TCGI calculation

1. Calculate: absolute_vorticity, PI_vmax, wind_shear, CRH and SD
2. For PI, CRH, and SD, refill the land area. (explained in the following slice, but we didn't do it in the checking)
3. Interpolate to 2*2 deg, and apply the land mask.
4. Get the annual climatology (year 1981-2010) differences between highresmip and ERA5: cor_val = ERA5_clim – highresmip_clim.
5. Add cor_val to 5 interpolated variables from Highresmip.
6. Plug the coefficients from ERA5 (Calculated by Suzana) to get TCGI.

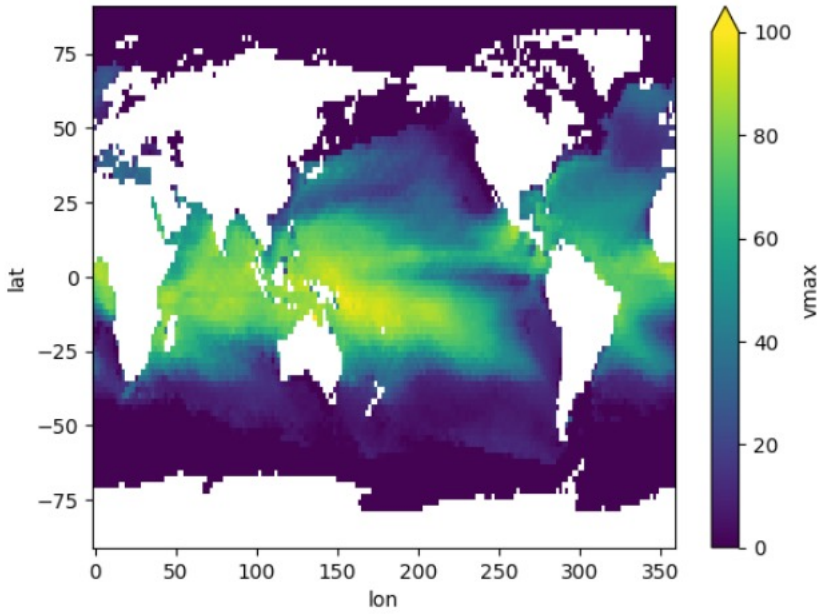
Refill the land area

For PI, CRH, and SD, they're not meant to be used for land areas. When we change the resolution to a 2x2 degree grid, odd values can appear along the coast. To deal with this, we do the following:

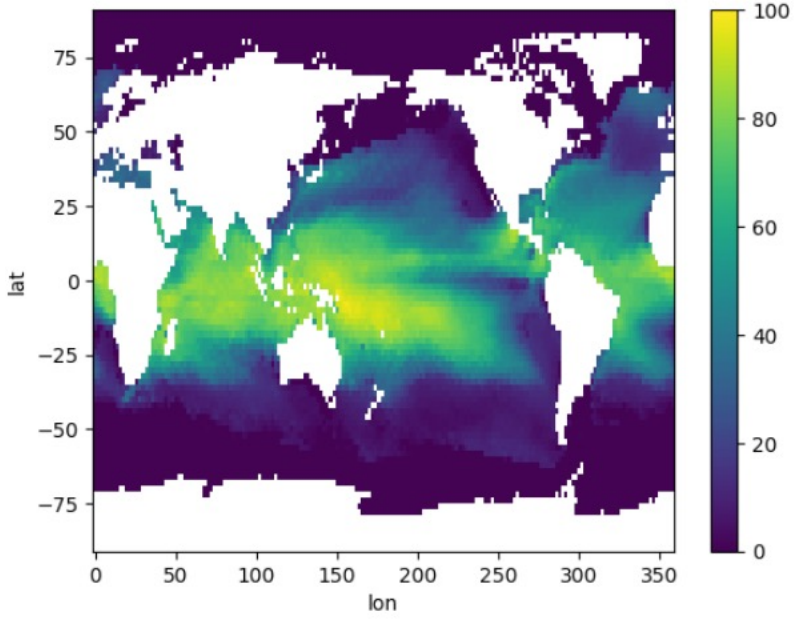
At a certain latitude, we take the zonal mean climatology over the ocean region, which should be just one single value. Then fill the land at this latitude with this single value. We do this for every latitude, which helps smooth out the coastal area a bit.

For the plots below, the left one shows the data before the process, the middle one shows the data after the process, and the left one shows the differences. This demonstrates that our adjustments only affect coastal regions.

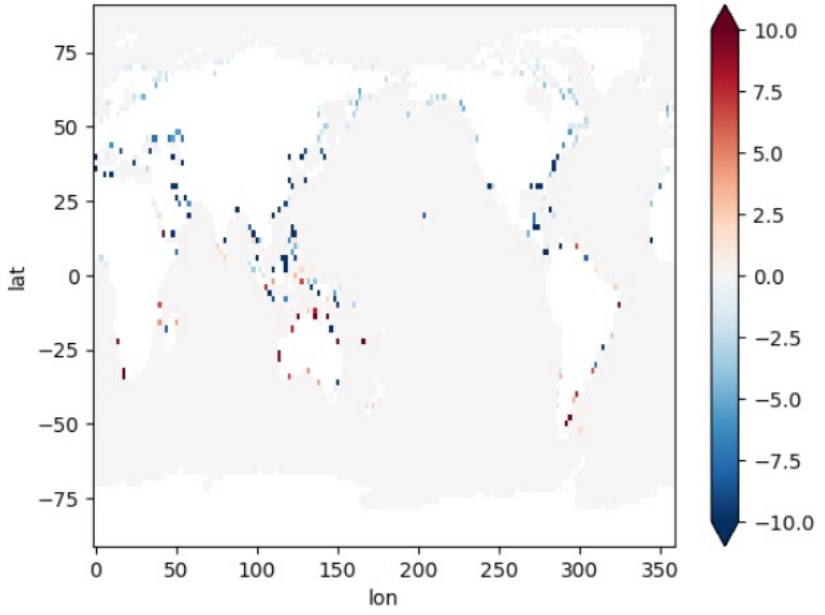
Original



Refill land



Original - Refill land



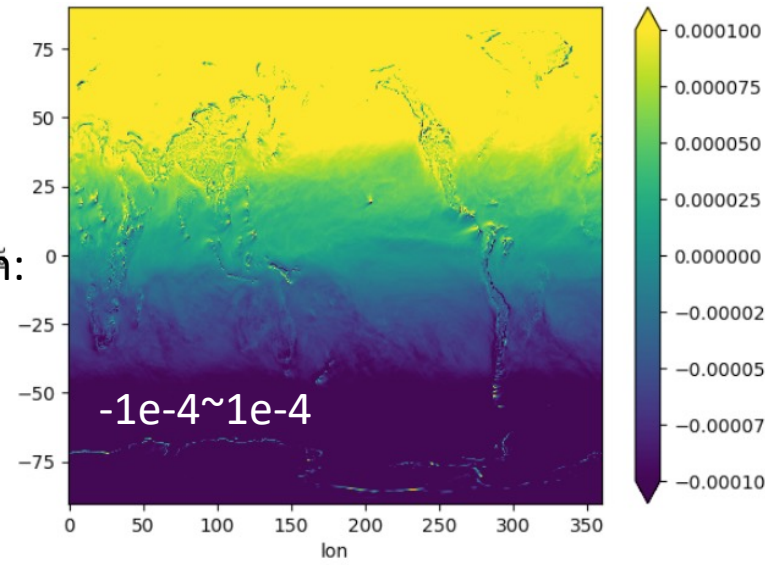
Absolute Vorticity @850hPa [s-1]

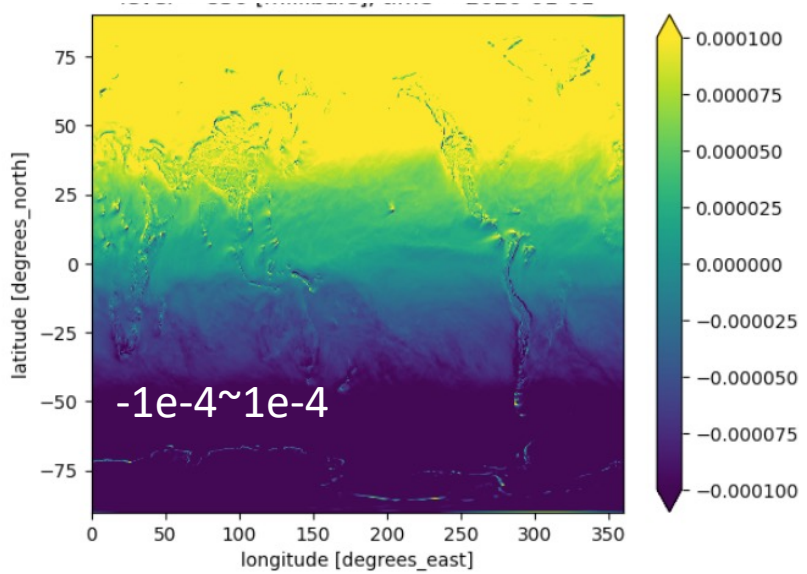
Suzana's output

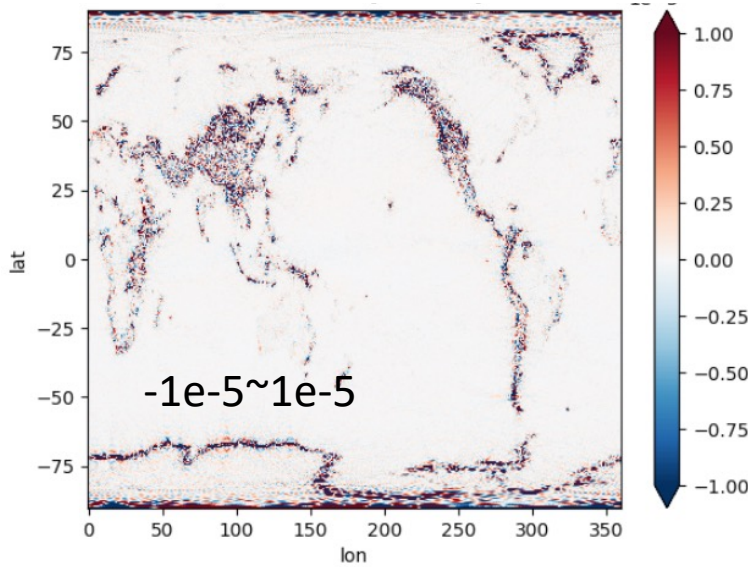
Yi's output

Differences (Suzana's –Yi's)

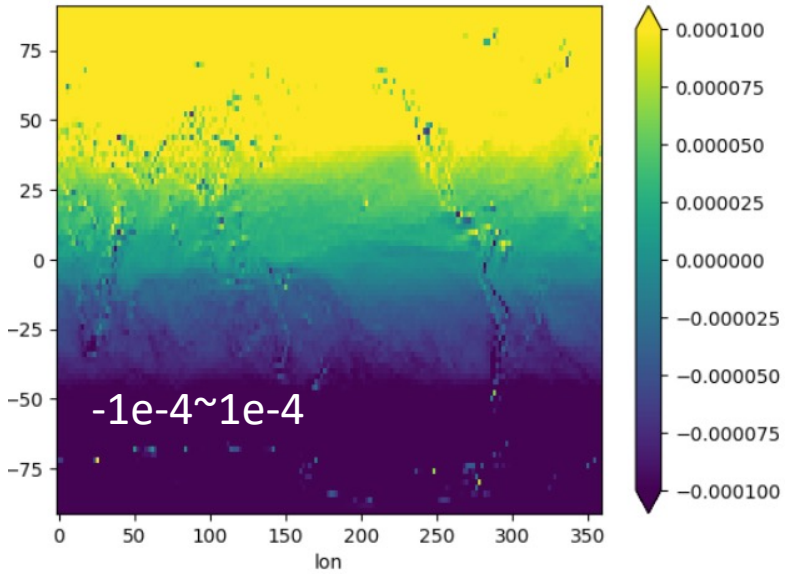
Original Resolution: 0.25*0.25

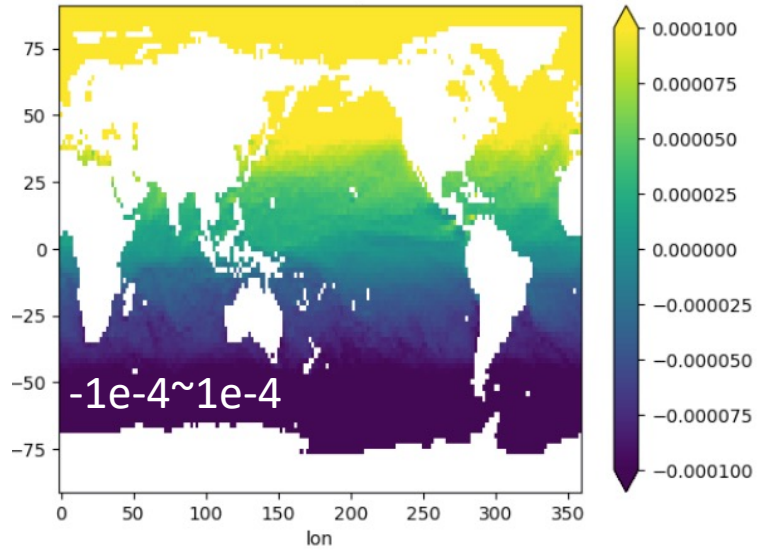


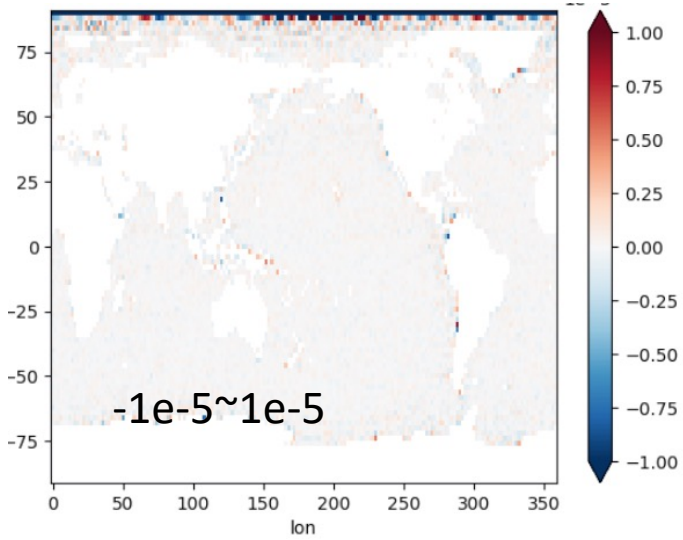




Regridded: 2*2







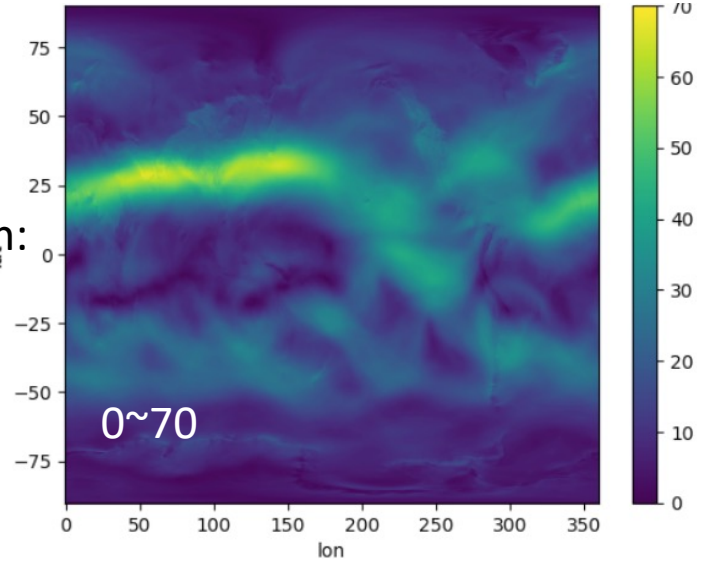
Wind Shear [m/s]

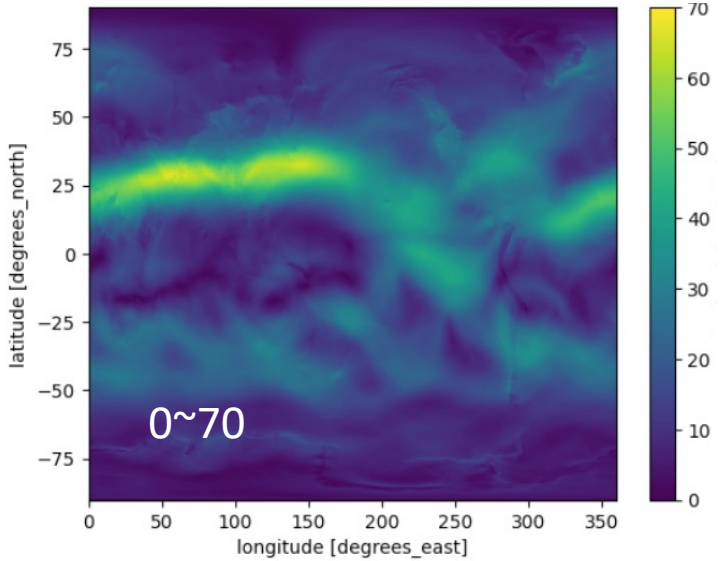
Suzana's output

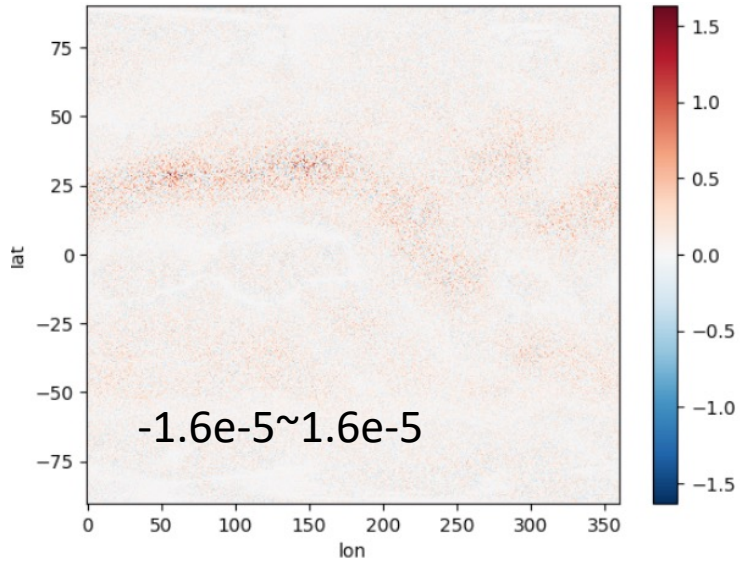
Yi's output

Differences (Suzana's –Yi's)

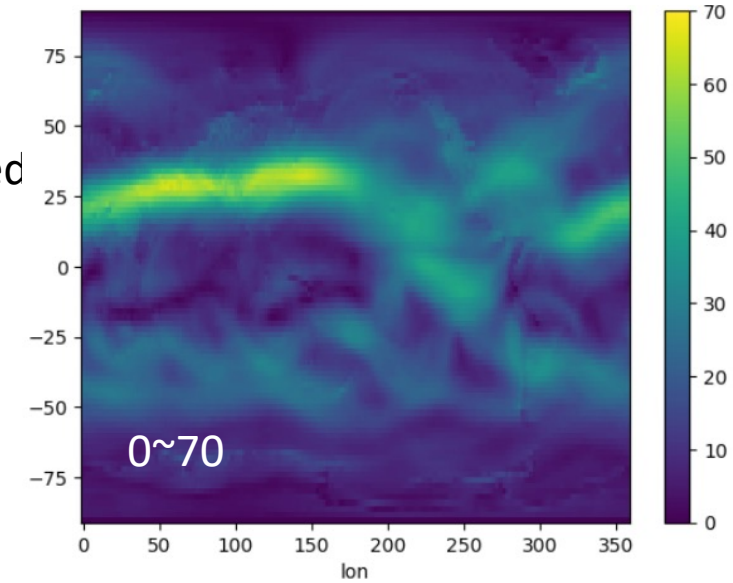
Original Resolution: 0.25*0.25

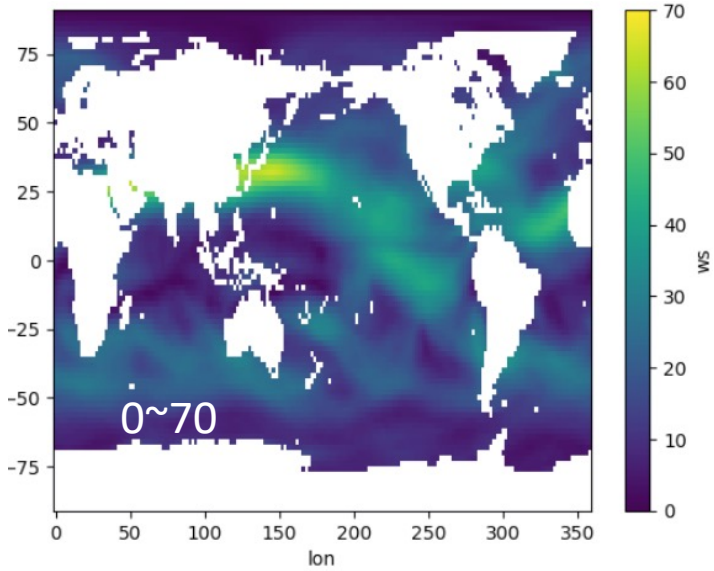


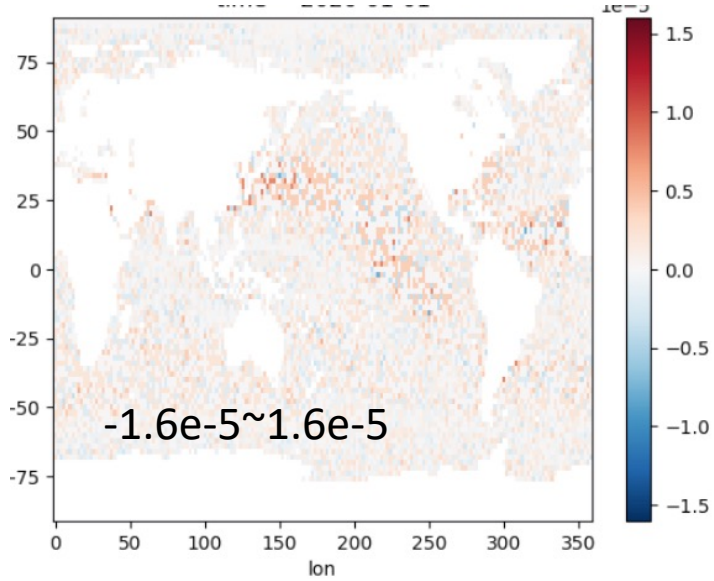




Regridded 2*2







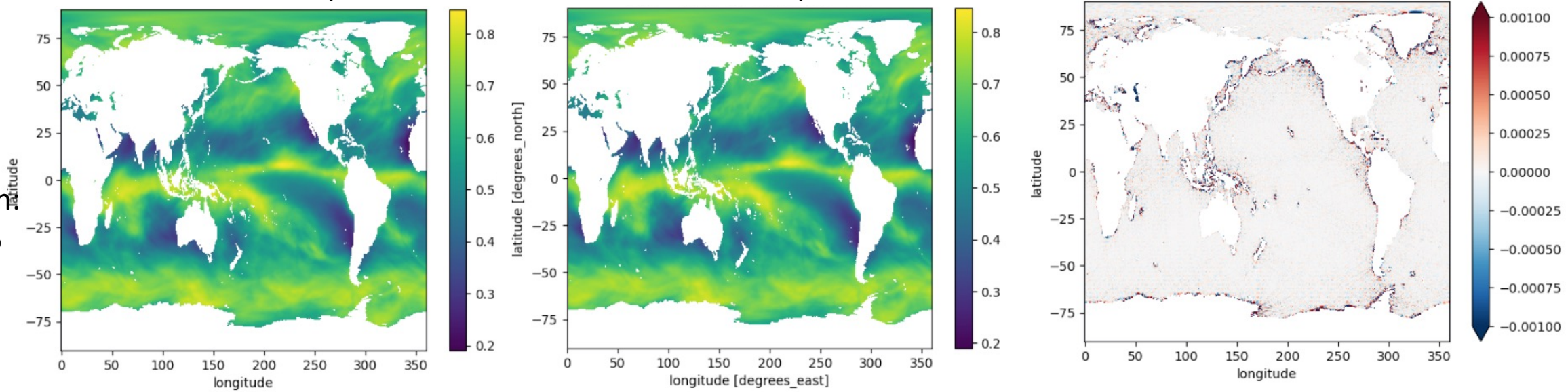
Column Relative Humidity

Suzana's output

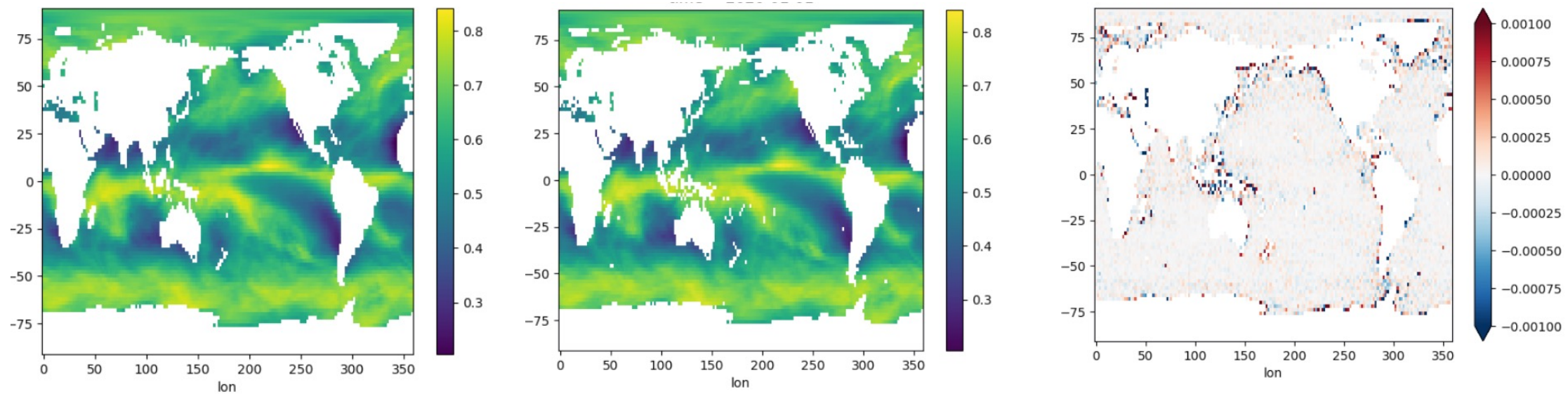
Yi's output

Differences (Suzana's –Yi's)

Original Resolution: 0.25*0.25



Regridded: 2*2



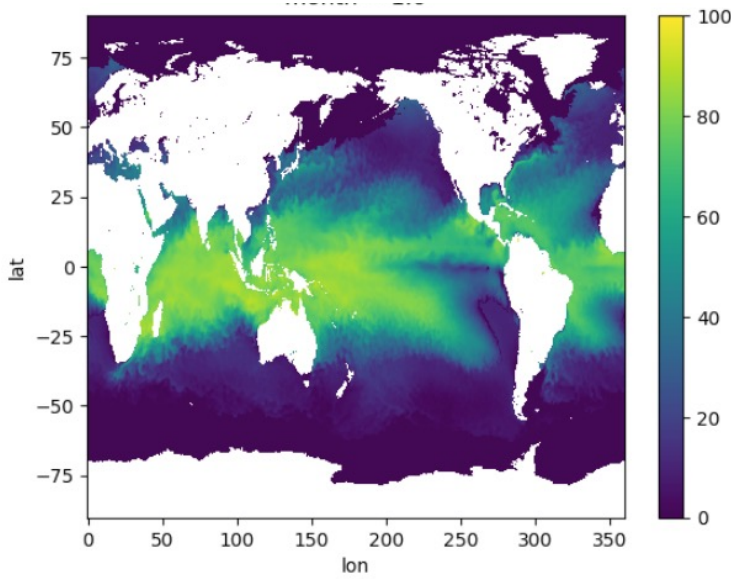
PI_vmax [m/s]

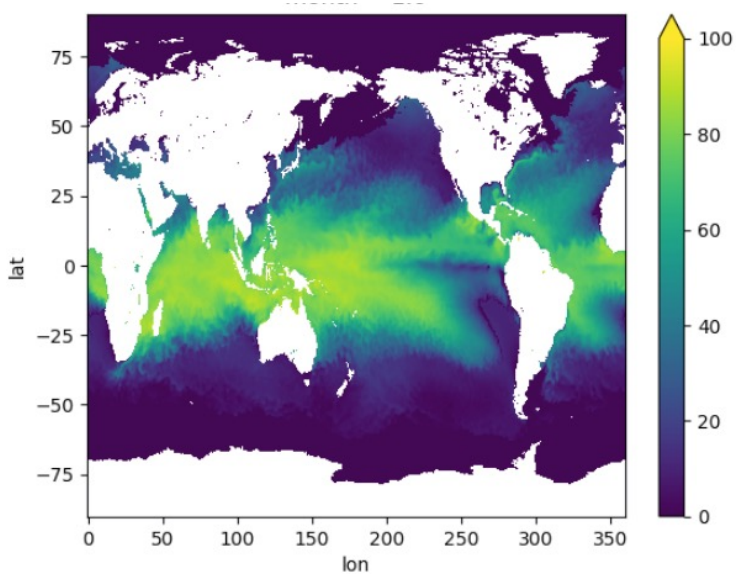
Suzana's output

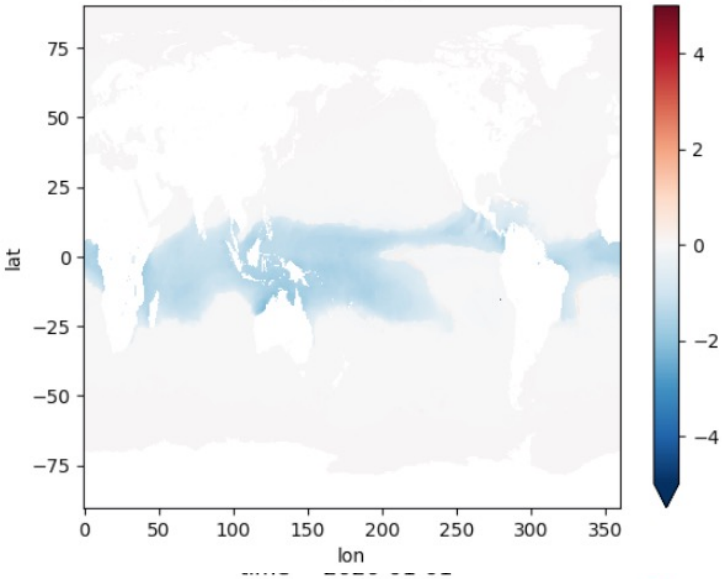
Yi's output

Differences (Suzana's –Yi's)

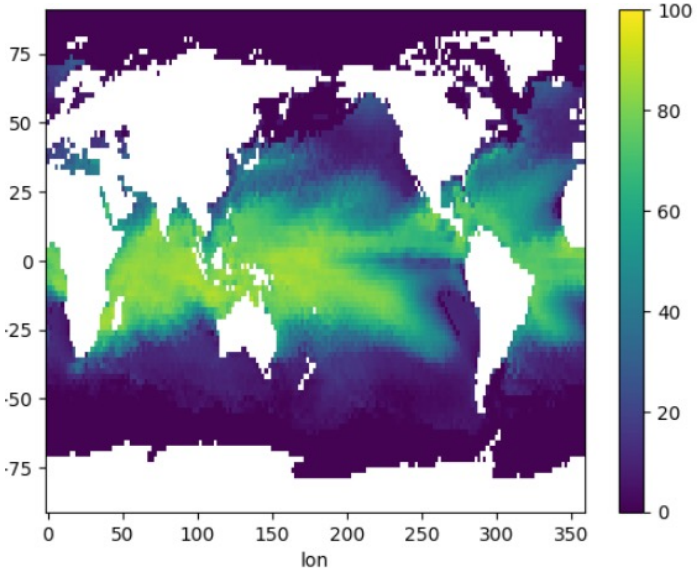
Original Resolution: 0.25*0.25

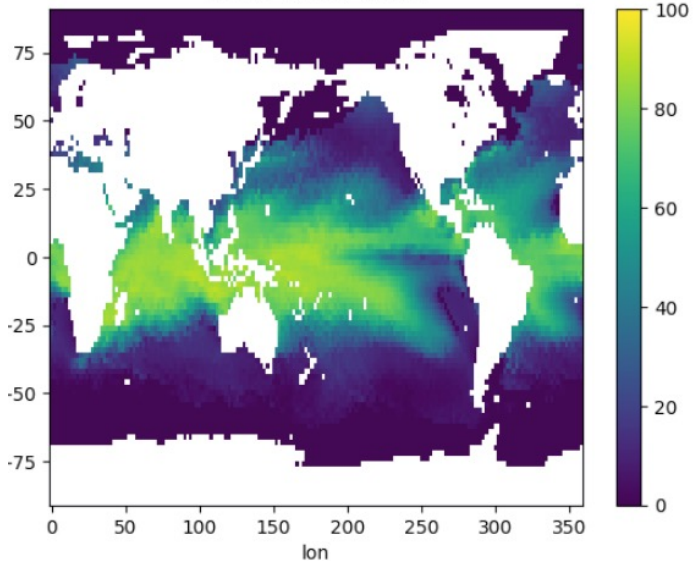


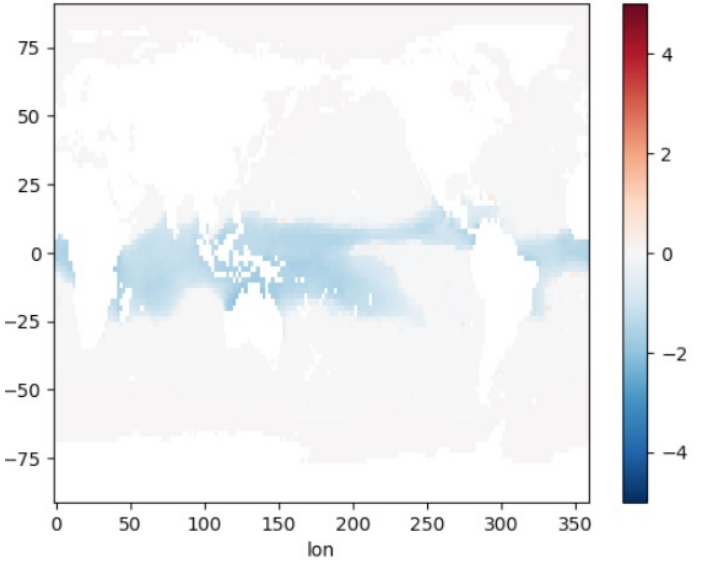




Regridded: 2*2







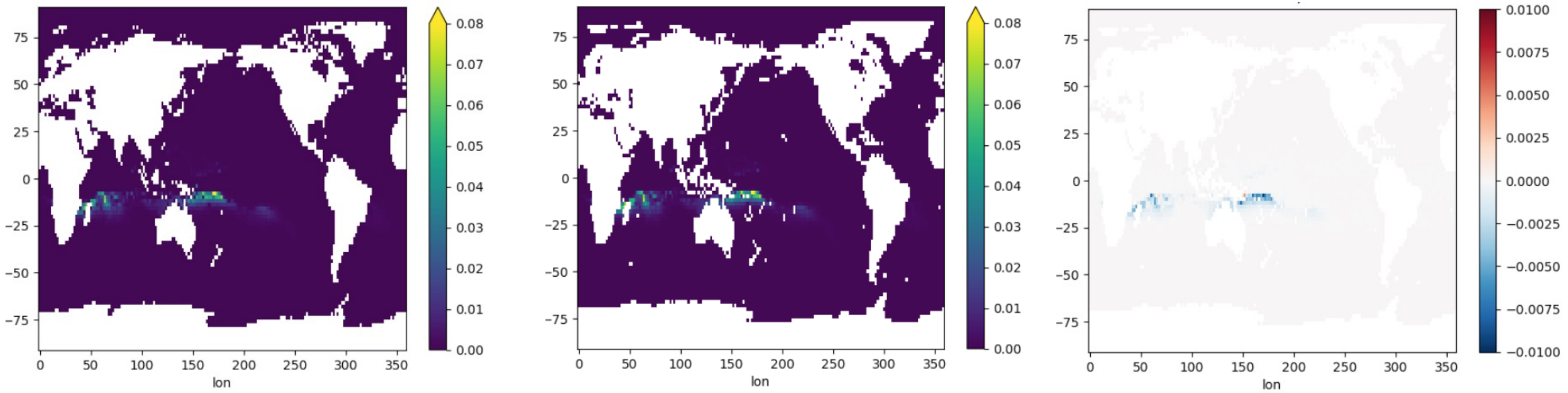
TCGI

Suzana's output

Yi's output

Differences (Suzana's –Yi's)

With CRH



With SD