



# Status and Plans of the Global Precipitation Climatology Centre (GPCC)

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## Structure of the presentation

- GPCC precipitation data sets and applications
- GPCC observational raingauge database
- GPCC quality control / assurance
- Conclusions and Outlook



# GPCC precipitation data sets and applications



## Users of GPCC's gridded data sets and purpose

- **GEWEX** Adjustment of satellite-based observation and analyses of hydrometeorol. processes
- **FAO, UNEP** Drought monitoring
- **GCOS** Global climate monitoring
- **CLIVAR, IPCC** Climate variability and trend analyses
- **UNESCO** Water resources assessment
- **HWRP, GTN-H** Runoff estimation (ungauged rivers)
- **ECMWF** Model verification (ERA 40 re-analysis)
- **CLIC** Cryospheric precipitation estimation
- **more than 2000 scientists** world-wide working at various institutes in the framework of international research projects



The **GEOSS** 10-Year Implementation Plan calls GPCC as an important GEO related activity.

# GPCC precipitation data sets and applications



## Users need products adjusted to their needs

The **features** of GPCCs gridded precipitation products - as required by users:

- **Timeliness** (for drought monitoring)
- **High resolution** (for regional structures in global maps)
- **High accuracy** (for verification of model results)
- **Homogeneity** (for climate change and variability analysis)

All of these requirements cannot be met by one single gridded data set

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Special products have to be designed and optimized with respect to the **priorities** as given by the **application purpose**.

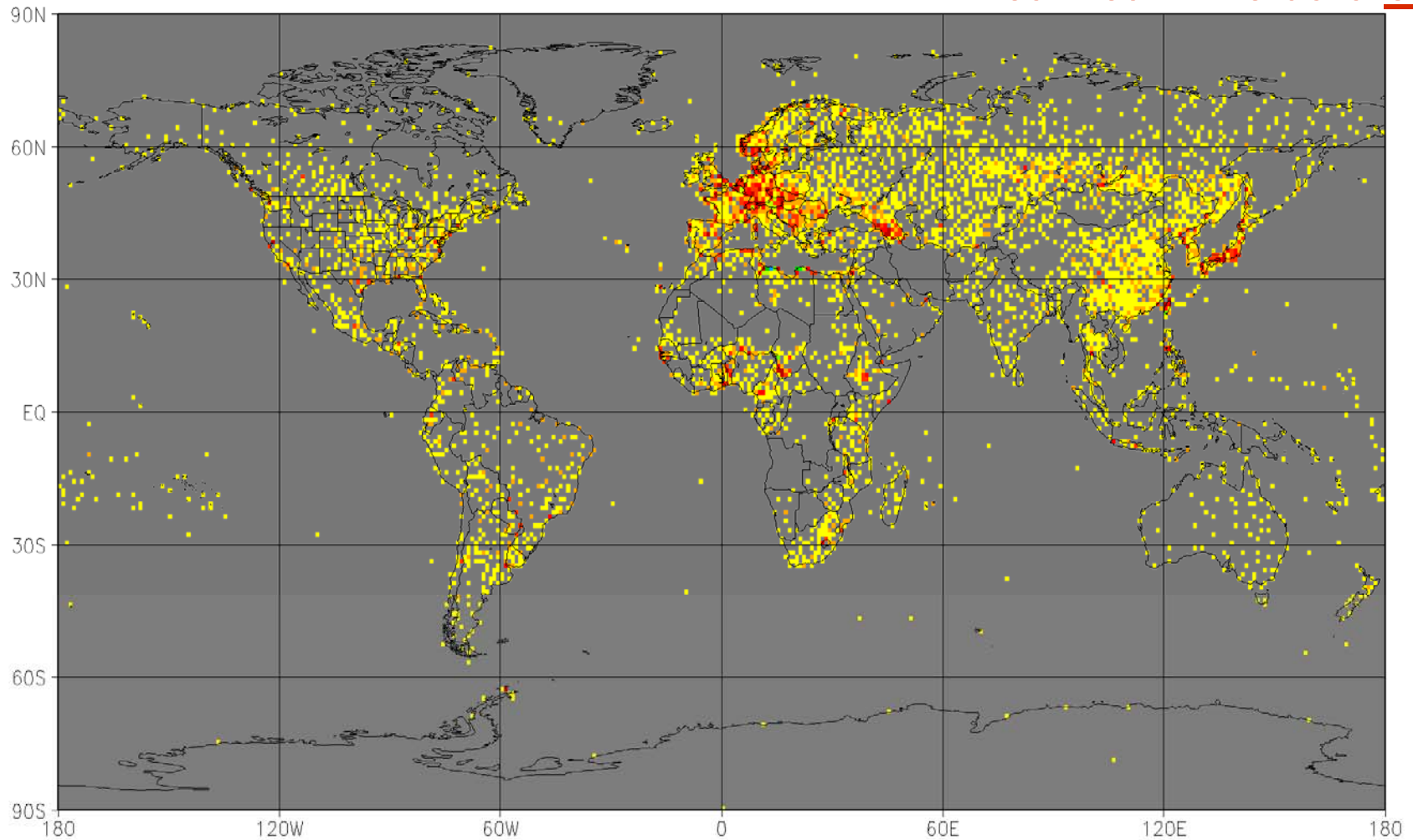


# GPCC observational raingauge database



GPCC Monitoring Product Gauge-Based Analysis 1.0 degree  
number of stations per grid for May 1987

**Near real-time data only**



(c) GPCC 2006/10/3

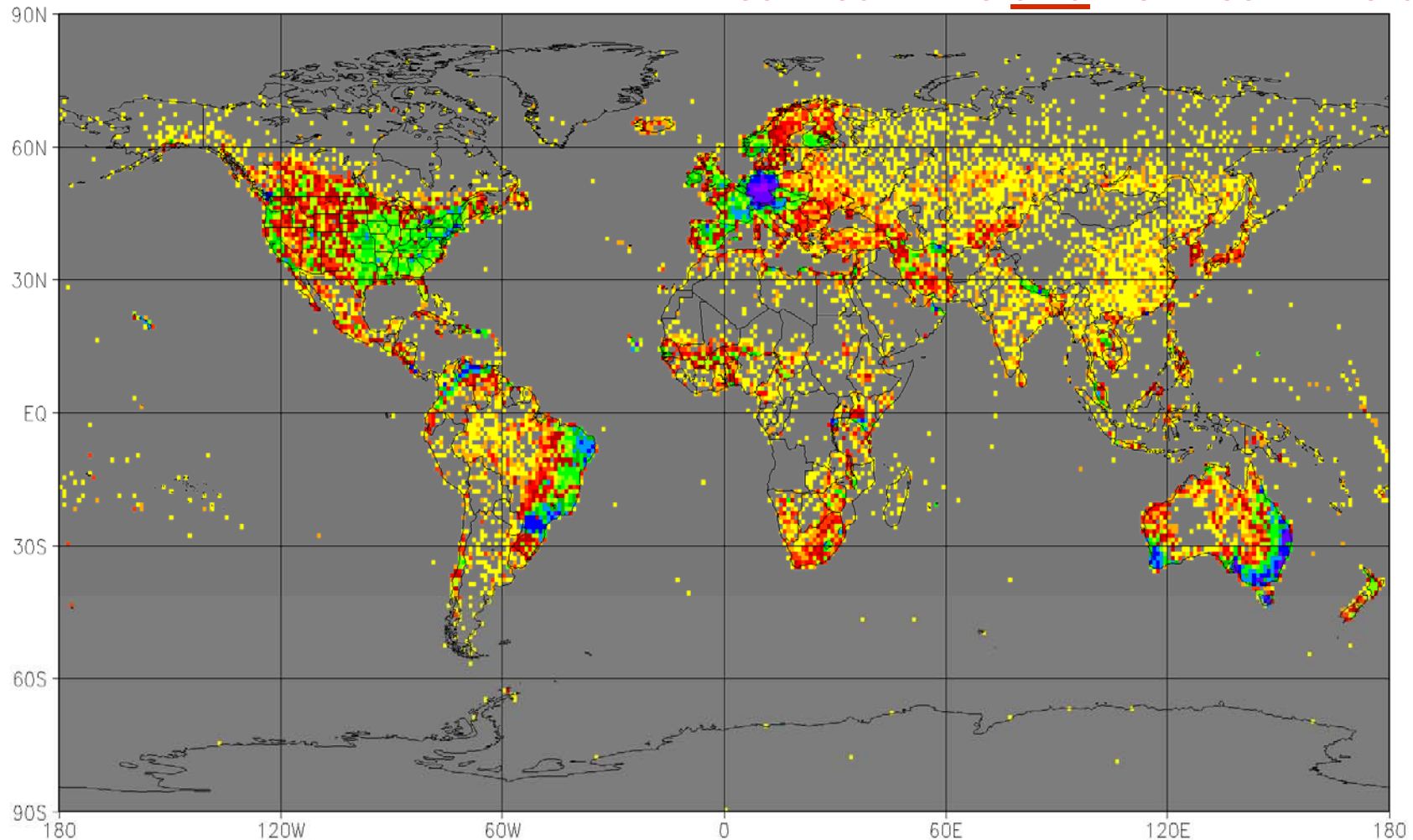


# GPCC observational raingauge database



GPCC Full Data Product Version3 Gauge-Based Analysis 1.0 degree  
number of stations per grid for May 1987

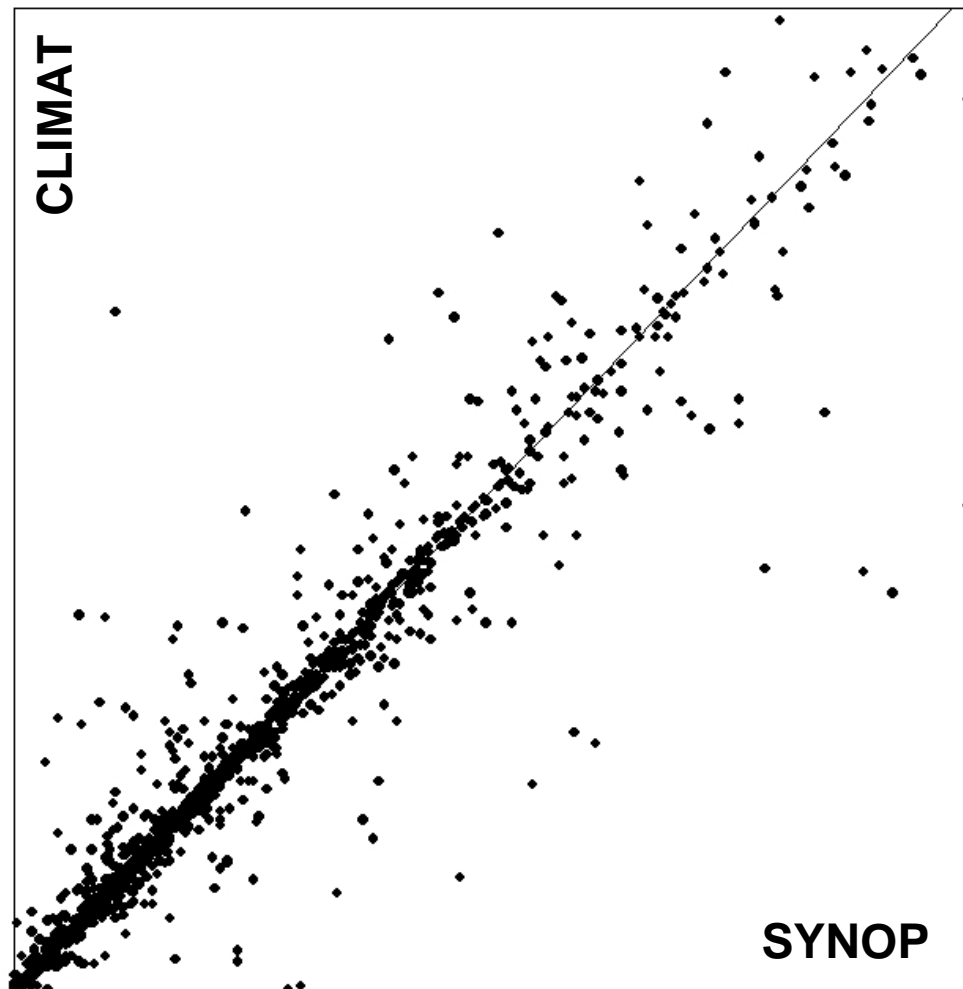
**Near real-time and non real-time data**



(c) GPCC 2006/10/3



# GPCC quality control / quality assurance



Comparison of

Monthly precipitation totals derived from synoptic data (SYNOP)

versus

Monthly precipitation totals compiled later by the national hydromet. services (CLIMAT)



Quality problems of monthly precipitation products based only on real-time data (SYNOP)

# GPCC quality control / quality assurance



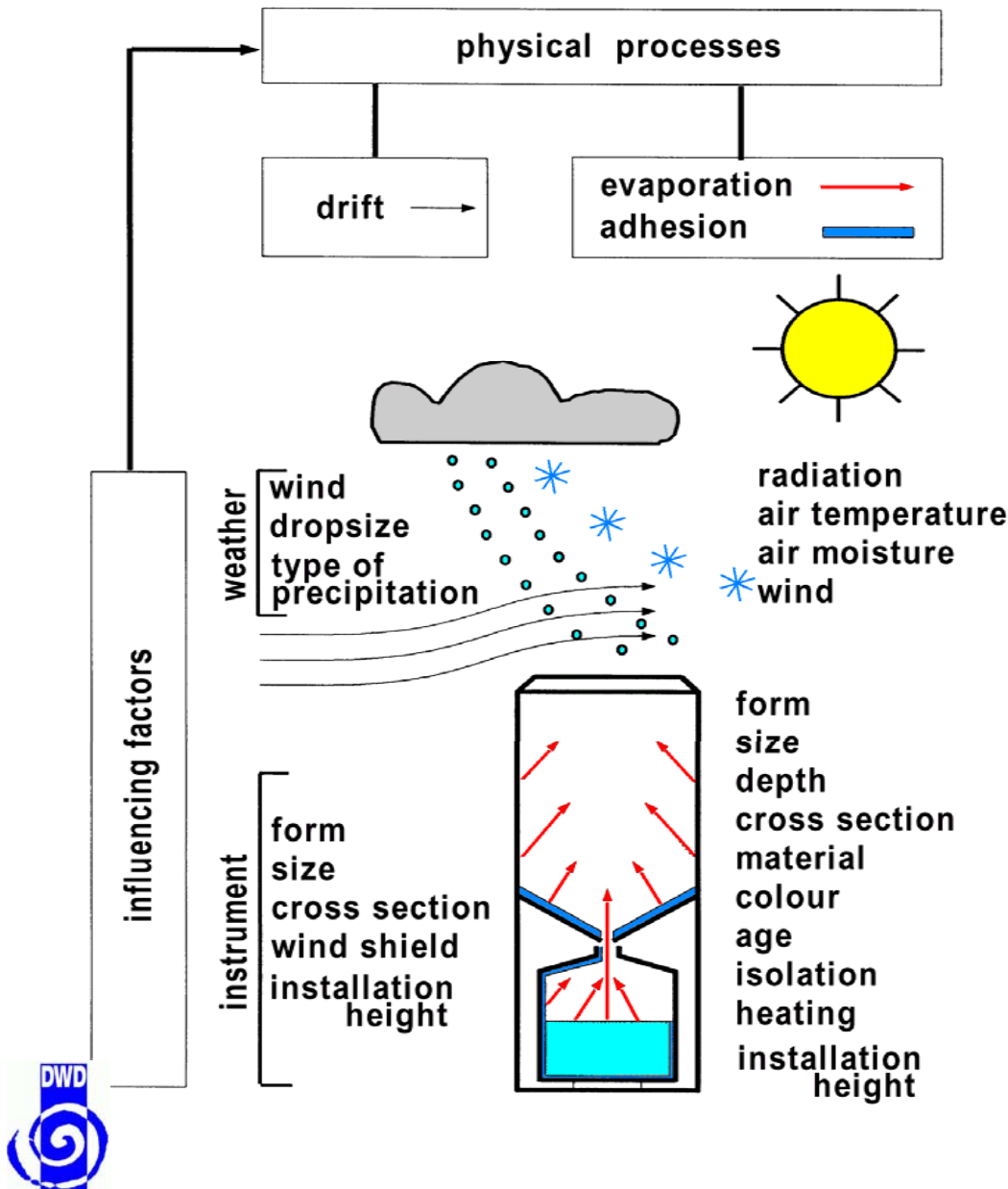
## Systematic Gauge Measuring Error

The problem:

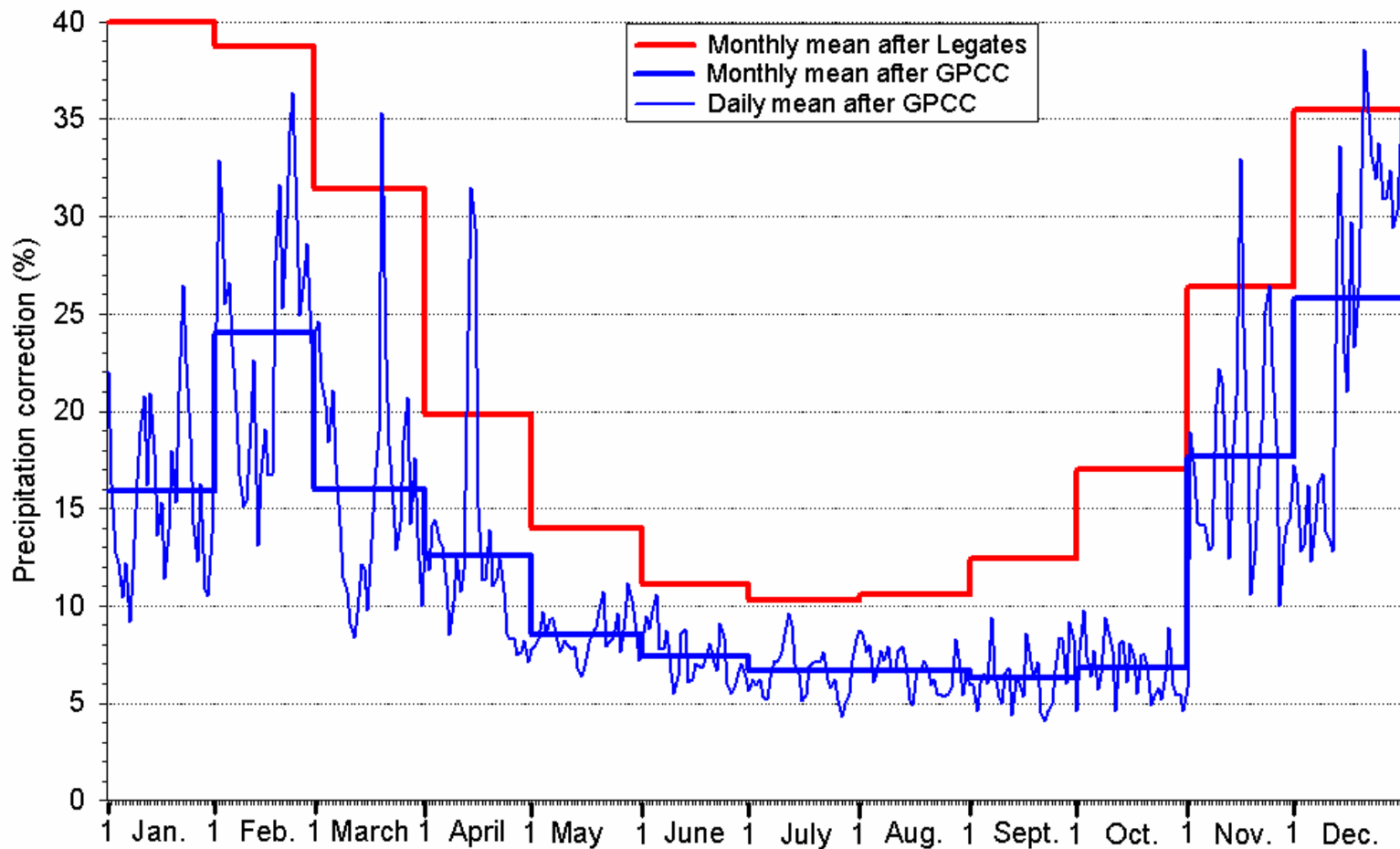
Precipitation amounts measured by raingauges are systematically underestimated.

For estimation of reliable global or regional precipitation amounts, an adequate correction of the data used or of the product is required.

(Fig. after SEVRUK 1989)



# GPCC quality control / quality assurance

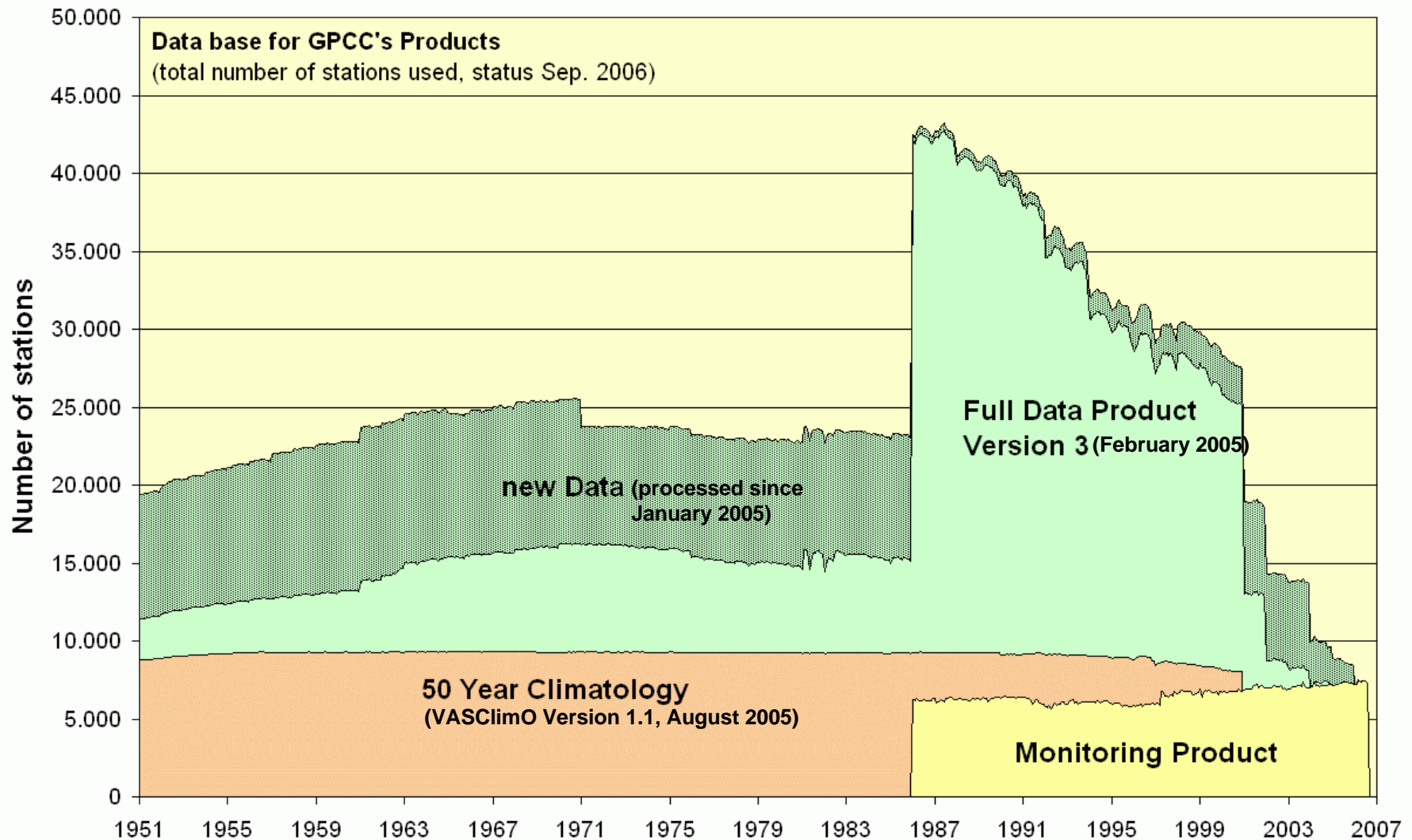


## Systematic gauge measuring error correction:



- **Monthly long-term mean error estimate after Legates**
- **Near real-time error correction by GPCC based on daily SYNOP data**

# GPCC observational raingauge database



**Number of stations used for the different GPCC products**



# GPCC precipitation data sets and applications



## Monthly operational near real-time GPCC products

### First Guess Product

**Purpose: Drought Monitoring**  
(by FAO and other institutes)

Available: **3 - 5 days after end of month**  
Data base: **5,500 stations**  
Data source: **SYNOP data only**  
Quality control: **automatic only**  
Available products: **Only the current product**

### Monitoring Product

**Purpose: Precipitation Monitoring**  
(input to GPCP and CMAP)

Available: **2 months later**  
Data base: **6,500 to 7,000 stations**  
Data sources: **SYNOP data plus**  
**monthly CLIMAT and CPC**  
Quality control: **automatic and visual**  
Available products: **From Jan. 1986**  
**up to near present**



**Available spatial resolutions: 1.0° and 2.5° lat/long**  
(GPCC-internally calculated on 0.5° lat/long)

# GPCC precipitation data sets and applications



## Monthly full data base GPCC products

### Full Data Reanalysis

**Purpose: verification of models  
continental water cycle studies  
UNESCO, GTN-H, GRDC**

### Use of data available at GPCC

- Current version 3 based on more than 50,000 stations (up to 43,000 stations in one month)
- Period: 1951 - 2004
- Quality control/assurance of meta data and monthly precipitation data

### 50-Year Climatology

**Purpose: variability studies  
trend analysis  
(GCOS, IPCC)**

### Use of selected data time-series

- Current Version 1.1 with 9,343 stations
- High level quality and homogeneity control analysis based on climatic background
- Period 1951 - 2000

Available spatial resolution: 0.5°, 1.0° and 2.5° Lat/Lon

Updates: Planned after significant improvements of the data base (i.e. once per year).

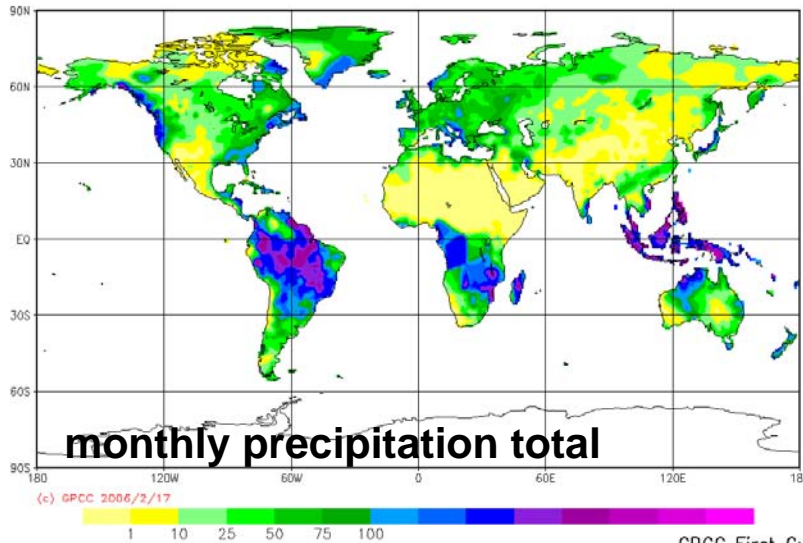


# GPCC precipitation data sets and applications

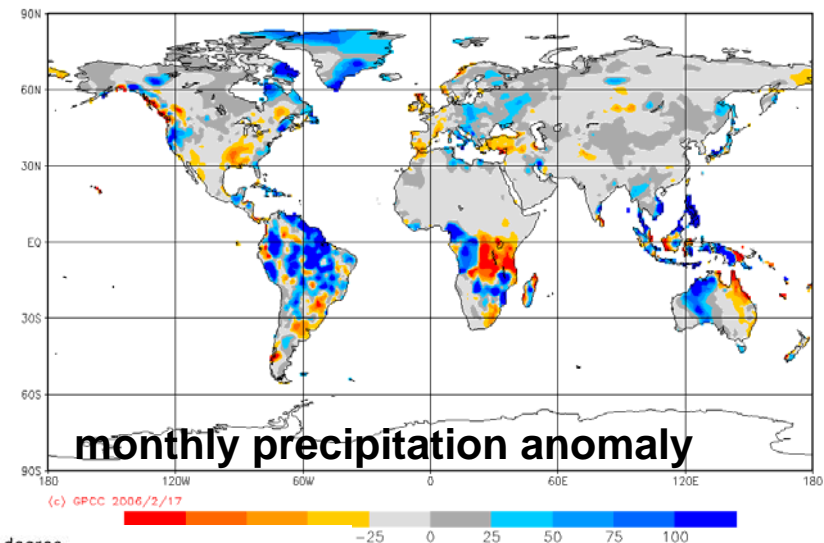


## Standard GPCC products provided on the grid

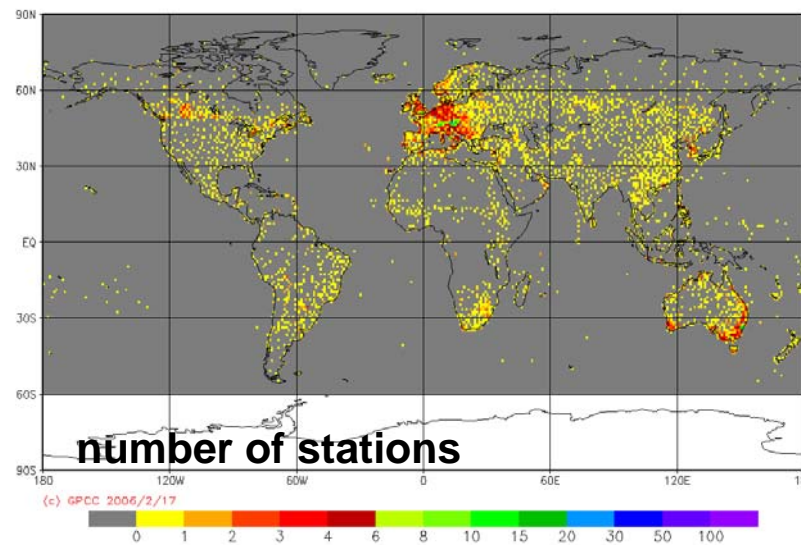
GPCC First Guess 1.0 degree  
precipitation for December 2005 in mm/month



GPCC First Guess 1.0 degree  
precipitation anomaly for December 2005 in mm/month  
(deviation from normals 61/90) (grid based)



GPCC First Guess 1.0 degree  
number of stations per grid for December 2005

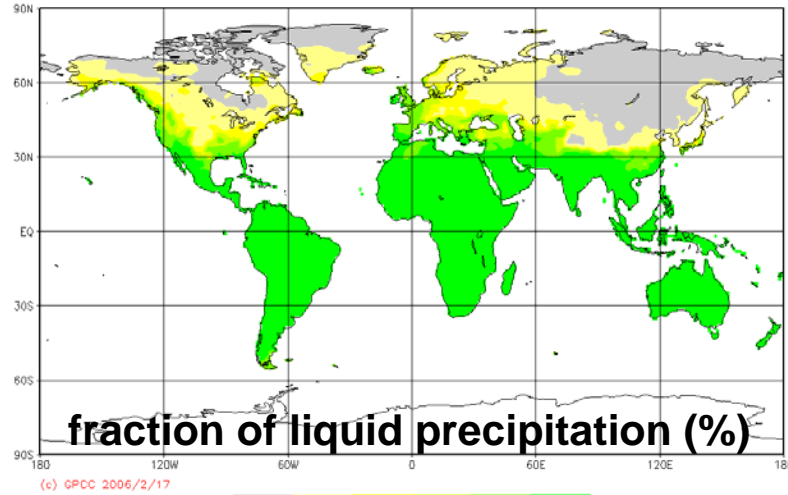


# GPCC precipitation data sets and applications



## New GPCC interim products based on daily synoptic data

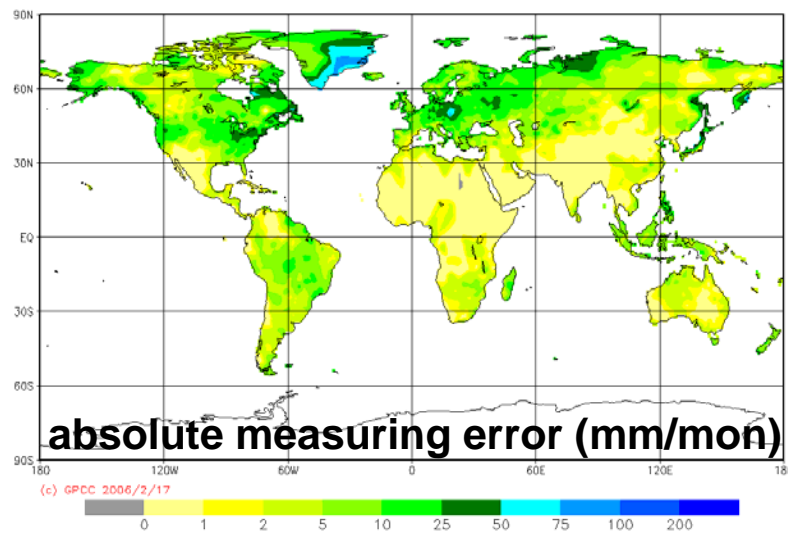
fraction of liquid precipitation  
for December 2005 in % per month



**fraction of liquid precipitation (%)**

(c) GPCC 2006/2/17

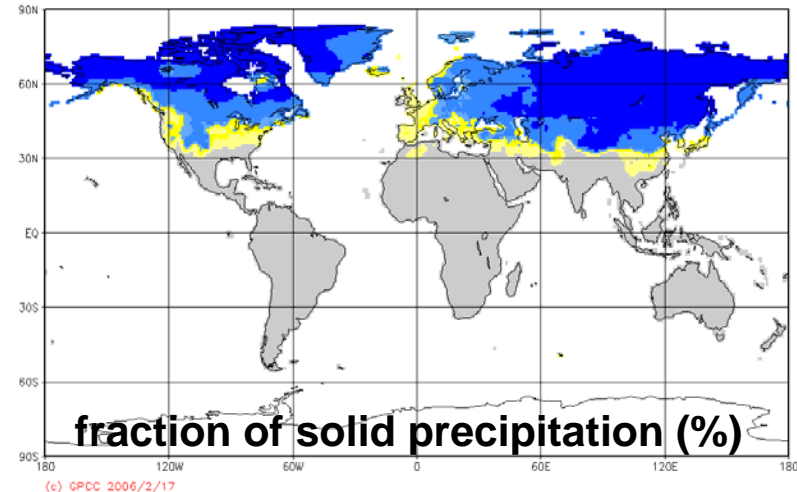
absolute gauge measuring error  
for December 2005 in mm/month



**absolute measuring error (mm/mon)**

(c) GPCC 2006/2/17

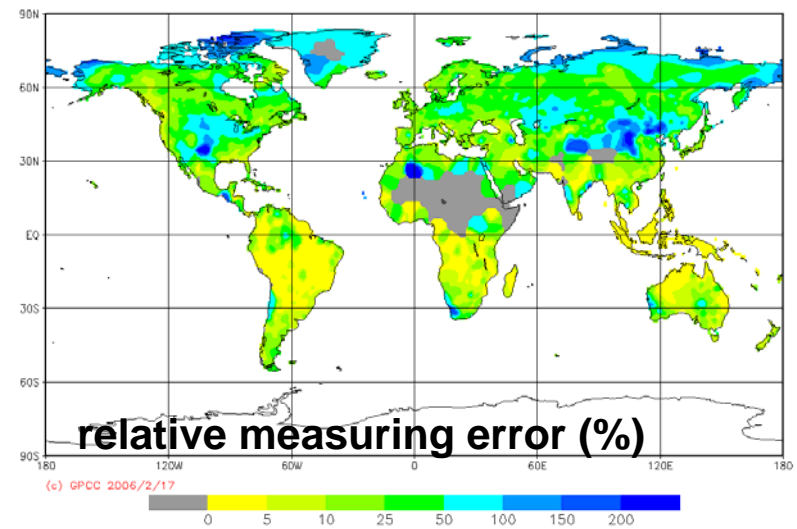
fraction of solid precipitation  
for January 2006 in % per month



**fraction of solid precipitation (%)**

(c) GPCC 2006/2/17

relative gauge measuring error  
for December 2005 in % per month



**relative measuring error (%)**

(c) GPCC 2006/2/17



# Conclusions and Outlook



- 1. Users of gridded GPCC gauge data sets should reflect their application purpose and select the GPCC product best meeting their needs (e.g. best spatial coverage or best homogeneity).**
2. The application of error corrections is advised before using GPCC products for hydrological purposes. The event-based systematic gauge measuring error is smaller than the climatological estimates published by Legates & Willmott (1989). Note, that the calculated gauge measuring error is still a rough bias estimate.
3. The GPCC data base is continuously growing. Updates of the Full Data and VASClimO Products are planned for 2007.
4. Based on the enlarged GPCC data base, also the collection of precipitation normals will increase to about 50,000 stations. Analyses of the normals reflect the orographic background.
5. In future, all GPCC products will be calculated using high-resolution climatological precipitation fields as analysis background.



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## **More information about GPCC**

**-> Presentation tomorrow morning during GRP meeting**

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**Thank you for your attention!**

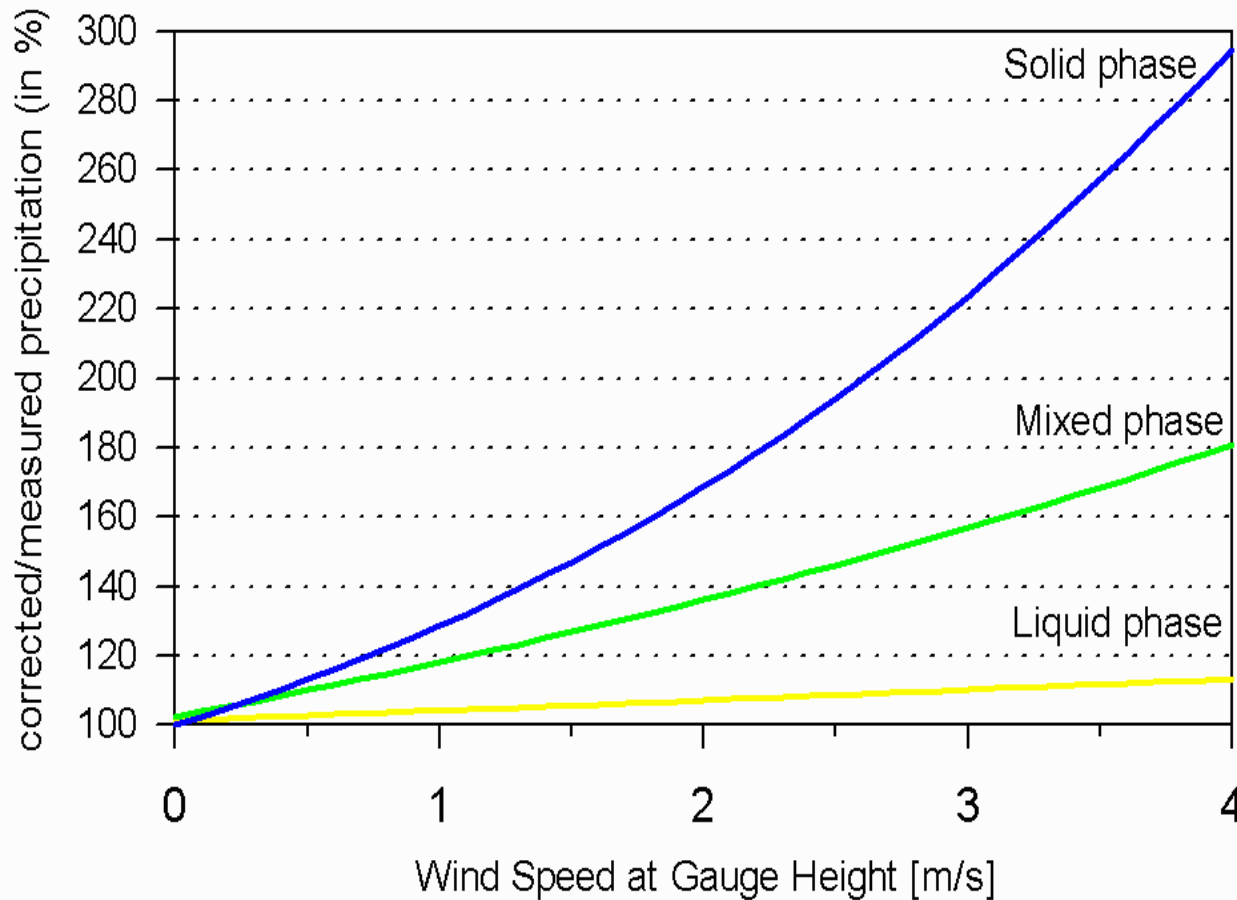


# Additional stuff





# Precipitation phase and windspeed are the most important parameters for correction of raingauge observations



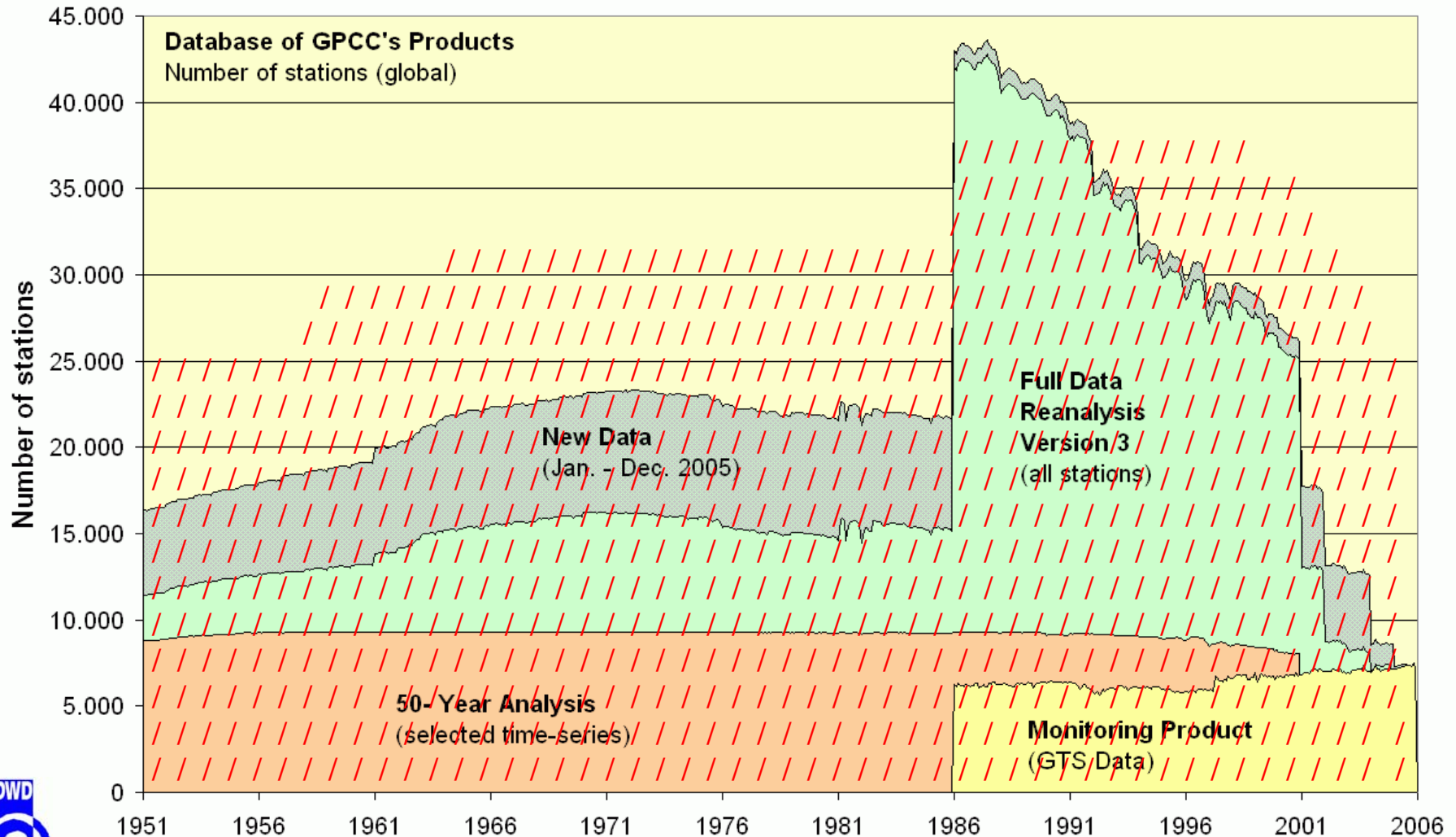
**Correction ratio in % of the data measured by the Hellmann gauge (without windshield)**

**as a function of wind speed for solid, liquid and mixed precipitation**

# Conclusions and Outlook



The GPCC database is continuously growing -> updates of GPCC Full Data Base Products are planned for 2007



Many new data received in 2005/06, currently undergoing QC/QA