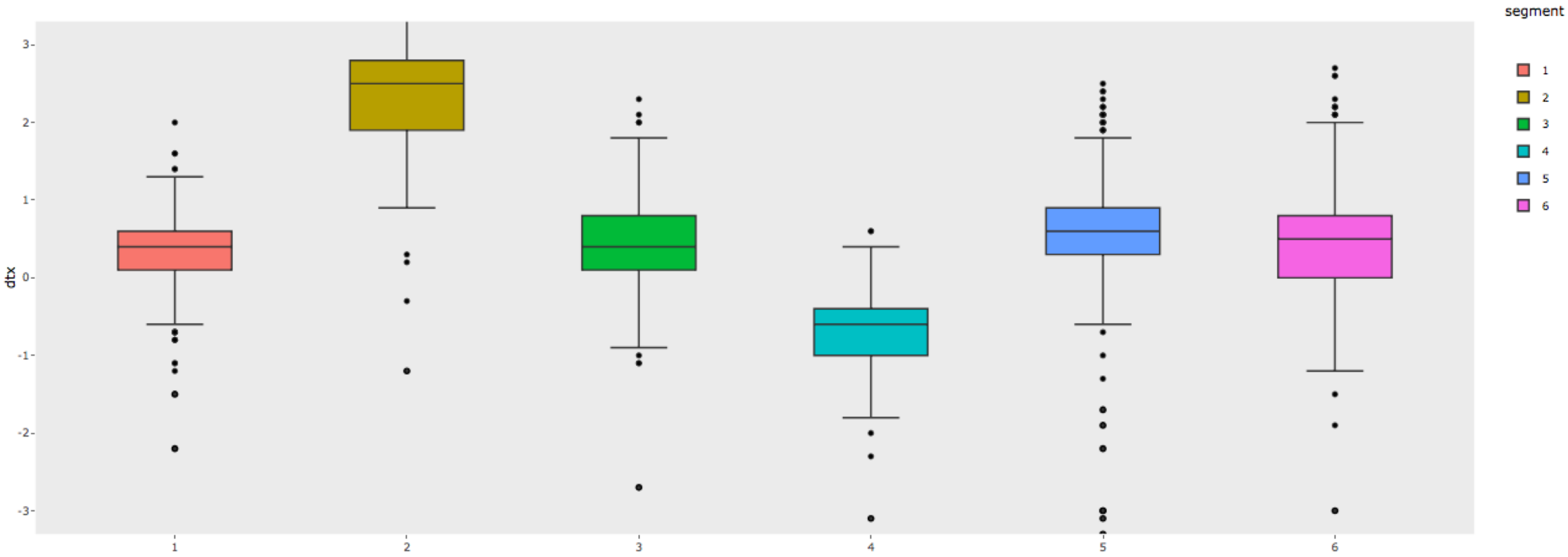
POSTIMPACT | Scatter plots | Box plots | IMPACTRON | POST-AWS | Summaries | Map | Info

Web app for the IMPACTRON and POST-AWS datasets

Choose a station to display: SP84510A

Show by: Segment

Choose a variable to display: dtx

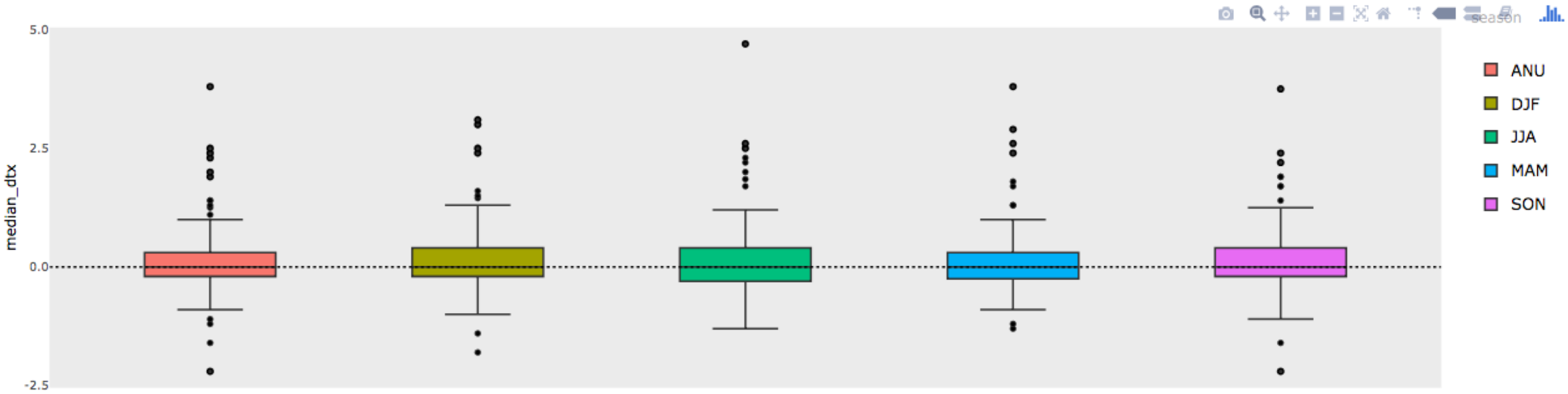


POSTIMPACT | Scatter plots | Box plots | IMPACTRON | POST-AWS | Summaries | Map | Info

Web app for the IMPACTRON and POST-AWS datasets

Choose a variable to display

median_dtx



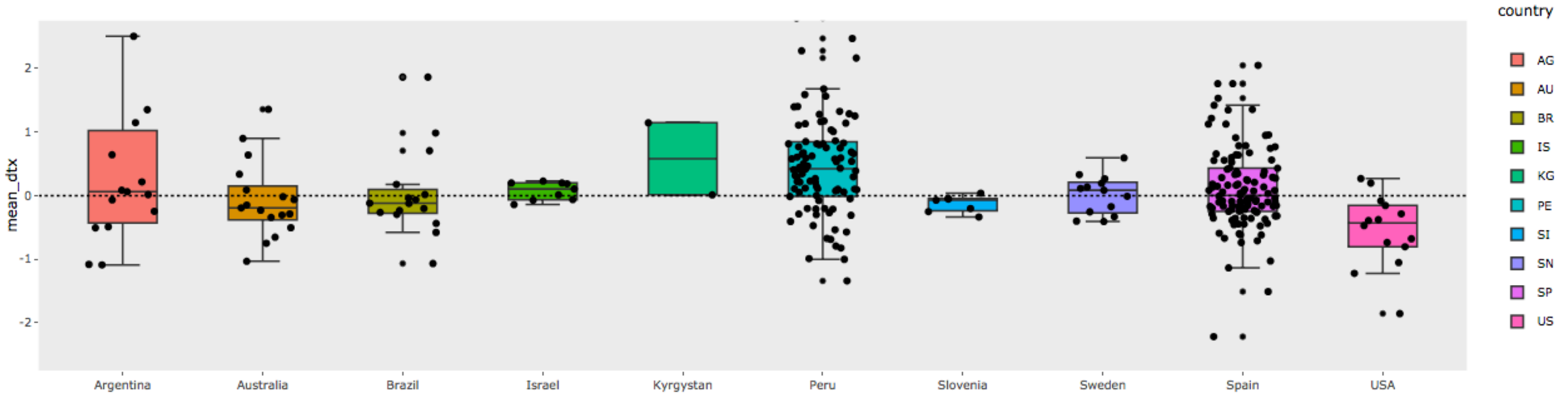

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
-2.2000 -0.3000  0.0000  0.0978  0.3000  3.8000
```

POSTIMPACT | Scatter plots | Box plots | IMPACTRON | POST-AWS | Summaries | Map | Info

Web app for the IMPACTRON and POST-AWS datasets

Choose a variable to display

mean_dtx



POSTIMPACT | Scatter plots | Box plots | IMPACTRON | POST-AWS | Summaries | Map | Info

Web app for the IMPACTRON and POST-AWS datasets

Choose a station to display

SP60001A

Show 10 entries

Search:

	season	segment	rmse_dtx	median_dtx	rmse_dtn	median_dtn	rmse_dtm	median_dtm	rmse_drn	median_drn
1	ANU	1	1.28	0.2	0.62	0.5	0.78	0.35	1.28	-0.3
2	ANU	2	0.86	-0.2	0.46	0.1	0.51	0	0.93	-0.2
3	ANU	3	0.6	0	0.48	0	0.41	0	0.71	0
4	ANU	4	0.69	0	0.5	0	0.41	0	0.88	0
121	MAM	1	1.28	0.2	0.62	0.5	0.78	0.35	1.28	-0.3
122	DJF	2	1.16	-0.3	0.56	0	0.69	-0.1	1.2	-0.3
123	JJA	2	0.5	-0.1	0.53	0.1	0.36	0	0.75	-0.2
124	MAM	2	0.85	-0.3	0.42	0.1	0.5	-0.1	0.9	-0.2
125	SON	2	0.93	-0.1	0.33	0	0.51	0	0.94	-0.2
126	DJF	3	0.6	0	0.48	0	0.41	0	0.71	0

Showing 1 to 10 of 12 entries

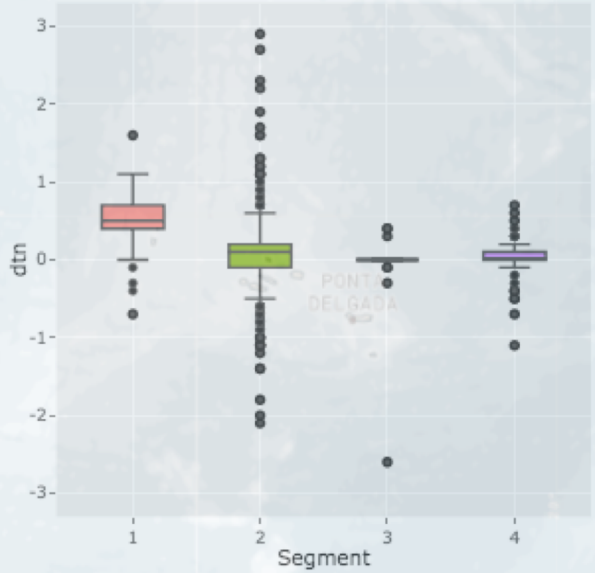
Previous 1 2 Next

POSTIMPACT | Scatter plots | Box plots | IMPACTRON | POST-AWS | Summaries | Map | Info

IMPACTRON and POST-AWS stations network

Choose a variable to display

dtn



Data from *IMPACTRON and POST-AWS projects*

https://bishopf.shinyapps.io/Impactron/

DISCUSSION

- POSTIMPACT implies a simplification of user technical attitudes, and at the same time a greater complexity in terms of results and uses.
- The use of *Shiny* implies a simplification in the process of developing weather data visualization applications
- Dynamic visualizations tools are a very useful alternative to display and communicate big and complex data sets
- They may foster collaboration within researchers and stakeholders in general
- POSTIMPACT can be extended and improved in future versions

¡MUCHAS GRACIAS!