Dynamic Anomaly Properties (DAP) – Products Description

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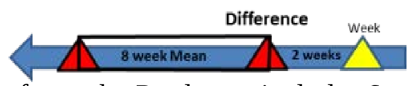
Description: ***Biological, Optical, and Physical*** **Ocean anomaly properties** for the Gulf of Mexico are weekly products created by the OWX to identify areas of abnormal events using (VIIRS) satellite and America Seas NCOM ocean model *(Arnone, Jones: 2017)*. Anomaly properties include the difference of the weekly average and the previous 8 week mean with a 2 week lag. Positive anomaly indicates an increase and negative values a decrease.



There are 11 Biological, Optical, and Physical properties with 9 products for each. Products includes 6 Masks (.5 - 4) of the Standard deviation of the 8 Week mean to identify the level of the anomaly. The Mask can be overlaid on the anomaly to block areas less that std Deviation Mask. The data Files are both NCDF and kml format for use in **GOOGLE earth**. Example

A - Properties

Bio- optical physical ***name***

VIIRS

1. **Chlorophyll→** **CHL**
2. **Zeu- Photic depth** **ZEU**
3. **Sea Surf Temperature** **MCSST**
4. **Kd- Attenuation Coef** **KD486**
5. **BB551- Backscattering** **BB551**
6. **Absorption 443** **A443**
7. **Salinity** (absorption 486-550) **SAL**

America Seas Model

8. **Sea Surf Temperature** **amsst**
9. **AmSalinity** **amsal**
10. ***AmCurrents*** **amcurr**

B - Products –KML

For each property

File Name

1. Weekly
2. StDev Mask 4
3. StDev Mask 3
4. StDev Mask 2
5. StDevmask1
6. StDevMask1.5
7. StDevMask0.5
8. StDev Image
9. Anomaly
10. 8Wk Avg

C - File Names – Chlorophyll & AMSST

1 CHL_Weekly_07272016_.kmz
2 CHL_StDevMask4_07272016_.kmz
3 CHL_StDevMask3_07272016_.kmz
4 CHL_StDevMask2_07272016_.kmz
5 CHL_StDevMask1_07272016_.kmz
6 CHL_StDevMask15_07272016_.kmz
7 CHL_StDev_Mask05_07272016_.kmz
8 CHL_StDev_07272016_.kmz
9 CHL_Anomaly_07272016_.kmz
10 CHL_8wkAvg_07272016_.kmz

1 amsst_Weekly_07272016_.kmz
2 amsst_StDevMask4_07272016_.kmz
3 amsst_StDevMask3_07272016_.kmz
4 amsst_StDevMask2_07272016_.kmz
5 amsst_StDevMask1_07272016_.kmz
6 amsst_StDevMask15_07272016_.kmz
7 amsst_StDev_Mask05_07272016_.kmz
8 amsst_StDev_07272016_.kmz
9 amsst_Anomaly_07272016_.kmz
10 amsst_8wkAvg_07272016_.kmz

C. File Names of example (kml) for the Chlorophyll and the Model SST products for week of 7/27/2017. Similar file names for all other properties listed in Column A (change CHL to Zeu etc) .

Year	Month	Week
2013	Jan	i_07272016
2014	Feb	i_07192016
2015	Mar	i_07112016
2016	Apr	i_07032016
2017	May	
2018	June	
	July	
	Aug	
	Sept	
	Oct	
	Nov	
	Dec	

DAP data is organized by year, month, week from 2013 to 2018. The weekly products represents 8 day following the date. Example 07272016 is July 272016 to Aug 3,2016.

Dap Data - NCDF and KML Located at NOAA NCEI→

https://ecowatch.ncddc.noaa.gov/thredds/AMSEAS_VIIRS_DAP/catalog_data.html

NOAA ERDAP→ https://www.ncdc.noaa.gov/data-access/model-data/model-datasets/navoceano-ncom-reg

Daily Imagery Located at USM- Ocean Weather

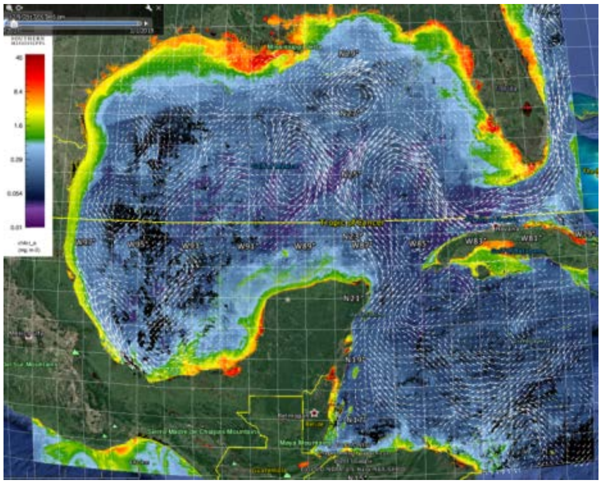
https://www.usm.edu/marine/dap

Arnone, R., Jones, B. 2017 " Monitoring abnormal bio-optical and physical properties in the Gulf of Mexico ", ***Proc. SPIE*** **10186, Ocean Sensing and Monitoring IX, 101860O (May 22, 2017); doi:10.1117/12.2266789** http://dx.doi.org/10.1117/12.2266789

Weekly DAP products in the Gulf of Mexico coverage area

Latitude 15- 31 N and Longitude -79- -98

Products include:



Satellite Data - VIIRS SNPP satellite SDR data is obtained from NOAA CLASS daily and processed daily using a USM processing methods by the Ocean Weather Laboratory which is based on the NRL SSC and NASA SeaDas processing. Daily SNPP data is used to determine weekly products and the DAP products. The SNPP data is at a 750 m resolution and coverage coastal estuaries and lakes surrounding the Gulf of Mexico.

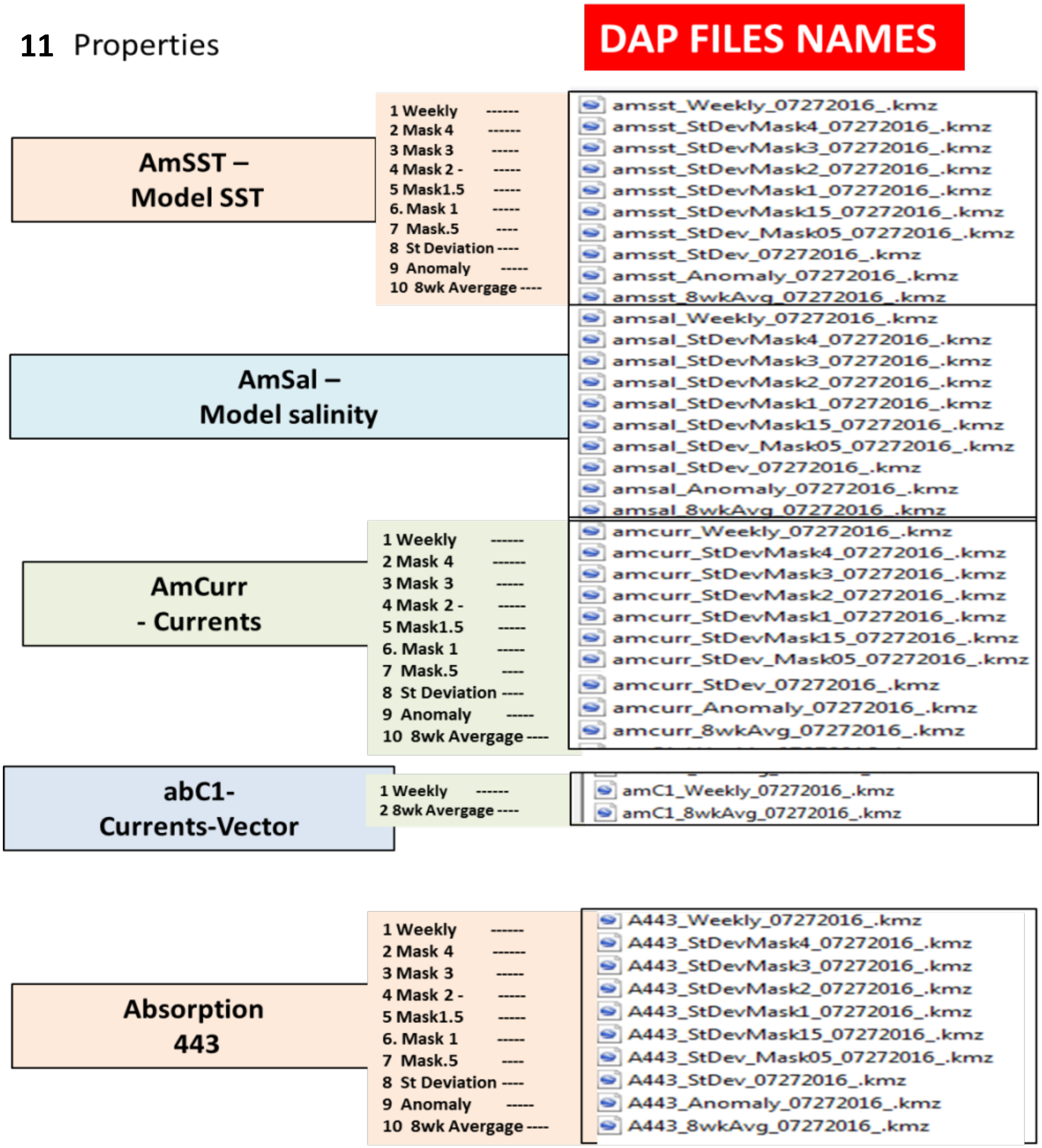
1. **Chlorophyll –** Ocean color data from VIIRS normalized water leaving radiance (nLw) uses the Spectral channels 440 and 550 to determine the surface chlorophyll representing the concentration within surface water of the first attenuation coefficients (O'Reilly et al,2000; NASA Tech. Memo. 2000-206892, Vol. 11
2. **Zeu –Photic depth –** The depth in meters that 1% of the surface light level penetrates the water column. This algorithm used the VIIRS spectral ocean color channels and provides water clarity. Clearer waters have deep penetration. (Lee et al 2007 - http://scholarcommons.usf.edu/cgi/viewcontent.cgi?article=1010&context=msc_facpub)
3. **Sea Surface Temperature –** The VIIRS thermal Infrared channels uses a multichannel seasurface temperature algorithm (MCSST) to determine surface temperature (McBride et al, 2013 http://www.dtic.mil/get-tr-doc/pdf?AD=ADA583680) .
4. **Kd- Attenuation Coefficient –** The VIIRS spectral channels are used to determine the rate of attenuation of the 486 nm light levels (ref). The first attenuation coefficient (1/kd) represents the depth of the satellite depth. (Lee, Du, Arnone 2005; DOI:10.1029/2004JC002573)
5. **Backscattering bb551-** The Inherent optical properties (IOP) of the backscattering at 551 nm from the VIIRS spectral channels used the QAA (Lee, Carder, Arnone ; http://dx.doi.org/10.1364/ao.41.005755) algorithms to determine the particle scattering and a means to estimate turbidity with higher bb551 values.
6. **Absorption 443-** The Spectral water leaving radiance from VIIRS us used to determine the water IOP property of absorption at 443 nm using the from the QAA algorithm. (Lee, Carder, Arnone 2016 http://dx.doi.org/10.1364/ao.41.005755) Absorption at 443 can be used to assess the ocean color from CDOM (color dissolved organic material).
7. **Salinity –** The VIIRS IOP products for absorption at 486 and 550 using the QAA algorithms are used to to estimate the surface salinity using the absorption spectral difference (Vandermeulen, 2012 https://www.usm.edu/sites/default/files/groups/division-marine-science/pdf/owx_pub_9_vandemeulen_spie_2014_salinity.pdf). The algorithms were created based on northern Gulf of Mexico and have some limitations.

America Seas Model – NCOM

Circulation model of the Gulf of Mexico that is a NRL NCOM model that on the NOAA NCEI ERDAP site in real time . https://ecowatch.ncddc.noaa.gov/erddap/griddap/NCOM_amseas_20100509_to_20130404_3d.graph

The model spatial resolution is 4 km and the model output is every 3 hours. The model is forced by COAMP atmospheric model and data assimilation of the SSH and SST. DAP products include:

1) **Temperature – AMSST** -surface model which are weekly 8 day averages of daily times of 0, 3,6,9,12,15,18 GMT.
2) **Salinity – AmSal** – surface model salinity of Weekly 8 day averages of daily times
3) **Currents AmCurrents surface**; weekly magnitude and direction from the daily model data to determine averages..



DAP FILES NAMES

Properties

ZEU- Euphotic Depth

1 Weekly ------
2 Mask 4 ------
3 Mask 3 -----
4 Mask 2 - -----
5 Mask1.5 -----
6. Mask 1 -----
7 Mask.5 ----
8 St Deviation ----
9 Anomaly -----
10 8wk Avergage ----

ZEU_Weekly_07272016_.kmz
ZEU_StDevMask4_07272016_.kmz
ZEU_StDevMask3_07272016_.kmz
ZEU_StDevMask2_07272016_.kmz
ZEU_StDevMask1_07272016_.kmz
ZEU_StDevMask15_07272016_.kmz
ZEU_StDev_Mask05_07272016_.kmz
ZEU_StDev_07272016_.kmz
ZEU_Anomaly_07272016_.kmz
ZEU_8wkAvg_07272016_.kmz

Sal- Salinity VIIRS

1 Weekly ------
2 Mask 4 ------
3 Mask 3 -----
4 Mask 2 - -----
5 Mask1.5 -----
6. Mask 1 -----
7 Mask.5 ----
8 St Deviation ----
9 Anomaly -----
10 8wk Avergage ----

SAL_Weekly_07272016_.kmz
SAL_StDevMask4_07272016_.kmz
SAL_StDevMask3_07272016_.kmz
SAL_StDevMask2_07272016_.kmz
SAL_StDevMask1_07272016_.kmz
SAL_StDevMask15_07272016_.kmz
SAL_StDev_Mask05_07272016_.kmz
SAL_StDev_07272016_.kmz
SAL_Anomaly_07272016_.kmz
SAL_8wkAvg_07272016_.kmz

MCSST- Temperature

MCSST_Weekly_07272016_.kmz
MCSST_StDevMask4_07272016_.kmz
MCSST_StDevMask3_07272016_.kmz
MCSST_StDevMask2_07272016_.kmz
MCSST_StDevMask1_07272016_.kmz
MCSST_StDevMask15_07272016_.kmz
MCSST_StDev_Mask05_07272016_.kmz
MCSST_Anomaly_07272016_.kmz
MCSST_8wkAvg_07272016_.kmz

KD – Attenuation Coefficient

KD486_Weekly_07272016_.kmz
KD486_StDevMask4_07272016_.kmz
KD486_StDevMask3_07272016_.kmz
KD486_StDevMask2_07272016_.kmz
KD486_StDevMask1_07272016_.kmz
KD486_StDevMask15_07272016_.kmz
KD486_StDev_Mask05_07272016_.kmz
KD486_StDev_07272016_.kmz
KD486_Anomaly_07272016_.kmz
KD486_8wkAvg_07272016_.kmz

CHl- Chlorophyll

1 Weekly ------
2 Mask 4 ------
3 Mask 3 -----
4 Mask 2 - -----
5 Mask1.5 -----
6. Mask 1 -----
7 Mask.5 ----
8 St Deviation ----
9 Anomaly -----
10 8wk Avergage ----

CHL_Weekly_07272016_.kmz
CHL_StDevMask4_07272016_.kmz
CHL_StDevMask3_07272016_.kmz
CHL_StDevMask2_07272016_.kmz
CHL_StDevMask1_07272016_.kmz
CHL_StDevMask15_07272016_.kmz
CHL_StDev_Mask05_07272016_.kmz
CHL_StDev_07272016_.kmz
CHL_Anomaly_07272016_.kmz
CHL_8wkAvg_07272016_.kmz

BB551- Backscattering

BB551_Weekly_07272016_.kmz
BB551_StDevMask4_07272016_.kmz
BB551_StDevMask3_07272016_.kmz
BB551_StDevMask2_07272016_.kmz
BB551_StDevMask1_07272016_.kmz
BB551_StDevMask15_07272016_.kmz