

SST Input Study on the MODIS Cloud Top Pressure Product

Eva Borbas and Paolo Veglio

UW-Madison/SSEC

Feb 6, 2023

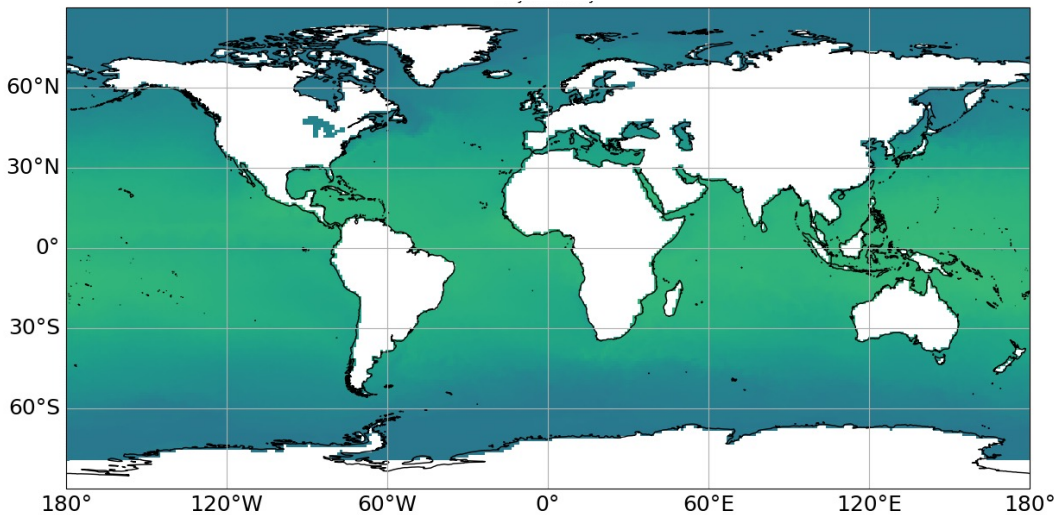
SST Input Study

- On November 27, 2022, NOAA discontinued the production of the Reynolds Sea Surface Temperature (SST) weekly data files used to generate several cloud products (i.e., MOD35, MOD06, MOD85).
- Replacement: daily mean Optimum Interpolation Sea Surface Temperature (OISST) data provided by NCEI-NOAA (<https://www.ncei.noaa.gov/data/sea-surface-temperature-optimum-interpolation/v2.1/access/avhrr/202301/>)
- An oisst_nc2bin converter package has been developed to create a pseudo-Reynolds SST data.
- Two granules are tested: Jan 15, 2021, at 14:15 UTC and 22:25 UTC
- MYD35 and MYD06 were processed with
 - Weekly mean Reynolds SST (1-degree, global, binary)
 - Month-old weekly mean Reynolds SST (1-degree, global, binary)
 - Daily mean OISST (0.25 degree, ocean only, NetCDF)
- Cloud Mask and CTP have been compared.

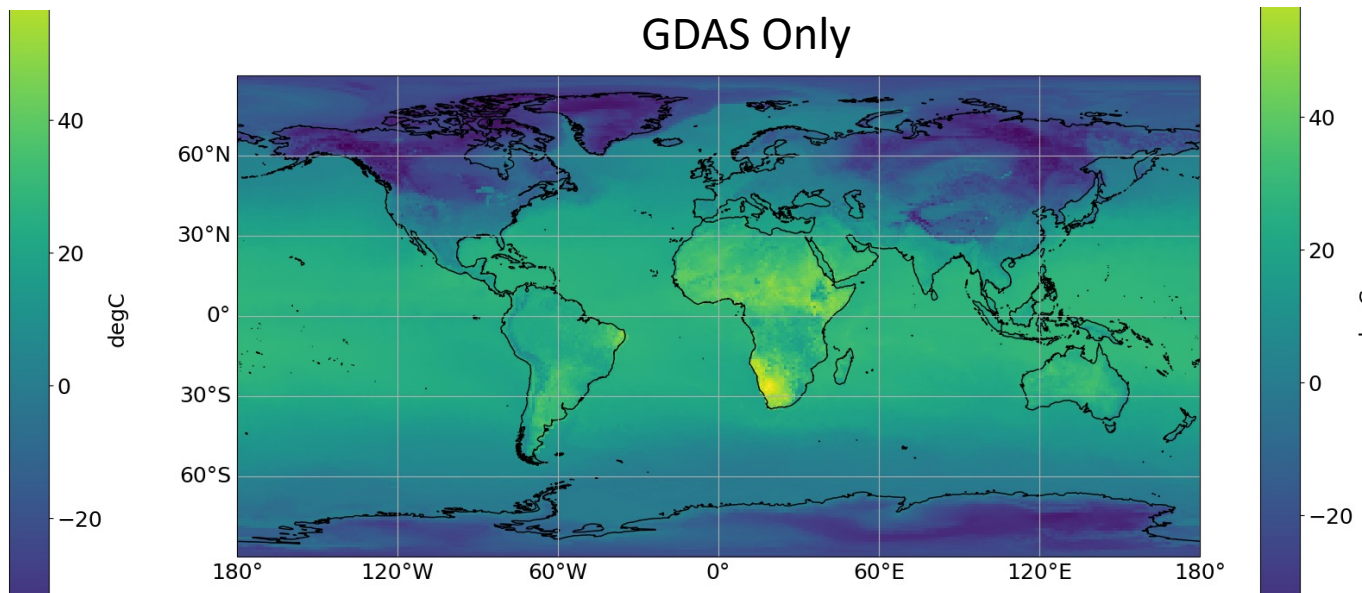
The new, pseudo-Reynolds SST file

- An `oisst_nc2bin` converter package has been developed.
- The software:
 - Resamples the OISST data from 0.25 degrees into 1-degree grid
 - Convert data format from NetCDF to binary
 - Fills up the land grid points with GDAS surface temperature data to provide SST over inland water surfaces
 - Smooths the coastline transition between GDAS and OISST

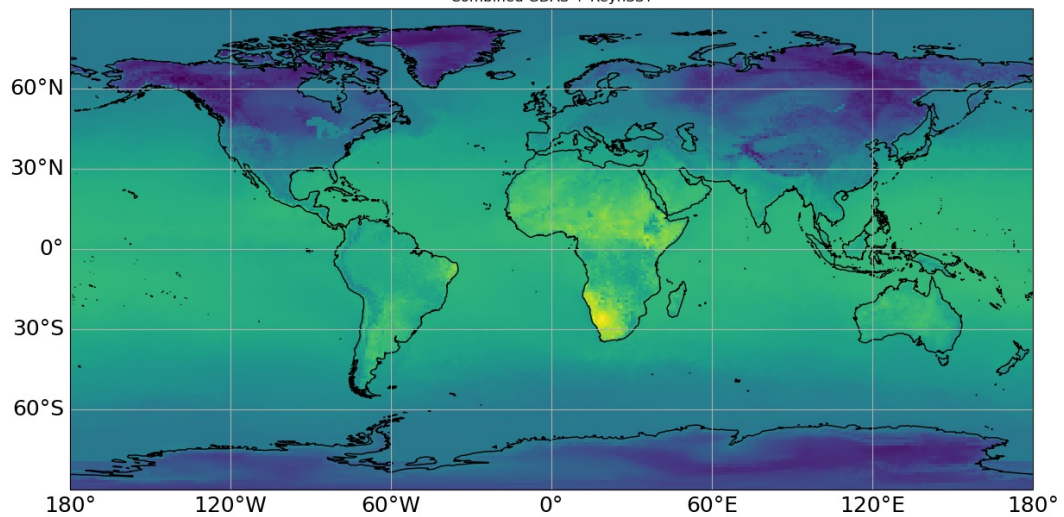
OISST Only



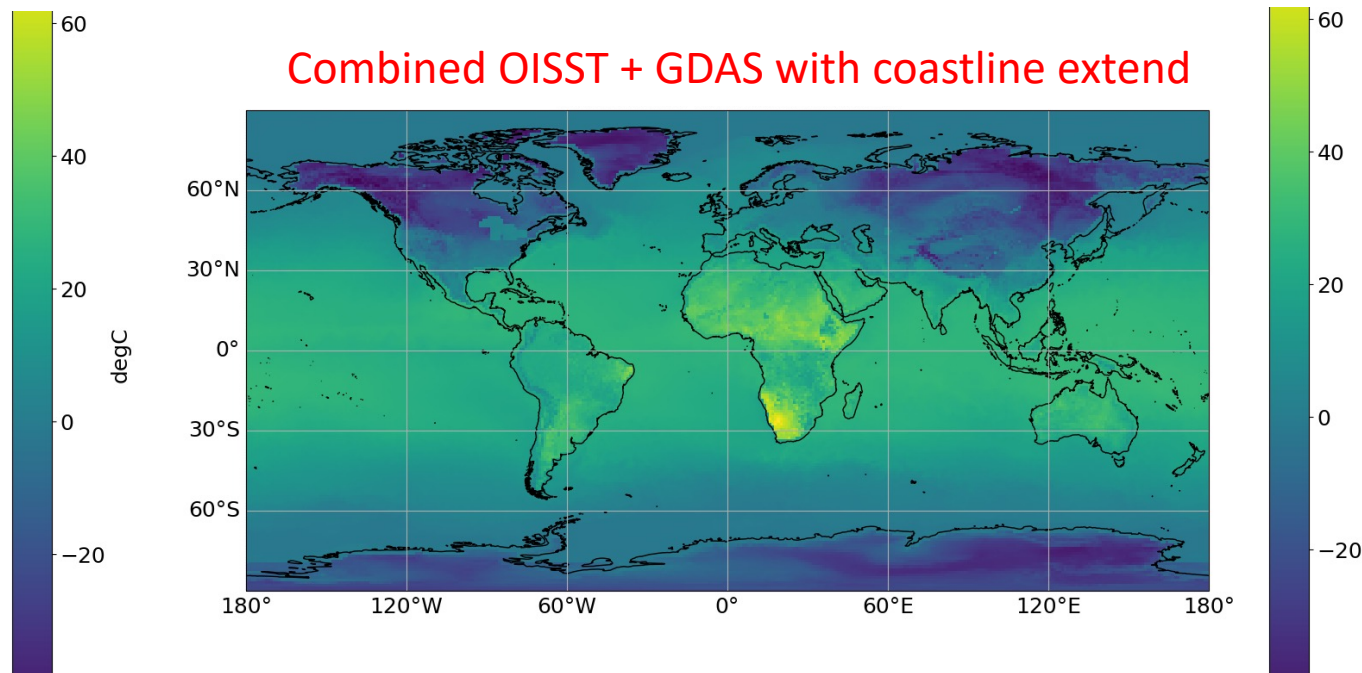
GDAS Only



Combined OISST + GDAS



Combined OISST + GDAS with coastline extend



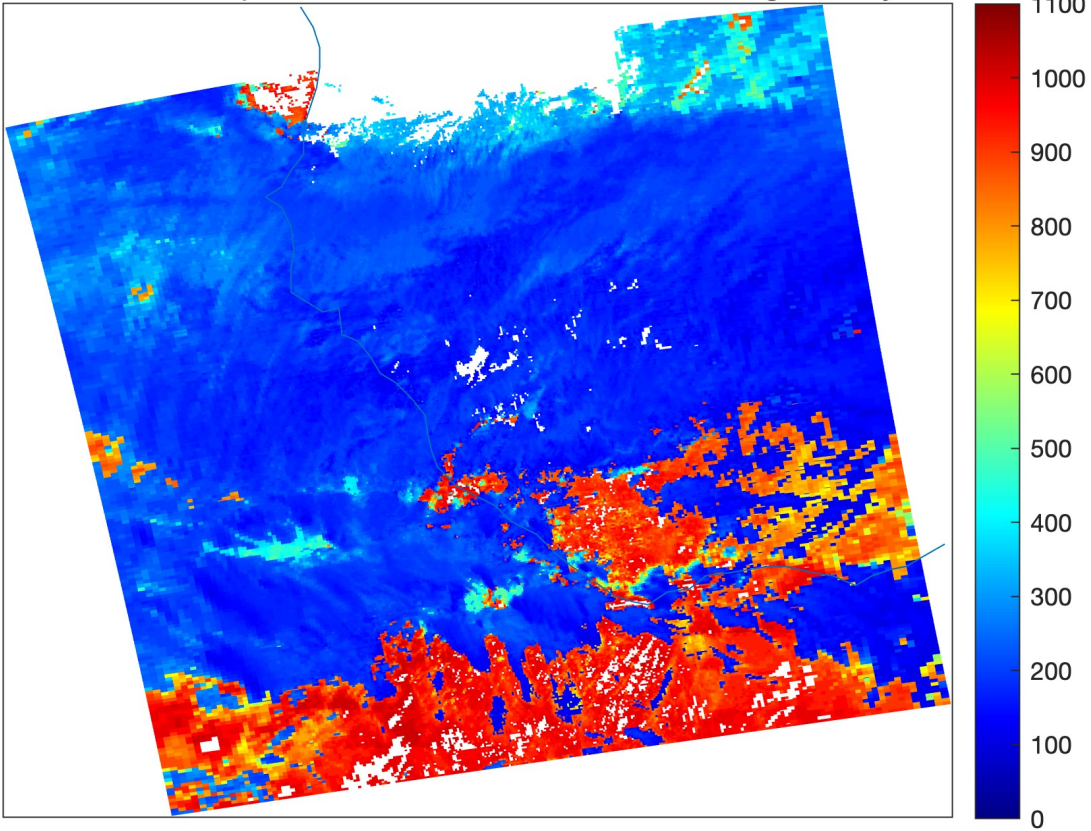
MYD06.A2021349.1415



MYD06 Cloud Top Pressure - Dec 15, 2021 14:15 UTC

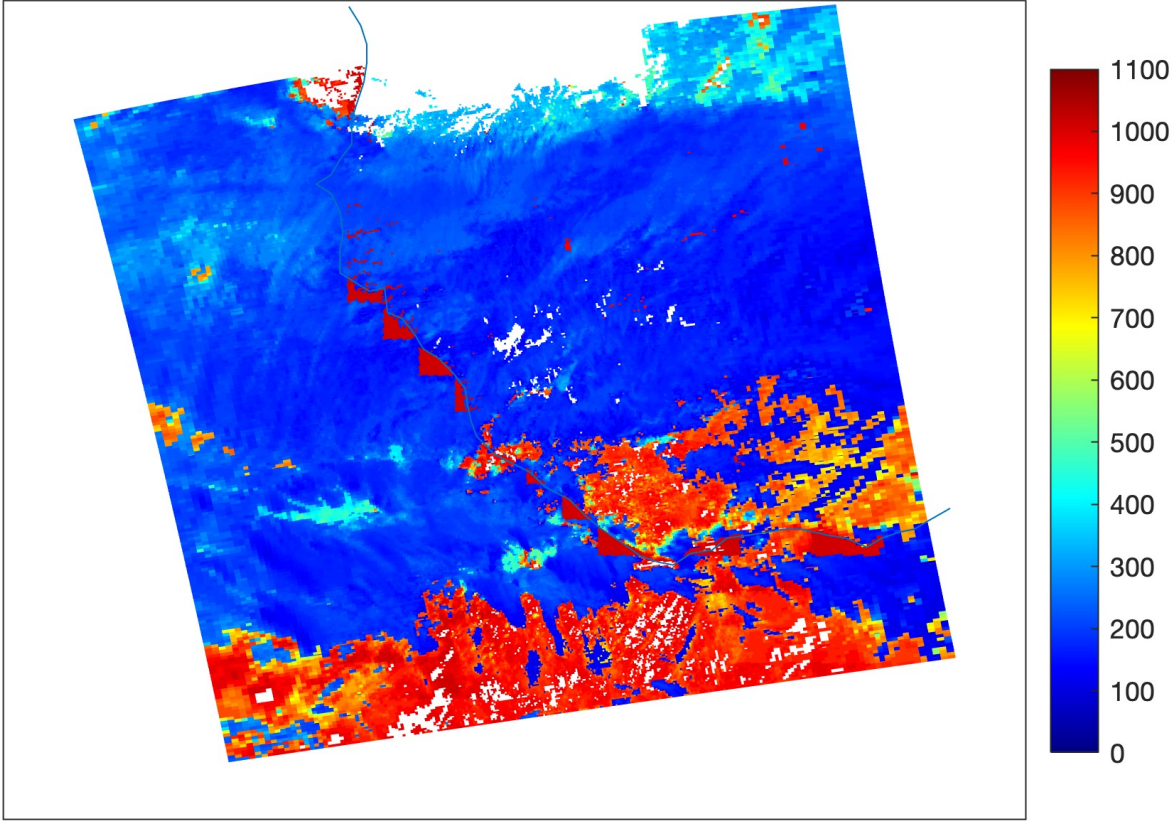
Weekly mean SST

MYD06 Cloud Top Pressure on 2021349.1415 - Using Weekly SST



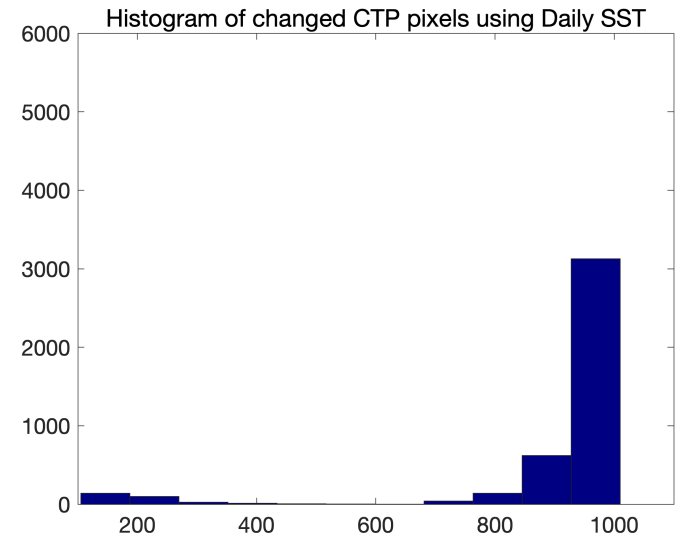
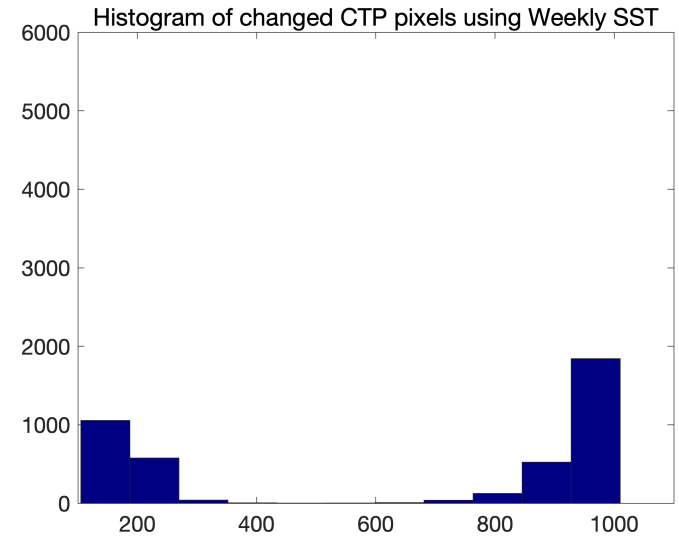
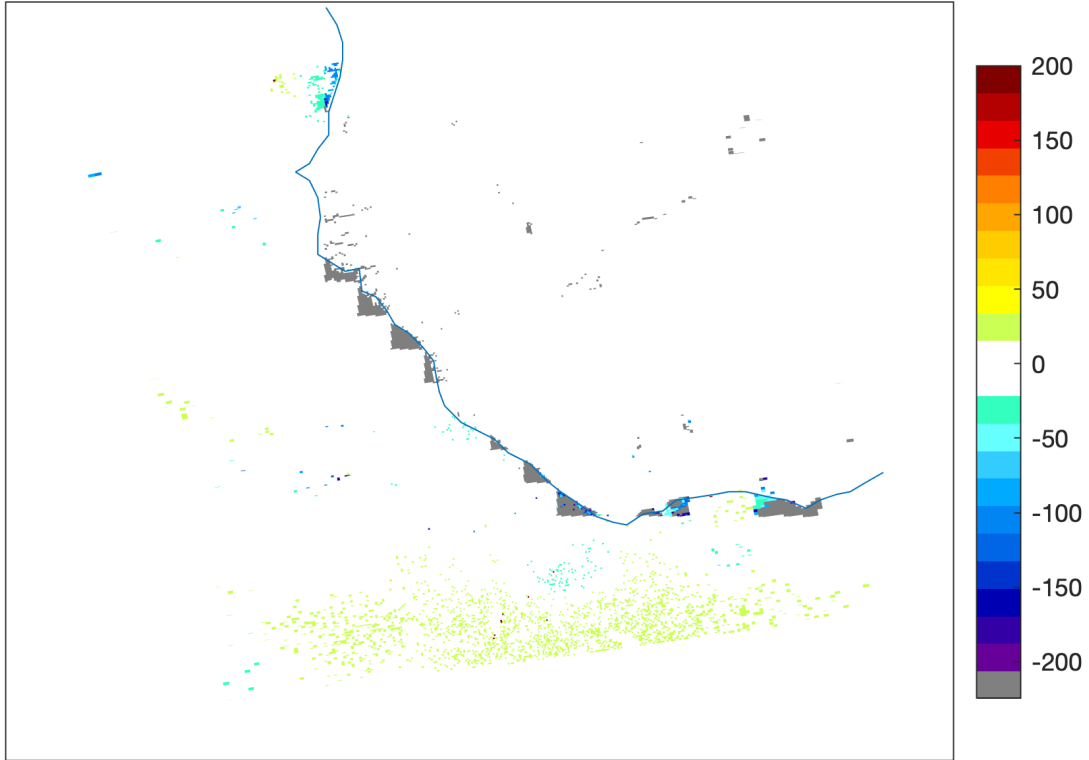
Daily mean SST

MYD06 CTP on 2021349.1415 - Using Daily SST



CTP Differences (weekly – Daily)

Differences of Cloud Top Pressure (Weekly-Daily) on 2021349.1415
Different pixels = 4217 out of 109620 Percent= 3.85 mean= -11.29 std= 97.77

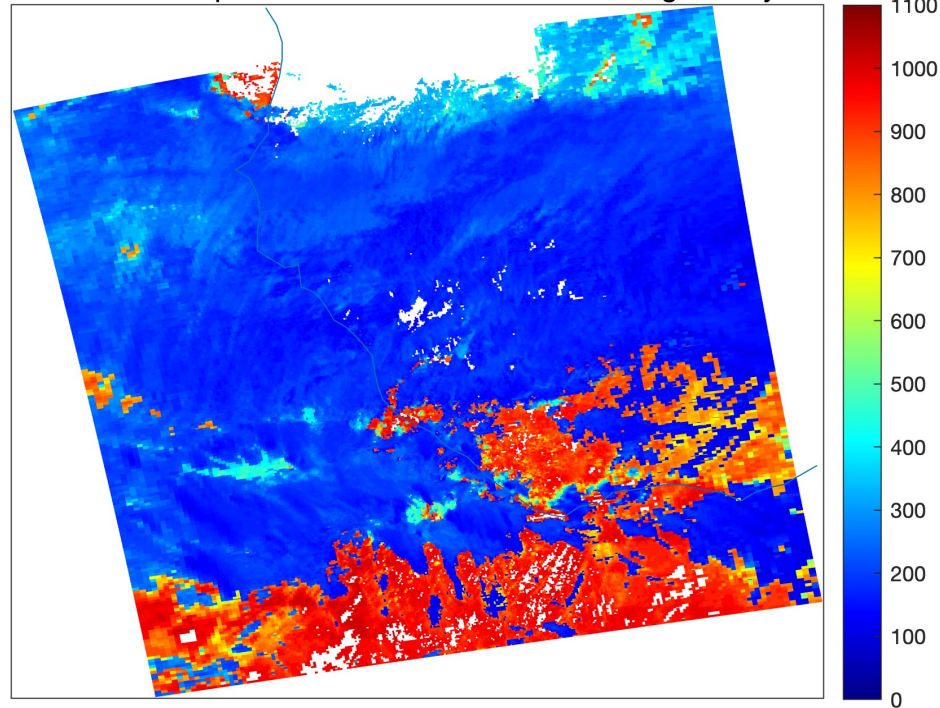


3.85 % of pixels have been changed, Mean of the diffs = -11.3 hPa, STDDEV=97.7 hPa.

MYD06 Cloud Top Pressure - Dec 15, 2021 14:15 UTC

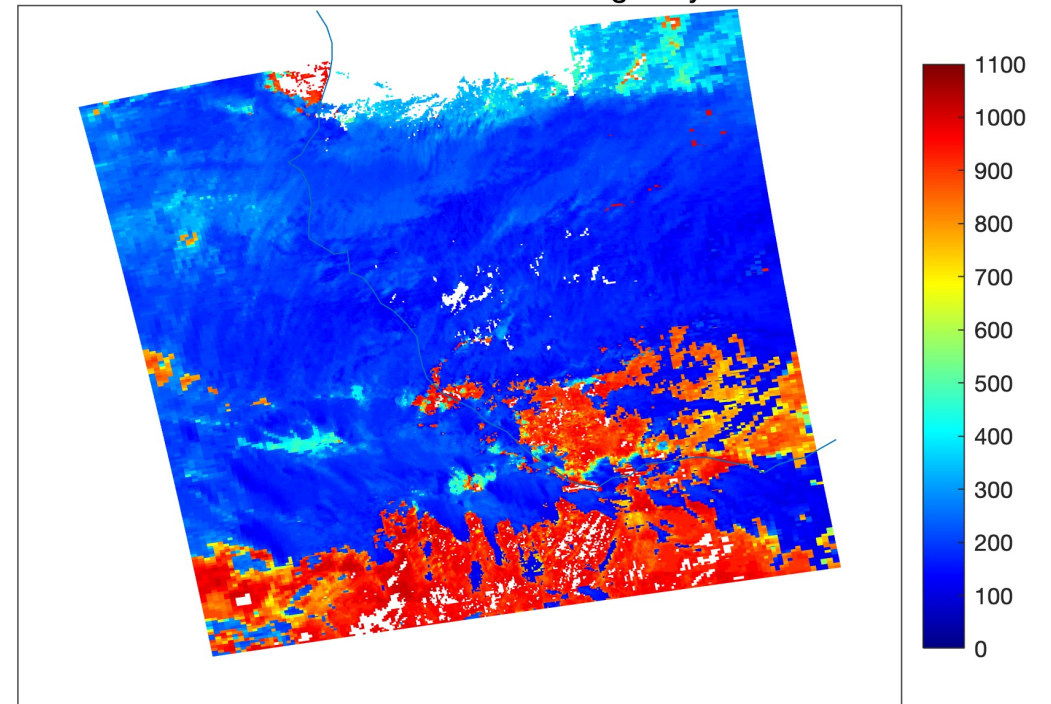
Weekly mean SST

MYD06 Cloud Top Pressure on 2021349.1415 - Using Weekly SST



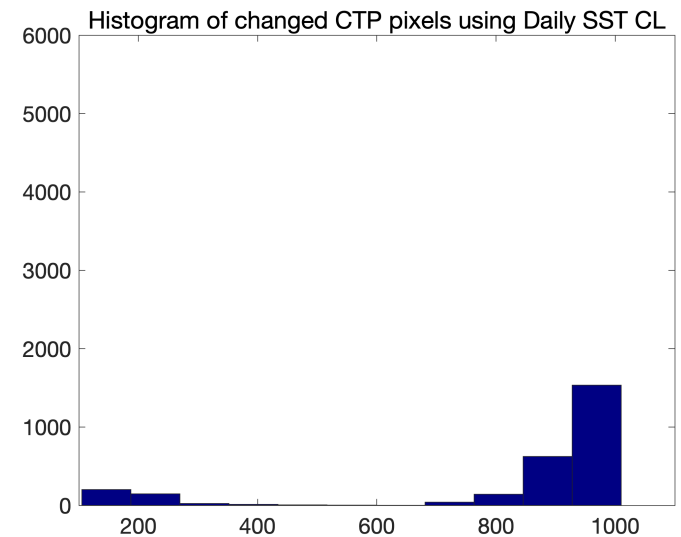
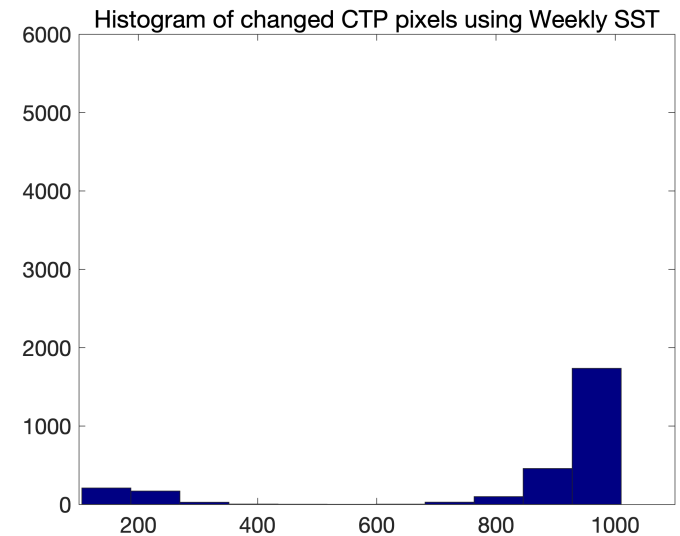
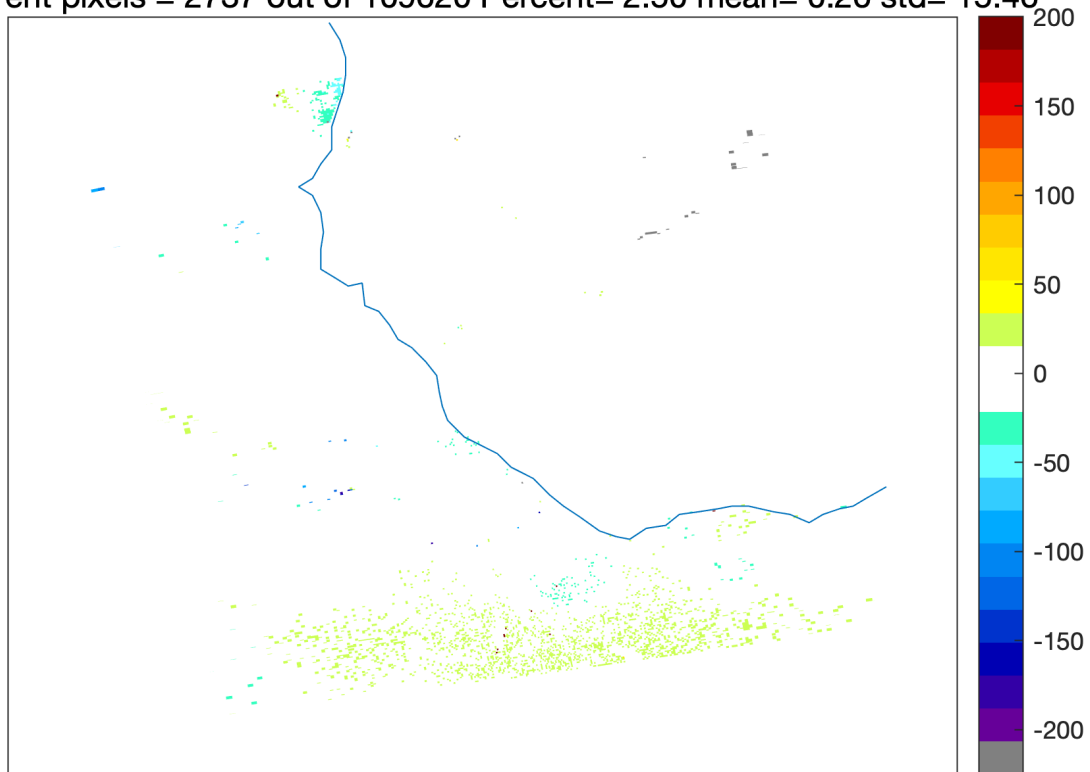
Daily mean SST coastline corrected

MYD06 CTP on 2021349.1415 - Using Daily SST CL



CTP Differences (weekly – Daily CL)

Differences of Cloud Top Pressure (Weekly-DailyCL) on 2021349.1415
Different pixels = 2737 out of 109620 Percent= 2.50 mean= 0.26 std= 15.46



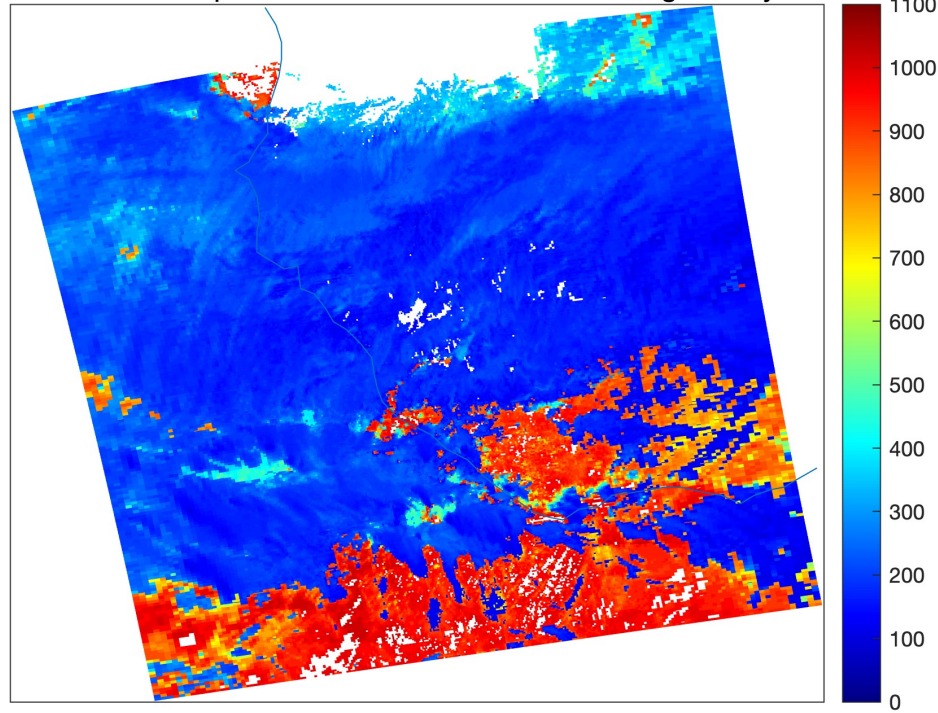
2.5 % of pixels have been changed, Mean of diffs = -11.3 hPa, STDDEV=97.7 hPa.

MYD06 Cloud Top Pressure - Dec 15, 2021 14:15 UTC

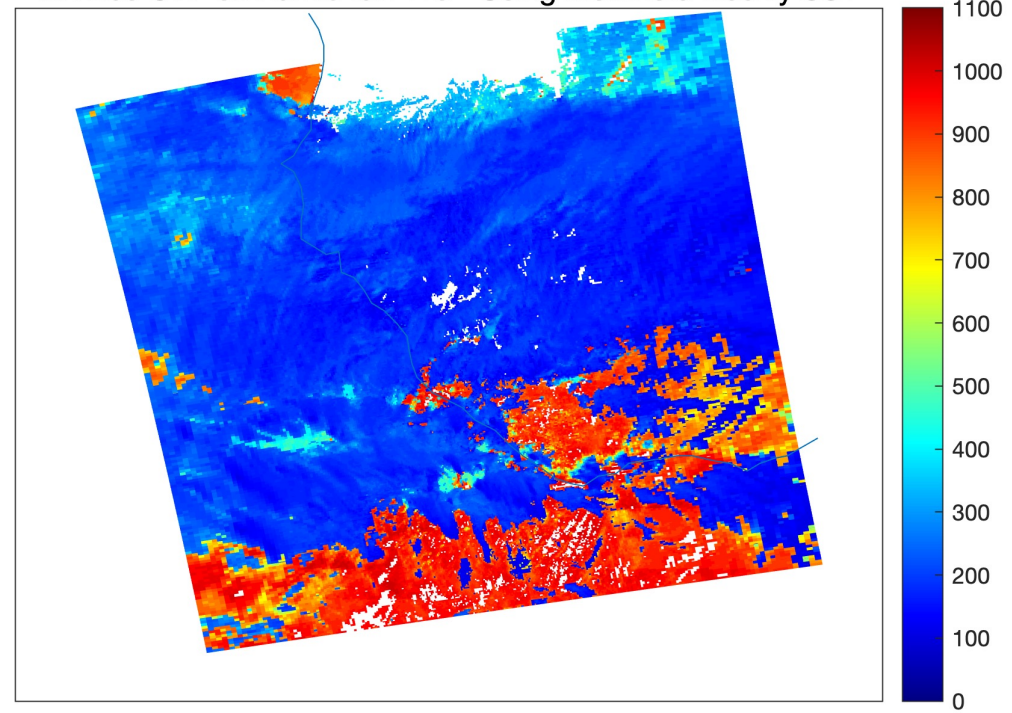
Weekly mean SST

Month-old weekly SST

MYD06 Cloud Top Pressure on 2021349.1415 - Using Weekly SST

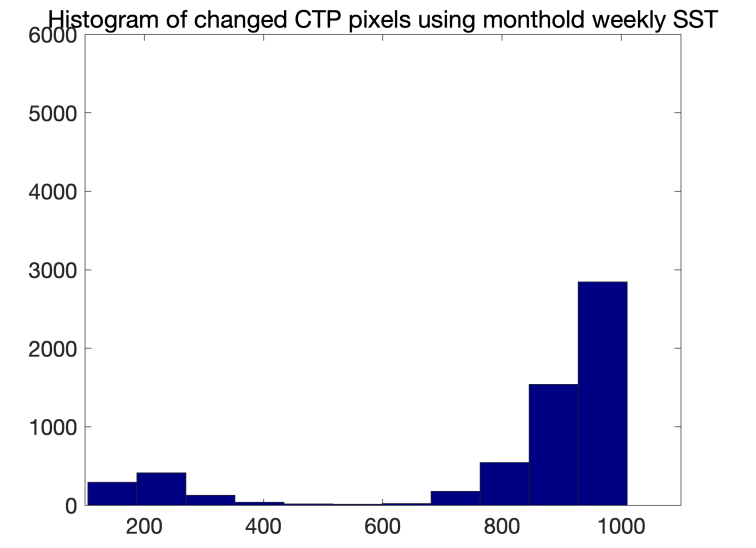
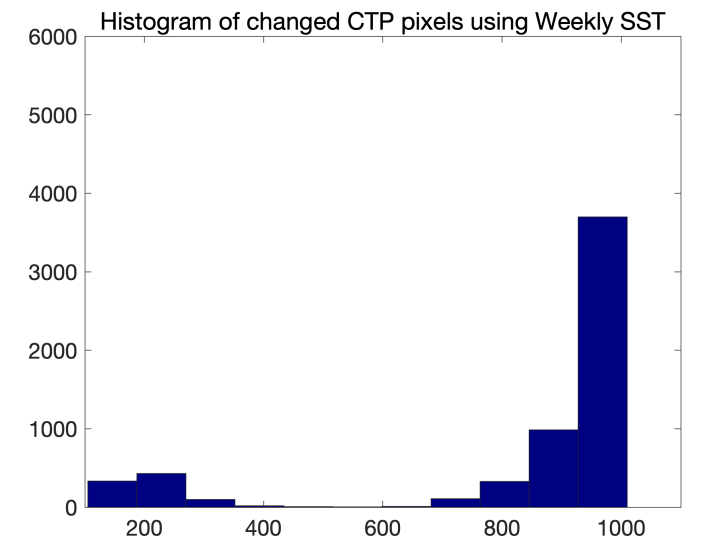
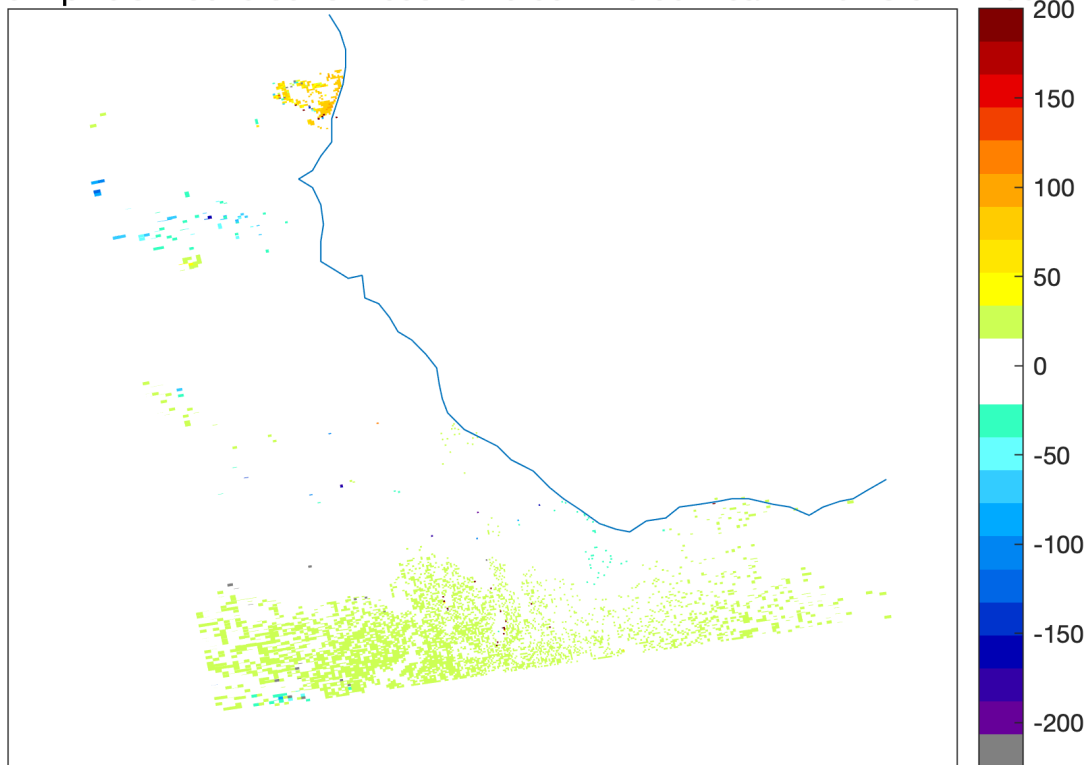


MYD06 CTP on 2021349.1415 - Using monthold weekly SST



CTP Differences (weekly – month-old)

Differences of Cloud Top Pressure (Weekly-Month Old Weekly) on 2021349.1415
Different pixels = 6029 out of 109620 Percent= 5.50 mean= 1.31 std= 14.33



5.5 % of pixels have been changed, the mean of the diffs = 1.3 hPa, STDEV=14.3 hPa

MYD06.A2021349.2225

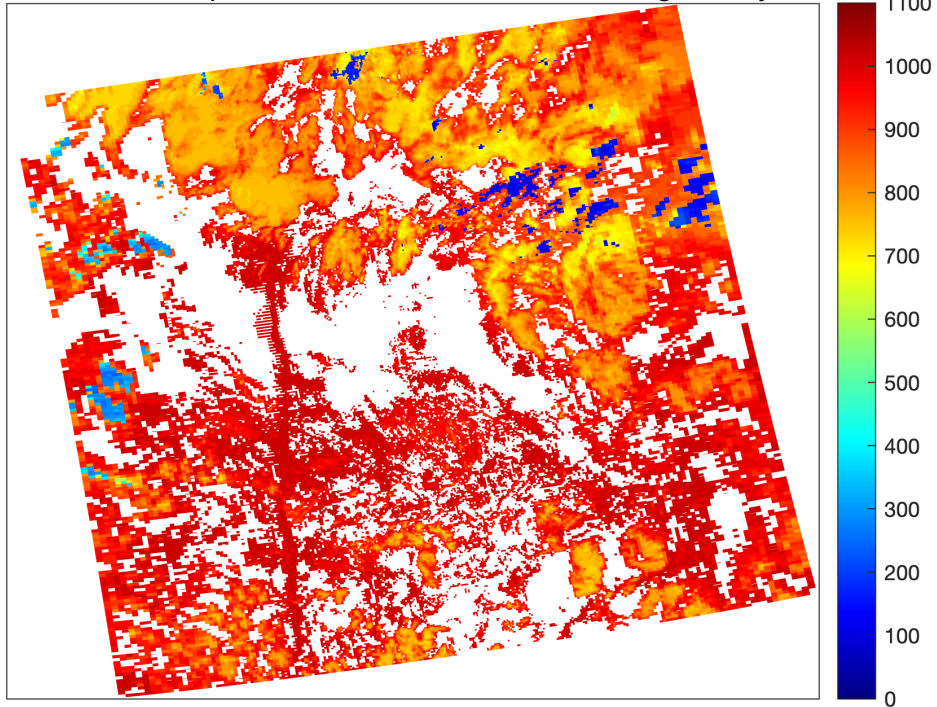


MYD06 Cloud Top Pressure - Dec 15, 2021 22:25 UTC

Over the Pacific Ocean

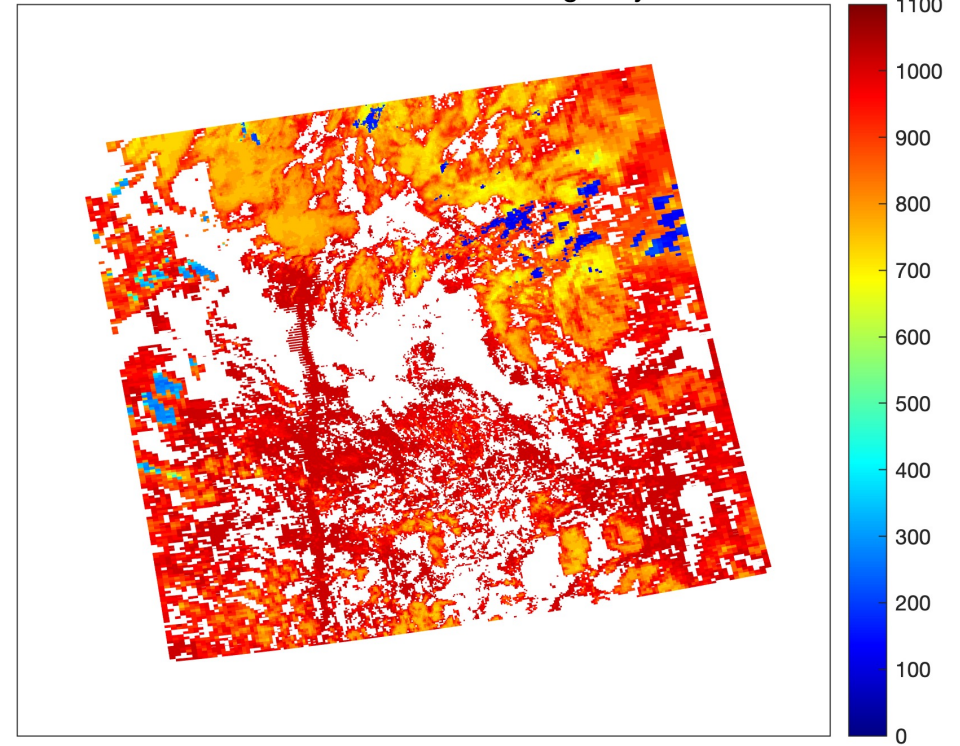
Weekly mean SST

MYD06 Cloud Top Pressure on 2021349.2225 - Using Weekly SST



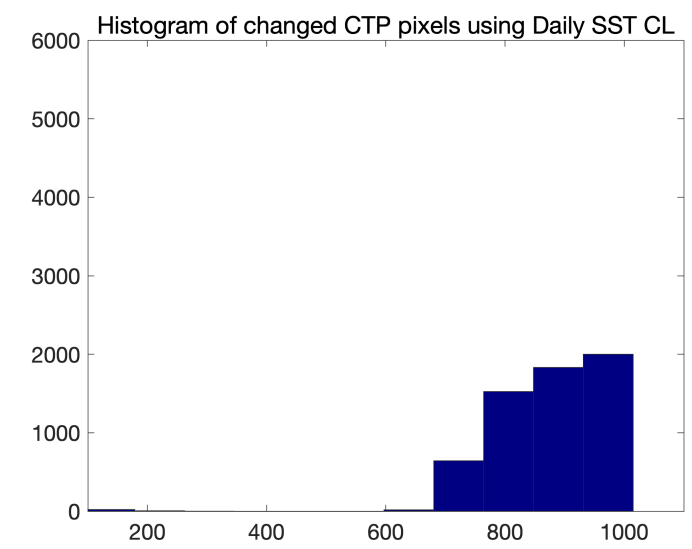
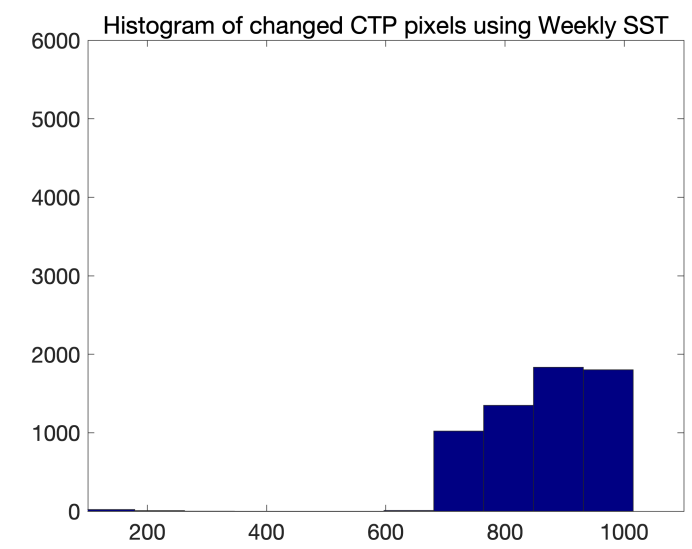
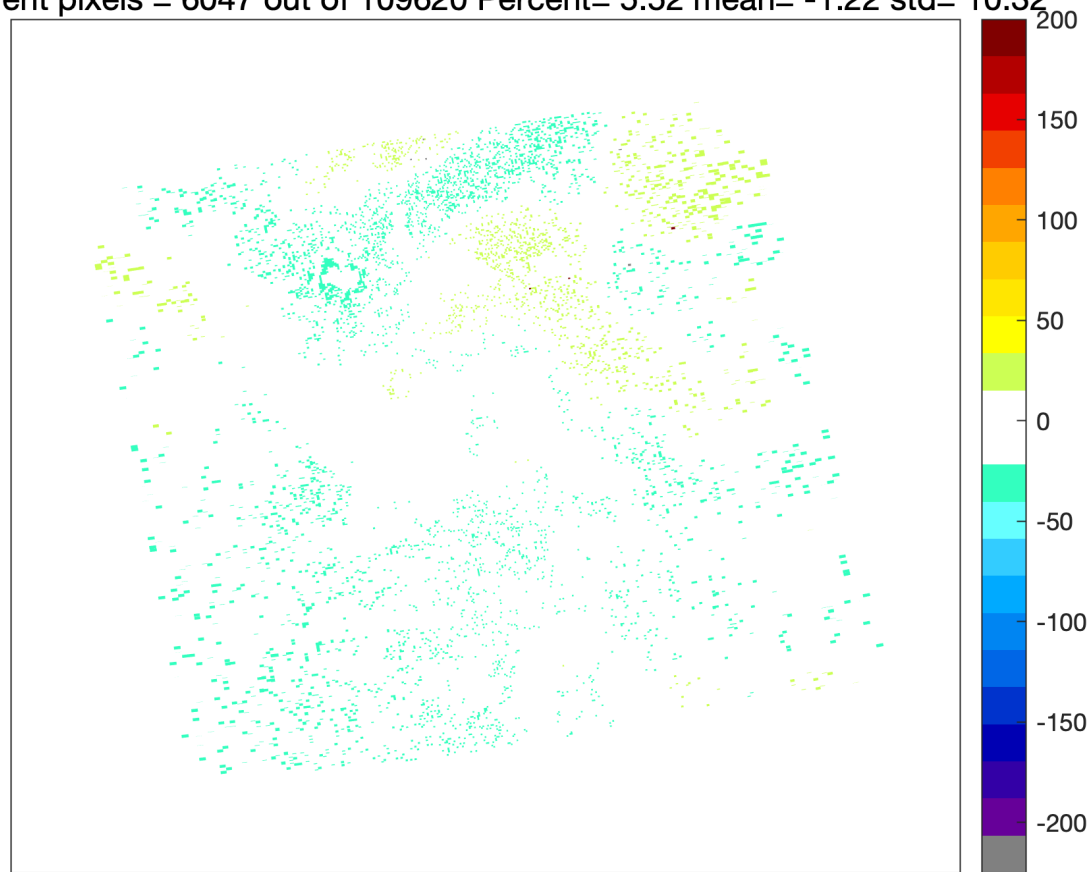
Daily mean SST coastline fixed

MYD06 CTP on 2021349.2225 - Using Daily SST CL



CTP Differences (weekly – Daily CL)

Differences of Cloud Top Pressure (Weekly-DailyCL) on 2021349.2225
Different pixels = 6047 out of 109620 Percent= 5.52 mean= -1.22 std= 10.32

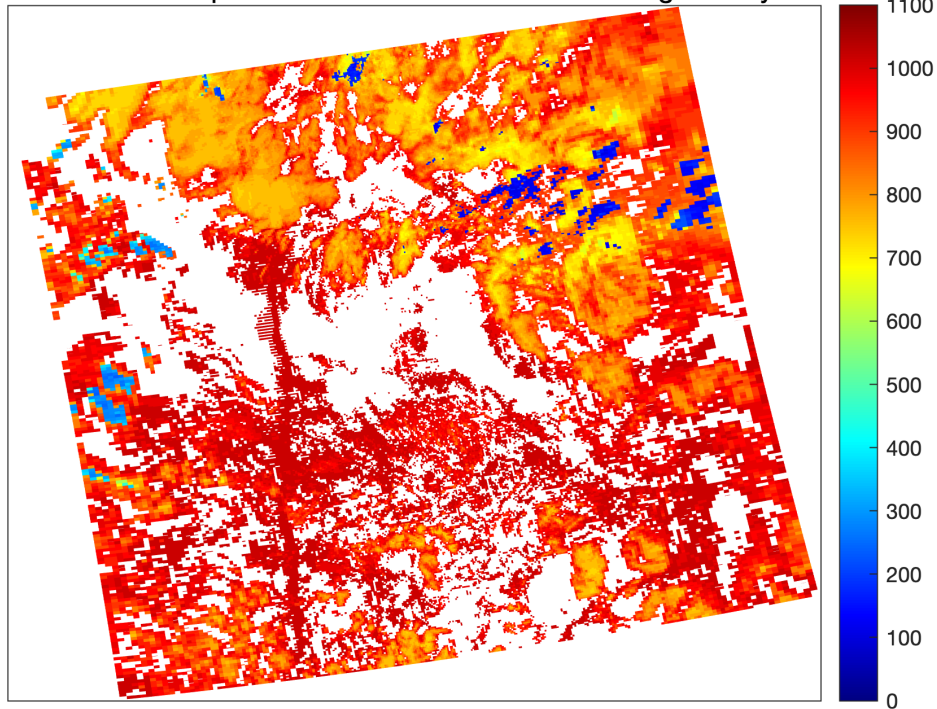


5.5 % of pixels have been changed, mean of the diffs=-1.2 hPa, STDDEV=10.3 hPa

MYD06 Cloud Top Pressure - Dec 15, 2021 22:25 UTC

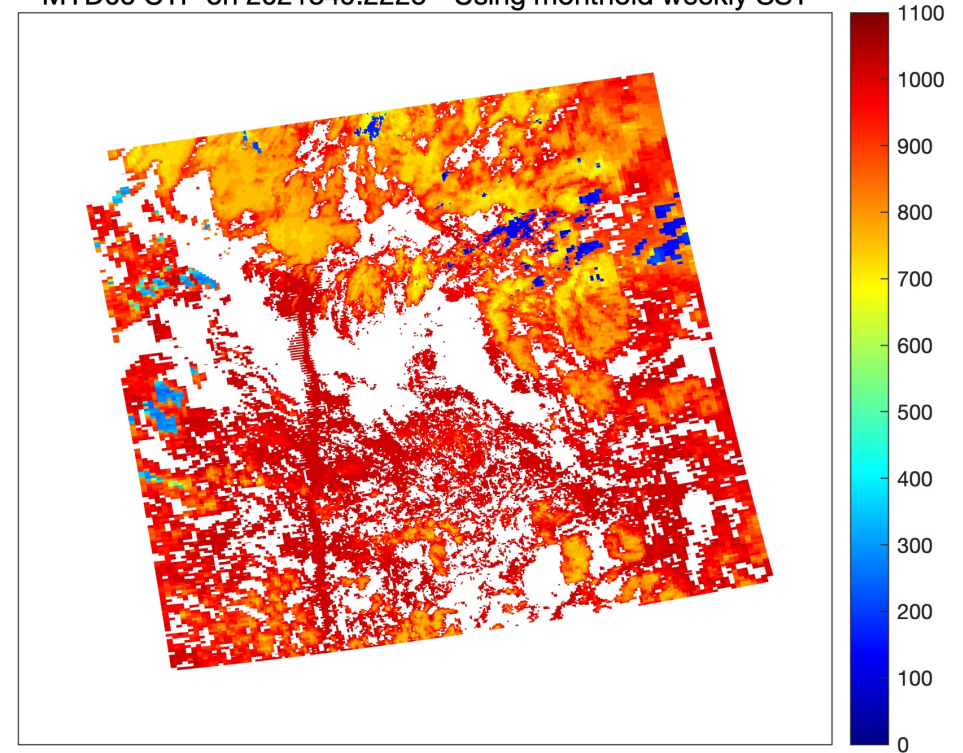
Weekly mean SST

MYD06 Cloud Top Pressure on 2021349.2225 - Using Weekly SST



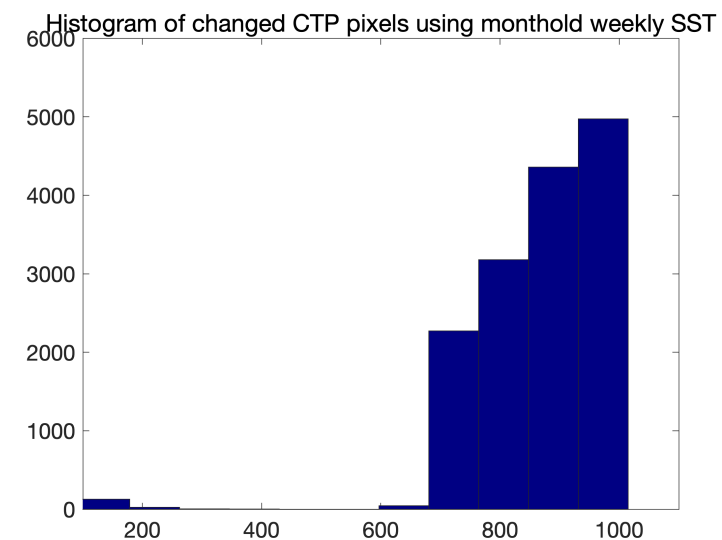
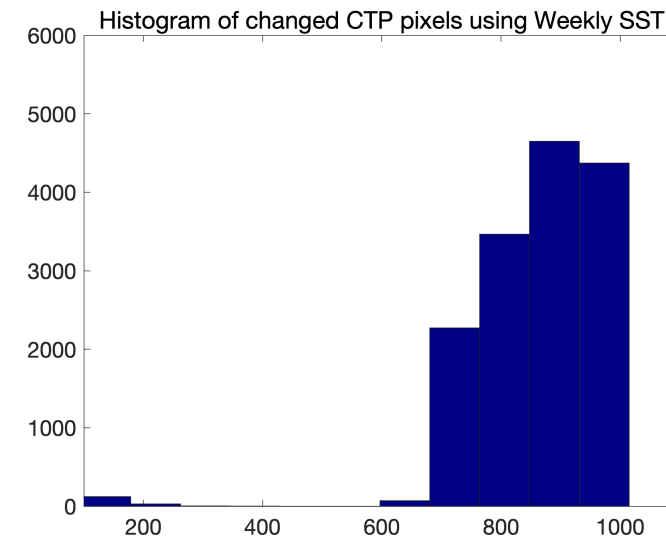
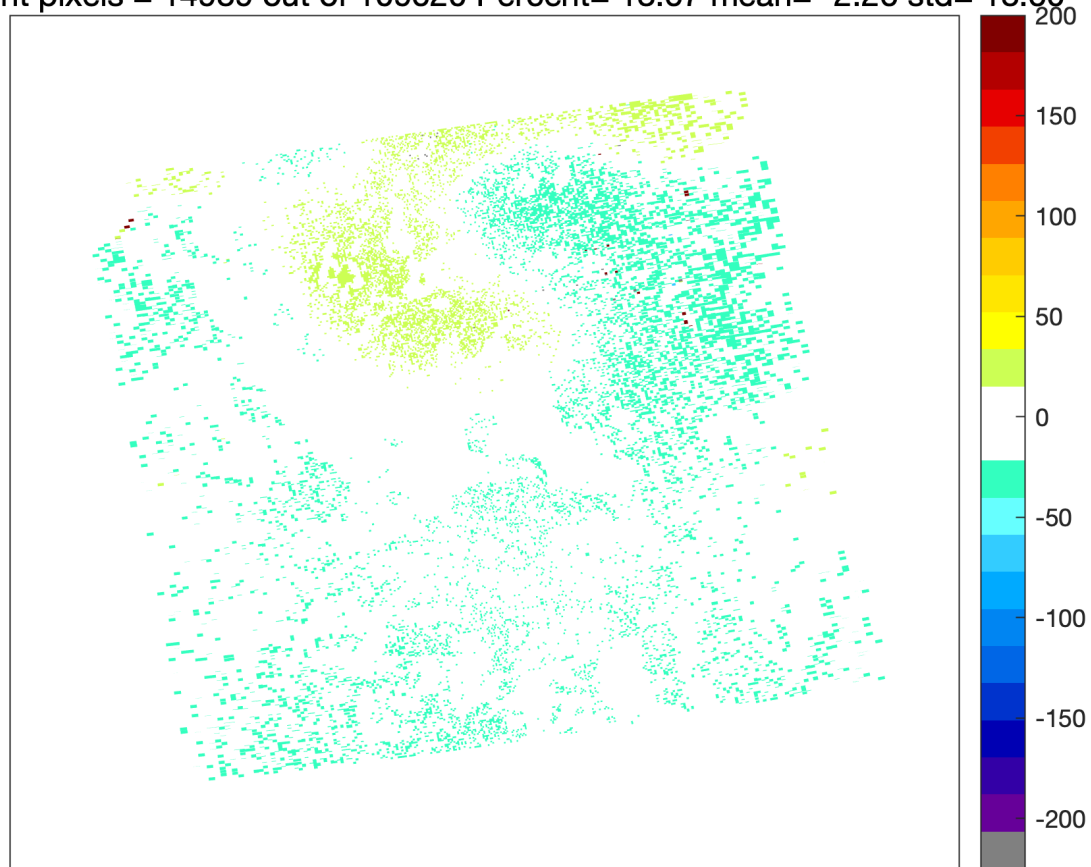
Month-old weekly mean SST

MYD06 CTP on 2021349.2225 - Using monthold weekly SST



CTP Differences (weekly – month-old)

Differences of Cloud Top Pressure (Weekly-Month Old Weekly) on 2021349.2225
Different pixels = 14989 out of 109620 Percent= 13.67 mean= -2.26 std= 18.60



13.7 % of pixels have been changed, the mean of the the diffs = -2.3 hPa, STDDEV=18.6 hPa

Next

- Do the same study but using GDAS SST only
- Compare SSTs (Reynolds, OISST (preliminary vs final), GDAS)
- Run diagnosis for a global day