



**Barcelona  
Supercomputing  
Center**

*Centro Nacional de Supercomputación*



# Quality Assurance for C3S Multi-model Seasonal Forecast Products

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PREDICTIA Intelligent Solutions, MeteoSwiss, University of Leeds,  
University of Exeter



Developing a strategy and **software prototype for the evaluation and quality control (EQC) of C3S multi-model forecasts**, taking into account the needs of a wide range of stakeholders.

## Principles:

- A prediction has no real value without some **estimate of quality** based on its past performance.
- **EQC is multifaceted** and includes: bias, uncertainty, resolution sharpness and discrimination of the forecasts.
- EQC should map the data flow to ensure full documentation and **reproducibility of the products**.

# EQC prototype

- A system to guide users through the EQC strategy.
- Existing R packages are being unified and further improved to address the identified user needs.
- High performance and reproducibility of the results are crucial.



**SpecsVerification**  
- Probabilistic and deterministic scores  
- Works on [time x members] arrays



**easyVerification**  
- Applies SpecsVerification scores to arrays of any dimensions, multi-core  
- Probabilistic and deterministic scores

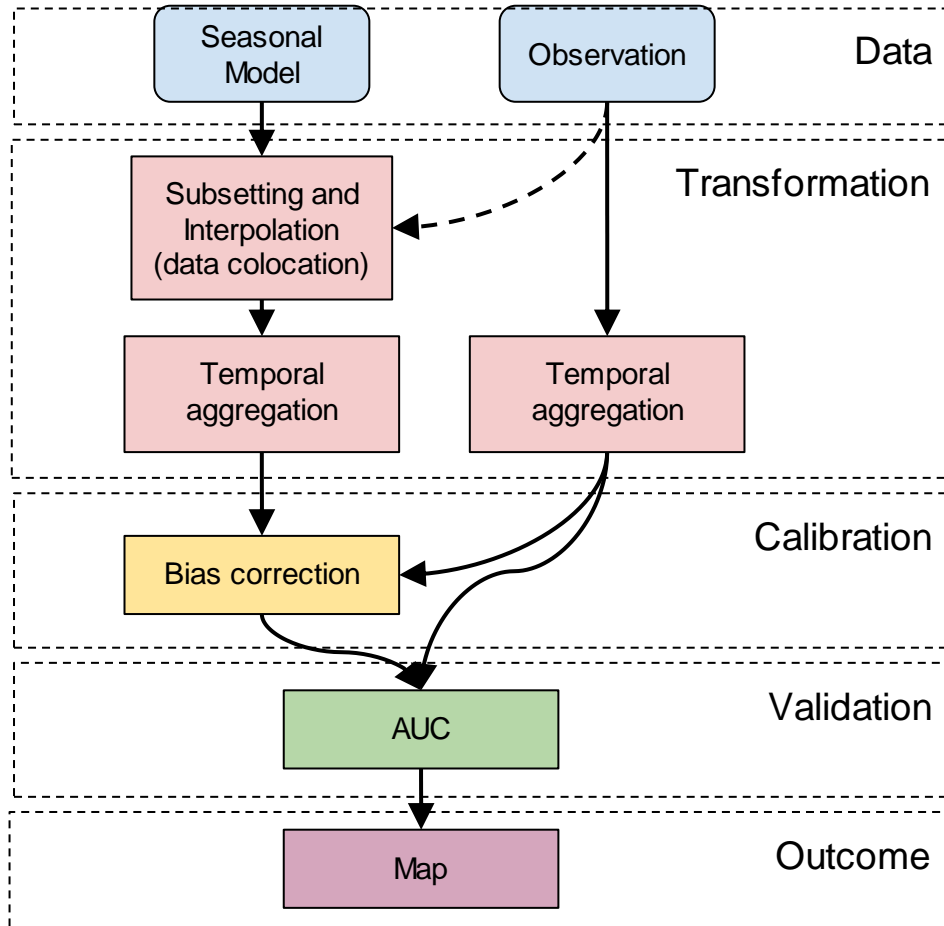
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**downscaleR + loadR**  
- Data retrieval and homogenization  
- Bias correction, modes, downscaling  
- Probabilistic and deterministic scores  
- Visualisation of data and results

**s2dverification**  
- Data retrieval and homogenization  
- Bias correction, filtering, modes  
- Probabilistic and deterministic scores  
- Visualisation of data and results





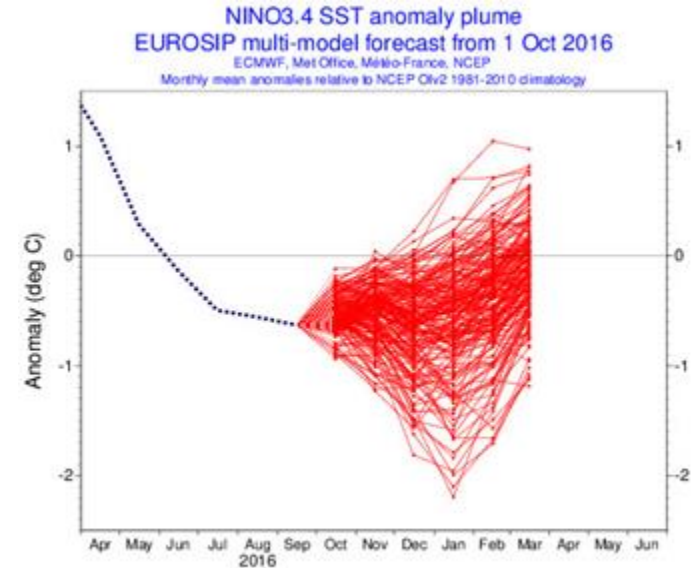
A comprehensive metadata model has been defined to:

Ensure the traceability and reproducibility of the results

Ensure products conform to a consistent set of standards

It relies on the standard W3C RDF framework. Use of community contributed conventions has been maximized.

JPG file



EXIF tags

Exchangeable Image File Format

CC BY

The metadata is delivered  
within the image



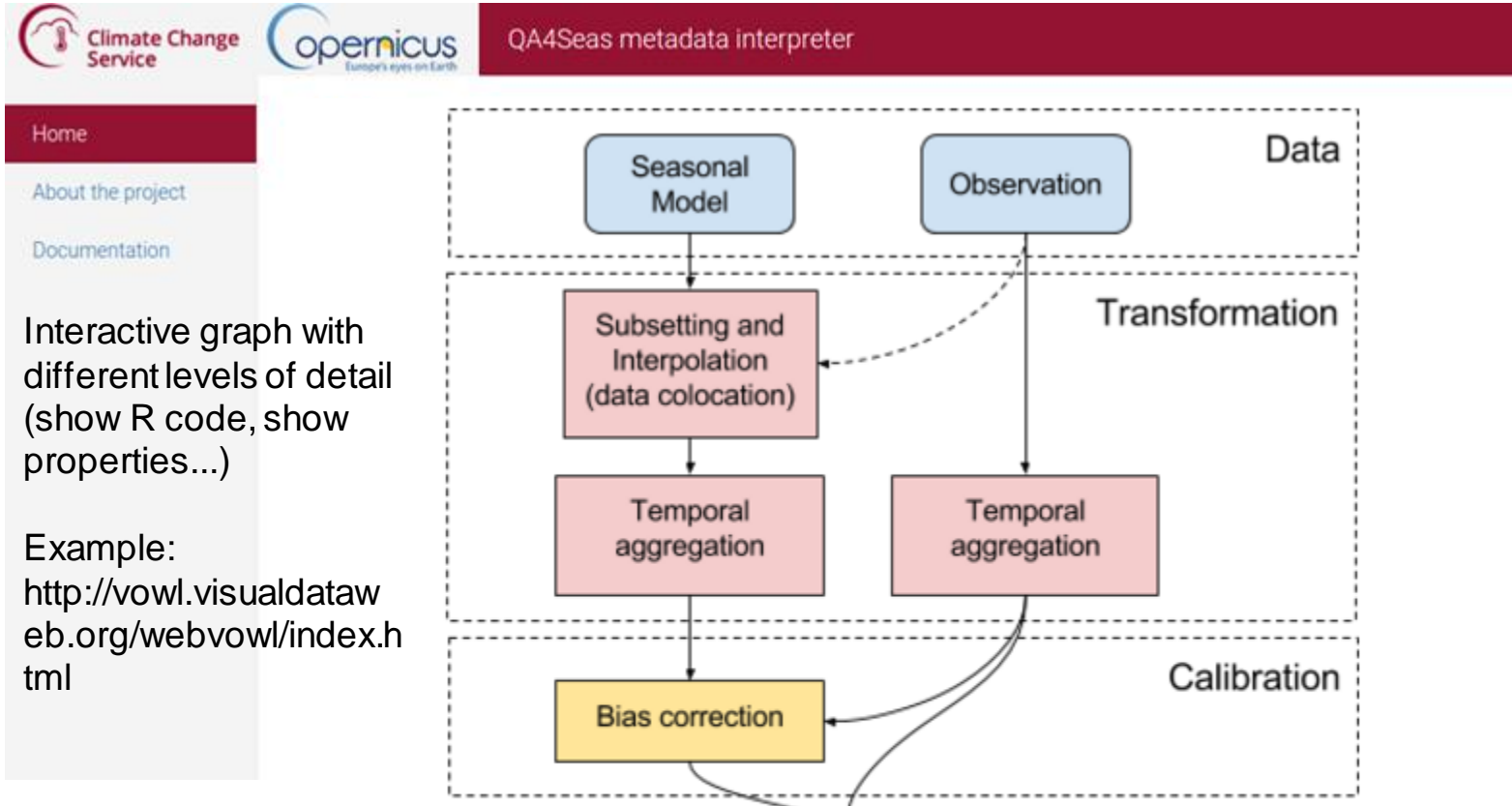
Generated products can be imported.



The screenshot shows the 'QA4Seas metadata interpreter' website. At the top, there are logos for 'Climate Change Service' and 'Copernicus Europe's eyes on Earth'. The main header is 'QA4Seas metadata interpreter'. A left sidebar contains navigation links: 'Home', 'About the project', and 'Documentation'. The main content area is titled 'Intro' and contains the text: 'This website describes the QA4Seas metadata model based on RDF. The metadata is described in the Documentation section. You can explore the metadata embedded in a QA4Seas outcome by dropping it in the box below:'. Below this text is a large dashed rectangular box with the text 'Drop your qa4seas outcome here'. To the right of this box is a large purple arrow pointing towards the box, and next to it is a large black and white icon of a document with 'JPG' written on it, indicating that a generated product can be imported into the system.

<http://demo.predictia.es/qa4seas/metadata/>

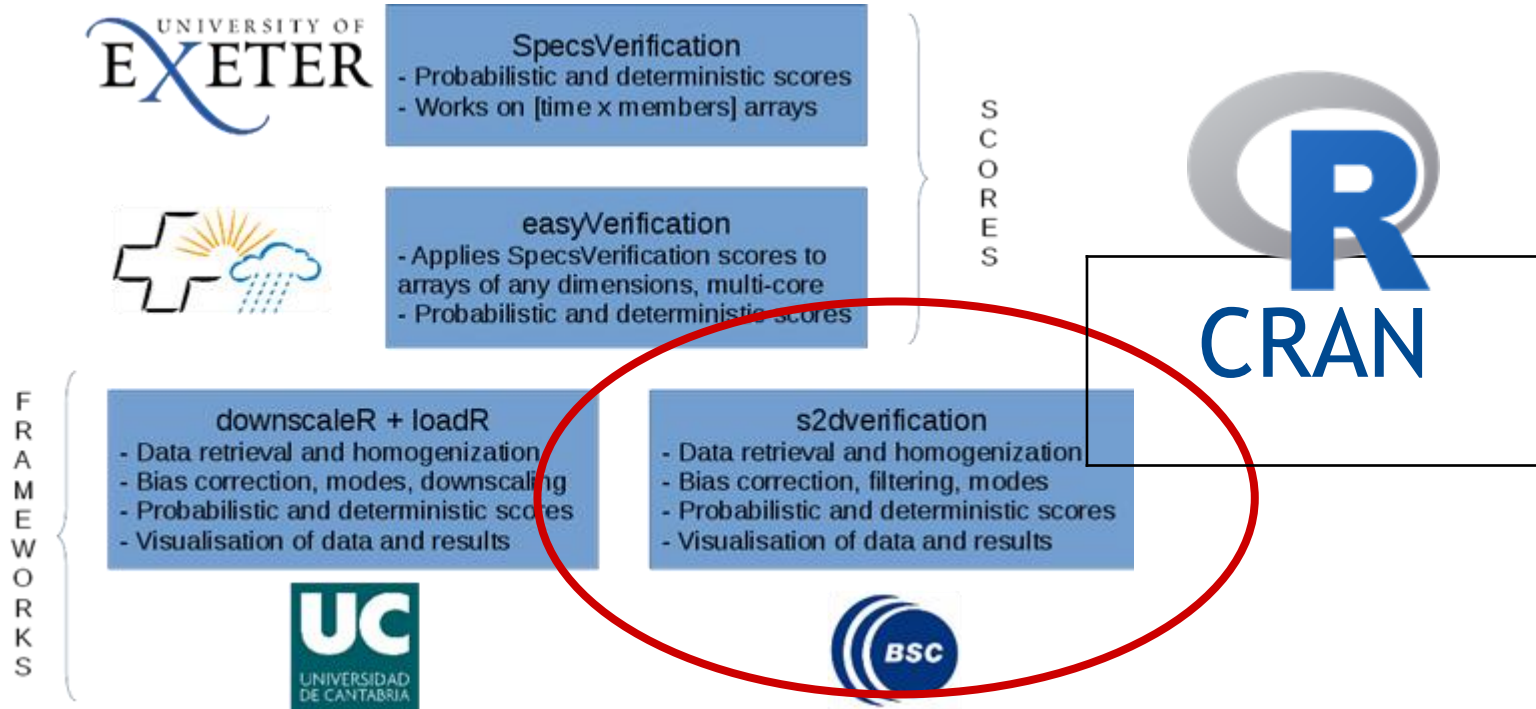
And the data flow is automatically displayed, with adjustable granularity.



Interactive graph with different levels of detail (show R code, show properties...)

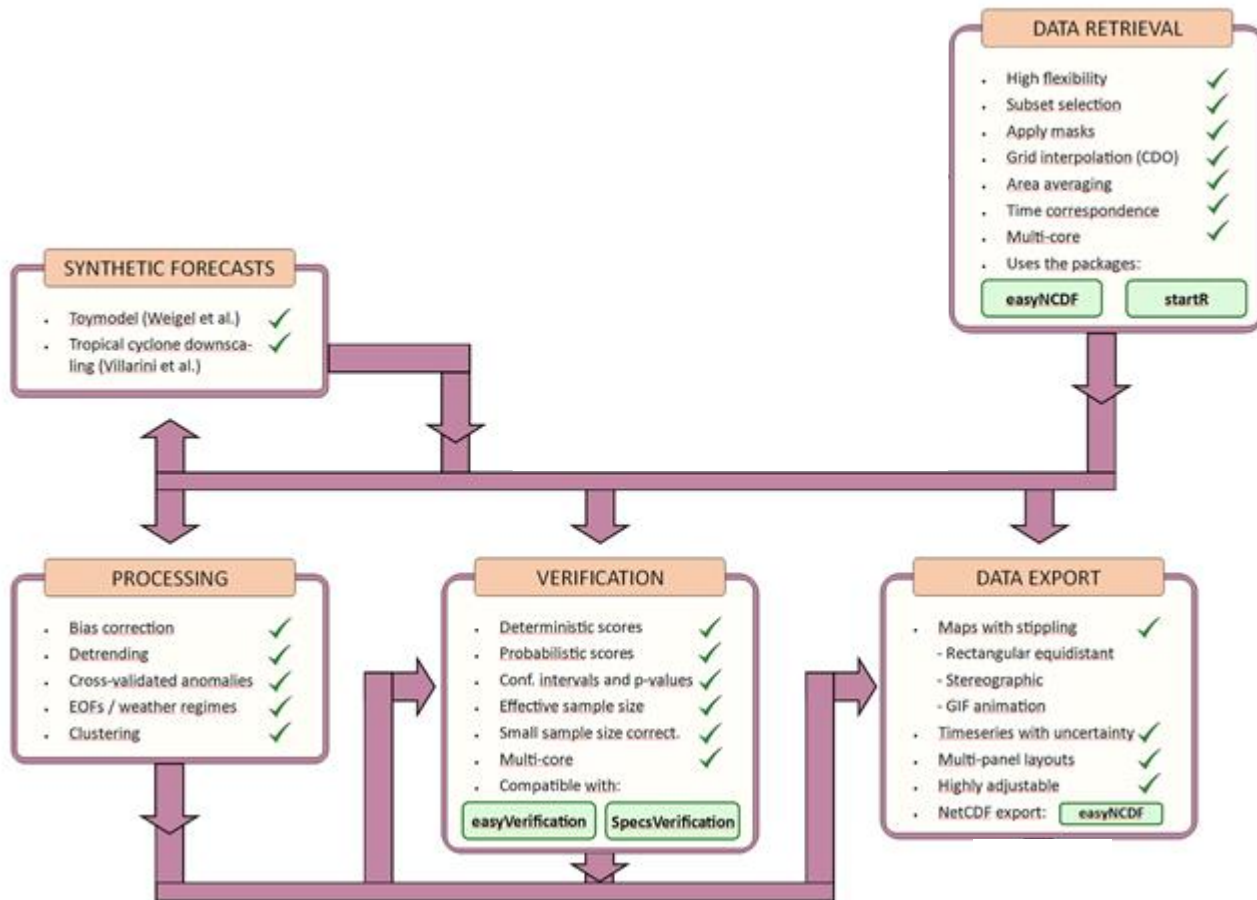
Example:  
<http://vowl.visualdataweb.org/webvowl/index.html>

# EQC prototype: s2dverification

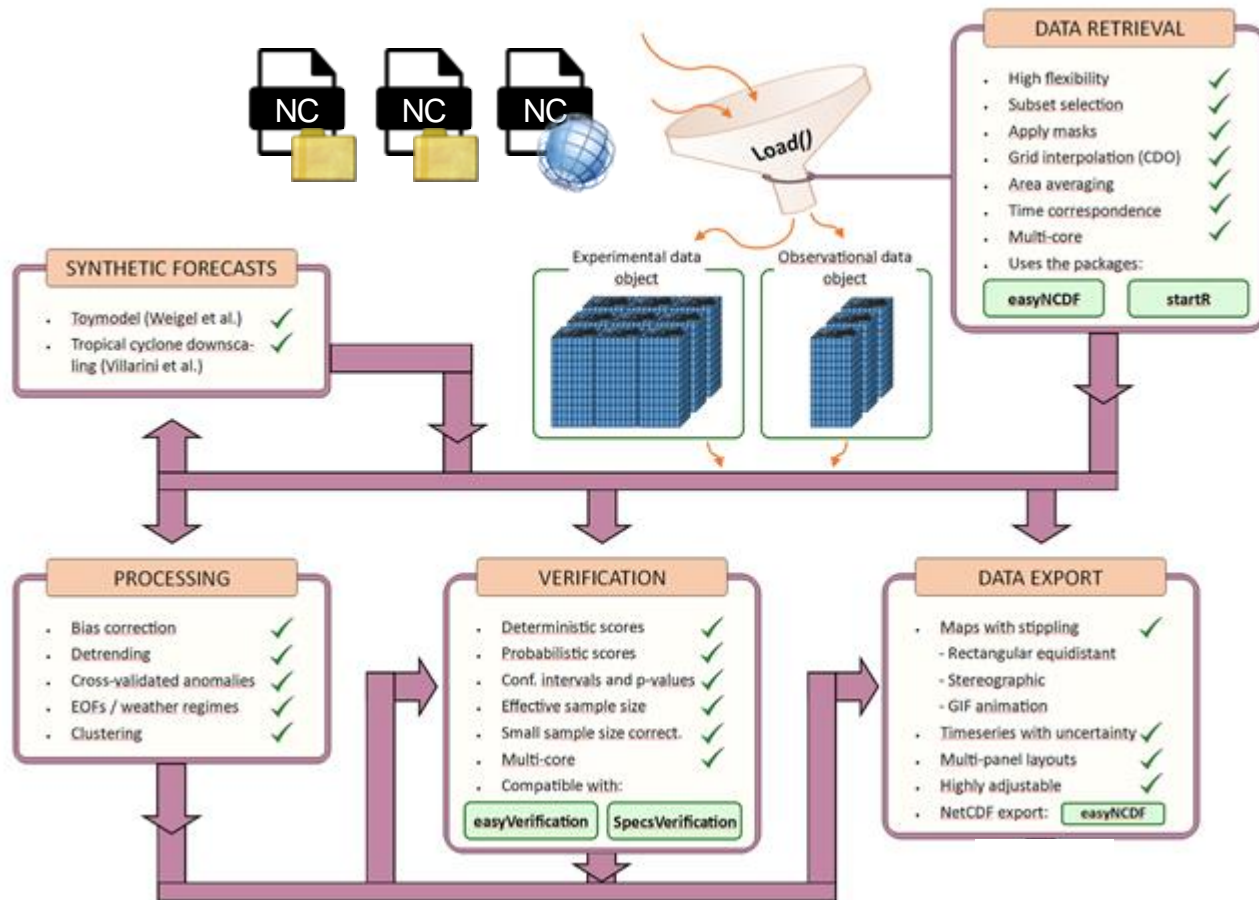




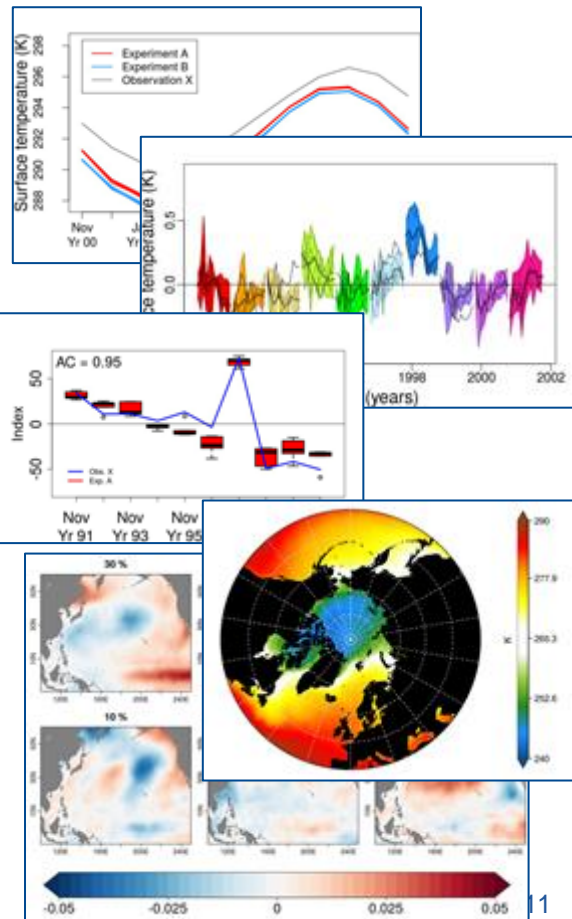
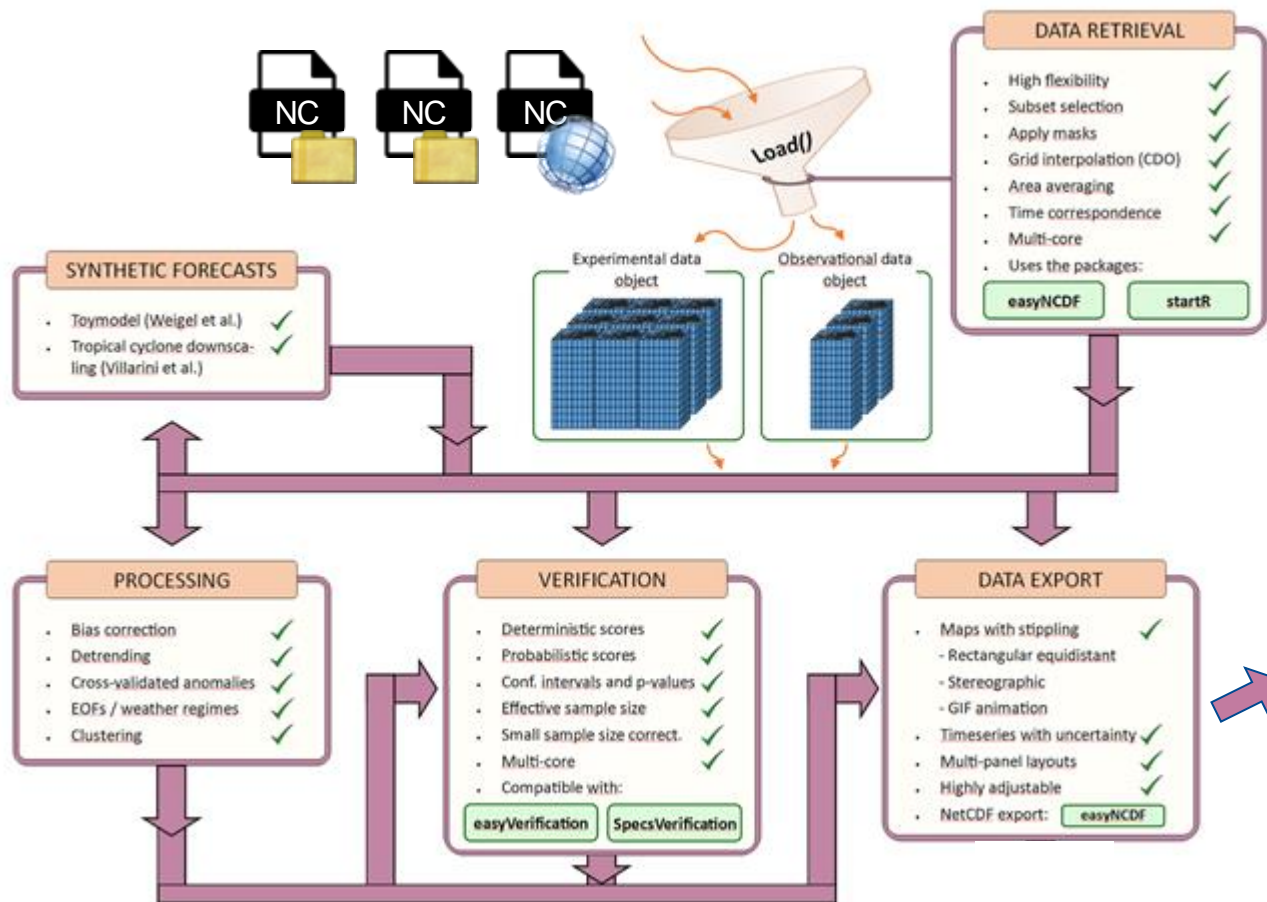
# EQC prototype: s2dverification



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s2dverification development prospects:

- Automate the handling and **propagation of metadata**.
- **Expand parallel processing** capabilities to other steps than verification.
- Enhanced **plotting engine**.
- Enhancements to the data retrieval module to handle **new file formats**.
- A major release, **s2dv 3.0.0**, is expected by the end of 2017.