

# PS3\_3

November 10, 2021

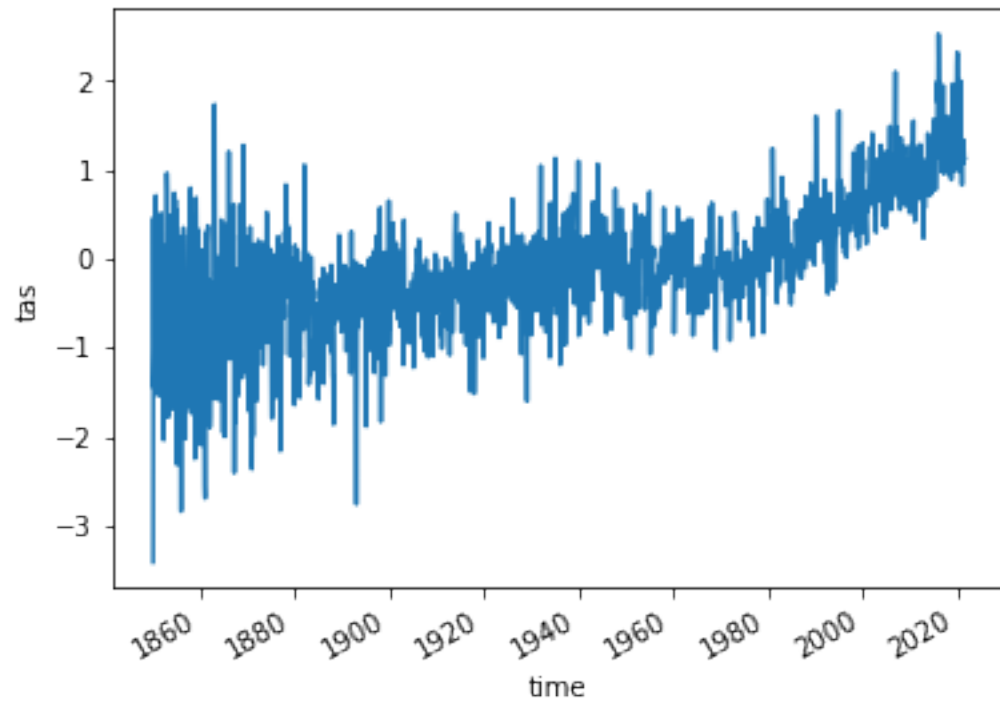
```
[1]: import numpy as np
import pandas as pd
import xarray as xr
from matplotlib import pyplot as plt
%matplotlib inline
```

```
[2]: ds = xr.open_dataset("CRUTEM.5.0.1.0.anomalies.nc", engine="netcdf4")
ds
```

```
[2]: <xarray.Dataset>
Dimensions:          (time: 2061, latitude: 36, longitude: 72, bnds: 2)
Coordinates:
  * time              (time) datetime64[ns] 1850-01-16T12:00:00 ... 2021-09-16
  * latitude           (latitude) float64 -87.5 -82.5 -77.5 ... 77.5 82.5 87.5
  * longitude           (longitude) float64 -177.5 -172.5 -167.5 ... 172.5 177.5
Dimensions without coordinates: bnds
Data variables:
  tas                  (time, latitude, longitude) float64 ...
  time_bnds            (time, bnds) datetime64[ns] ...
  latitude_bnds        (latitude, bnds) float64 ...
  longitude_bnds       (longitude, bnds) float64 ...
Attributes:
  comment:             CRUTEM5 air temperature at 2m
  history:             Data set built at: 2021-10-21T19:03:35+00:00
  institution:         Climatic Research Unit, University of East Anglia/Met Offic...
  licence:             CRUTEM5 is licensed under the Open Government Licence v3.0 ...
  reference:           Osborn, T. J., P. D. Jones, D. H. Lister, C. P. Morice, I. ...
  source:
  title:               CRUTEM5 air temperature over land
  version:             CRUTEM.5.0.1.0
  Conventions:         CF-1.7
```

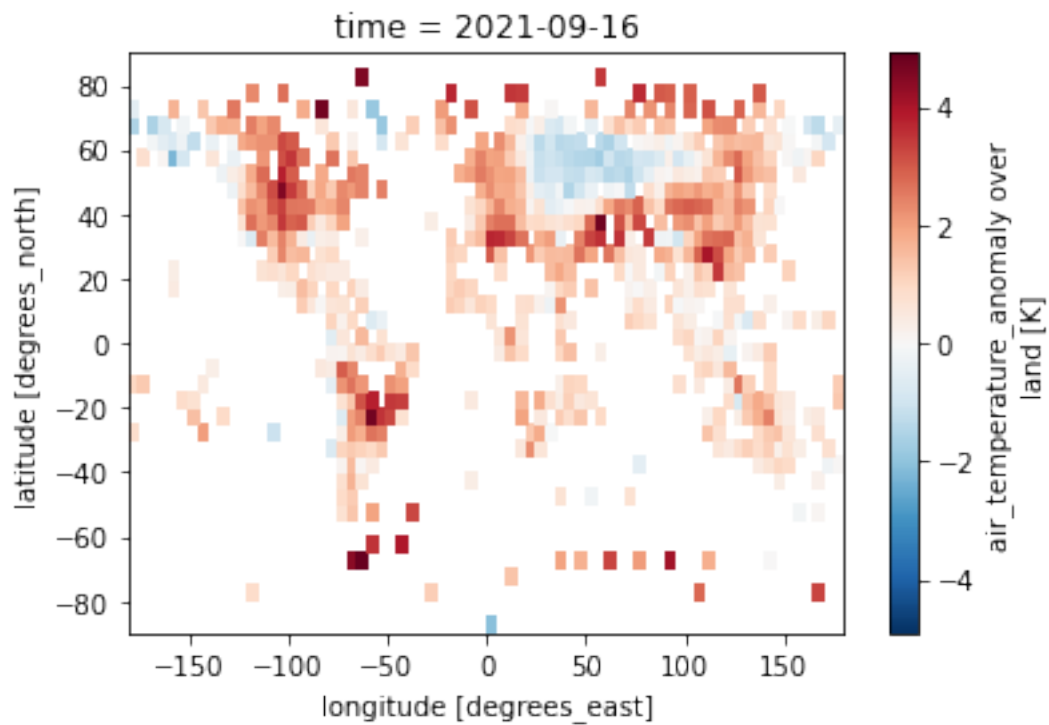
```
[3]: ds.tas.mean(dim=('longitude', 'latitude')).plot()
```

```
[3]: [<matplotlib.lines.Line2D at 0x1d44b5d09a0>]
```



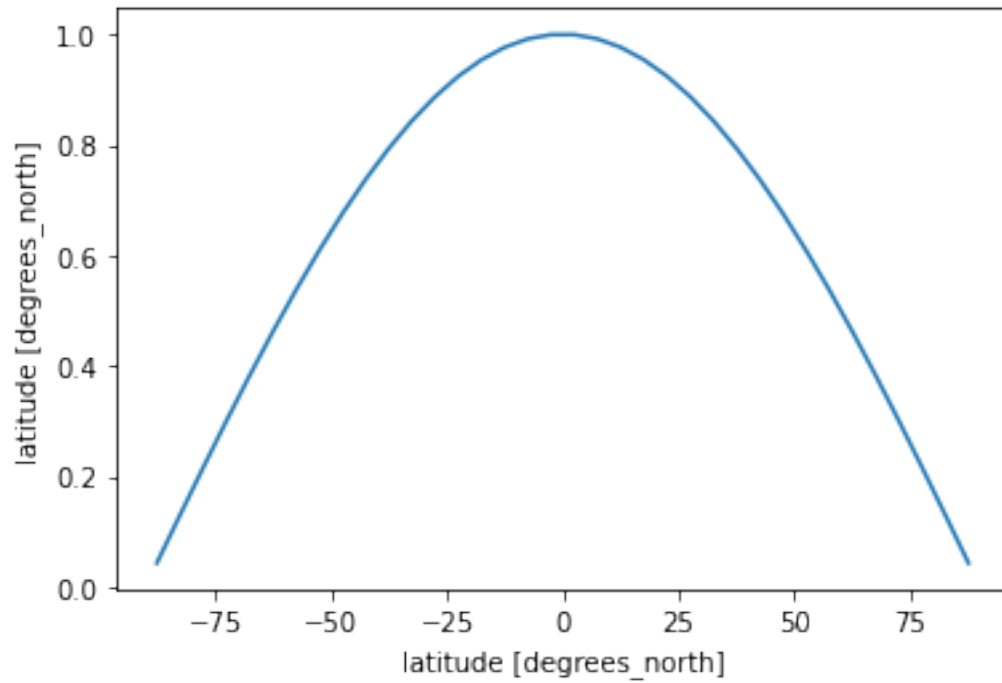
```
[4]: ds.tas[-1].plot()
```

```
[4]: <matplotlib.collections.QuadMesh at 0x1d44bdedee0>
```



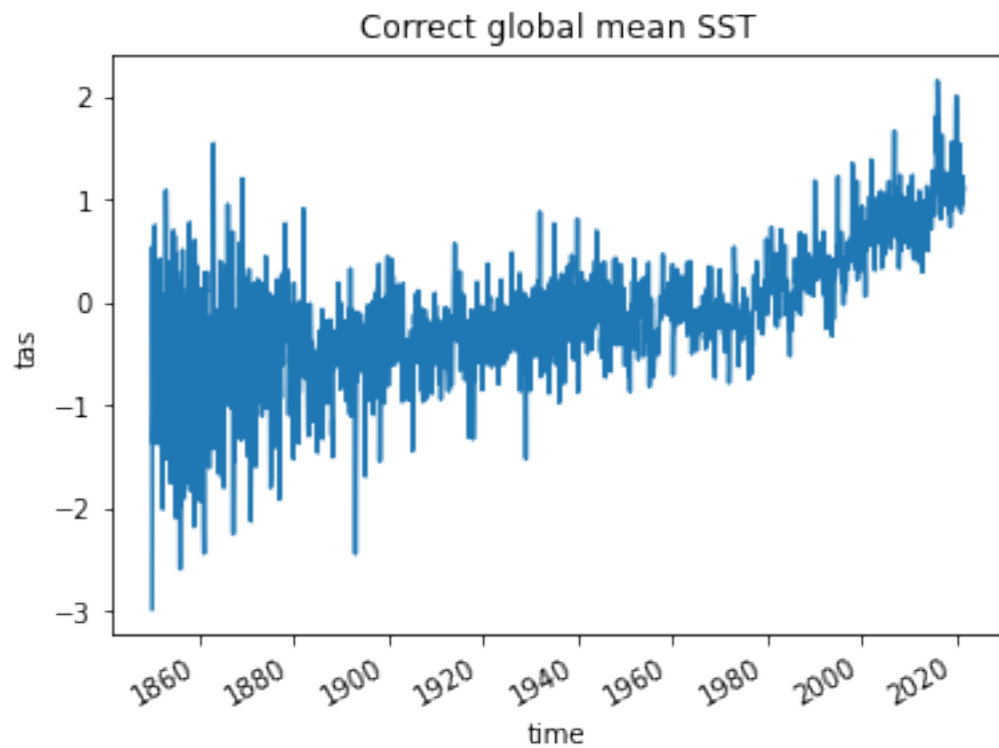
```
[5]: weights = np.cos(np.deg2rad(ds.latitude))
      weights.dims
      weights.plot()
```

```
[5]: [<matplotlib.lines.Line2D at 0x1d44be49730>]
```



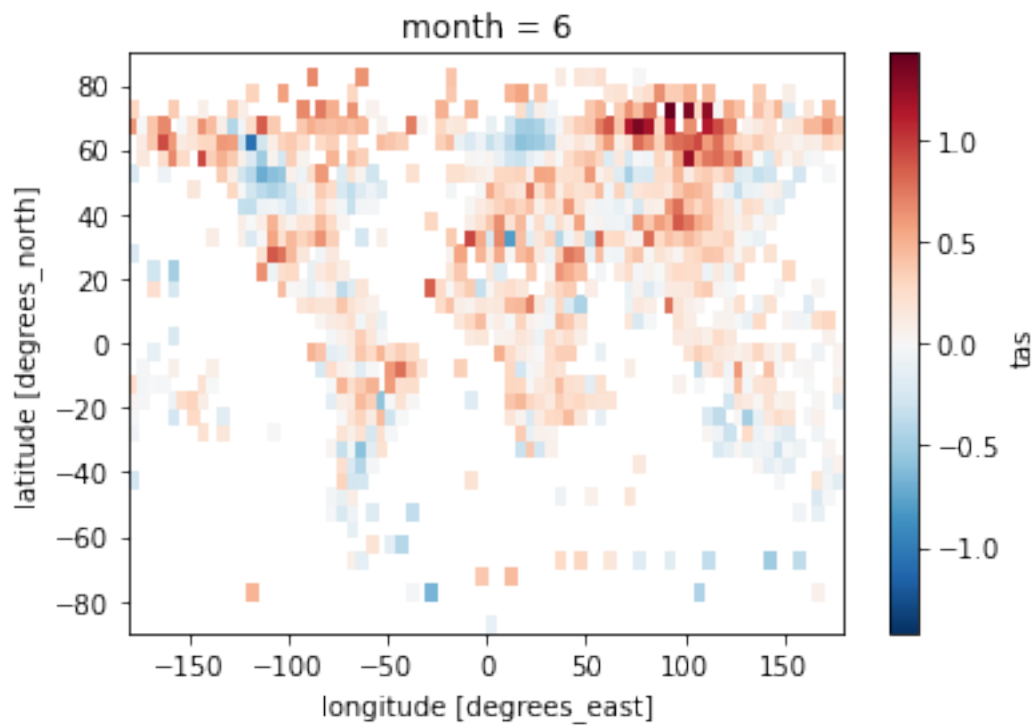
```
[6]: tas_weighted = ds.tas.weighted(weights)
tas_weighted.mean(dim=('longitude', 'latitude')).plot()
plt.title("Correct global mean SST")
```

```
[6]: Text(0.5, 1.0, 'Correct global mean SST')
```



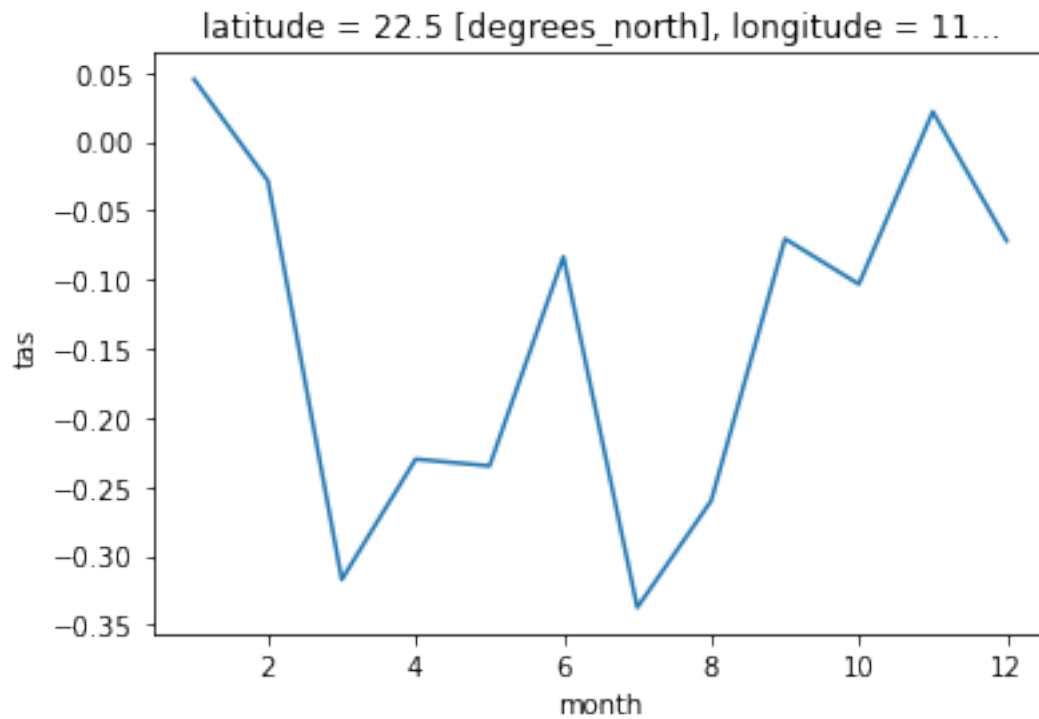
```
[7]: tas_clim = ds.tas.groupby('time.month').mean()  
tas_clim.sel(month=6).plot()
```

```
[7]: <matplotlib.collections.QuadMesh at 0x1d44bf83fd0>
```



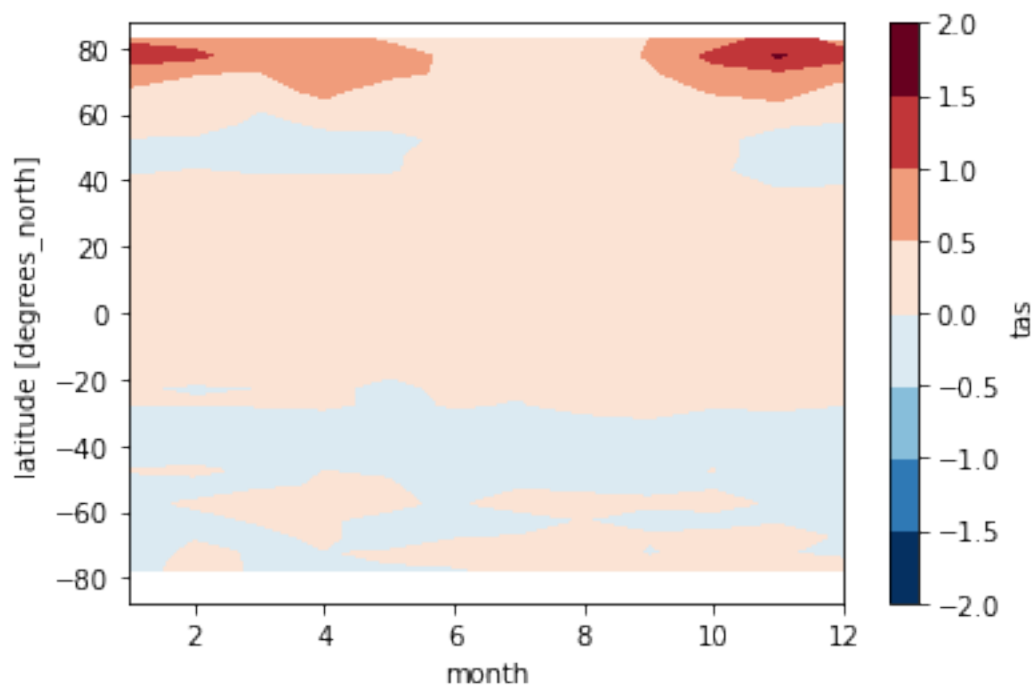
```
[8]: tas_clim.sel(longitude=114.55, latitude=22.5, method='nearest').plot()
```

```
[8]: [<matplotlib.lines.Line2D at 0x1d44c038100>]
```



```
[9]: tas_clim.mean(dim='longitude').plot.contourf(x='month',levels=8)
```

```
[9]: <matplotlib.contour.QuadContourSet at 0x1d44bef3bb0>
```



[ ]: