bgcArgoDMQC: A python package for performing Biogeochemical Argo quality control

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biogeochemical Argo

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`bgcArgoDMQC`: What and Why?

- The `bgcArgoDMQC` package is a python module made for performing delayed mode quality control on (eventually) all BGC-Argo variables, but for now just oxygen.
- We seek to provide an open source tool to the community that is straightforward to use, reliable, and is consistent with previously established methods (i.e. SAGE-O2).

- Requirements:
  - run on python3.4 or higher (uses `pathlib`)
  - `numpy`, `scipy`, `matplotlib`
  - `gsw` package for TEOS
  - `netCDF4`
  - `pandas`
- Optional packages
  - `seaborn`
  - `cmoean`
  - `cartopy`

- Installation
  - via conda:

```
conda install -c conda-forge bgcArgoDMQC
```

  - via python package index:

```
pip install bgcArgoDMQC
```

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bgcArgoDMQC: Workflow

Import package

```
import bgcArgoDMQC as bgc
```

Set environment variables

```
bgc.set_dirs(…)
```

Load Argo data

```
argo = bgc.sprof(wmo) OR argo = bgc.profiles(wmo)
```

Calculate gain

```
argo.calc_gains(ref='NCEP')
```

- Load reference data (NCEP or WOA18)
- Interpolate reference data along float track

```
argo.get_woa() or
argo.get_ncep()
```

- Calculate ratio between reference and float data

```
argo.calc_gains(ref='NCEP')
```

Apply gain, calculate error

Output DMQC'ed file

work in progress

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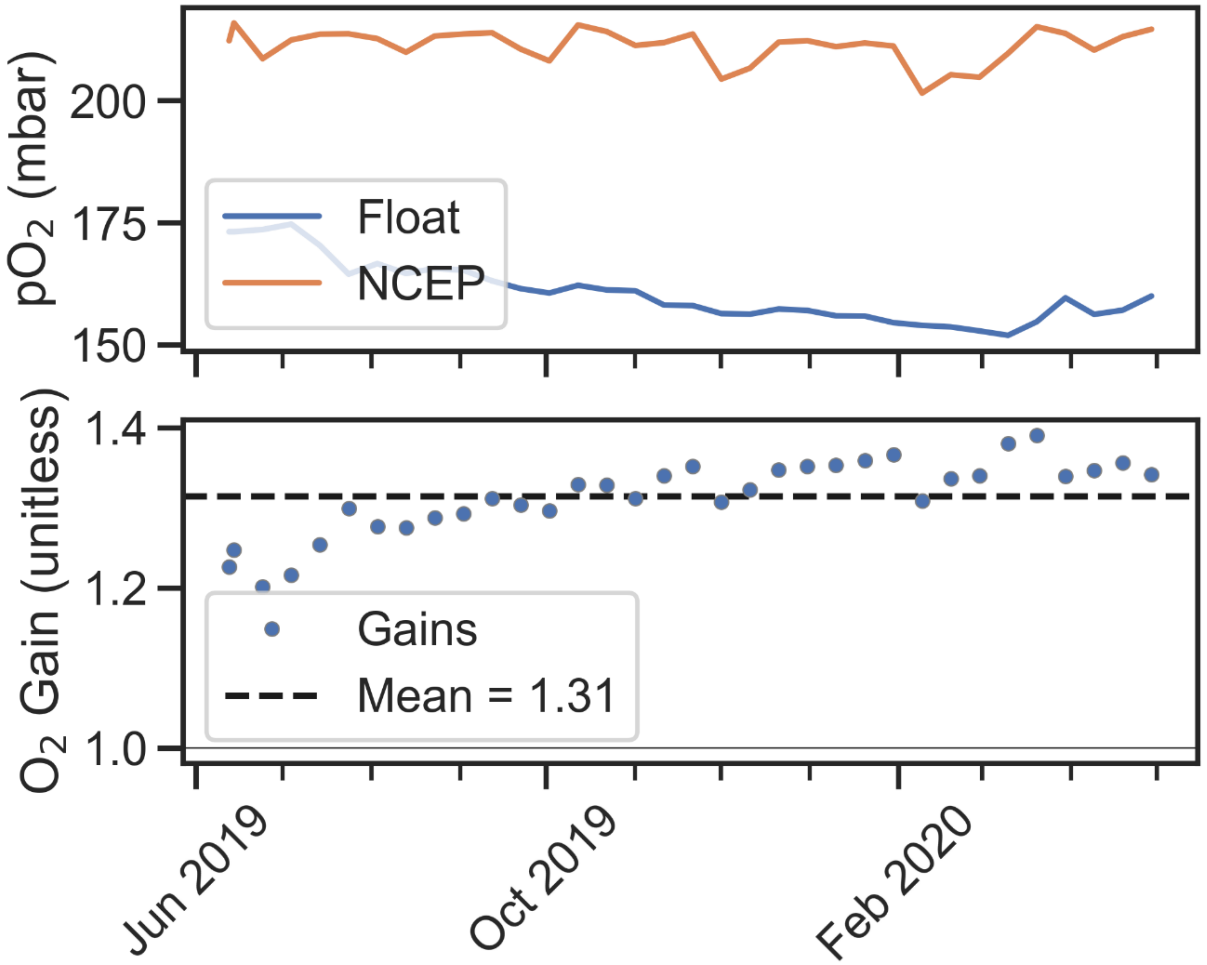
bgcArgoDMQC: Example I

```python
import bgcArgoDMQC as bgc

# will load a synthetic (Sprof) file
syn  = bgc.sprof(4902481)
# will load the first 10 profile fil
prof = bgc.profiles(4902481, cycles=

# calculate the gain using in-air da
gains = syn.calc_gains(ref='NCEP')
# calculate the gain using WOA data
woa_gains = prof.calc_gains(ref='WOA

# plot the gains
g = syn.plot('gain', ref='NCEP')
```



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`bgcArgoDMQC`: Validation

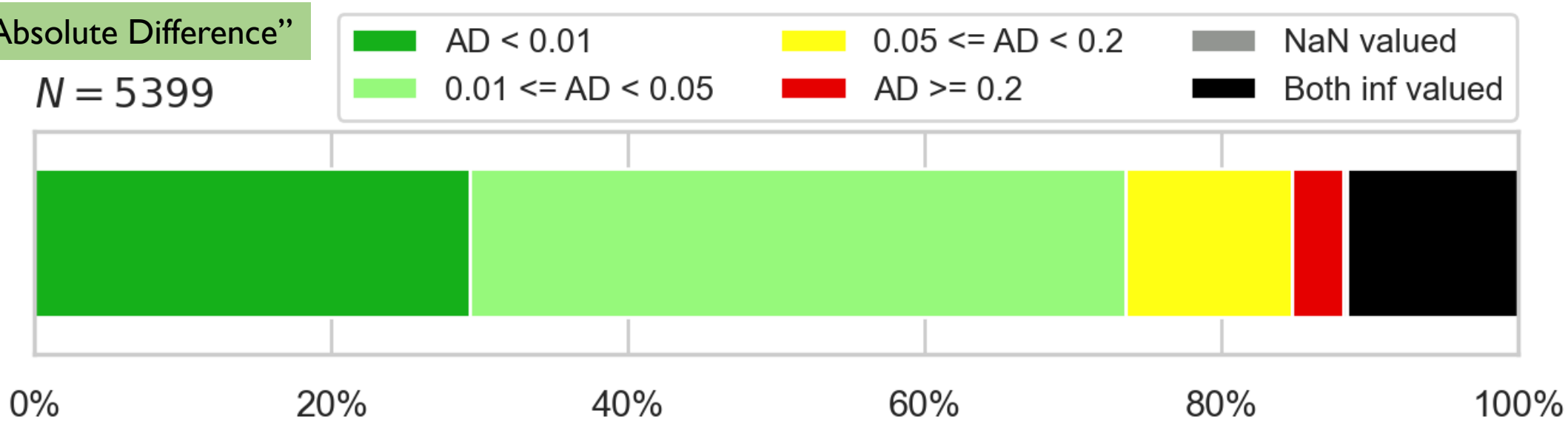
- Three main branches for validating the results of the python package:

1. Validating directly against output of SAGE-O2
2. Comparing and re-creating the DOXY audit
3. Repeating QC process on already DMQC'ed floats

bgcArgoDMQC: Comparison to DOXY Audit

- Precision in audit file is ~0.01, so calling absolute differences of <0.01 "perfect" matches
- Infinite gain values in this case are also perfect matches
- Remain about 800 profiles outside "acceptable" threshold

AD:"Absolute Difference"



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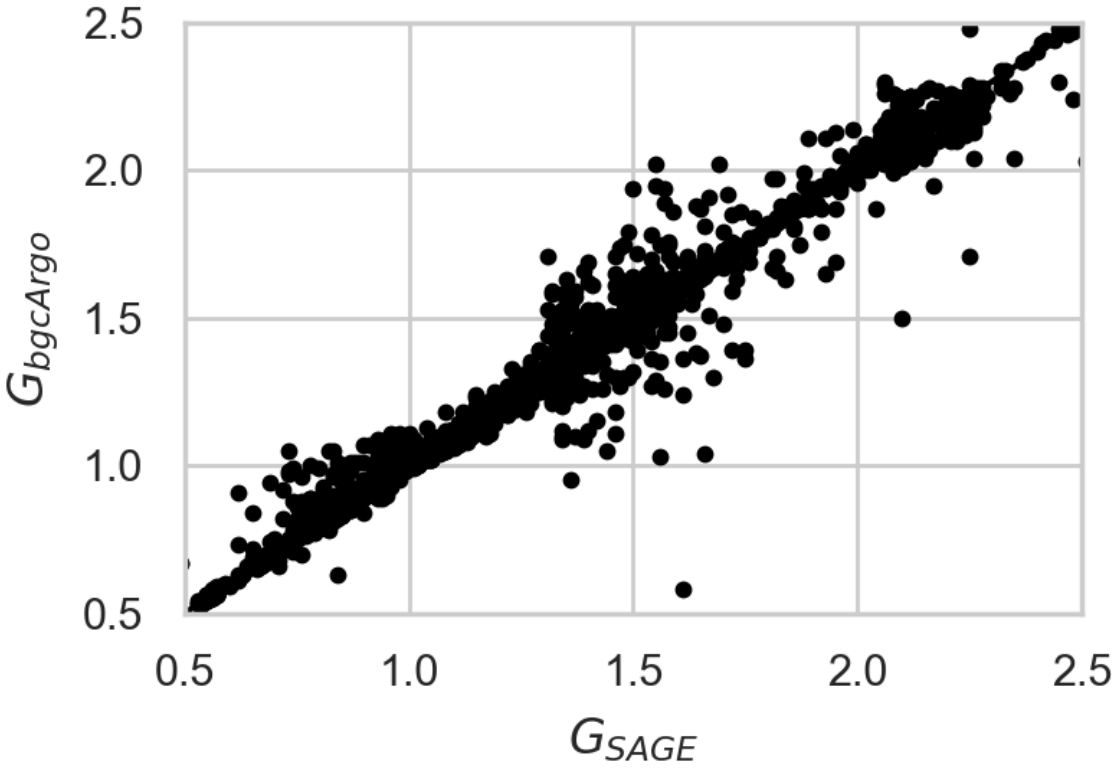
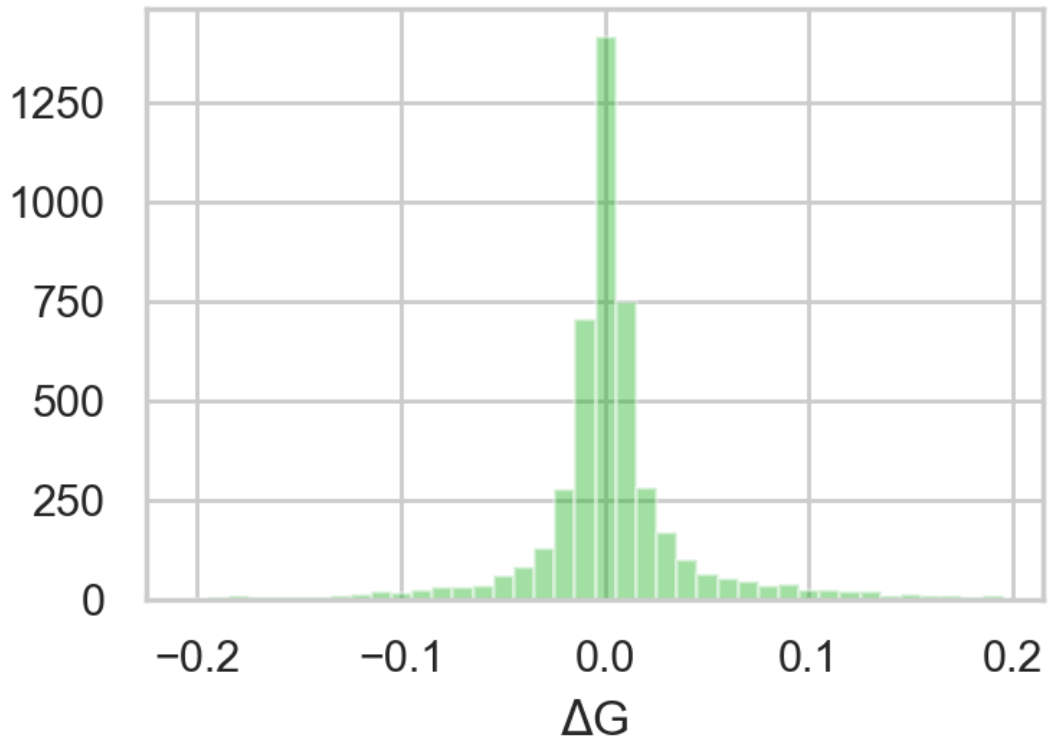
bgcArgoDMQC: Comparison to DOXY Audit

- Does not appear to be any bias towards negative or positive differences
- While results are *pretty* good, improvement still necessary





Future work & closing notes

- Package can be installed and used, but validation is not complete at this point. Package is in active development.
- Eventually, `bgcArgoDMQC` will be a package for performing DMQC on any/all BGC variable – for now our focus is on oxygen.
- If you're interested in collaborating as (1) and alpha user/tester, (2) contributing to a python tool for another variable or (3) generally helping with development of the package, or submitting issues via github - please get in touch!! My email is chris.gordon@dfo.mpo.gc.ca.

Feedback questions

- Would a graphical interface (GUI) make you more likely to use this tool?

- What features would you like to see in future development?

- Any other comments?