Emission Inventory

> On road NOx emission inventory and how HEMCO processes it.

`root = /uufs/chpc.utah.edu/common/home/haskins-group1/data/ExtData//HEMCO`. I didn't find corresponding NEI2016 directory in our root path, but I found it here.

file 1️⃣

```
EPA16_NO2__onroadNO2 $ROOT/NEI2016/v2021-06/2016fh_16j_onroad_0
# resolution: monthly
# 25/210/251/1007 are references to scaling factors
```

file 2️⃣

```
# Diurnal scale factors
25 EDGAR_TODNOX $ROOT/EDGARv42/v2015-02/NO/EDGAR_hourly_NOxScal
```

file 3️⃣

```
# EPA NEI day-of-week scale factors
210 NEI99_DOW_NOX   $ROOT/NEI2005/v2023-02/NEI99.dow.geos.1x1.c
```

file 4️⃣

```
# EPA NEI2016 annual scale factors
# Annual scale factors were computed from the EPA Trends Report
251 NEI2016_NOx_YRSCALE  2.341/2.213/2.083/1.989/1.879/1.768/1.6
```

file 5️⃣

```
# country/region masks
1007 CONUS_MASK  $ROOT/MASKS/v2018-09/CONUS_Mask.01x01.nc  MASK
```

monthly → daily → hourly

Emissions Resolution

1. File 1️⃣

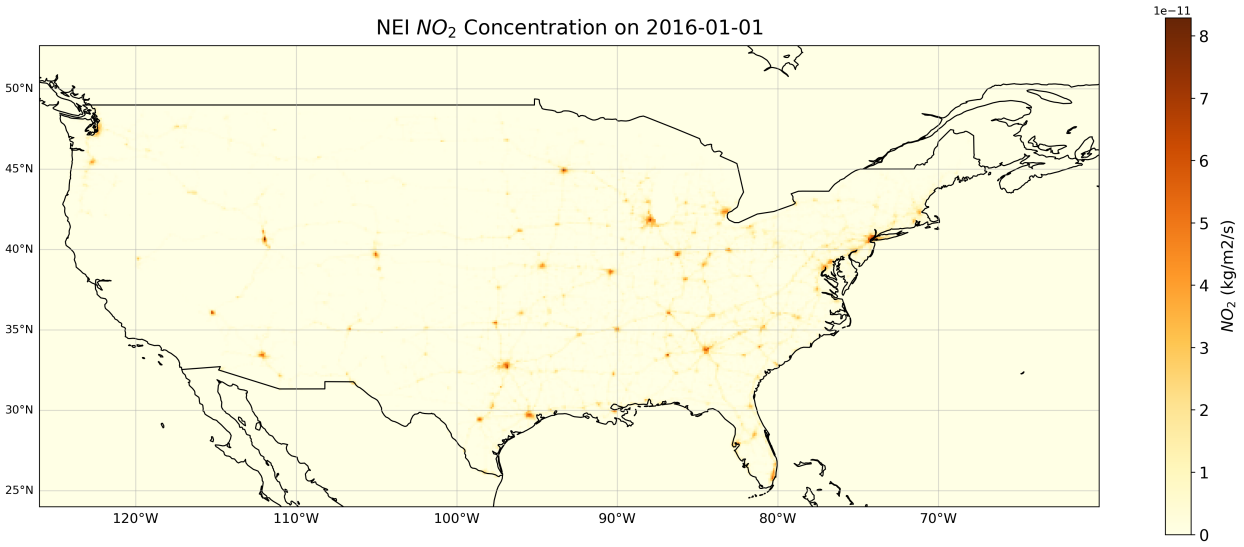
```
import xarray as xr
path = '/uufs/chpc.utah.edu/common/home/haskins-group1/users/szl
onroad_nox = xr.open_dataset(path)
onroad_nox
```

`time`: 2016-01-01

`lon`: 0.1 [-139.9, -50.5]

`lat`: 0.1 [20.05, 59.95]

One dataset for every month.



2. File 2️⃣

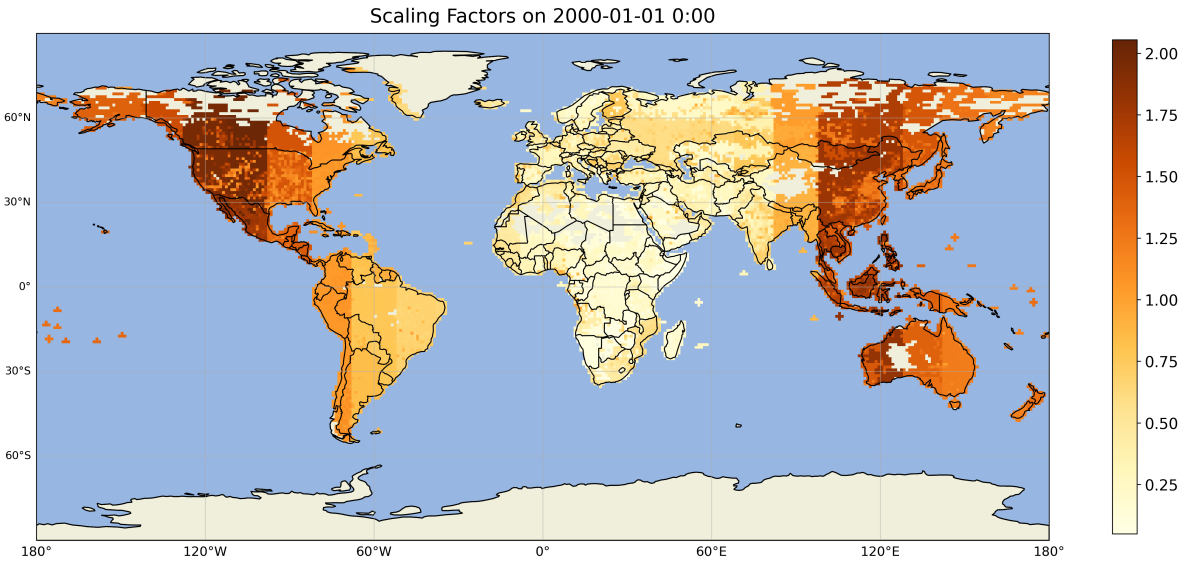
- Global Scale Factors

```
<xarray.DataArray 'time' (time: 24)>
array(['2000-01-01T00:00:00.000000000', '2000-01-01T01:00:00.000000000',
       '2000-01-01T02:00:00.000000000', '2000-01-01T03:00:00.000000000',
       '2000-01-01T04:00:00.000000000', '2000-01-01T05:00:00.000000000',
       '2000-01-01T06:00:00.000000000', '2000-01-01T07:00:00.000000000',
       '2000-01-01T08:00:00.000000000', '2000-01-01T09:00:00.000000000',
       '2000-01-01T10:00:00.000000000', '2000-01-01T11:00:00.000000000',
       '2000-01-01T12:00:00.000000000', '2000-01-01T13:00:00.000000000',
       '2000-01-01T14:00:00.000000000', '2000-01-01T15:00:00.000000000',
       '2000-01-01T16:00:00.000000000', '2000-01-01T17:00:00.000000000',
       '2000-01-01T18:00:00.000000000', '2000-01-01T19:00:00.000000000',
       '2000-01-01T20:00:00.000000000', '2000-01-01T21:00:00.000000000',
       '2000-01-01T22:00:00.000000000', '2000-01-01T23:00:00.000000000'],
      dtype='datetime64[ns]')
```

`time`: The NO scale factors are hourly data, from 0 to 24.

`lon`: 1, [-179.5, 179.5]

`lat`: 1, [-89.5, 89.5]

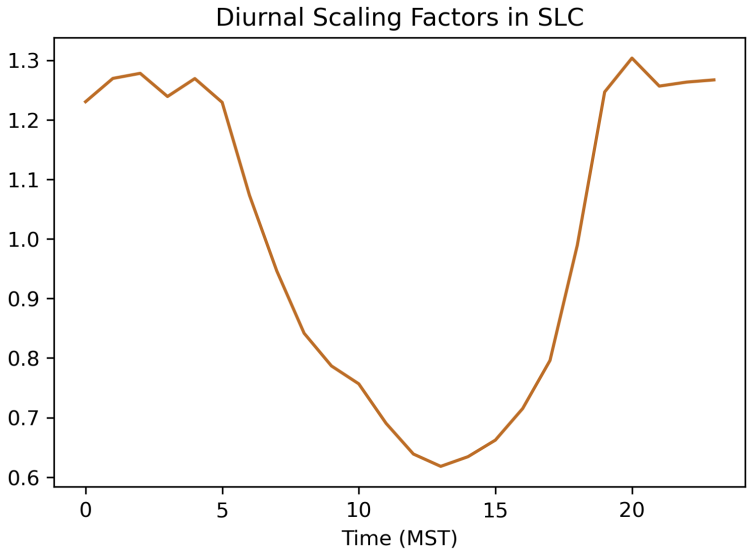


Other time: https://github.com/SicoJensennn/Inventory_GEOS.git

- Pick a grid box

  Target: SLC (40.76, -111.88)

  Target grid: (40.5, -111.5)

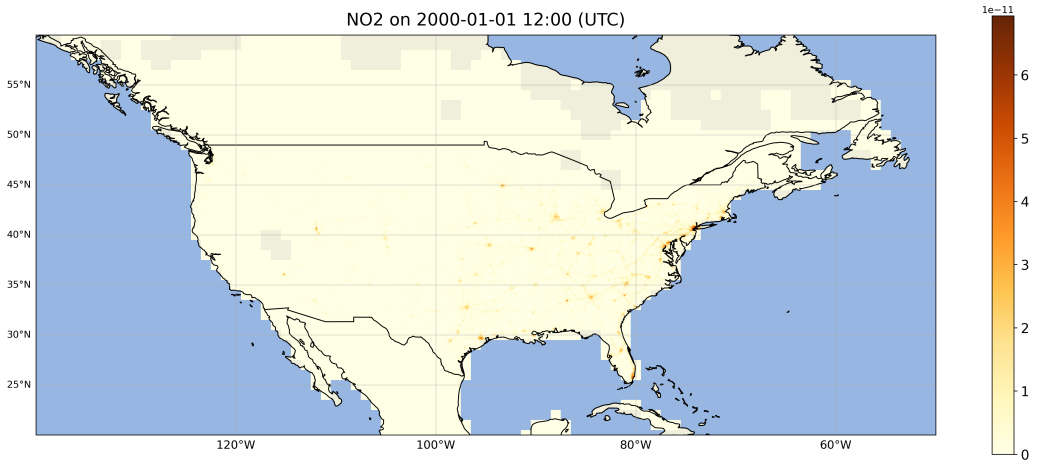


3. Multiply File 1️⃣ by File 2️⃣

`interp`:

Performs univariate or multivariate interpolation of a DataArray onto new coordinates using scipy's interpolation routines.

```
sf_interp = sf_ds[var].interp(lat = onroad.lat).interp(lon = onr
# regrid, turn 1 * 1 -> 0.1 * 0.1
```



4. File 3️⃣

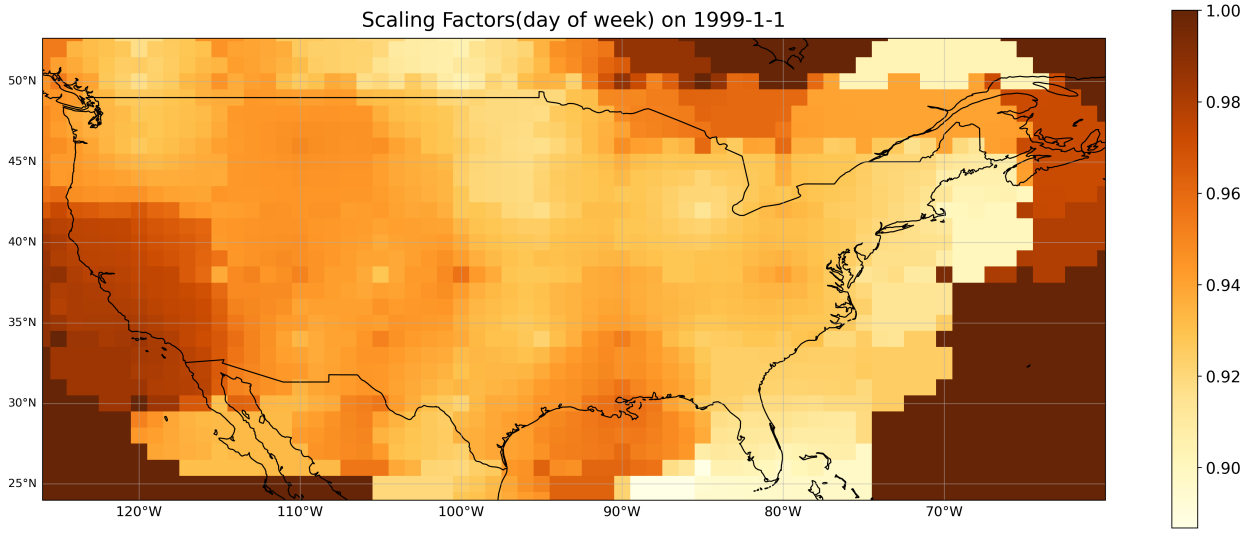
```
import xarray as xr
path = '/uufs/chpc.utah.edu/common/home/haskins-group1/users/szh
dw = xr.open_dataset(path)
var = "NOX"

nox = dw[var]
```

`time`: daily (but only the first week of each month)

`lon`: 1

`lat`: 1

What's inside: daily NOx scaling factors.



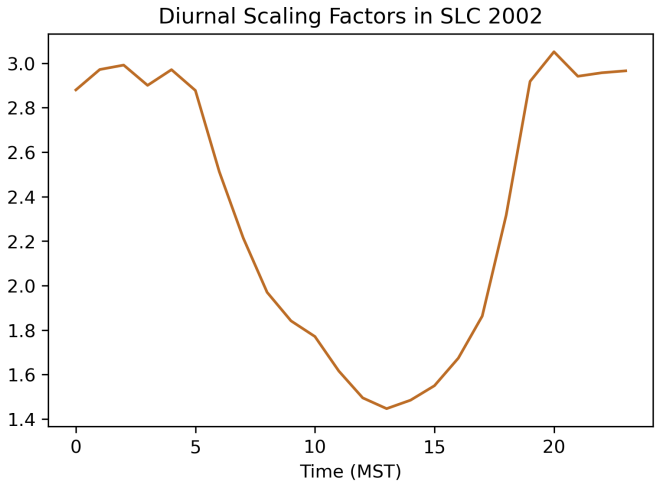
Other day of week:
https://github.com/SicoJensennn/Inventory_GEOS/tree/master/no2_dow

5. File 4️⃣

Annual scale factors are shown below.

Year	Scaling Factor	Year	Scaling Factor
2002	2.341	2012	1.345
2003	2.213	2013	1.282
2004	2.083	2014	1.224
2005	1.989	2015	1.135
2006	1.879	2016	1.000
2007	1.768	2017	0.943
2008	1.651	2018	0.895
2009	1.539	2019	0.840
2010	1.448	2020	0.785
2011	1.407		

Try to multiply your maps from SLC diurnal representing the emissions in 2016 by the 2020 scaling factor to see how much lower they are.



Min: 2020, 0.4852.