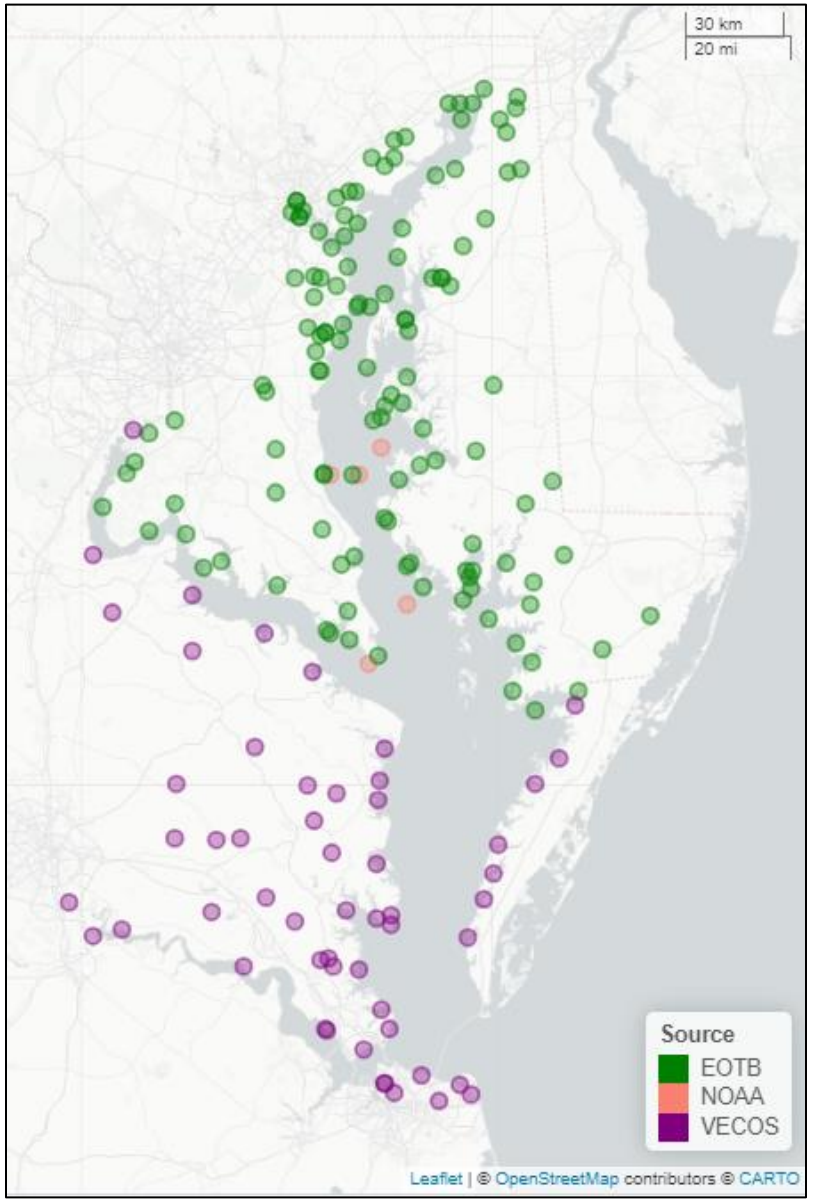
High Frequency Data

Uses

1. Daily Cycles
   - Within day (cyclic) interpolation
   - Small-scale correlation
2. Large-scale Correlation—
   Patterns in DO from day to day
3. Spatial Correlation—DO
   Patterns in space (PILOT)



Data Compilation: For Development

Raw Data Sources
- CBP DataHub
- EOTB: Eyes on the Bay
- VECOS: Virginia Estuarine and Coastal Observing System
- NOAA vertical array

Data Compilation*

Consolidated Variable Name	Long Name
date_time	Date/Time
station	Station
layer	Layer
depth	Sample Depth [m]
salinity	Salinity [ppt]
ph	pH [-]
do	Dissolved Oxygen [mg/L]
do_sat	Dissolved Oxygen [%]
turb	Turbidity [NTU]
chl	Chlorophyll [µg/L]
temp	Water Temperature [°C]
sp_cond	Specific Conductance [µS/cm]
tchl_pre_cal	Total Chlorophyll Pre-calibrated [µg/L]
chla	Chlorophyll-a [µg/L]
bga_pe	Blue-Green Algae Peak Excitation [µg/L]
bga_pe_rfu	Blue-Green Algae Peak Excitation [RFU]
fluor	Fluorescence [%FS]
salinity_psu	Salinity [PSU]
press_w	Water Pressure [kPa]
depth_b	Bottom Depth [m]
secchi	Secchi Depth [m]
kd	Light Attenuation [1/m]

CBP DataHub
- 1984-2022
- 835 stations
- 819k obs.

EOTB: Eyes on the Bay
- 2001-2022
- 126 stations
- 11,916k obs.

VECOS: Virginia Estuarine and Coastal Observing System
- 2003-2022
- 54 stations
- 6,776k obs.

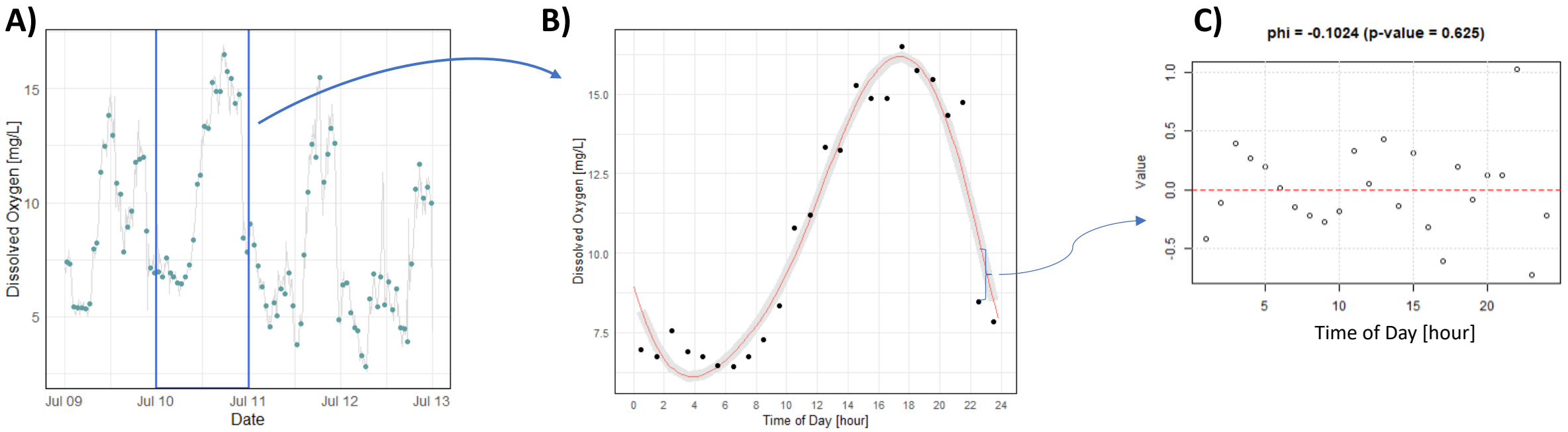
NOAA vertical array
- 2022-2023
- 5 stations
- 440k obs.

DATAFLOW (pilot)
- 2007-2008 (Potomac)
- 576k obs.

*
- Station location in scope
- Date/time available
- Sample depth available (datum)
- Consolidated variable naming
- Consistent units
- QC/Remark code processing
- Plausible DO concentrations
- **No** date/time screening

Criteria assessment would include Tier 3 citizen science data.

1. Daily Cycles—Within day (cyclic) interpolation and small-scale correlation



Panel A: High frequency data are used at an hourly frequency (symbols) for consistency across all data sources.

Panel B: Diel and tidal harmonic coefficients are computed for each `station/layer/day` of data.

Panel C: Small-scale (hourly) correlation coefficient is computed using residuals from Panel B.

Calculations performed with beta-logit transformed DO. Panels A and B displayed in observed units (mg/L). Panel C displayed in transformed units.

2. Large-scale Correlation—Patterns in DO from day to day

Panel A: High frequency data (gray line) are subsampled to one value per day (symbols).*

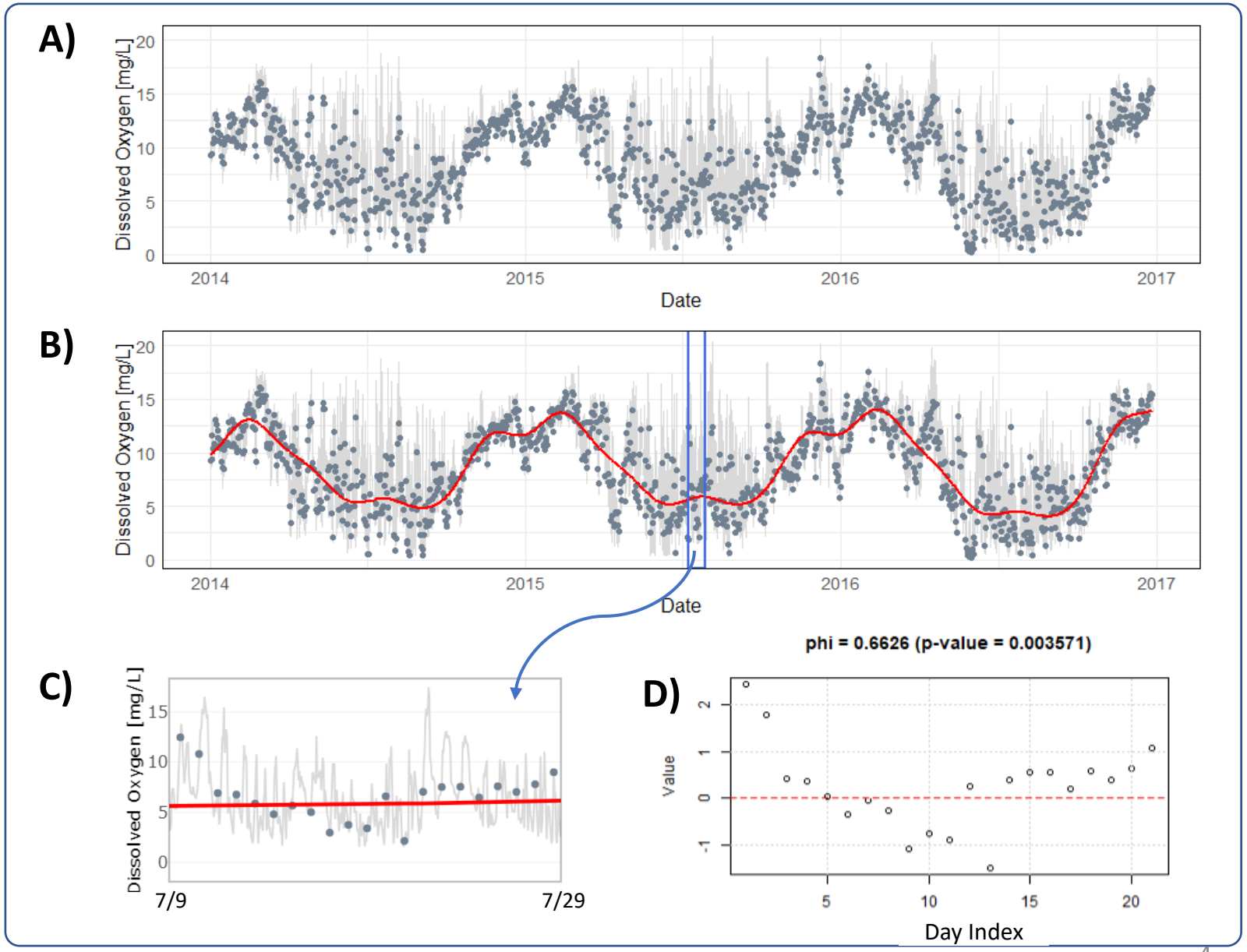
** Data were subsampled to the observation closest to 11am.*

Panel B: Seasonal DO cycles are estimated (red line).†

† Red line is the mid-day interpolation.

Panel C: Sliding 21-day window of data selected.

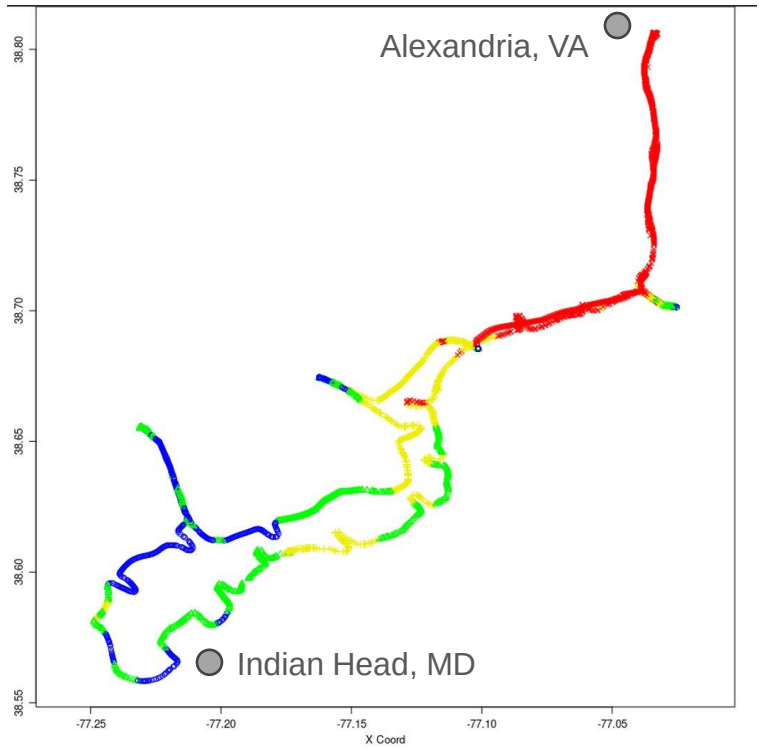
Panel D: Large-scale correlation coefficient is computed using residuals from Panel C.



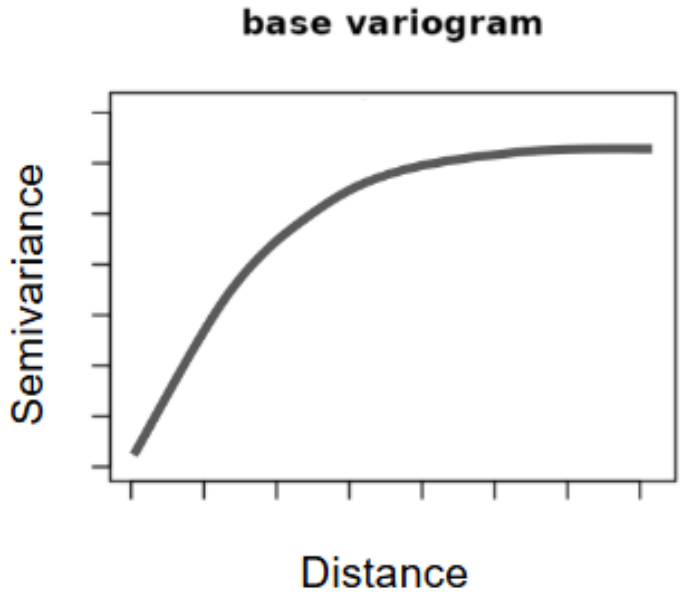
Calculations performed with beta-logit transformed DO. Panels A, B, and C displayed in observed units (mg/L). Panel D displayed in transformed units.

3. Spatial Correlation—DO Patterns in space (PILOT)

A)



B)



Panel A: DATAFLOW (DFLOW).

- Selected individual cruises from May-September 2007-2008 for pilot analyses.
- Surface measurements (<1m depth) taken every 4 seconds.

Panel B: Variogram will be created and used to inform spatial correlation.

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Status

- Daily Cycles & Large-scale Correlation
  - Coefficients computed
  - Developing interpolation algorithm
  - Scale up Gooses Reef demonstration
- Spatial Correlation (PILOT)
  - Data exploration complete
  - Variogram development – in progress