Intra-ACP Climate Service and related applications (ClimSA)

Climate Station

Product Report

Version 1.1.0

April 2022

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Abstract / Résumé
This document lists all the products available on Climate Station (or C-Station)

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	Details	Date
Version history		
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ACRONYMS and DEFINITIONS

ACMAD	African Centre of Meteorological Applications for Development
AGRHYMET	Centre Régional de Formation et d'Application en Agro météorologie et Hydrologie Opérationnelle
AU	African Union
CAPC-CA	Central Africa Regional Climate Centre
CIMH	Caribbean Institute of Meteorology and Hydrology
EO	Earth Observation
EUMETSAT	European Organisation for the Exploitation of Meteorological Satellites
EUMETCast	EUMETSAT's primary dissemination mechanism for the near real-time delivery of satellite data and products
FTP	File Transfer Protocol
GIS	Geographical Information System
IOC	Indian Ocean Commission
JRC	Joint Research Centre of the European Commission
MOI	Mauritius Oceanography Institute
REC	Regional Economic Communities
RCC	Regional Climate Centre
SADC-CSC	SADC Climate Services Centre
SPREP	Secretariat of Pacific Regional Environment Programme
TA	Technical Assistance
TAT	Technical Assistance Team
ACP	Africa Pacific Caribbean

1. INTRODUCTION

1.1 APPLICABLE AND REFERENCE DOCUMENTS

Id	Title	Date	Reference
AD-1			
AD-2			
AD-3			
AD-4			

Table 1: Applicable documents

Id	Title	Date	Reference
RD-1			
RD-2			
RD-3			

Table 2: Reference documents

1.2 SCOPE OF THE DOCUMENT

This document describes all EO products processed and visualized on the Climate Station, release 1.1.0. It is meant mainly for the thematic expert making use of the system.

2. DATASETS DISTRIBUTED ON CLIMATE STATION

The following tables contain the products treated on the Climate Station: firstly, the input products are listed, followed by the derived products computed by each processing chain. The reference period for the computation of LTA (Long Term Anomalies) is also indicated: normally, it corresponds to the whole datasets length, and is therefore longer then the temporal extension of time series locally available on the stations.

2.1 VEGETATION PRODUCTS

The products indicated in grey correspond to previous versions, which are still available on the Climate Station but not automatically activated.

2.1.1 Input products

Product code	Version	Ingested sub-product	Description	Coverage	Period for LTA	Ref
vgt-ndvi	vgt-pv-olci[1]	ndvi	NDVI from CGLS (1km)	Africa	1999-2019	link
vgt-ndvi	olci-v2.0	ndv	NDVI from CGLS at 300m	Africa	N/A	link
modis-ndvi[2]	1.0	ndvi, zndvi, ndvid	NDVI from BOKU university	Africa	N/A	link
modis-fapar[3]	1.0	fapar, 10dzscore	FAPAR products from DRO (0.01 degree)	Africa	N/A	link
wsi-hp	V1.0	pasture, crop	Water Satisfaction Index from JRC/MARS	Africa	N/A	link

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[1] Since July 2020, the PROBAV platform ended its operations and was replaced by Sentinel-3 products in Copernicus Global Land Service (CGLS). The NDVI vgt-pv-olci version is the temporal composition of VEGETATION, PROBAV and S3-OLCI (see olci-v2.0 below) products into a single timeseries, in order to allow LT anomaly detection.

[2] These products are available only for visualization on eStation online version http://estation.jrc.ec.europa.eu/eStation2/

2.2 INLAND WATER PRODUCTS

The following table describes the 'Inland water' products that are retrieved and ingested in the Climate Station. The reference period for the computation of LTA (Long Term Anomalies) is also indicated: normally, it corresponds to the whole datasets length, and is therefore longer then the temporal extension of timeseries locally available on the stations.

2.2.1 Input products

Product code	Version	Ingested sub-product	Description	Coverage	Period for LTA	Ref
wd-gee	V1.0	occurr	Inland water surface from Landsat – monthly occurrences (30m)	Africa[3]		link
wd-gee	V1.0	avg	Long Term average occurrences (30m)	Africa	1985-2015	
theia-wl	1.0	n.a.	Water level over lakes and rivers (CSV Point data)[4]			link

[3] The product is computed globally, but distributed over Africa only, divided by region

[4] This product serves only for data download over the lakes and rivers selected in data source description

2.3 RAINFALL PRODUCTS

The following table describes the 'rainfall' products that are retrieved and ingested in the Climate Station. The reference period for the computation of LTA (Long Term Anomalies) is also indicated: normally, it corresponds to the whole datasets length, and is therefore longer then the temporal extension of timeseries locally available on the stations.

2.3.1 Input Products

Product code	Version	Ingested sub-product	Description	Coverage	Period for LTA	Ref
fewsnet-rfe	2.0	10d	Precipitation estimates over 10 days	Africa	2001-2017	link
tamsat-rfe	3.0	10d	Precipitation estimates over 10 days	Africa	1983-2017	link
tamsat-rfe	3.1	10d	Precipitation estimates over 10 days	Africa	1983-2020	link
chirps-dekad	2.0	10d	Precipitation estimates over 10 days	Africa	1981-2017	link
arc2-rain	2.0	1d	Precipitation estimates from NASA-CPC(1983-Present)	Africa	NA	link
rain-spi	V1.0	spi-1mon	Standard Precipitation Index over 1month from JRC-MARS	Africa	NA	link
rain-spi	V1.0	spi-3mon	Standard Precipitation Index over 3months from JRC-MARS	Africa	NA	link
era-hourly-tp	1.0	tp	CDS ERA5 Total Precipitation rate hourly	ACP	NA	link
s5-monthly-tp	1.0	tp	Seasonal forecast 5 ensemble monthly mean of Total Precipitation rate	ACP	NA	link
efi-spi	1.0	1month	Wet and Dry Spells 1month forecast	ACP	NA	link
efi-spi	1.0	3month	Wet and Dry Spells 3 months forecast	ACP	NA	link
efi-spi	1.0	6month	Wet and Dry Spells 6 months forecast	ACP	NA	link

2.4 FIRE PRODUCTS

The following table describes the 'Fire' products that are retrieved and ingested in the Climate Station. The reference period for the computation of LTA (Long Term Anomalies) is also indicated: normally, it corresponds to the whole datasets length, and is therefore longer then the temporal extension of timeseries locally available on the stations.

2.4.1 Input Products

Product code	Version	Ingested sub-product	Description	Coverage	Period for LTA	Ref
modis-firms	V6.1	1day	Daily Active Fires at 1 km resolution	Africa	2002-Till date	link

2.5 MISCELLANEOUS PRODUCTS

The following table describes the 'Miscellaneous' products that are retrieved and ingested in the Climate Station. The reference period for the computation of LTA (Long Term Anomalies) is also indicated: normally, it corresponds to the whole datasets length, and is therefore longer then the temporal extension of time series locally available on the stations.

2.5.1 Input Products

Product code	Version	Ingested sub-product	Description	Coverage	Period for LTA	Ref
ascat-swi	V3.1	swi	Soil Water Index- Every day product (0.1 degree)	Africa	NA	link
cpc-sm[5]	1.0	sm	Soil Moisture – Monthly product (0.5 degree)	Africa	NA	link
lsasaf-et	Undefined	et	Evapotranspiration 30mins product	MSG-disk	NA	link
lsasaf-lst	Undefined	lst	Land Surface temperature 15mins product	MSG-disk	NA	link
s2-l1c[6]	V1.0	N/A	Sentinel 2 L1C products selected band acquisition alone from JEODPP		NA	link

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[5] This product data are available on JRC server since 2008.

[6] This product is introduced for Sentinel 2 data (selected bands) acquisition JRC Earth Observation Data and Processing Platform(JEODPP). The detailed description how to use the acquisition for other Sentinel 2 sensors (L2A) in mentioned in Appendix.

2.6 MARINE PRODUCTS

The following table describes the 'Marine' products that are retrieved and ingested in the Climate Station. The reference period for the computation of LTA (Long Term Anomalies) is also indicated: normally, it corresponds to the whole datasets length, and is therefore longer then the temporal extension of time series locally available on the stations.

2.6.1 Input Products

Product code	Version	Ingested sub-product	Description	Coverage	Period for LTA	Ref
modis-sst	v2013.1	sst-day	Ingested daily SST (4km)	Africa	Since 2002	link
modis-chla	v2013.1	chl-day	Ingested daily CHLA (4km)	Africa	Since 2002	link
modis-par	v2012.0	par-day	Ingested daily PAR (4km)	Africa	Since 2002	link
modis-kd490	v2012.0	kd490-day	Ingested daily KD490 (4km)	Africa	Since 2002	link
pml-modis-chla	3.0	chl-3day	Ingested CHL (1km)	Region	NA	link
pml-modis-sst	3.0	sst-3day	Ingested SST (1km)	Region	NA	link
olci-wrr	V02.0	chl-oc4me	Chlorophyl-a computed with oc4me algo (1km)	Africa	NA	link
olci-wrr	V02.0	tsm-nn	Total Suspended Matter computed with nn algo (1km)	Africa	NA	link
slstr-sst	1.0	wst	Sea Surface Temperature	Africa	NA	link
era-hourly-sst	1.0	sst	CDS ERA5 Sea Surface Temperature hourly	ACP	NA	link
era-monthly-sst	1.0	sst	CDS ERA5 Sea Surface Temperature Monthly	ACP	NA	link
s5-monthly-sst	1.0	sst	Seasonal forecast 5 ensemble monthly mean of Sea Surface temperature	ACP	NA	link

2.7 TEMPERATURE PRODUCTS

The following table describes the 'Temperature' products that are retrieved and ingested in the Climate Station.

2.7.1 Input Products

| Product code	Version	Ingested sub-product	Description	Coverage	Period for LTA	Ref
era-hourly-2mt	1.0	2mt	CDS ERA5 2 meter temperature hourly	ACP	NA	link
era-hourly-2mdw	1.0	2mdw	CDS ERA5 2 meter dew point temperature hourly	ACP	NA	link
s5-monthly-2mt	1.0	2mt	Seasonal forecast 5 ensemble monthly mean of 2 meter temperature	ACP	NA	link
s5-monthly-2mdw	1.0	2mdw	Seasonal forecast 5 ensemble monthly mean of 2 meter dew point temperature	ACP	NA	link
cdas-daily-temperature	1.0	tmax	Gridded daily temperature max	ACP	NA	link
cdas-daily-temperature	1.0	tmin	Gridded daily temperature min	ACP	NA	link

3. DESCRIPTION OF THE 'STANDARD' PROCESSING CHAINS

The current paragraph presents in a graphic manner how the 'derived' products are computed in the 'standard' processing chains, available in release 2.X.X, according to the following conventions:

- The 'entry' point of the processing chain is displayed at the top-left corner, and indicated with the number 0. It is normally an ingested product.
- Every group of derived products is indicated with an increasing number, according to the order of the computation.
- Some processing chains can be called with an option, which activates/deactivates some steps. When he steps are de-activated, the corresponding outputs are not updated (e.g. long-term statistics).
- The options are indicated in a table, together with the products the chain is applied to (non-exhaustive list). The default option is also indicated, for which the active computational steps are indicated in green in the diagram.

Processing chain: **std_precip**
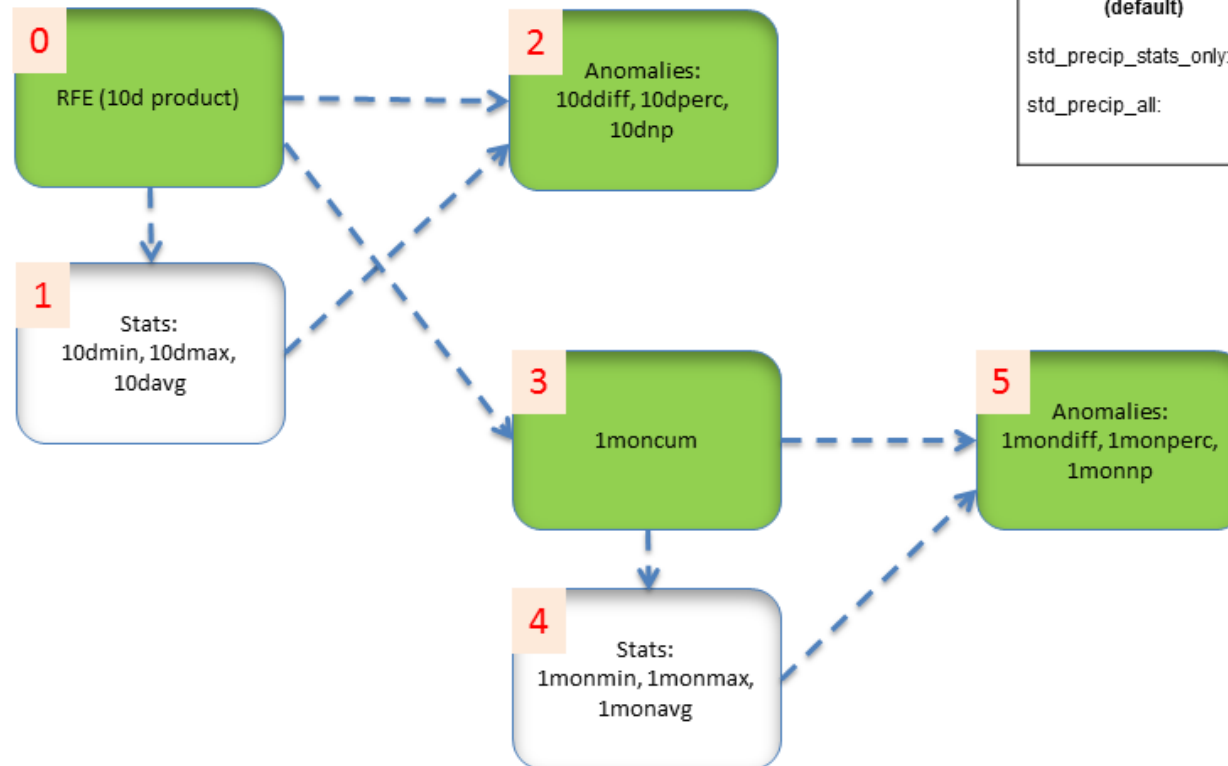
Applied to:	FEWSNET TAMSAT CHIRPS
Options:	
std_precip_prods_only (default)	**Activates: 2, 3 and 5**
std_precip_stats_only:	Activates: 1 and 4
std_precip_all:	Activates: all

0 RFE (10d product)

1 Stats: 10dmin, 10dmax, 10davg

2 Anomalies: 10ddiff, 10dperc, 10dnp

3 1moncum

4 Stats: 1monmin, 1monmax, 1monavg

5 Anomalies: 1mondiff, 1monperc, 1monnp

Processing chain: Standard Precipitation processing chain (**std_precip**)
Applied to: fewsnet-rfe, tamsat-rfe, chirps-dekad
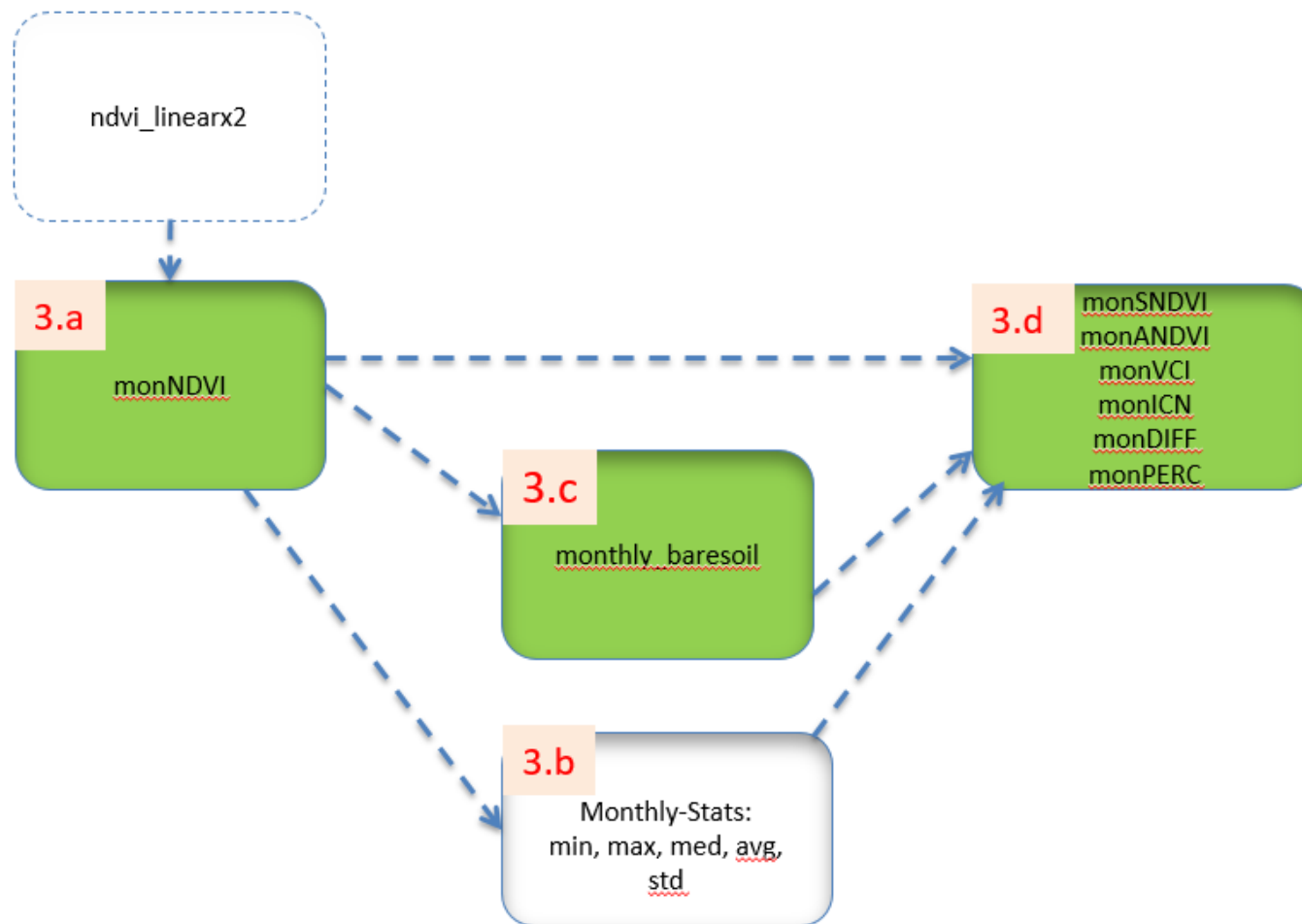
10davg	Statistic: multi-years average for each dekad
10dmin	Statistic: multi-years minimum for each dekad
10dmax	Statistic: multi-years maximum for each dekad
10ddiff	Anomaly: ABSOLUTE DIFFERENCE (10d – 10davg)
10dperc	Anomaly: RELATIVE DIFFERENCE % ((10d – 10davg)/10davg)
10dnp	Anomaly: Normalized Precipitation (10d- 10dmin)/(10dmax-10dmin)
10dratio	Anomaly: Precipitation Ratio 100*(10d/10davg)
1moncum	Cumulated 10day RFE over each month
1monavg	Statistic: multi-years average for each month
1monmin	Statistic: multi-years minimum for each month
1monmax	Statistic: multi-years maximum for each month
1mondif	Anomaly: ABSOLUTE DIFFERENCE (1moncum-1monavg)
1monperc	Anomaly: RELATIVE DIFFERENCE (1moncum-1monavg)/1monavg
1monnp	Anomaly: Normalized Precipitation (1moncum- 1monmin)/(1monmax-1monmin)

Processing chain: **std_ndvi**

0 NDV

1.a No-filter-Stats: min, max, med, avg, std

2.a ndvi_linearx1
ndvi_linearx2

2.b Filtered-Stats: min, max, med, avg, med linearx2
year_min, year_max linearx2
absol_min, absol_max linearx2

2.c baresoil_linearx2

2.d Anomalies: diff_linearx2
perc_linearx2
difflinearx2_linearx2
stddiff2avg_linearx2
vci_linearx2
icn_linearx2

1.b Anomalies (diff, vci, icn)

1.c Masks (baresoil)

Applied to:	vgt-ndvi
Options:	
std_ndvi_prods_only (default)	Activates: 2, 4, 5, 6, 7, 8, 10
std_ndvi_stats_only:	Activates: 1, 3, 9
std_ndvi_all:	Activates: all

Processing chain: **std_ndvi** (continued)

ndvi_linearx2

3.a
monNDVI

3.c
monthly_baresoil

3.b
Monthly-Stats:
min, max, med, avg,
std

3.d
monSNDVI
monANDVI
monVCI
monICN
monDIFF
monPERC
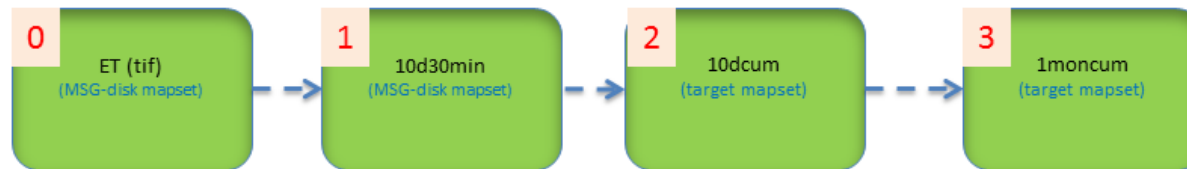
Derived products

Processing chain: Standard Precipitation processing chain for VGT NDVI (**std_vgt_ndvi**)

Applied to: vgt-ndvi

|	
ndvi-linearx2	Filtered NDVI (linear filtering applied twice)
10davg-linearx2	Statistic: AVG of ndvi-linearx2
10dmin-linearx2	Statistic: MIN of ndvi-linearx2
10dmax-linearx2	Statistic: MAX of ndvi-linearx2
10dmed-linearx2	Statistic: MED of ndvi-linearx2
10dstd-linearx2	Statistic: STD of ndvi-linearx2
10ddiff-linearx2	Anomaly: DIF of ndvi-linearx2
10dsndvi-linearx2	Anomaly: SNDVI of ndvi-linearx2 (aka z-score)
10dperc-linearx2	Anomaly: PERC difference of ndvi-linearx2 (100*(curr-LTA)/LTA)
linearx2diff-linearx2	Anomaly: Absolute Difference (ndvi-linearx2 -10davg-linearx2)
vci-linearx2	Anomaly: VCI (linearx2 vs. linearx2 statistics)
icn-linearx2	Anomaly: ICN (linearx2 vs. linearx2 statistics)
ratio-linearx2	Anomaly: Ratio (100 * ndvi-linearx2/10davg-linearx2)
monndvi	Indicator: monthly NDVI (from ndvi-linearx2)
1monavg	Statistic: monthly multi-year average NDVI
1monmin	Statistic: monthly multi-year min NDVI
1monmax	Statistic: monthly multi-year max NDVI
1monicn	Statistic: monthly ICN NDVI
1monvci	Statistic: monthly VCI NDVI
1monstd	Statistic: monthly std NDVI
1mondiff	Anomaly: monthly diff NDVI
1monperc	Anomaly: monthly perc NDVI
1monsndvi	Anomaly: monthly SNDVI (aka z-score)
monthly-ratio	Anomaly: monthly ratio

Processing chain: **std_lsasaf_et**

0		1		2		3	
ET (tif) (MSG-disk mapset)	→	10d30min (MSG-disk mapset)	→	10dcum (target mapset)	→	1moncum (target mapset)	

Applied to:	lsasaf-et
Only default option	
Notes:	10d and 1mon stats and anomalies to be added

Processing chain: Standard Processing chain for LSASAF ET related products (**std_lsasaf_et**)

Applied to: lsasaf-et

10d30min^2	Statistics (30min average over 10 days)	MSG-disk
10dcum	Indicator: ET cumulated over 10 days	Africa
1moncum	Indicator: ET cumulated over 1 month	Africa

Processing chain: **std_lsasaf_lst**

| Applied to:	lsasaf-lst
Only default option	
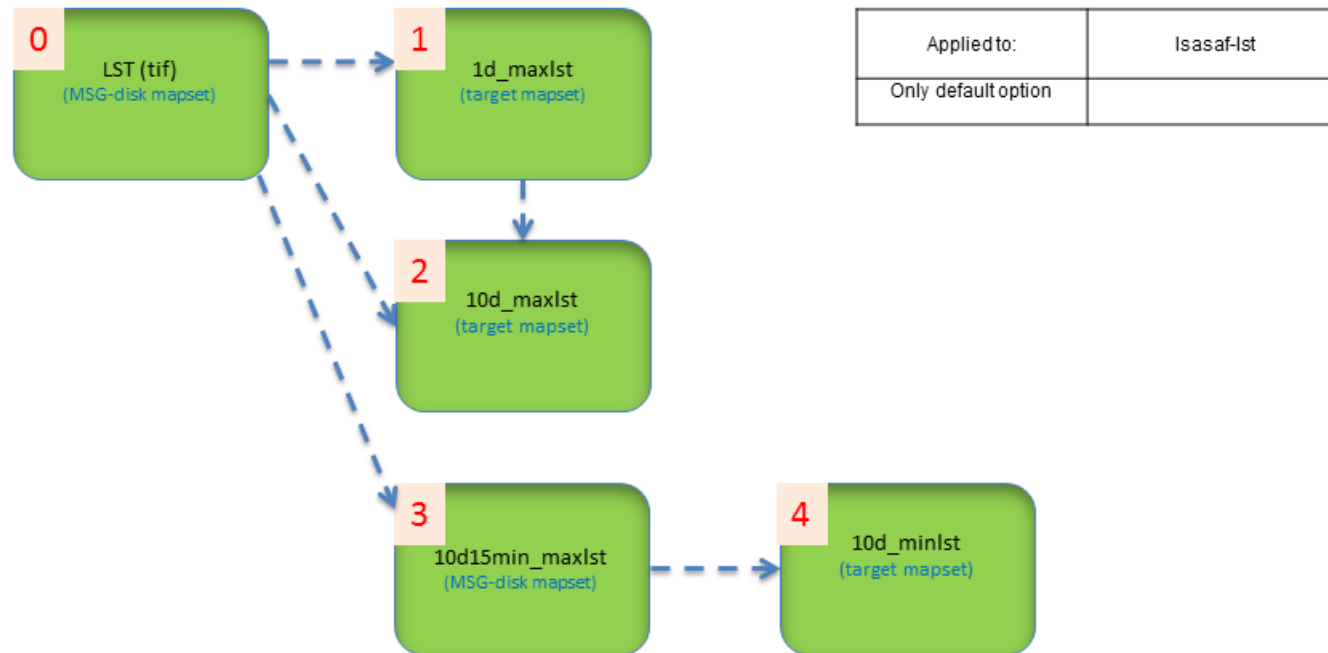
Processing chain: Standard Processing chain for LSASAF LST related products (std_lsasaf_lst)

Applied to: lsasaf-lst

| 10d15min^2	Statistics (15min max over 10 days)	MSG-disk
1dmax	Indicator: LST maximum over 1 day	Africa
10dmax	Indicator: LST maximum over 10 days	Africa
10dmin	Indicator: LST minimum over 10 days	Africa

Processing chain: **std_modis_monavg**
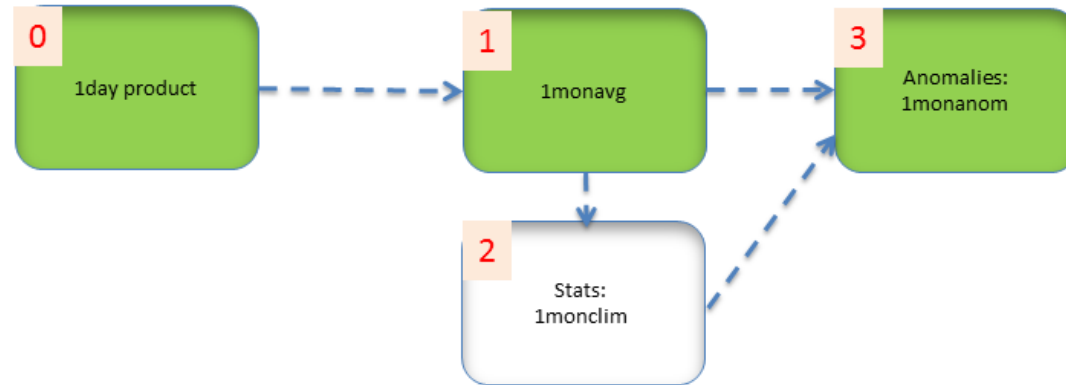
Applied to:	modis-chla modis-sst modis-kd490 modis-par
Only default option	
Notes:	The computation of 1monclim is done once for all (no updated)

Processing chain: Standard Processing chain for MODIS monthly average computation (**std_modis_monavg**)

Applied to: modis-chla, modis-sst, modis-par, modis-kd490

8daysavg	8 days Average
monavg	Monthly average
monclim	Monthly Climatology
monanom	Monthly Anomaly (monthly - climatology)

Processing chain: **std_fronts**
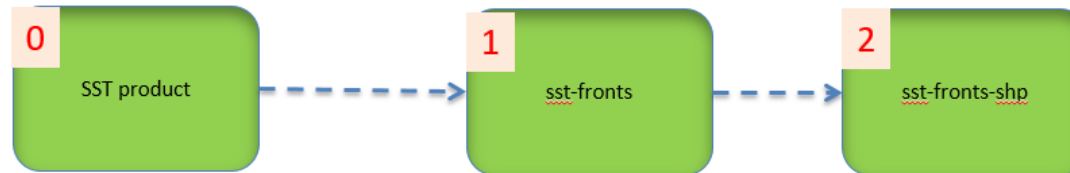

Applied to:	modis-sst pml-modis-sst slstr-sst
Only default option	

Processing chain: Standard Processing chain for fronts computation (**std_fronts**)
Applied to: pml-modis-sst, slstr-sst

sst-fronts	Fronts of Sea Surface Temperature
sst-fronts-shp[7]	Fronts of SST in shapefile format

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[7] On top of the GeoTiff file (sst-fronts) this product is created for usage in QGIS or other applications (it is not visualized by Climate Station viewer).
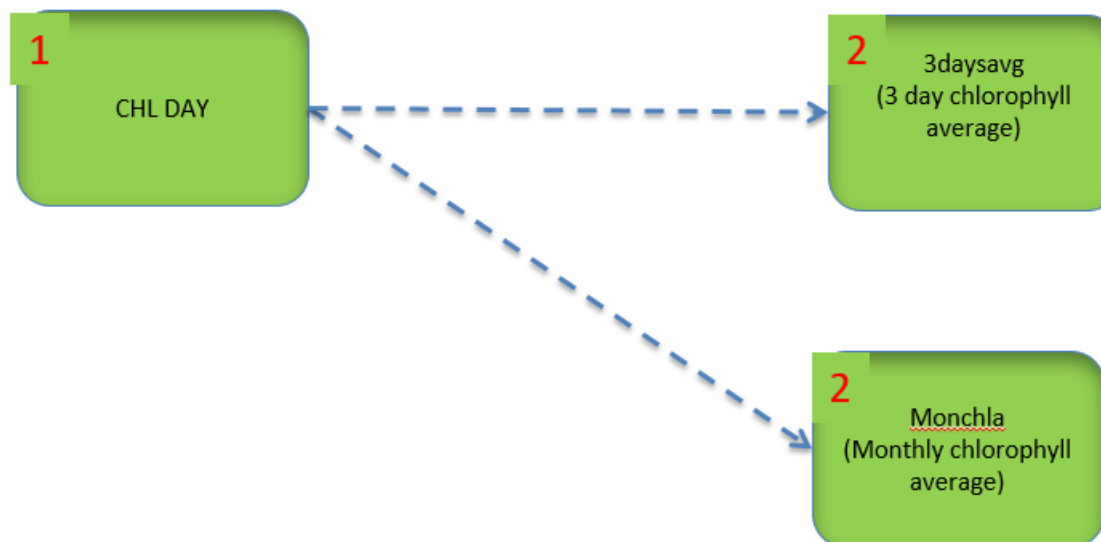
Processing chain: std_modis_firms
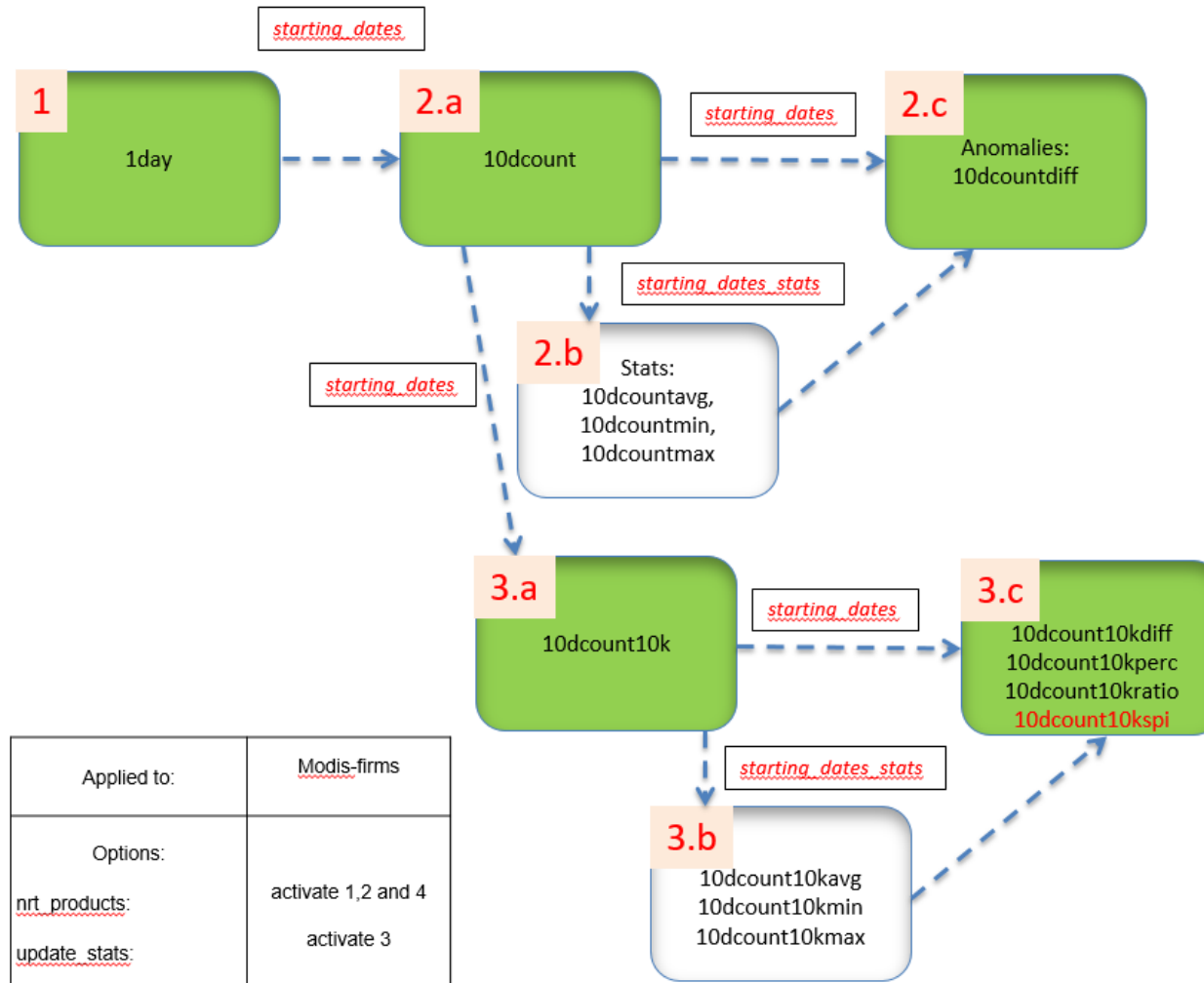
Processing chain: Processing chain of standard MODIS FIRMS products (**std_modis_firms**)
Applied to: modis-firms

10dcount	Number of fires over 10 day period
10dcountavg	Multi-years average number of 10dcount
10dcountmin	Multi-years minimum number of 10dcount
10dcountmax	Multi-years maximum number of 10dcount
10dcountdiff	Difference between 10dcount and 10dcountavg
10dcount10K	Number of fires over 10 day period over 10 Km grids
10dcount10Kavg	Multi-years average number of 10dcount over 10 Km grids
10dcount10Kmin	Multi-years minimum number of 10dcount over 10 Km grids
10dcount10Kmax	Multi-years maximum number of 10dcount over 10 Km grids
10dcount10Kdiff	Difference between 10dcount and 10dcountavg over 10 Km grids
10dcount10Kratio	Ratio between 10dcount and 10dcountavg over 10 Km grids

Processing chain: std_olci_wrr

Processing chain: Standard Processing chain for 3day average, monthly average products computation (**std_olci_wrr**)
Applied to: slstr-sst, olci-wrr

3daysavg	3day average Product
monavg	Monthly average product

Processing chain: std_gradient

1 CHL or SST
(chlorophyll or sea
surface temperature)

- - - →

2 gradient
(chlorophyll or sst)

Processing chain: std_monavg

1 Any daily product
(chlorophyll or sea
surface temperature
etc)

- - - →

2 monavg
(Montly average)

Processing chain: std_3dayavg

1 Any daily product
(chlorophyll or sea
surface temperature
etc)

- - - →

2 3dayavg
(3 day product)

Processing chain: Standard Processing chain for gradient computation (**std_gradient**)
Applied to: modis-chla, slstr-sst, olci-wrr

| gradient	Horizontal Gradient for chlorophyll and sea surface temperature.

Processing chain: Standard Processing chain for monthly average computation from daily products (**std_monavg**)
Applied to: slstr-sst, olci-wrr

monavg	Monthly averaged for sst or chla

Processing chain: Standard Processing chain for monthly average computation from daily products (**std_3dayavg**)
Applied to: slstr-sst

| 3dayavg	Three day averaged for sst or chla

Processing chain: **modis_pp**
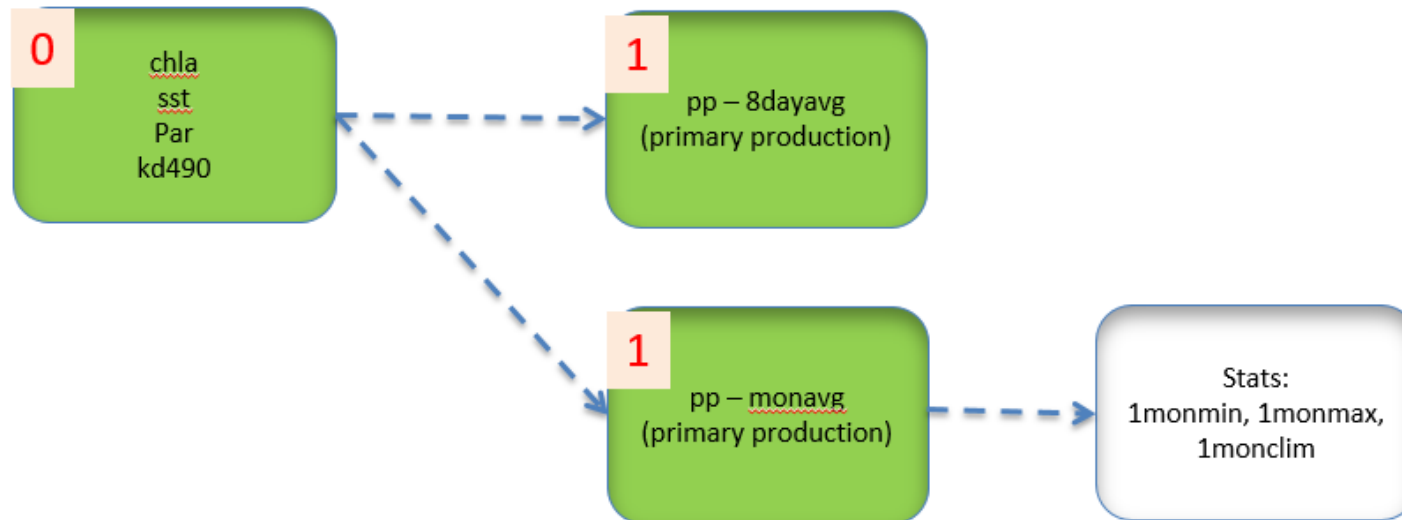
Processing chain: Non Standard Processing chain for Primary production computation (**modis_pp**)
Applied to: modis-chla, modis-sst, modis-par, modis-kd490 are the 4 inputs for computing PP

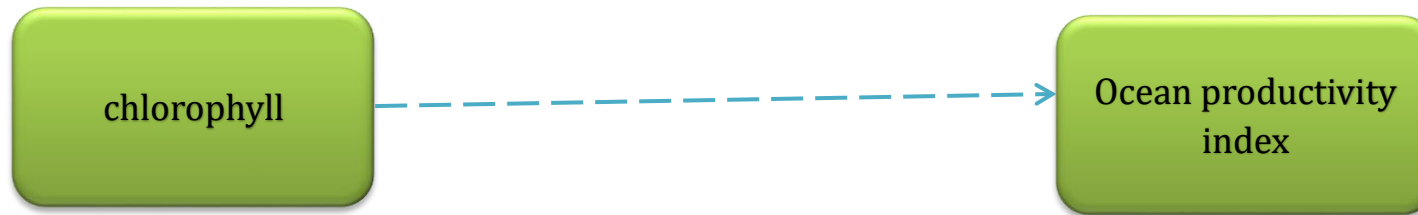| 8daysavg	Average Primary production over 8 days
monavg	Monthly average primary production

Processing chain: std_reproject
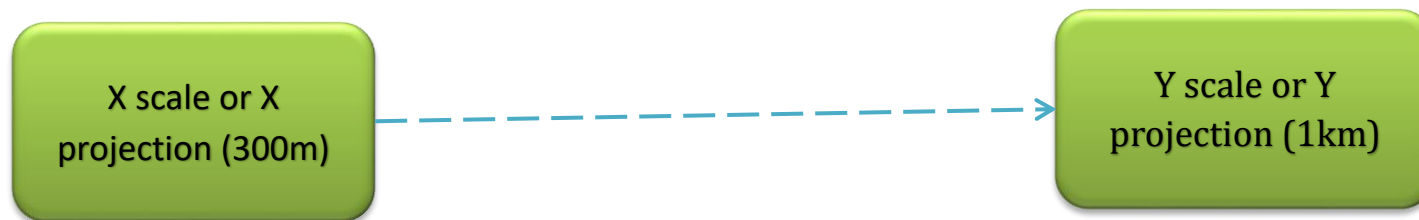
Processing chain: Standard Processing chain to convert to one resolution, one projection from existing resolution and projection (**std_reproject**)
Applied to: vgt-ndvi

ndvi	Reprojected data from 300m to 1km

Processing chain: std_opfish

```
┌─────────────────┐                          ┌─────────────────┐
│                 │                          │ Ocean productivity│
│   chlorophyll   │ - - - - - - - - - - - -> │      index       │
│                 │                          │                 │
└─────────────────┘                          └─────────────────┘
```

Processing chain: Standard Processing chain to generate Ocean productivity index from chorophyll (**std_opfish**)
Applied to: modis-chla

opfish	Ocean productivity index from Modis chlorophyll data