

Database of Observations: Ocean/Marine perspectives

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As time permits, effort must be made to gather inputs from other JCSDA - JEDI stakeholders

Observation Network

★ In Situ

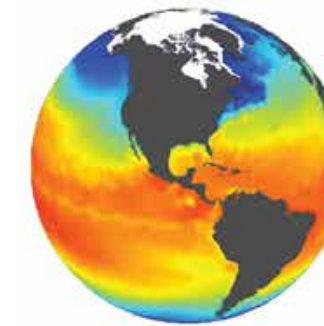
★ Satellite

- Radiances are handled by atmospheric obs network- via *coupling*
- Derived (retrievals)
- along-track (L2P)
- gridded (L3/L4)

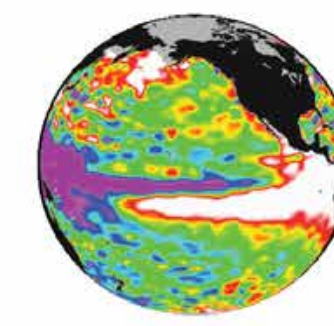
★ Coverage (sampling) and observation type vary over decades (reanalysis)

Modern era (~2017)

Satellite Observations



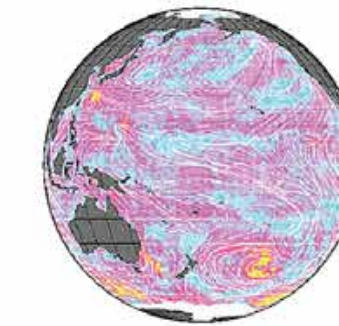
SST



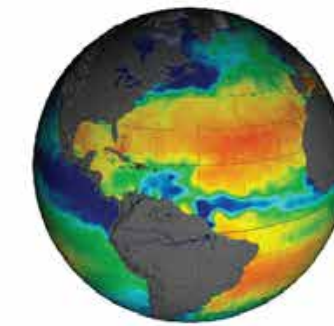
SSH



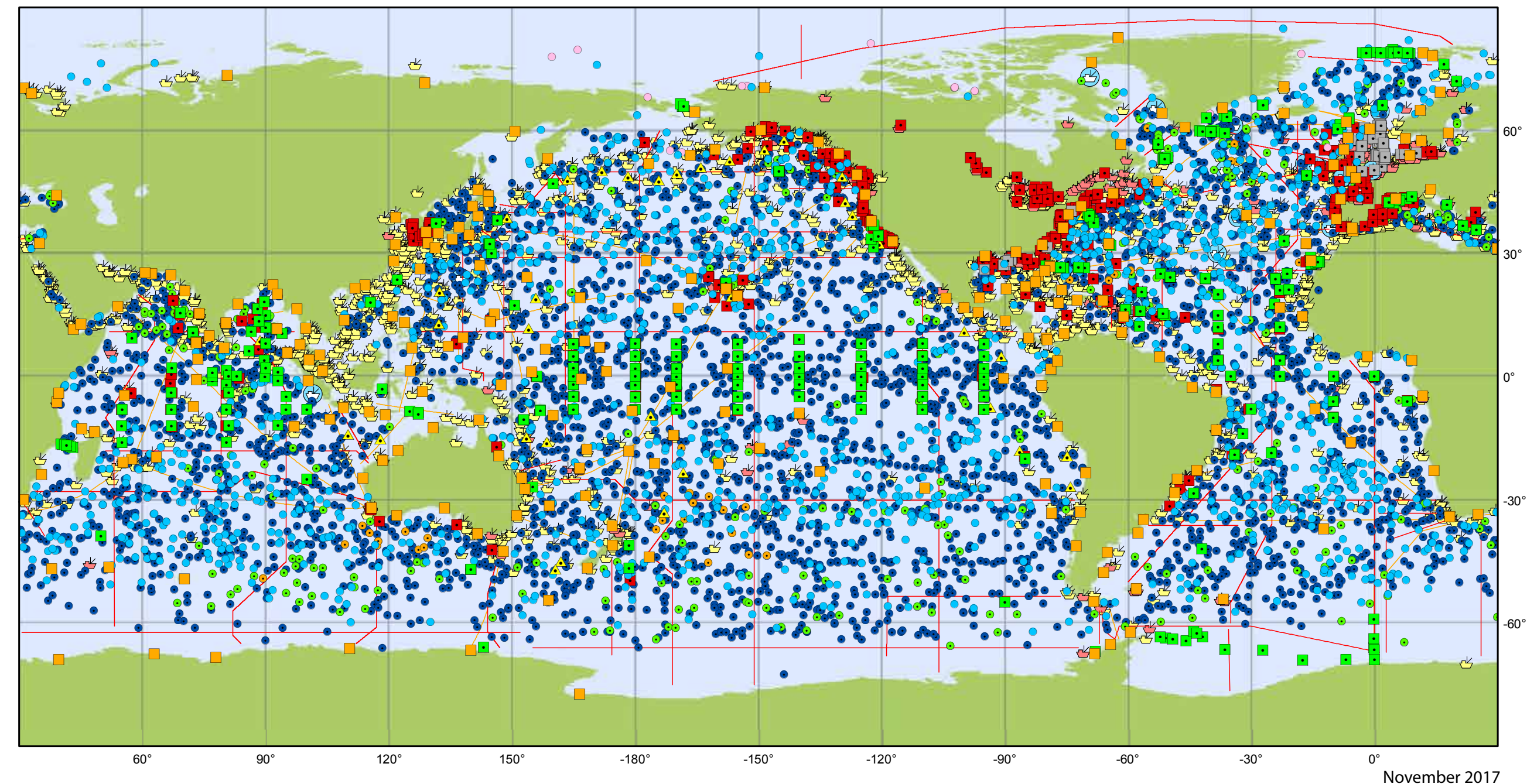
Ocean Color



Surface Vector Wind



Surface Salinity



Main In Situ Elements of the Global Ocean Observing System

Profiling Floats (Argo)

- Core (3,873)
- Deep (38)
- Biogeochemical (284)

Data Buoys (DBCP)

- Surface Drifters (1,372)
- Offshore Platforms (102)
- Ice Buoys (15)
- Moored Buoys (407)
- Tsunameters (36)

Timeseries (OceanSITES)

- Interdisciplinary Moorings (332)

Repeated Hydrography (GO-SHIP)

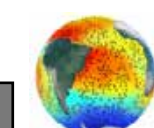
- Research Vessel Lines (61)

Sea Level (GLOSS)

- Tide Gauges (252)

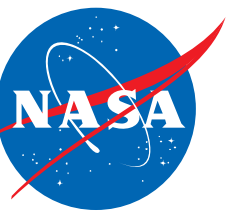
Ship Based Measurements (SOT)

- Automated Weather Stations (248)
- Manned Weather Stations (1,609)
- Radiosondes (19)
- eXpendable BathyThermographs (37)



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www.jcommops.org
08/12/2017

Lindstorm et al., 2018. *Oceanography* 31(1):38–41, <https://doi.org/10.5670/oceanog.2018.107>.

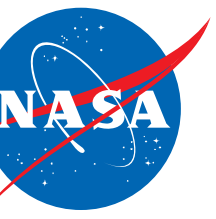


Considerations

- ★ Support all the observations types (in situ, satellite)- past, present and future...
 - ◎ Readers/converters for different types (csv, nc4, bufr, etc)
 - ◎ Flexibility to choose different types (add new types, exclude certain types, *single-obs or simulated obs*)
- ★ Used in assimilation, off-line model diagnostics (call observer), obs-impact studies
 - ◎ Information for QC (details follow)
- ★ Be able to write innovations (assimilation output) in the “same” format (e.g., ERA-5)
- ★ Ability to write to disk (preferably nc4- NASA format requirements, be able to trace: metadata, external partnerships, ...)
 - ◎ Questions:
 - ➔ Contents of the database?
 - ➔ **How are they organized?**
 - ➔ **How many files/day?**

Not in this talk!

Contents of the database



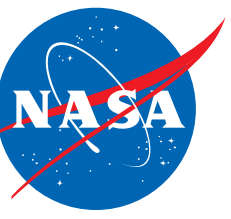
Generic to all observation types (fill UNDEF if not available)

- **Position** (lat, lon, depth/pressure), **Time** (yyyymmddhhss or offset from a *ref*)
- Variable, Error estimate ($\sigma_{i,i}^0$) - *think* of cross correlations (future SWOT Mission)
- **WMO ID** (*station* ID; satellite ID for satellite derived data), **instrument ID** (e.g., barometer, thermometer, ...)
- **Bottom pressure** (if not available or otherwise distance from bottom)
- **Difference from climatological values** (every center may prefer a different clim(s))
- **Distance from coastline or nearest land-point** (every center may prefer a different topography/bathymetry)

Must
have

Good
to have

May
have



Contents of the database

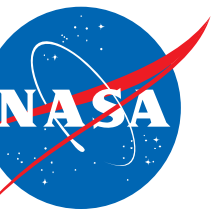
Specific to satellite derived data (fill UNDEF if not available)

- Ascending/ Descending
- Distance from center of track
- Local Time (or solar zenith angle)
- Altimeter (Sea Level Anomaly/Dynamic Topography)
 - ➔ Include geoid height, cross-calibration bias (correction due to atmosphere), tide info; this may expand in future
- Radiometer, Laser Altimeter, etc (Sea ice concentration/thickness/freeboard)
 - ➔ Include water temperature and salinity, meteorology *should* be handled by other (atmosphere) database(s)- collocation should be thought of...

Must
have

Good
to have

May
have



Not Covered

- How is the database organized in memory?
- If stored on disk - how many files/day? Naming convention (variables, file names, ...)
- Efficiency (memory footprint, ease of access, ...)
- Connections with other observations (atmosphere, land- run off, land-ice, waves, bio, chem, ...)
- Operational requirements (NOAA, NAVY, ... other JCSDA - JEDI partners)
- Converters to handle data from GTS (real-time ARGO, drifters, ...)
- Software to derive error estimate