

ROSENSTIEL SCHOOL
COOPERATIVE INSTITUTE for
MARINE & ATMOSPHERIC STUDIES



Photo Credit: Molly Baringer

Deriving uncertainties for the Global Drifter Program hourly product

Case studies

Shane Elipot, July 16, 2024, OceanUQ Summer School

Tuesday activity!

- Goal of the activity is to compare two SST products: **The Global Drifter Program hourly SST product** (*Elipot et al. 2022*) and the **The Multi-scale Ultra-high Resolution (MUR) SST analysis** (Chin et al. 2017), a mostly satellite-based product.
- Both products provide **uncertainty estimates** and we would like you to use these estimates to inform the comparisons.
- A preliminary step of the comparison is “matching” the two datasets in space (and time). This has been prepared for you so that you can focus on the statistical and oceanographic aspects of the comparisons

Tuesday activity!

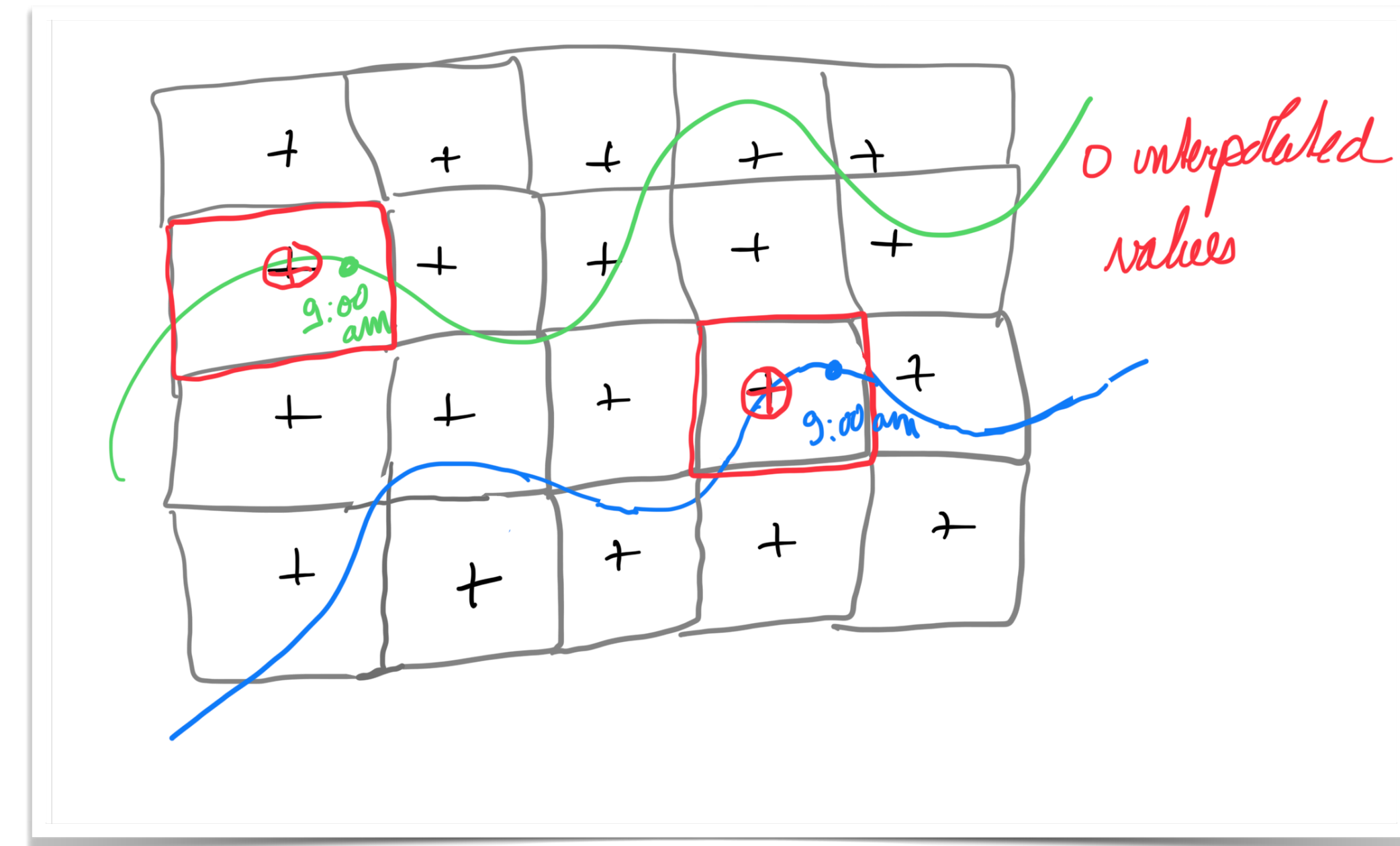
- MUR is available publicly on an AWS S3 bucket but only from 2002 to 2020 (<https://registry.opendata.aws/mur/>)
- Alternatively, it is available from NASA PO.DACC from 2002 to present (<https://podaac.jpl.nasa.gov/dataset/MUR-JPL-L4-GLOB-v4.1>). Datasets for you to play with today were prepared from data downloaded from PODAAC ...
- Global Drifter Data hourly product is available from AWS S3 bucket <https://registry.opendata.aws/noaa-oar-hourly-gdp/>

Tuesday activity!

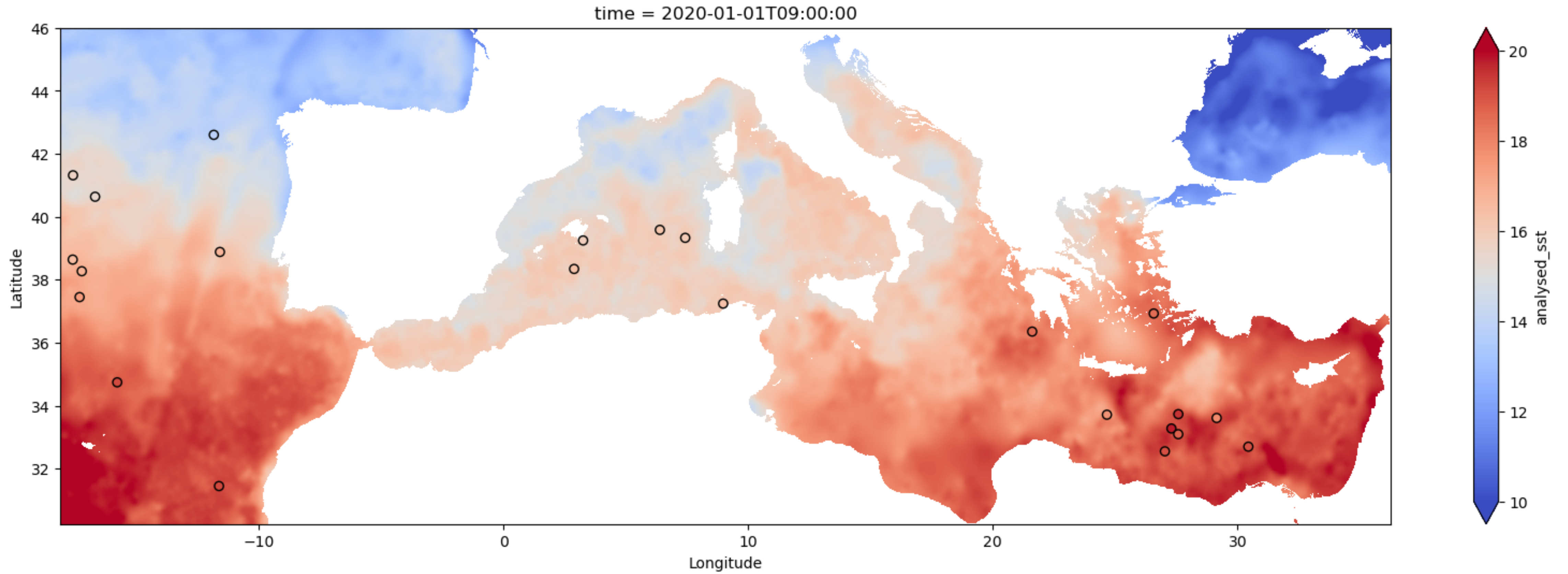
- MUR is the result of the application of the Multi-Resolution Variational Analysis (MRVA) method. This method fits a basis of wavelet functions to multiple satellite and in situ datasets within multiple spatial and temporal windows.
- The method includes a least square estimation of the coefficients multiplying basis functions, the sum of which leads to an estimate of the SST field $T(x,y)$ which can be evaluated anywhere and continuously on the globe. The MUR product consists of an estimation of $T(x,y)$ on a 0.01 by 0.01 geographical grid, so approximately 1~km scale resolution (at best).
- As stated in Chin et al. (2017), **the standard deviation of the formal estimation error is provided at each grid point as an estimate of analysis uncertainty.** The analysis time is **09:00 UTC**. One global estimate per day is available.

Tuesday activity!

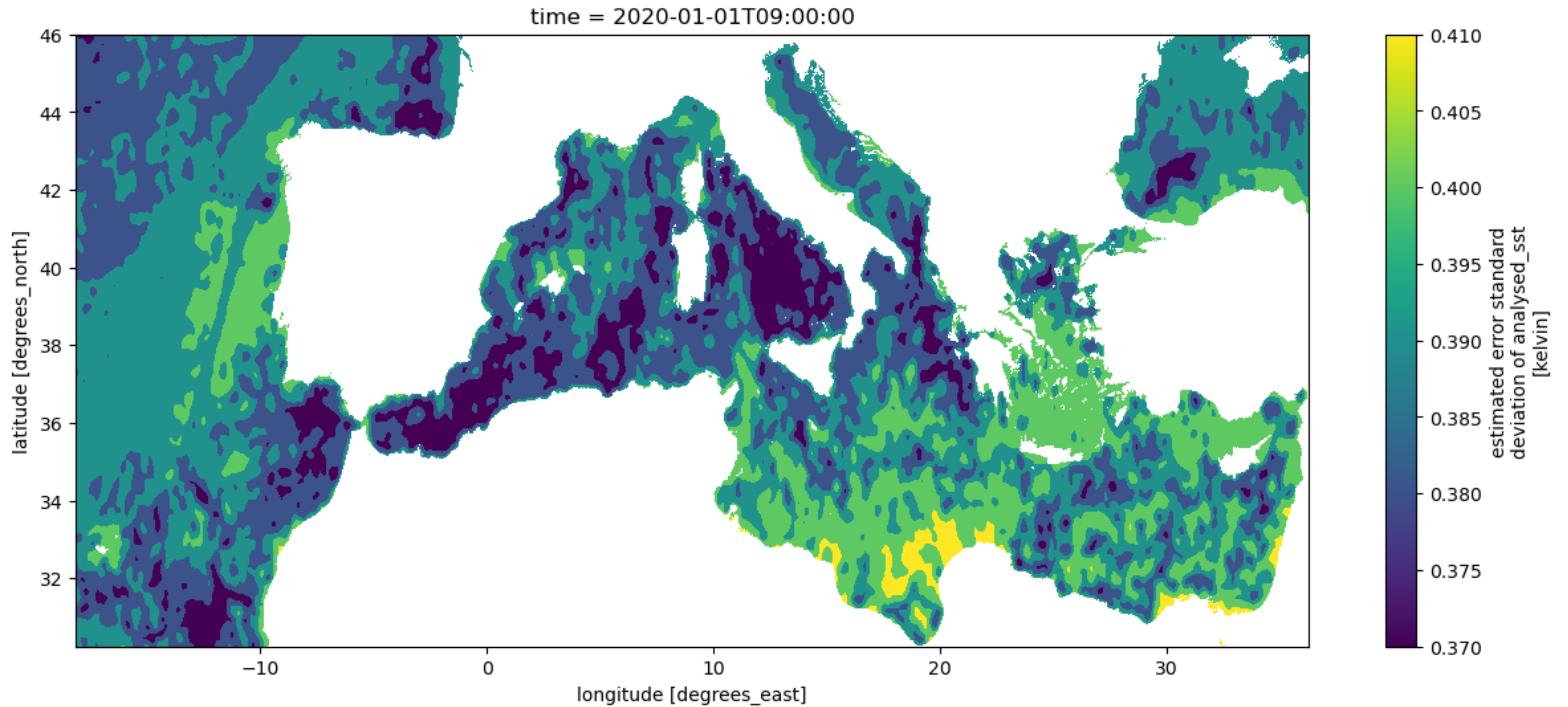
- To prepare a match-up dataset, we matched drifter and MUR data by doing a nearest neighbor interpolation of MUR data (SST estimates and uncertainty estimates) at the 9:00 am drifter locations.
- Limited ourselves to small region in North Atlantic (60-50W, 30-40N)
- **Matched 74,921 9:00am drifter SST estimates from 797 trajectories**
- For bonus activity, also matched 1,799,525 hourly drifter SST estimates from 804 trajectories by expanding to nearest neighbor interpolation in time ...



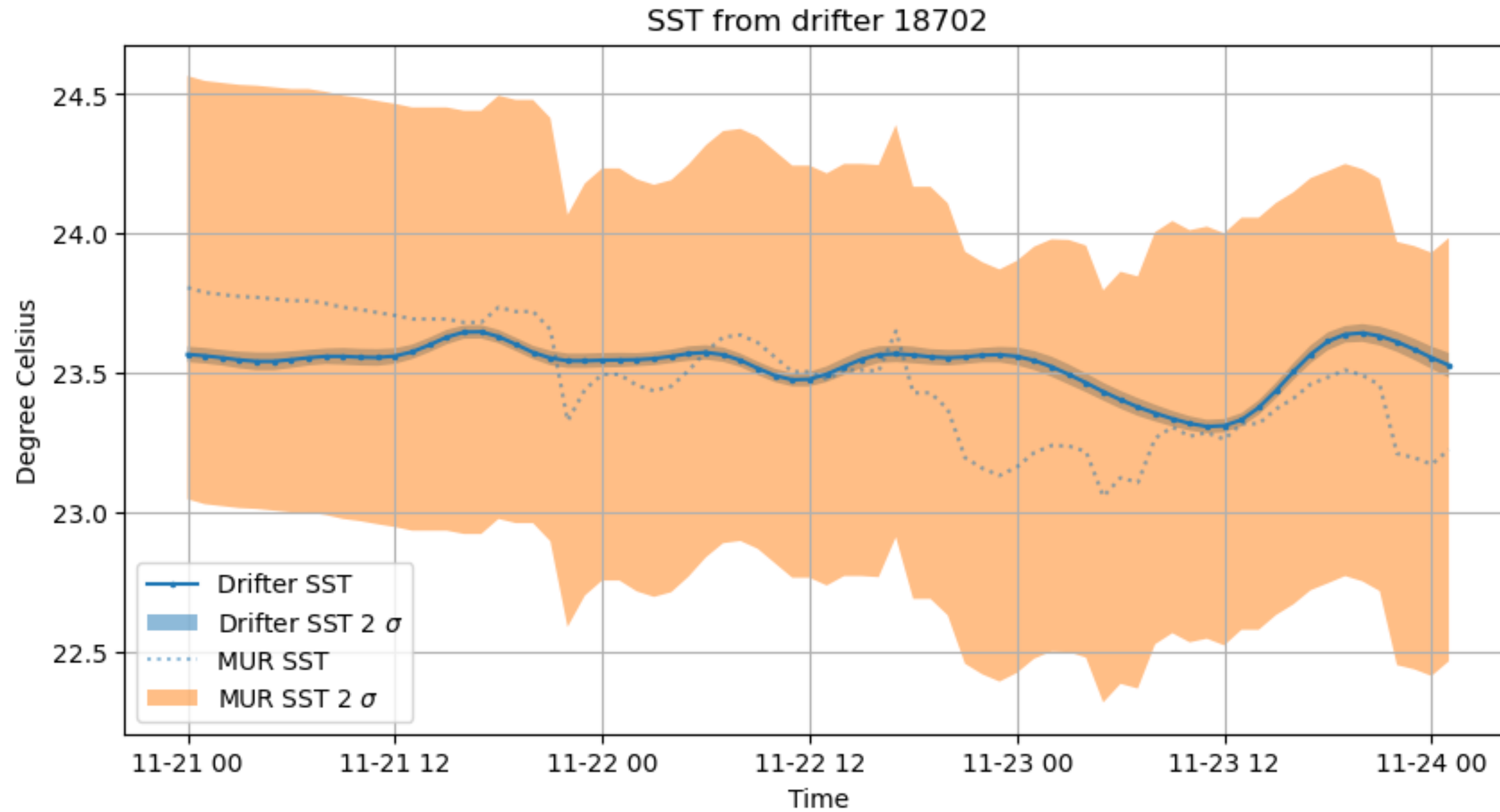
Tuesday activity!



Tuesday activity!



Tuesday activity!



Questions?

Adam S. and Shane E. will be around the classrooms from 1:30pm to 3:30pm

4:00pm we all re-convene in SLAB103 for Science
Talk by Mohamed Iskandarani