



the cci toolbox newsletter

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hello!

Almost exactly one year ago the first version of the ESA CCI Toolbox was provided to the user community. Since then the developers of the toolbox have steadily been working on the further implementation of the development roadmap in order to tailor solutions for users' requirements. Developers and scientists as champion users have introduced a multitude of ideas, suggestions and efforts to further improve Cate and to shape it according to the specific needs of the users.

In this 2nd edition of the newsletter we want to highlight the improvements coming with Cate 2.0. Since Cate 1.0, we have not only added numerous

new features but have as well made a lot of usability improvements!

Within this newsletter you will moreover discover a champion user's feedback which describes a particularly interesting use case which is for a "teleconnection explorer" that looks at potential links between the El Nino/La Nina phenomenon and other variables.

Finally, we would like to invite you to participate in a short survey in order to join our continuous improvement process to enhance and maintain the quality of the CCI Toolbox.

Enjoy reading!



156

Number of CCI datasets available
through the toolbox.

news

CATE 2.0 IS ON ITS WAY !
NUMEROUS NEW FEATURES IMPLEMENTED!
SIGNIFICANT USABILITY IMPROVEMENTS!

Improvements coming with Cate 2.0

Since Cate 1.0, we have added numerous new features and made a lot of usability improvements!

In a nutshell, this comprises:

- support for all CCI datasets
- vector data added to the data model
- new scientific graphs and animations
- new scientific operations for cross-ECV analysis
- easy installation and improved GUI application usability

For detailed information please have a look at the following pages of the newsletter.

Training course

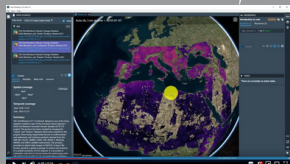
In the framework of this year's ISU Space Studies Program a CCI Toolbox workshop was held on July 27th 2018. The CCI Toolbox workshop at the European Space Research and Technology Centre (ESA-ESTEC) in Noordwijk, Netherlands was a hands-on training of the "Space-aided climate change adaptation" participants. The training focused on two CCI Use Cases. Altogether, 33 participants took part in the CCI Toolbox workshop.

Tutorial video

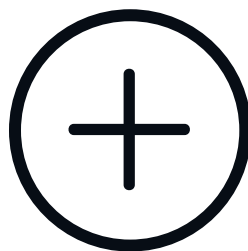


Have a look at our Quickstart video tutorial:

<https://youtu.be/w0ZEK4aIC9I>



what's new in Cate 2.0?



Full CCI Dataset Support

Cate is now able to **open all CCI datasets**. To allow maximum applicability of operations, Cate tries to **normalise the data sources** so that they conform to a common data model that more strictly applies the **CF-conventions**. Still, the Cate functionality on some gridded datasets may be limited. But Cate Desktop's 3D view can display any gridded dataset with equirectangular projection ("WGS84"). For the display, we added configurable **default colour mappings** for most CCI variables and determined a **representative default variable** to be initially displayed.

Scientific graphs and animations

Cate can now perform **map animations** using the **`animate_map()`** operation. A new plot type is **`plot_hovmoeller()`**, and **`plot_line()`** that can now **plot multiple variables** in one diagram. The **`plot_scatter()`** has been extended to allow for points, hexbins and 2D histogram diagrams.

To allow for arbitrary data analysis, we added the new operations **`compute_dataset()`** and **`compute_data_frame()`** that evaluate a **user provided Python script** in the context of the current workspace and create a new gridded dataset or vector data frame.

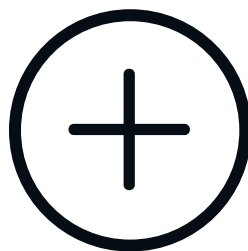
Vector data and geometries

Cate now facilitates display and analysis of vector data sources such as **CCI Glaciers**. You can now read from and write to **Shapefiles** or **GeoJSON** files and perform a whole set of new operations on their geometries and feature attribute tables such as **vector data queries**, **subsets**, **aggregations**. The new vector data frame operations are

```
read_geo_data_frame(),  
write_geo_data_frame(),  
data_frame_aggregate(),  
data_frame_find_closest(),  
data_frame_subset(), data_frame_min(),  
data_frame_query().
```

Along with the support for vector data, Cate now has a **geometry editor** for user defined points, lines, polygons. These geometries, as the ones from any vector data source, can be easily passed to various operations that have a **geometry input**, e.g. creating spatial subset of gridded data. For changing display properties of gridded and vector data, we added a new **style editor**.

what's new in Cate 2.0?



Installation and usability

Improved usability updates include the ability to **drag and drop data files** on the Cate Desktop, which in turn will add them to the workspace. **Right-clicking in the world view will now open a menu** on the selected geometry or gridded data layer for easy access to context-relevant operations. When moving the mouse over the world view, the values of all variables are displayed for that position. Cate also shows the attribute values for a selected vector data feature, e.g. a glacier from a CCI Glaciers data frame.

For Cate 1.0, users had to first install Cate's Python core and then install Cate Desktop for the graphical user interface. In Cate 2.0 users **only install Cate Desktop**, which installs the Python core automatically. By default, Cate will now **auto-update** so users don't need to reinstall new releases. Finally, we improved the overall stability and extended applicability of operations to as many dataset types as possible. We also improved input validation and error handling in many places.

New scientific operations for cross-ECV analysis

The operations are ***reduce()*** to create arbitrary data reductions and ***merge()*** to combine variables of datasets into a new dataset have been added to improve the cross-ECV analysis.



"The
CCI toolbox
is an
excellent tool for
investigating
the properties
of a dataset
and the
potential
links
between
different datasets."



Kevin Pearson,
University of Reading
Champion User

57

Number of operations in the toolbox.

champion users' feedback [#]2 -El Nino



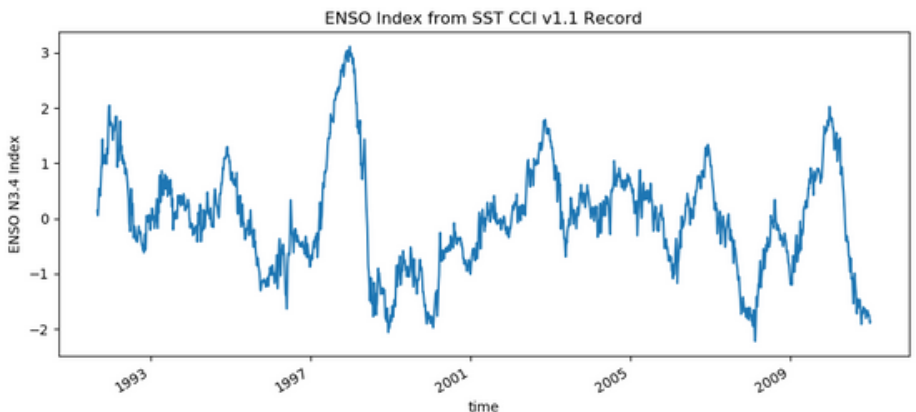
Kevin Pearson, University of Reading

As a champion user in the university sector, I have been able to provide suggestions and feedback on the operation of the toolbox particularly relating to how student might use it for project work. A particularly interesting use case is for a "teleconnection explorer" that looks at potential links between the El Nino/La Nina phenomenon and other variables. A student may be interested for example investigating whether El Nino is related to monsoon rainfall.

The strength of El Nino can be summarised by an index based on ocean temperatures in the Pacific.

The toolbox can calculate this using sea surface temperature (SST) CCI data which allows us to follow the evolution of the index for nearly two decades (see figure). Drawing in data from the soil moisture CCI, the toolbox is then able to calculate the degree of correlation between the El Nino index and soil moisture at different locations around the world.

This is an excellent way for a student to gain an appreciation, first hand, of how interconnected the ocean and atmosphere are using real-world data.



This figure shows the strength of El Nino from 1991-2010 using the ENSO 3.4 index. It is based on results from ESA's SST CCI project that has combined together data from 10 different satellites.

"The
Toolbox
offers great
possibilities
to analyse
glacier
data and
combine them
with other CCI
datasets."



Philipp Rastner,
University of Zurich
Champion User

We rely on your feedback



In autumn last year, the first version of the ESA CCI Toolbox was provided to the user community. Since then the developers of the toolbox are steadily working on the implementation of the development roadmap in order to fulfill users' needs as good as possible.

In order to improve steadily and maintain the quality of the CCI Toolbox, we rely on your feedback. Thus, we would like to invite the users of CCI Toolbox to participate in the following survey. We would be very happy if you take the time and answer the following questions.

[1] How did you hear about the ESA CCI Toolbox?

[5] Have you already worked with the Command Line Interface?

[2] Were there any problems with the installation?

[6] What do you like and what should be improved?

[3] How do you like the appearance of the toolbox in general?

[7] Would you recommend the toolbox to your colleague? Why? Why not?

[4] Which topic affects your interest? Which ESA CCI Data do you use?

Please, use the link or QR code listed below in order to answer our questions.

Thank you for your contribution!



<https://tinyurl.com/CCITBX-survey>

terms & conditions

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USE OF ESA DATA

The CCI Toolbox is designed to access the data held on the CCI Open Data Portal. This data may be used by any user for any purpose, but the terms and conditions of the data use, such as the acknowledgement of the ESA Climate Change Initiative, must be adhered to. These can be found on the CCI Open Data Portal at cci.esa.int/content/terms-and-conditions.