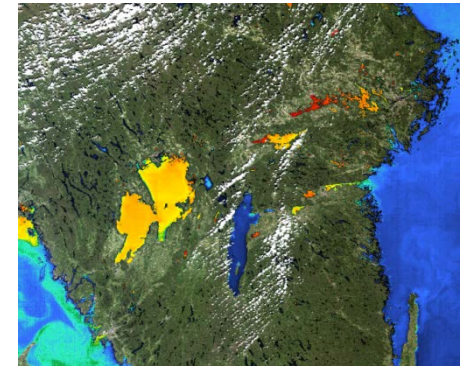
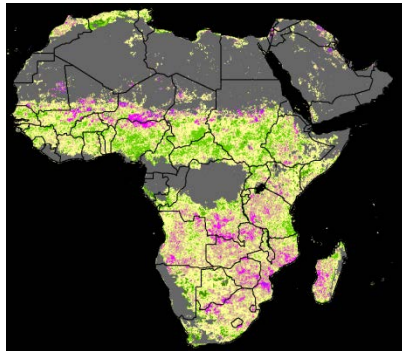




# Diversity II Project



Workshop on Land Productivity Indicators

07.-09.07.2014

Carsten Brockmann, Project Manager



# DIVERSITYII - Team & Key People



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# *International Environmental Conventions*

- Dramatic environmental problems affecting our planet have mobilised governments, scientists and environmental organisations over the world.
- As a result, several **Multilateral Environmental Agreements (MEAs)** have been signed that aim at reducing environmental degradation.

The **United Nations Conference on Environment and Development** (UNCED), also known as the '**Earth Summit**', held in Rio in 1992.

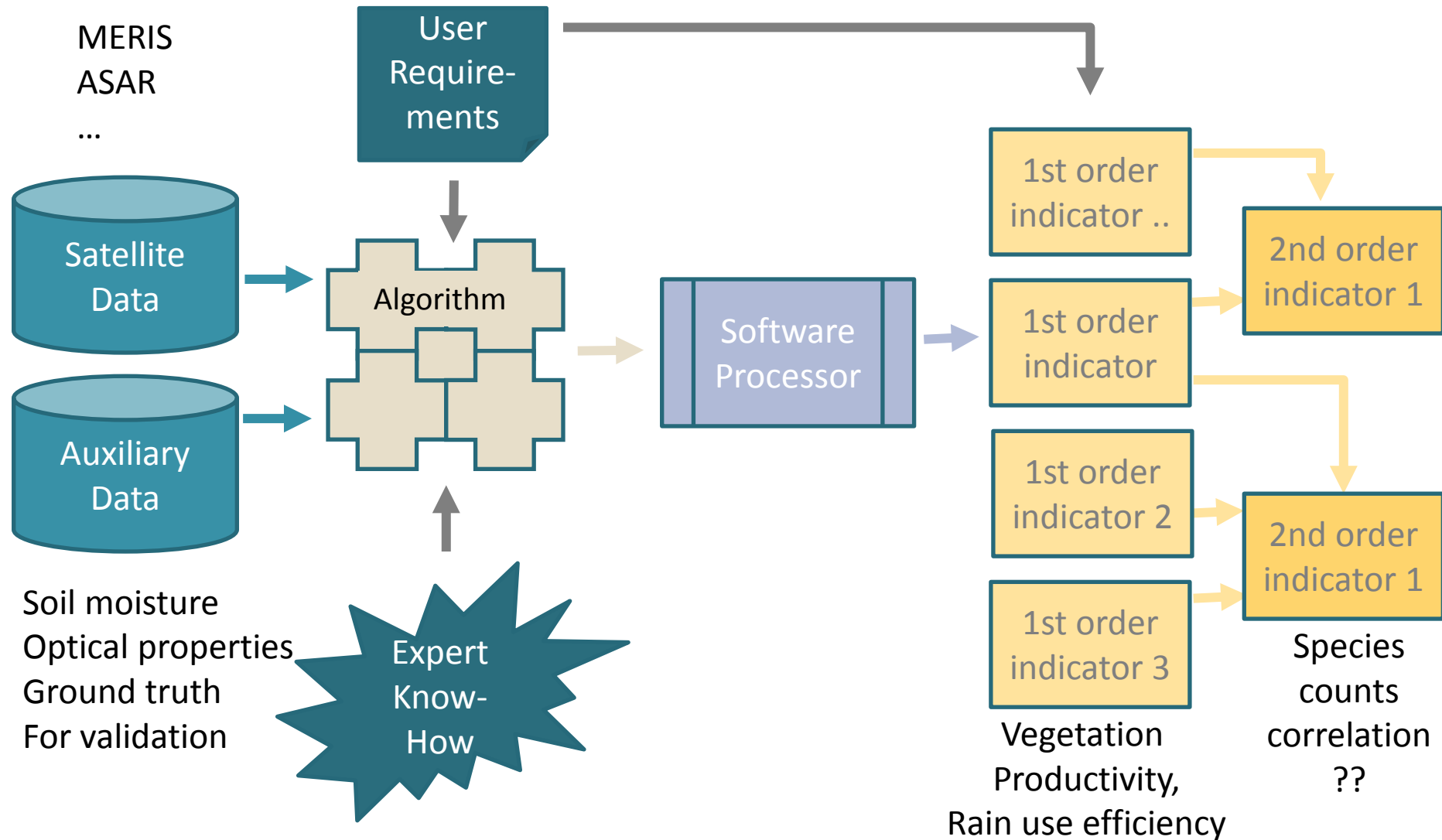
It resulted in the definition of the '**Agenda 21**' plan of actions and the subsequent signature of different multilateral agreements such as

- the UN Convention to Combat Desertification (**UNCCD**),
- the UN Convention on Biodiversity (**CBD**)
- the UN Framework Convention on Climate Change (**UNFCCC**).

# Diversity II

- Contribute to the Convention on Biological Diversity (CBD) and also UNCCD, of respectively inland water and drylands ecosystems,
- global assessment of the availability of freshwater and of its quality with the provision of key observations over large perennial inland waters (lakes and reservoirs)
- assessment of the status and trends of the biological diversity in drylands.







# Geographical Coverage



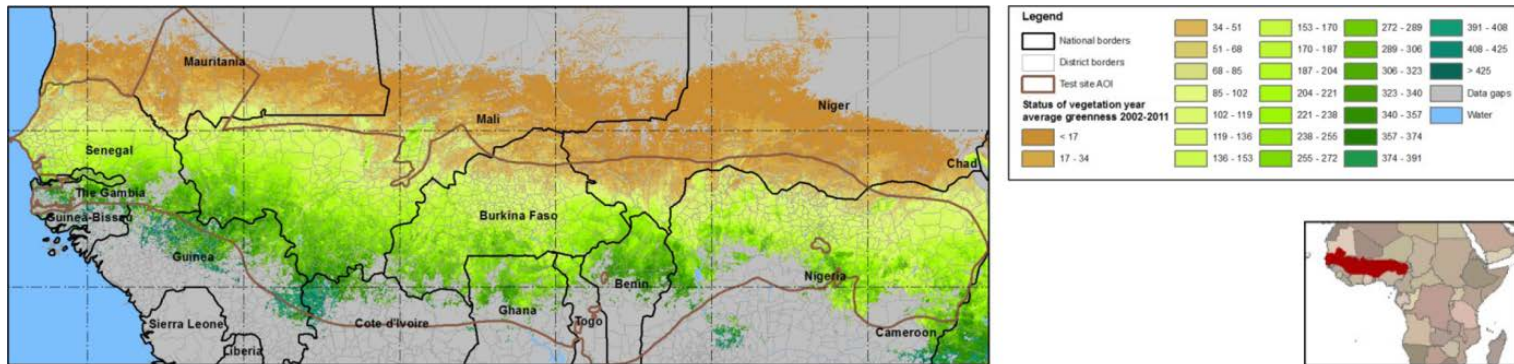
# First Order Indicators – NPP proxies

Product	Content
<i>Vegetation year fAPAR</i>	
<b>Average Vegetation Year Greenness</b> fapar_vegyear_average_mean_classes	Vegetation year fAPAR average 2002 - 2011, aggregated to 28 classes.
<b>Vegetation Year Variability</b> fapar_vegyear_average_coeffvar_classes	Vegetation year fAPAR coefficient of variation 2002 - 2011, aggregated to 28 classes.
<b>Vegetation Year Greenness Trend</b> fapar_vegyear_mean_abs_trend_classes, fapar_vegyear_mean_rel_trend_classes	Absolute and relative trend of Vegetation Year fAPAR 2002 - 2011, aggregated to 15 classes.
<i>Cyclic vegetation fAPAR</i>	
<b>Cyclic Vegetation Greenness</b> fapar_cyclic_fraction_mean_classes	Cyclic vegetation fAPAR average 2002 - 2011, aggregated to 28 classes.
<b>Cyclic Vegetation Variability</b> fapar_cyclic_fraction_coeffvar_classes	Cyclic Vegetation fAPAR coefficient of variation 2002 - 2011, aggregated to 28 classes.
<b>Cyclic Vegetation Greenness Trend</b> fapar_cyclic_fraction_abs_trend_classes, fapar_cyclic_fraction_rel_trend_classes	Absolute and relative trend of Cyclic Vegetation fAPAR 2002 - 2011, aggregated to 15 classes.
<i>Dry season fAPAR</i>	
<b>Dry Season Greenness</b> fapar_dry_season_mean_classes	Dry season fAPAR average 2002 - 2011, aggregated to 28 classes.
<b>Dry Season Variability</b> fapar_dry_season_coeffvar_classes	Dry season fAPAR coefficient of variation 2002 - 2011, aggregated to 28 classes.
<b>Dry Season Greenness Trend</b> fapar_dry_season_mean_abs_trend_classes, fapar_dry_season_mean_rel_trend_classes	Absolute and relative trend of Dry Season fAPAR 2002 - 2011, aggregated to 15 classes.

# Product Example

## Vegetation Year Greenness

Average Vegetation Year Greenness **Status**  
 Mean fAPAR 2002 - 2011

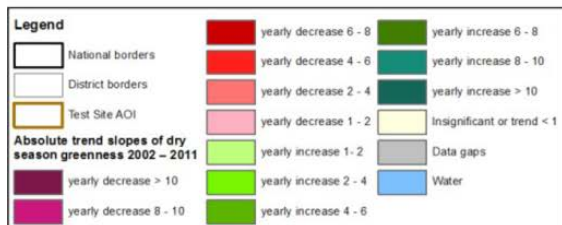
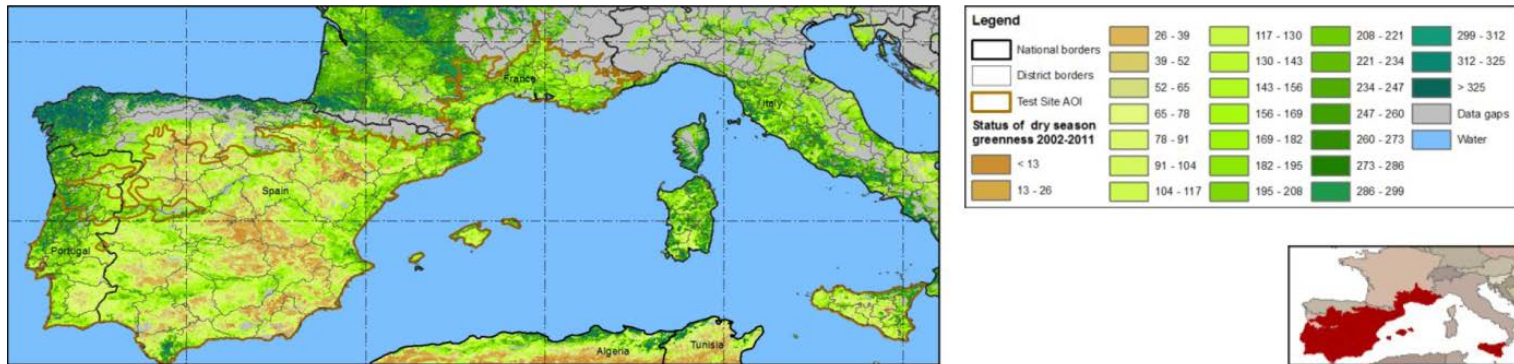


Vegetation Year Greenness **Trend**  
 Trend slopes of fAPAR 2002 - 2011



# Product Example Dry Season Greenness

## Dry Season Greenness **Status** Mean fAPAR 2002 - 2011



## Dry Season Greenness **Trend** Trend slopes of fAPAR 2002 - 2011

# First Order Indicator: Rain Use Efficiency

Product	Content
<i>Vegetation Year Rain Use Efficiency</i>	
<b>Average Vegetation Year Rain Use Efficiency Status</b> fapar_rue_vegyear_trmm_mean_classes	Vegetation Year Rain Use Efficiency 2002 - 2011, aggregated to 28 classes.
<b>Vegetation Year Rain Use Efficiency Variability</b> fapar_rue_vegyear_trmm_coeffvar_classes	Coefficient of variation of vegetation Year Rain Use Efficiency 2002 - 2011, aggregated to 28 classes.
<b>Vegetation Year Rain Use Efficiency Trend</b> fapar_rue_vegyear_trmm_abs_trend_classes, fapar_rue_vegyear_trmm_rel_trend_classes	Absolute and relative trend of Vegetation Year Rain Use Efficiency 2002 - 2011, aggregated to 15 classes.
<i>Cyclic Vegetation Rain Use Efficiency</i>	
<b>Cyclic Vegetation Rain Use Efficiency Status</b> fapar_rue_cyclic_fraction_trmm_mean_classes	Cyclic Vegetation Rain Use Efficiency 2002 - 2011, aggregated to 28 classes.
<b>Cyclic Vegetation Rain Use Efficiency Variability</b> fapar_rue_cyclic_fraction_trmm_coeffvar_classes	Coefficient of variation of cyclic Vegetation Rain Use Efficiency 2002 - 2011, aggregated to 28 classes.
<b>Cyclic Vegetation Rain Use Efficiency Trend</b> fapar_rue_cyclic_fraction_trmm_abs_trend_classes, fapar_rue_cyclic_fraction_trmm_rel_trend_classes	Absolute and relative trend of Cyclic Vegetation Rain Use Efficiency 2002 - 2011, aggregated to 15 classes.
<i>Dry Season Rain Use Efficiency</i>	
<b>Dry Season Rain Use Efficiency Status</b> fapar_rue_dry_season_trmm_mean_classes	Dry Season Rain Use Efficiency 2002 - 2011, aggregated to 28 classes.
<b>Dry Season Rain Use Efficiency Variability</b> fapar_rue_dry_season_trmm_coeffvar_classes	Coefficient of variation of dry Season Rain Use Efficiency 2002 - 2011, aggregated to 28 classes.
<b>Dry Season Rain Use Efficiency Trend</b> fapar_rue_dry_season_trmm_abs_trend_classes, fapar_rue_dry_season_trmm_rel_trend_classes	Absolute and relative trend of Dry Season Rain Use Efficiency 2002 - 2011, aggregated to 15 classes.

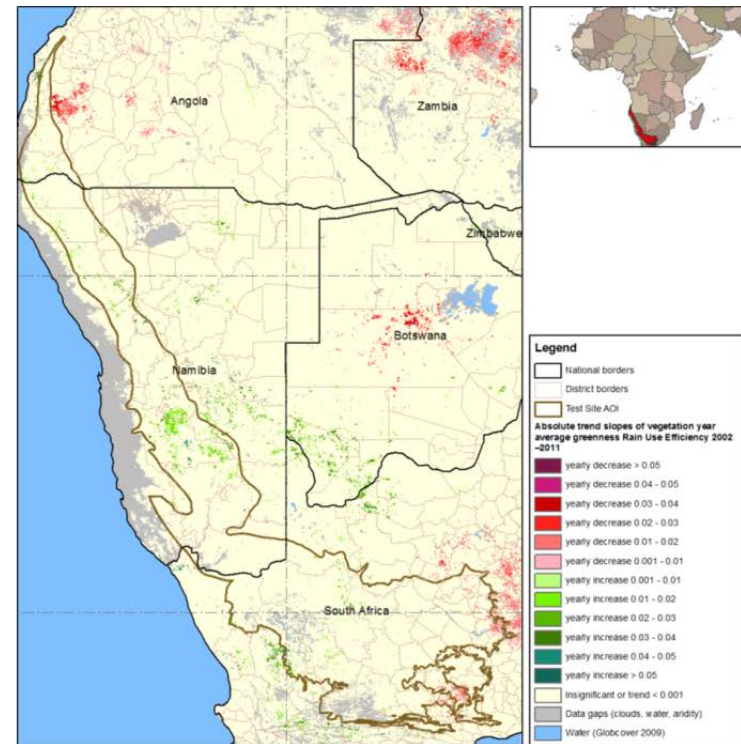
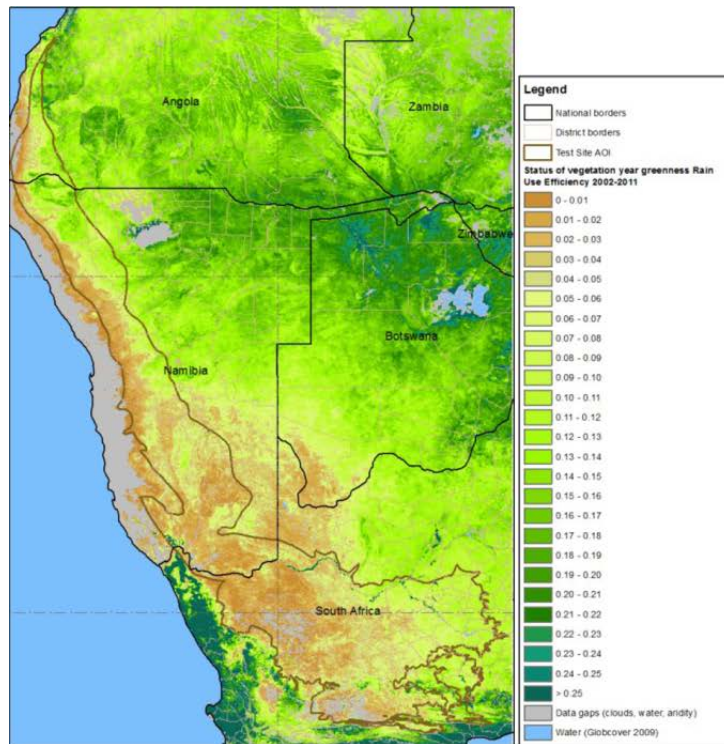
# Product Example:

## Rain Use Efficiency of Vegetation Year

### RUE Vegetation Year **Status**

Derived from fAPAR

Average 2002 - 2011



### RUE Vegetation Year **Trend**

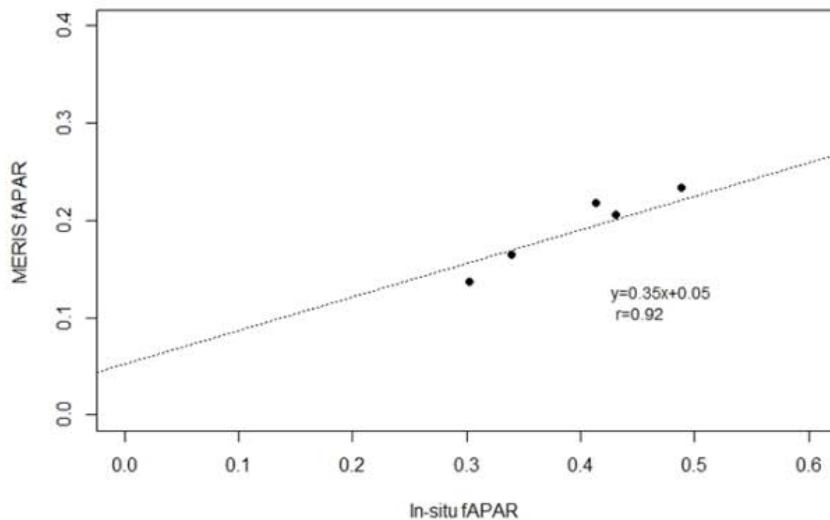
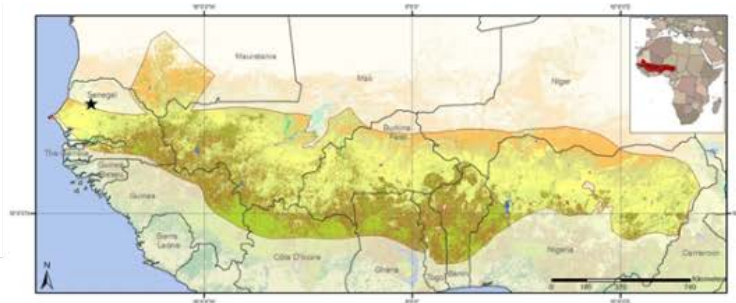
Trend slopes of RUE 2002 - 2011



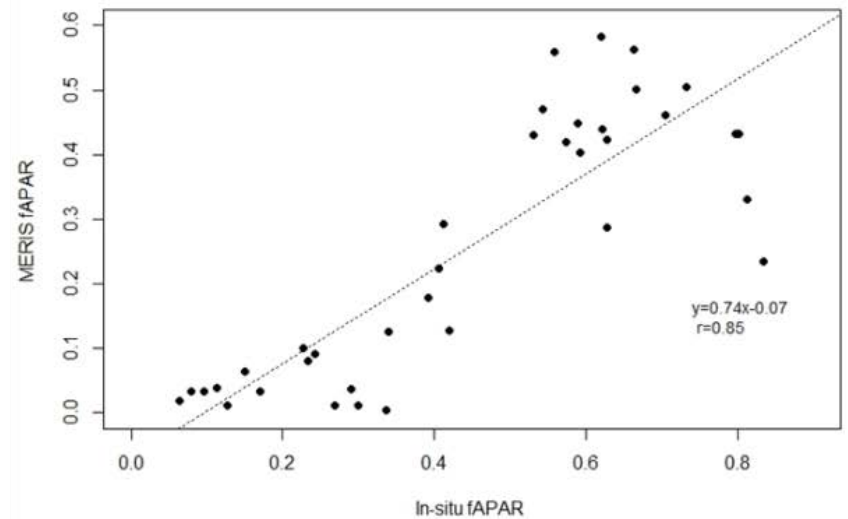
# Precipitation

Product		Content
<i>Vegetation Year Precipitation</i>		
<b>Vegetation Year Precipitation Status</b> trmm_rainfall_vegyear_average_classes	Vegetation Year Precipitation average 2002 - 2011, aggregated to 28 classes.	
<b>Vegetation Year Precipitation Variability</b> trmm_rainfall_vegyear_coeffvar_classes	Coefficient of variation of vegetation Year Precipitation 2002 - 2011, aggregated to 28 classes.	
<b>Vegetation Year Precipitation Trend (abs.)</b> trmm_rainfall_vegyear_mean_abs_trend_classes	Absolute trend of Vegetation Year Precipitation 2002 - 2011, aggregated to 15 classes.	
<b>Vegetation Year Precipitation Change</b> trmm_rainfall_vegyear_classes	Vegetation Year Precipitation Change between the two 4- year epochs ('2002 - 2006' / '2007 - 2011'), aggregated to 14 classes.	

# Validation - fAPAR



fAPAR integrated over growing season June-November, 2005-2009, 2011

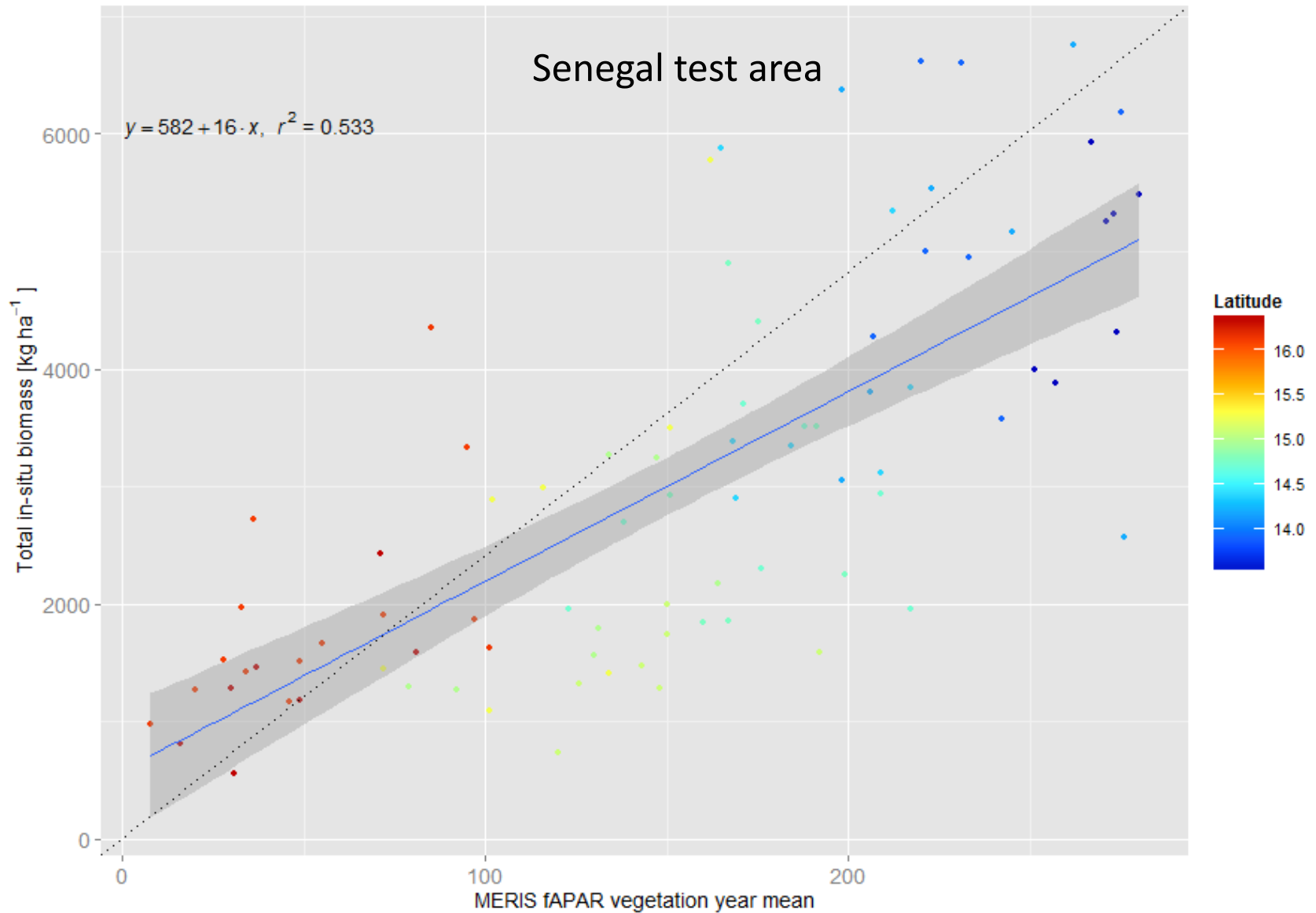


Increasing fAPAR values in the growing season, 2005-2011

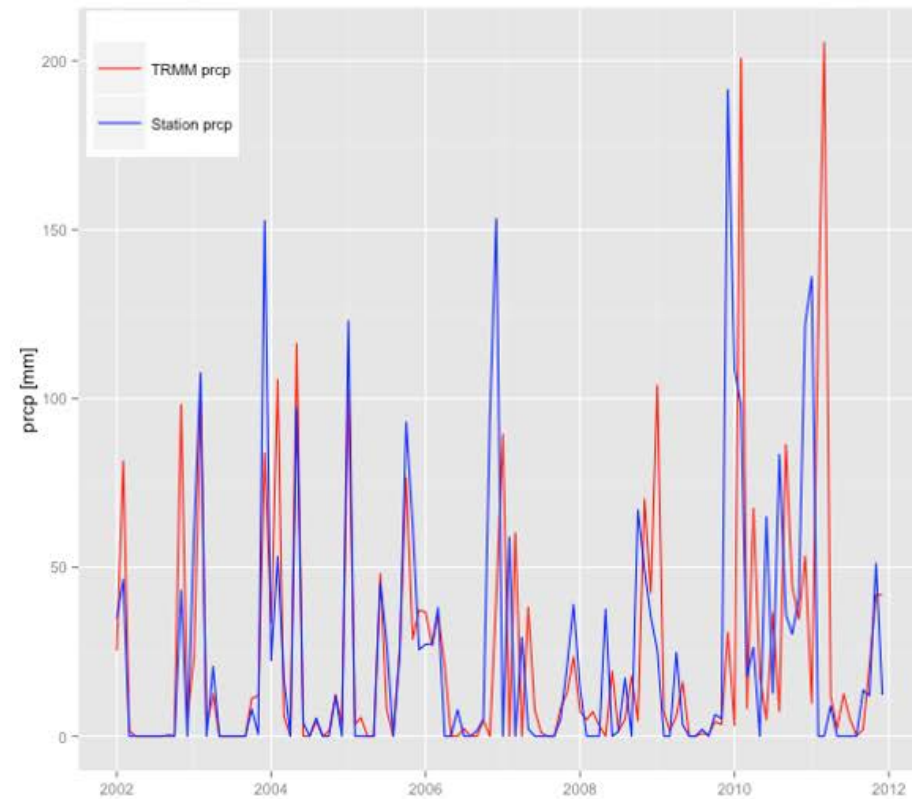
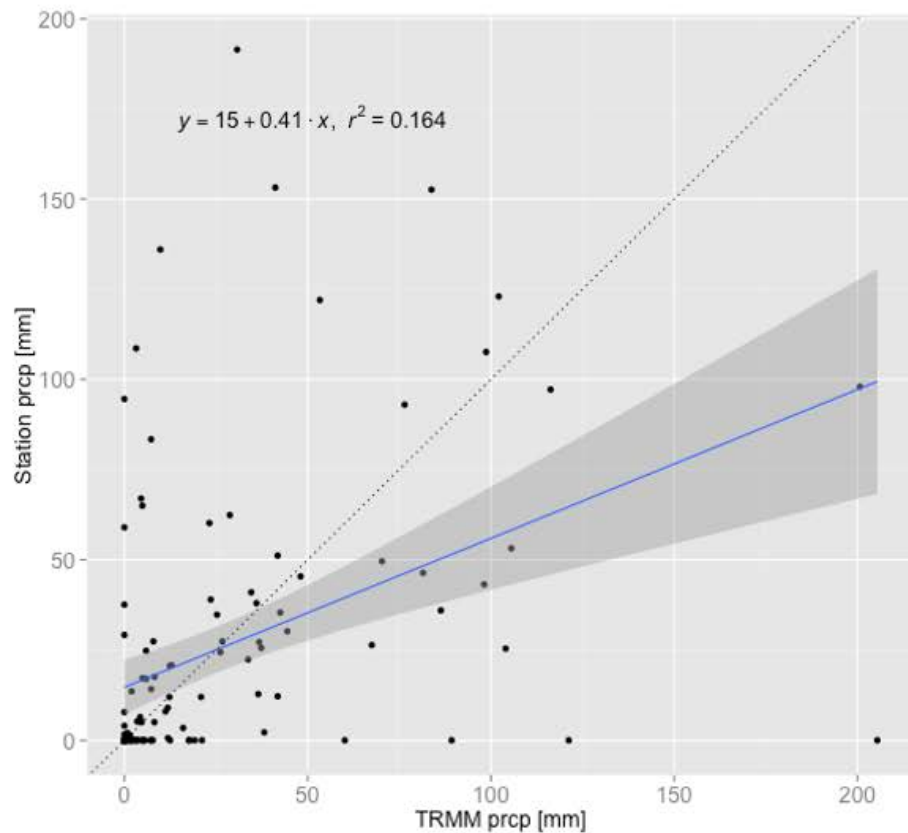
**Figure 43:** MERIS fAPAR versus ground measured fAPAR in Senegal (black star in upper image indicates location).



# Validation fAPAR as NPP Proxy



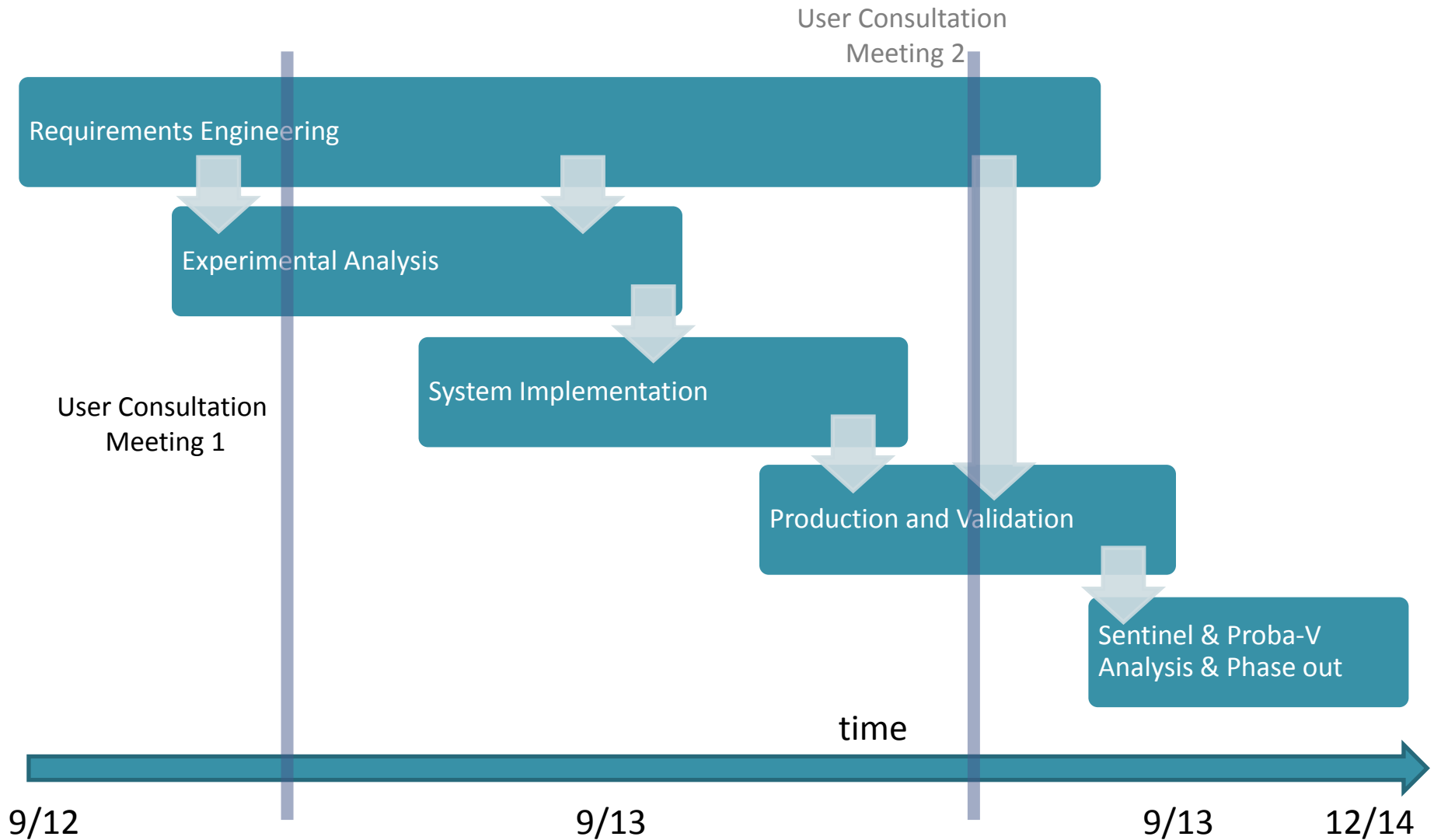
# Validation Rain Use Efficiency



# The 6 cornerstones of our Approach

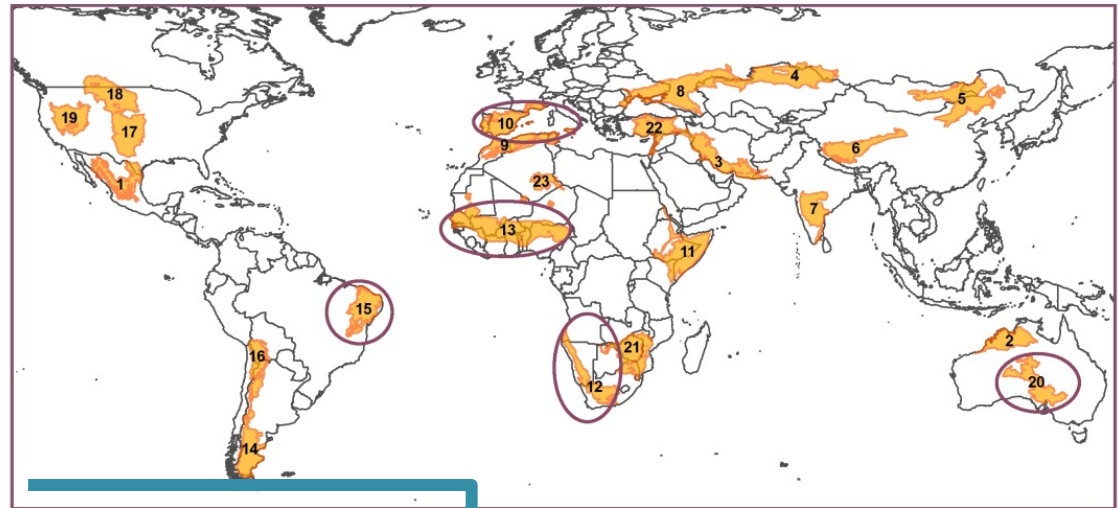
1. Link biodiversity users and EO experts
2. Selection of best algorithms
3. Software and production
4. Validation
5. Communication and product dissemination
6. Preparing the future

# Project Calendar



# What can you get today?

## For 5 Dryland Sites



- ..
- 10\_iberia
- 12\_southafrica
- 13\_west-sudanian-savanna
- 15\_caatinga
- 20\_australia

- ..
- 10\_iberia\_fapar\_gap\_filled
- 10\_iberia\_filled\_gaps\_metadata
- 10\_Iberia\_NPP\_status\_products
- 10\_Iberia\_NPP\_trend\_products
- 10\_Iberia\_RUE\_status\_products
- 10\_Iberia\_RUE\_trend\_products
- 10\_Iberia\_TRMM\_rainfall\_products
- file\_name\_table\_iberia.pdf
- Site 10\_Southern\_Europe\_prelim\_booklet

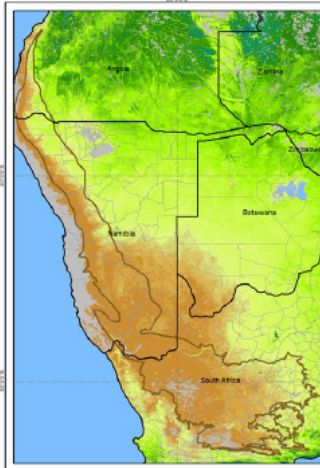
..	
2002_10_iberia_fapar_gap_filled_fin.tif	943.519.082
2003_10_iberia_fapar_gap_filled_fin.tif	1.617.440.432
2004_10_iberia_fapar_gap_filled_fin.tif	1.617.440.432
2005_10_iberia_fapar_gap_filled_fin.tif	1.617.440.432
2006_10_iberia_fapar_gap_filled_fin.tif	1.617.440.432
2007_10_iberia_fapar_gap_filled_fin.tif	1.617.440.432
2008_10_iberia_fapar_gap_filled_fin.tif	1.617.440.432
2009_10_iberia_fapar_gap_filled_fin.tif	1.617.440.432
2010_10_iberia_fapar_gap_filled_fin.tif	1.617.440.432
2011_10_iberia_fapar_gap_filled_fin.tif	1.617.440.432
2012_10_iberia_fapar_gap_filled_fin.tif	471.774.144



# Booklets

## Introduction

### Average Vegetation Year Greenness



#### Description:

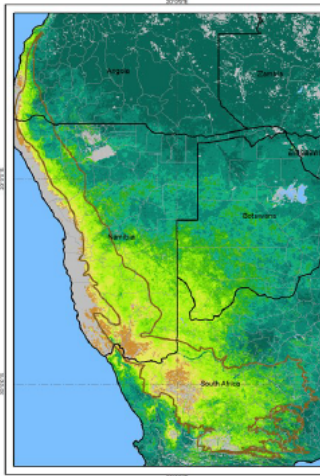
Status of ENVISAT MERIS APAR average vegetation year greenness, calculated as mean value for the period 2002-2011 in test site southern Africa. One vegetation year comprises one full phenological cycle of the vegetation.

#### Legend



Cartographic Reference:  
Projection: GCS\_WGS\_1984  
Datum: WGS 1984

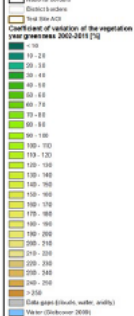
### Vegetation Year Variability



#### Description:

Variability of ENVISAT MERIS APAR vegetation year greenness expressed by the coefficient of variation for the period 2002-2011 in test site southern Africa. One vegetation year comprises one full phenologic cycle of the vegetation.

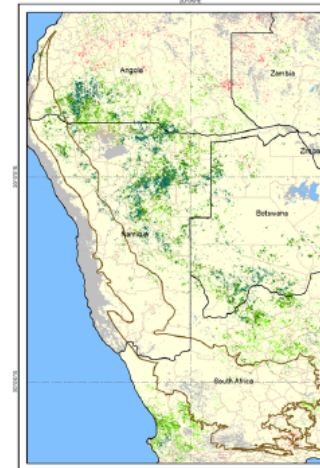
#### Legend



Cartographic Reference:  
Projection: GCS\_WGS\_1984  
Datum: WGS 1984

## Overview of Test Site

### Vegetation Year Greenness Trend (abs.)



#### Description:

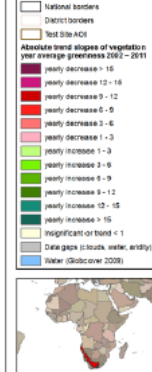
Slopes of absolute trends of ENVISAT MERIS APAR vegetation year averages in test site southern Africa throughout the period 2002-2011. One vegetation year comprises one full phenological cycle of the vegetation and hence constitute a proxy for the overall annual NPP. The vegetation year is defined to start at the onset of vegetation greening following first rainfalls and last until the end of the dry season. The actual start of each vegetation year is individually determined for each year.

Trends are calculated using the median trend estimator after Theil (1950) and Sen (1968). Only significant trends (p < 0.05) are depicted based on the trend test on significance according to Mann (1945) and Kendall (1975).

Trend values indicate average change per year. Original APAR values reach from 0 to 1 and have been stretched from 0 to 1000.

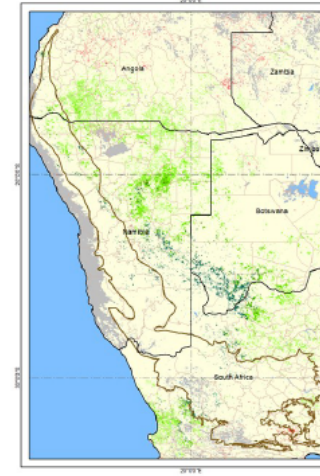
Data gaps in the time series resulting from cloud cover, or too pronounced aridity or water bodies have been masked out.

#### Legend



Cartographic Reference:  
Projection: GCS\_WGS\_1984  
Datum: WGS 1984

### Vegetation Year Greenness Trend (rel.)



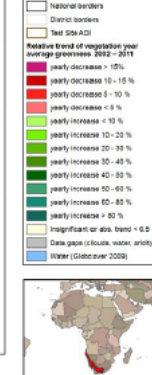
#### Description:

Relative yearly changes of ENVISAT MERIS APAR vegetation year averages in test site southern Africa throughout the period 2002-2011. One vegetation year comprises one full phenological cycle of the vegetation and hence constitute a proxy for the overall annual NPP. The vegetation year is defined to start at the onset of vegetation greening following first rainfalls and last until the end of the dry season. The actual start of each vegetation year is individually determined for each year.

Trends are calculated using the median trend estimator after Theil (1950) and Sen (1968). Only significant trends (p < 0.05) are depicted based on the trend test on significance according to Mann (1945) and Kendall (1975).

Data gaps in the time series resulting from cloud cover, or too pronounced aridity or water bodies have been masked out from the analysis.

#### Legend



Cartographic Reference:  
Projection: GCS\_WGS\_1984  
Datum: WGS 1984

Thanks!

