The Tithes System

- It was a tributary system managed by the Church. The collected amount was distributed among the Church, the Aristocracy and the Crown.
- It was a highly controlled, bureaucratic and documented procedure, with several redundant controls to avoid fraud.
- There were two methods to pay the tithes: pay in kind (cereals) and pay in money after public auction (rest).
- Payment in kind (10% of total farmer’s production), allows to estimate very accurately the total cereal production for each island, which was strongly affected by the precipitation regime.
- Since late XVI to mid XIX the system worked homogeneously.

The Canary Islands constitute an excellent natural observatory of atmospheric disturbances in the Subtropical North Atlantic.

Their location, close to the southern edge of the Azores High, along with their complex orography, make the Canarian rainfall very sensitive to changes in the subtropical circulation associated to the NAO.

NAO index exhibits a significant negative correlation with the precipitation in the Islands, which is greater for the five western islands (-0.40 in average).

NAO Influence Over the Canarian Rainfall

Tithes Time Series Reconstruction

- The raw tithes series has been collected primarily from original documents preserved in the Cabildo Catedralicio (Las Palmas de Gran Canaria) and local private archives. The main source of data were the Libros del Pan, which summarized the information collected along the tax collection procedure.
- Extreme care has been taken to control for transcription error and subjectivity typical of the ancient documents.
- Crosschecking procedures have been implemented to elucidate discrepancies between different documents in the same archive and between different archives.

Raw Series Filtering and Calibration

- Only crops paid in kind (cereal) were chosen in order to work with real productions. Otherwise, the production must be inferred from the price obtained in public auction, which is largely variable by non-climatic factors.
- Non-significant or very variable cereal crops were avoided (ex. rye).
- Only production of the most powerful NAO signal islands (the five western ones) were chosen.
- Further work on factors other than precipitation has been made in order to filter minima non due to climatic origin, for example those due to locust plagues.
- The average value of the standarized series of total wheat and barley productions for the five western islands, can be used as a NAO proxy index. It shows a strong significant correlation with the early instrumental winter NAO series of Jones et al. over the 13-year common period.