

DDC Report 2015 of WDCC

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1. Summary

The total AR5 data volume provided by IPCC DDC is 1.7 PBytes, 1.6 PBytes in the DDC AR5 Reference Archive and 100 TBytes in the IPCC AR5 WG1 Archive, compared to about 1 TBytes for AR4, and less than 10 GBytes each for the preceding ARs: FAR, SAR, and TAR.

In 2015 IPCC DDC users downloaded ca. 2.6 PBytes of data in ca. 2 million individual downloads. Over 700 WDCC users plus an unknown number of ESGF users¹ accessed IPCC DDC data. 42 % of the users were located in developing and economy-in-transition countries in Africa, Asia and South America. The average number of downloads for an individual IPCC DCC user was ca. 2 900. Relative to 2014, the user downloads increased significantly: the download volume was increased by a factor of 25 relative to the 2014 value, the download counts by a factor of 10, the number of active users by a factor of 2, and the average number of downloads for a single user by a factor of 5.4.

Data downloads and user requests for 2015 were dominated by AR5. The data downloads and therefore the significance of AR4 data were still of the same order as in the previous years. The total DDC download rates increased of more than an order of magnitude over the last three years: In 2015 the download volume was 11 times the value of 2014 and for 2014 the download

¹ Data downloads from ESGF users are executed under a single WDCC user account.

volume was 26 times that of 2013. The download rates were particularly high during the second half of the year 2015 due to the unavailability of the ESGF.

Geographically, ca. 59 % of the file downloads were performed by Asian, 23 % by European, and less than 10 % by users from the other continents. However, Asian and African users were the most active. The average download numbers for an Asian and African user were ca. 5000 and ca. 4600 compared with the download number of 2800 for an average active users in 2015. The offer to send data for selected areas on storage media was requested by 15 users from developing and economy-in-transition countries.

2. Evolution of data access

In the user downloads from the DDC reference archive, a significant increase is observed for 2014 and during the second half of 2015 (**Figure 1**). The 2015 increase was caused by the unavailability of the ESGF (Earth System Grid Federation) disseminating CMIP5 data. The total download volume for 2015 was 2.6 PBytes in 2 million individual file downloads. The download volume in September 2015 exceeded 1 PByte.

The download numbers of 2015 were 11 times those of 2014 and the download volume in 2015 was 26 times that in 2014. This indicates that the individual downloads were of larger file sizes in 2015.

The average monthly download volume in 2015 was ca. 214 TBytes, which increased from 33 TBytes for the first half of the year to 395 TBytes for the second half of 2015.

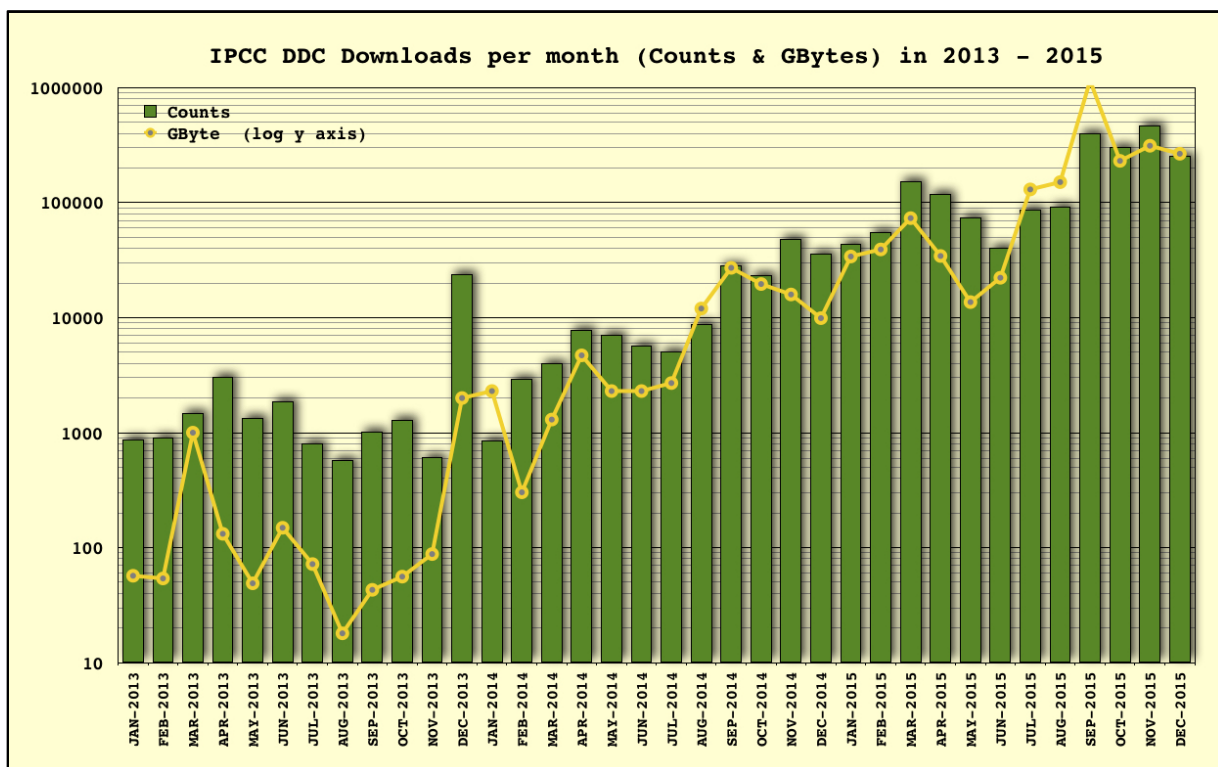


Figure 1: Total data download counts and volumes per months over the last three years in GBytes from the IPCC DDC reference archive.

3. Geographical distribution of data access

For the IPCC DDC AR5 data, direct data access at the WDCC and data access via ESGF (Earth System Grid Federation) is supported. For the ESGF data access share, no information about user locations is available.

More than 1/3 of the registered active users were located in Asia and about another 1/3 in Europe. North American users contributed with about 23 % to the total number of users and the other continents, South America, Africa and Australia were of minor importance (between 1 and 5 %). The percentage of users from developing and economy-in-transition countries was 42 % (Africa, Asia, and South America).

Data downloads via ESGF were of minor importance as their contribution was only 8 % (**Figure 2**). The majority of user downloads were processed by Asian users with ca. 59 % plus an unknown number of ESGF users. Assuming the same percentage of Asian users among the ESGF users as among the WDCC users would result in 64 %. Thus at least 59 % of the files were downloaded to Asia and least 23 % to Europe. The percentage of file downloads to developing and economy-in-transition countries (Asia, Africa, and South America) was at least 69 %.

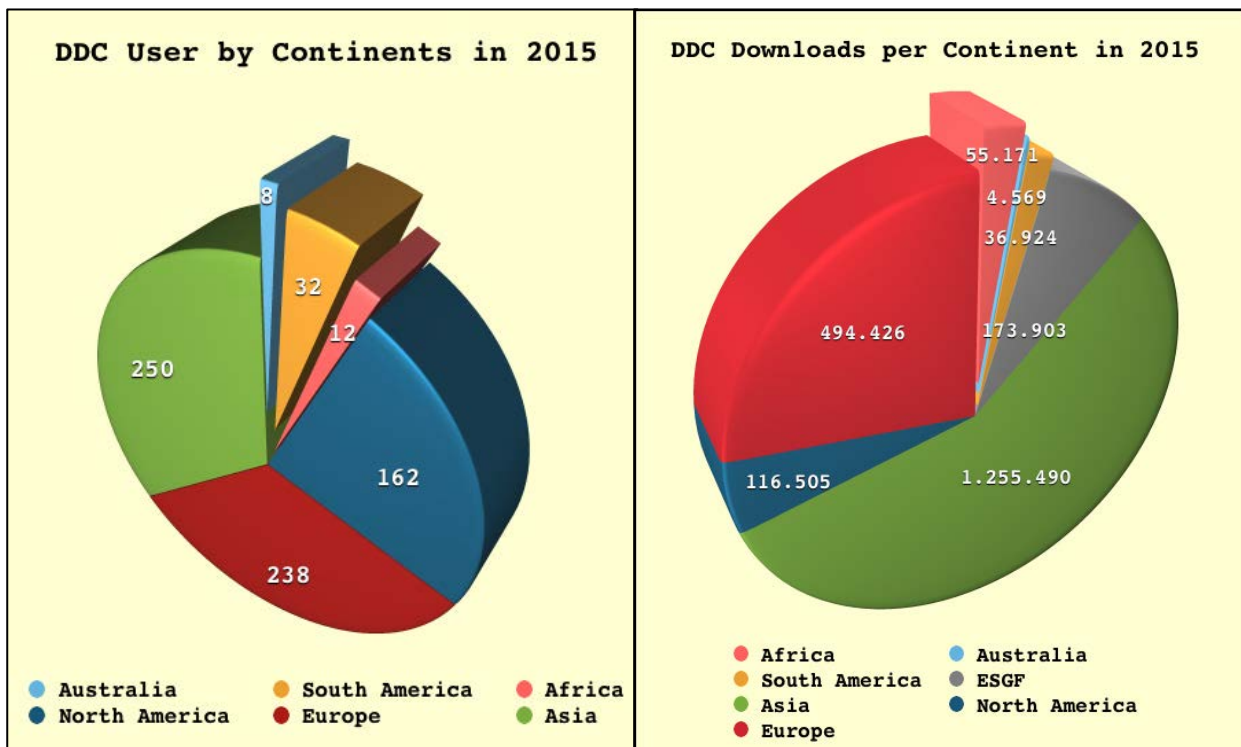


Figure 2: Number of active DDC users in 2015 (left) and downloads counts of users per continent (right).

Compared to the number of registered active users, the average download numbers for an Asian user with 5 000 downloads and an African user with 4 600 downloads were significantly higher than for users located on other continents: European (2 100), North American (700) or South American (1 150) users. Thus the users in developing and economy-in-transition countries were the most active data users in 2015.

3.1 Data on storage media

Most of the users of storage media requested data for their own continent. All users asked for AR5 data, one additionally for AR4 data. All users are located in continents with low internet bandwidths to Europe: Asia, Africa, South America and Australia (see **Table 1** and **Table 2**). The requests for storage media were sent in the first half of the year except for one request in September 2015.

Table 1: Number of storage media requests per data area for AR4 and AR5 in 2015.

Area of Data	No of storage media	Africa	Asia	Australia / Central Pacific	Europe	North America	South America	North Pole	South Pole
AR4	2	1	1	-	-	-	-	-	-
AR5	18	4	7	2	-	-	3	1	1
DDC total	20	5	8	2	-	-	3	1	1

Table 2: Number of user requests for AR4/AR5 data on storage media per user origin (continent) in 2015 (*: Some users requested data for multiple areas or AR4 and AR5 data).

User origin	No of users	African users	Asian users	South American users	Australian users
AR4	2	1	1	-	-
AR5	14	2	8	3	1
DDC total*	15	3	8	3	1

4. Data access by category AR

The monthly download rates in 2015 from the IPCC DDC reference archive were dominated by AR5 downloads with a relation of AR5:AR4 of ca. 570 for download volume and of 25 for download counts. The data download numbers increased for AR5 and AR4 data in 2015 relative to the values in 2014 by a factor of 10 and 7, respectively (**Figure 3**; online monthly download statistics²).

² Online monthly download statistics are available at:
<http://cera-www.dkrz.de/WDCC/ui/Statistics.jsp?domain=IPCC-DDC>
http://cera-www.dkrz.de/WDCC/ui/Statistics.jsp?domain=IPCC-DDC_AR5
http://cera-www.dkrz.de/WDCC/ui/Statistics.jsp?domain=IPCC-DDC_AR4

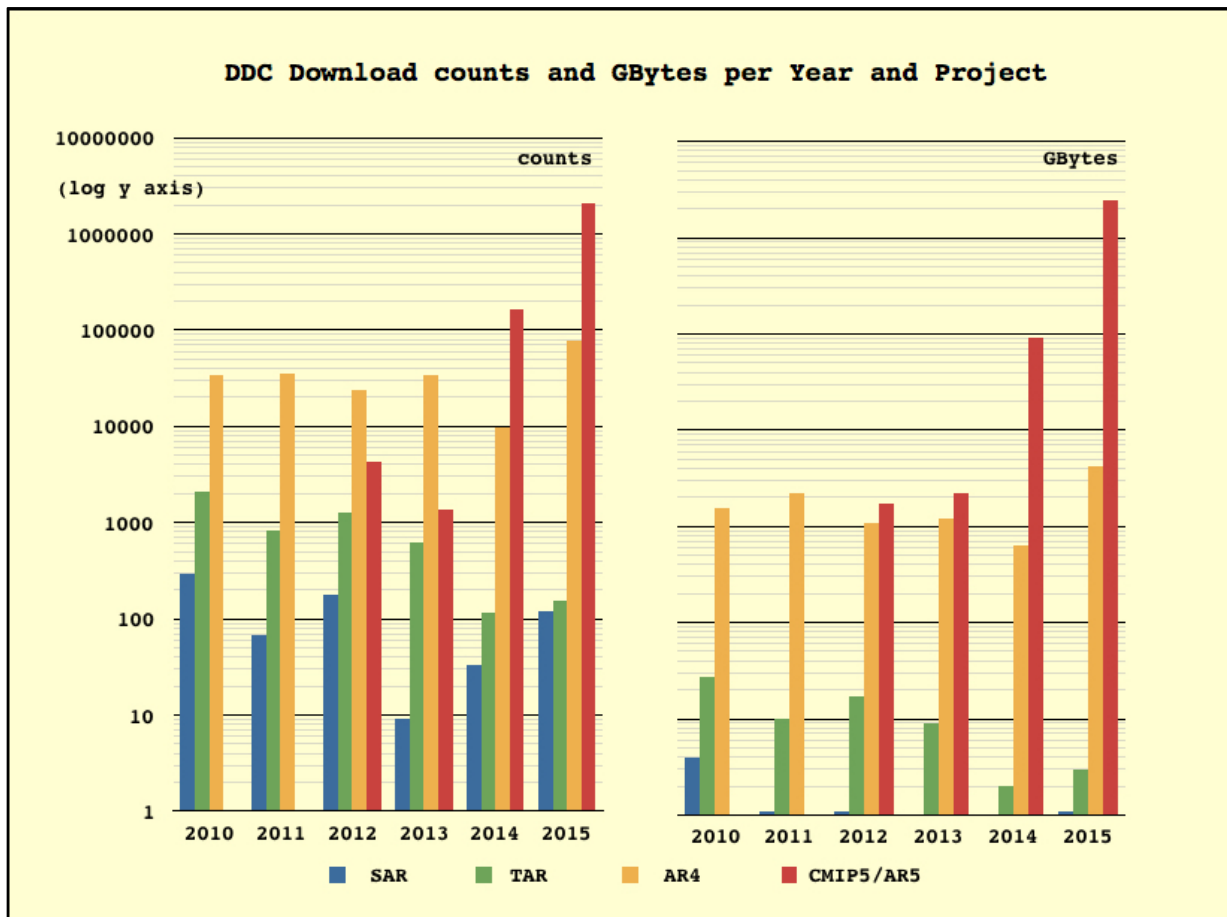


Figure 3: Total annual data download counts (left) and volumes in GBytes (right) over the last six years for the different DDC reference archives (without FAR).

5. Review of user queries

The WDCC/DKRZ user support handled ca. 4 100 user requests in 2015, 65 % in the second half of the year. This is more than 4 times the number of requests in 2014. A separation of user requests on IPCC DDC issues is not possible. With the background of an increase in the number of active DDC users from 225 in 2014 to 702 in 2015 it can be assumed that the DDC related requests increased in the same order.

As part of the IS-ENES support activity, DKRZ provides first level user support for ESGF. Within ESGF 45 requests related to CMIP5/AR5 were handled, which is about the same number of requests as in 2014. During ESGF downtime in the second half of 2015 the user requests shifted from ESGF to the DDC.

In parallel to the regular user support channels, additional requests were directed to individuals at the modelling centres or at the data centres (within ESGF or to WDCC/DKRZ).