



# Comparative Study between Brewer Spectrophotometer Networks

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Short Term Scientific Mission Boulder, CO

- Overview
  - Brewer Networks
    - NeuBrew
      - David Skaggs Research Center (Boulder, CO)
    - EuBrewNet
      - Izaña Atmospheric Research Center (Tenerife, Spain)

- Introduction
- Short Description
- Iberonesia
- Neubrew
- Comparison

- Introduction
  - Motivation
  - Eubrewnet
    - Database
    - Real time
    - Different level products
  - Study of the present solutions
    - Iberonesia
    - Neubrew

- Introduction
- **Short Description**
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- Iberonesia
  - Network of Brewer Spectroradiometers
  - North Macaronesian and Iberian Peninsula
    - From 30W to 3E
    - From 28N to 44N

- Neubrew
  - Network of Brewer Spectrophotometers
  - Western, Central and Eastern (US)
  - Measurement
    - Daily Ultraviolet Radiation
    - Total Column Ozone
  - Other equipment
    - Total Surface Radiation Budget
    - Total Sky Imagers

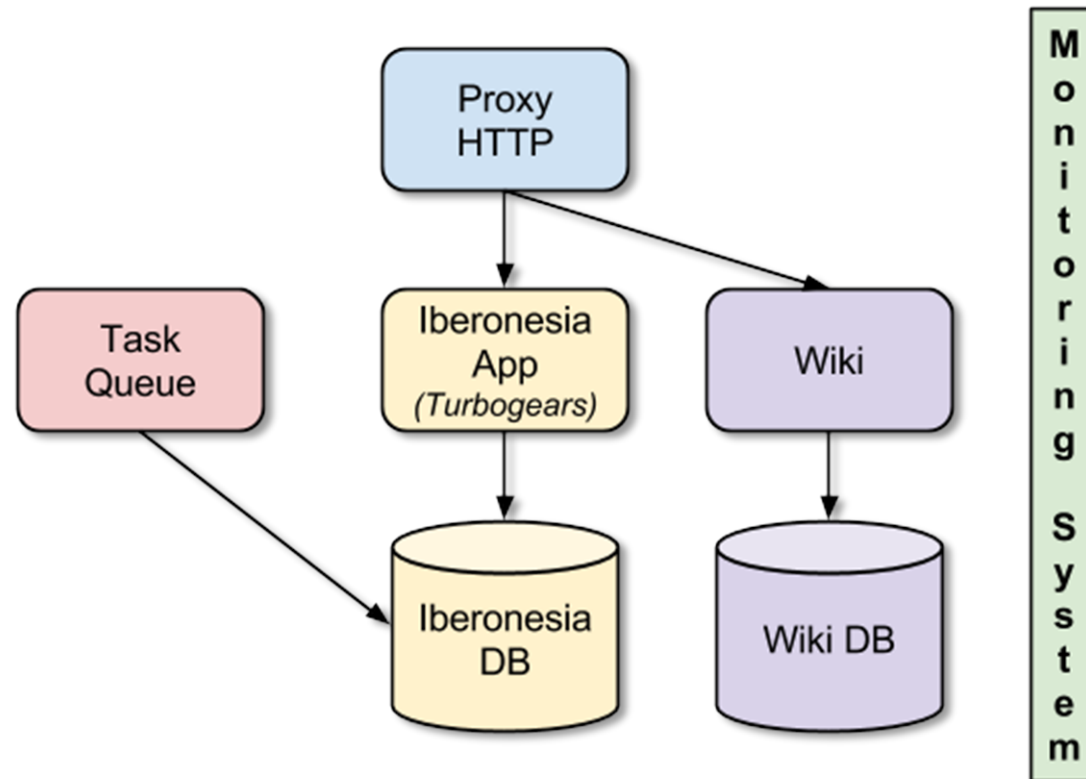
- Introduction
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- **Iberonesia**
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- System Description
  - Modules
    - Data Import
      - File schema and history
    - Processing
      - Database automated processing
    - Error Handling
      - Interactive process in case of error
    - Product Generation
      - Automated or in demand

- System Description
  - Cloud Server
  - Client - Server communication
  - OS
    - Server: Ubuntu server
    - Client: Python interpreter
  - Real Time (programmed tasks)

- Web service

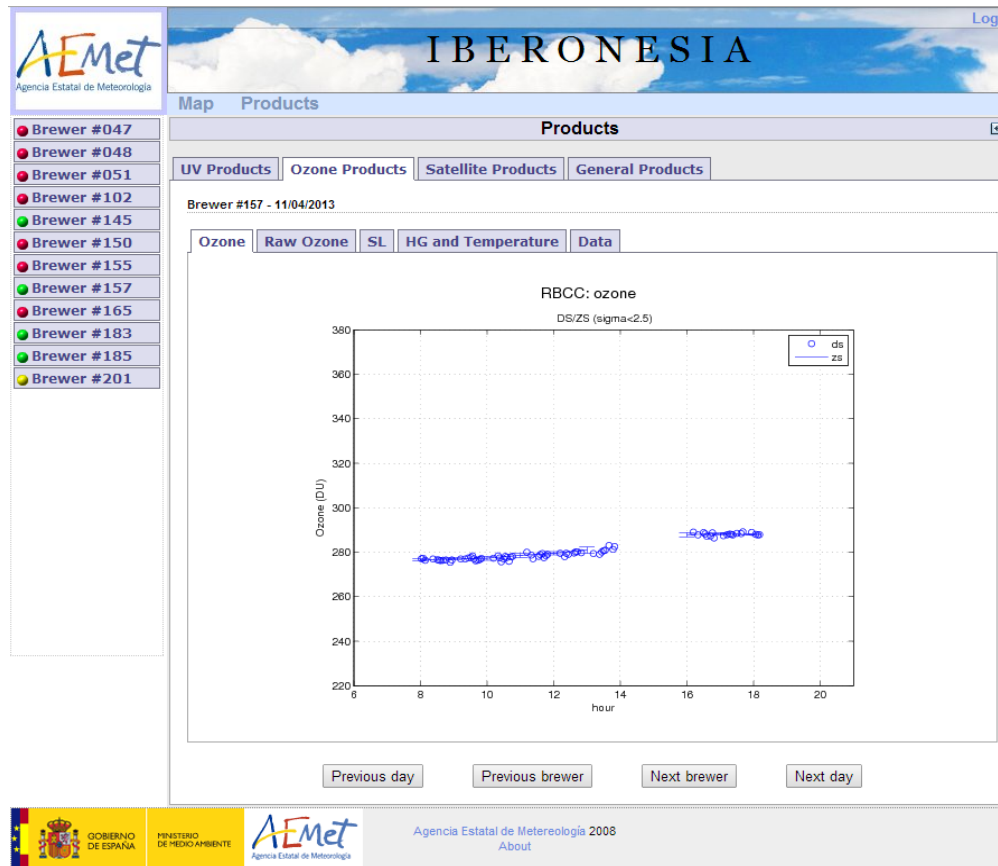


- Data Transmission
  - Data communication depending on the client
    - New files that are not stored in the server
    - Last change in the files
    - Change in a checksum based in md5
  - Only new information is sent to the server
  - Redundance of information
    - File System
    - Database

- Database
  - MySQL
  - Data issues:
    - Brewer Info
    - Code Error Messages
    - Log table
    - File status
    - Refresh information
    - Calibration and configuration
    - Neighborhood/Satellite Information

- **Products Generation**
  - Ozone and UV
  - Still under development
  - Several scripts in Matlab
    - Images accesible from the website

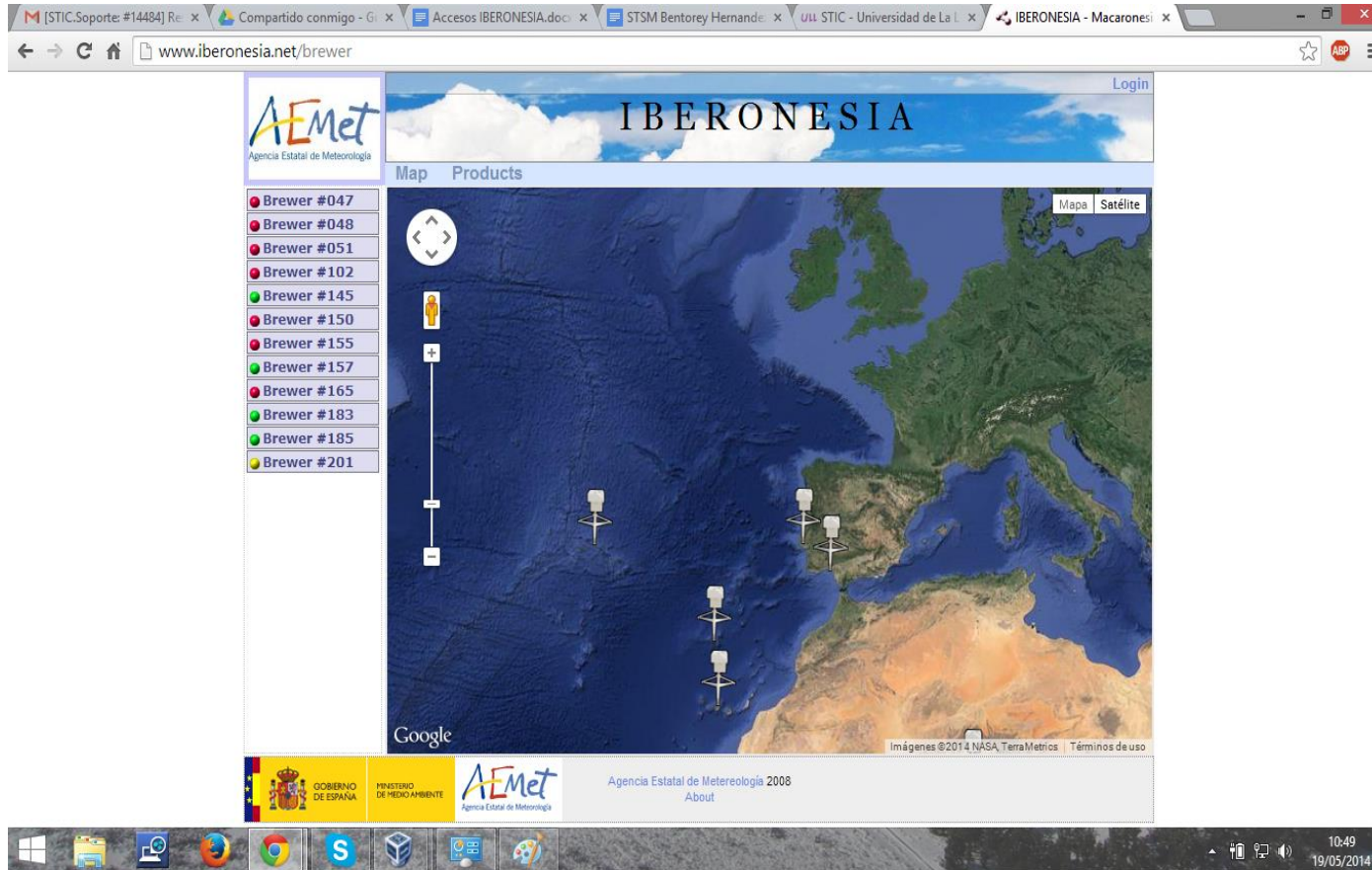
# • Products Generation



- Quality Assurance
  - Real time connection control
    - Colour based tool
      - Green
      - Orange
      - Red
  - File status
    - Comprehensive message of fails:
      - Dates
      - Brewer
      - Type of message



# • Quality Assurance



# • Quality Assurance

The screenshot shows a web browser window displaying the AEMet website. The URL is www.iberonesia.net/brewer. The page title is 'IBERONESIA'. The main content area is titled 'Brewer #157' and includes tabs for 'Status', 'Brewer Information', 'UV Index', and 'Current Ozone Value'. The 'Status' tab is selected, showing 'On-line Brewer Information 157' with the following details:

- Brewer ID: 157
- Connection: 2
- Last File: B13914.157
- Last measured value: ds
- Time since last measurement: 2014-05-19 11:52:13 GMT

Below this information is a 'STATUS' table:

| ID | Code | Description |
|----|------|-------------|
| 0  | OK   | File is OK  |

At the bottom of the main content area, there is a 'Messages' section with several warning messages:

- WARNING : B13914.157 : line 12 : Unknown section 'b\_hpscan'
- WARNING : B13914.157 : line 18 : Unknown section 'b\_hgscan'
- WARNING : B13914.157 : line 22 : Unknown section 'b\_reo3'
- WARNING : B13914.157 : line 82 : Unknown section 'b\_summary'
- WARNING : B13914.157 : line 83 : Unknown section 'b\_fv'
- WARNING : B13914.157 : line 319 : Unknown section 'b\_dz'

The footer of the page includes the AEMet logo, the text 'Agencia Estatal de Meteorología 2008', and an 'About' link. The Windows taskbar at the bottom shows the time as 12:35 on 19/05/2014.

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- System Description
  - Centralized server
    - Quad core
    - 16 Gigabytes RAM
    - Hard Drive: 1.8 Terabytes
  - Os: Centos (Client and Server)
  - Backups taken every night
  - Not oriented to real time

- Web Service
  - Java + HTML
  - Apache Tomcat + Servlets
- Data Transmission
  - Server Request
    - SSH communications
  - Sequential mode
    - One Brewer at a time
  - Communication problems
    - Poorly communicated areas

- Database
  - PostgreSQL (pgAdmin)
  - Data Issues:
    - Station
    - Very descriptive column names
    - Use of tables for logic behaviour
    - Configuration of Communications
    - Different data levels and product generation
    - Contacts

- Products Generation
  - UV Index and UV Erythema
  - UV Irradiance
  - UV Spectral Scans
  - Ozone Time Series
  - Tropospheric Ozone time series
  - Ozone Vertical Profiles

- Quality Assurance
  - Data processed by the administrator
  - No automatic way
  - Some graphics tools showing reception information
    - Blanks
    - Medium size of files
  - Last six days of Ozone and UV Index and Erythema



- Quality Assurance
  - Comprehensive daily report
    - Experimented administrator
    - Tables in plain text and messages
  - ICFs historical from the beginning
    - Daily backup

- Diagnostic
  - More than twenty five different displays
    - Langley Regression Analysis tool
      - Step by step
    - Brewer UV spike detection and correction
      - Percentage of spikes in UV spectra
    - Brewer Multi-instrumental Display
      - From all brewers in a single page
    - Ozone QC Level Diagnostic
      - Differences between data levels

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## • Comparison

| NeuBrew  | Iberonesia  |
|--|---|
| Network not prepared for solving real time issues  | Network oriented for receiving and processing data in real time |
| Use of a physical server placed in a laboratory  | Use of virtual machines and cloud computing                     |
| Designed for running in a centralized server   | Designed for having the possibility to be distributed.          |
| Very extended monitoring system for human operators  | Reduced monitoring system based in logs and status messages     |
| Graphical information generated in execution time extracting different data levels from database | Graphic information stored in file system                       |
| Use of a reduced number of different technologies  | Big amount of different technologies for solving several issues |
| Data transferred by server requests in a scheduled way   | Client oriented data transmission depending on local schedules  |

# Questions and Answers

Thank you for your attention