DOXY cookbooks

Argo data management
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Processing Argo OXYGEN
data at the DAC level
Version 2.2
July 28th 2016

ARGO
part of the integrated global observation strategy

Argo data management
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Argo Quality Control Manual
For Biogeochemical Data
Version 1.1
8th July 2016

ARGO
part of the integrated global observation strategy

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Argo Quality Control Manual
For dissolved oxygen
concentration
Version 1.0
8th July 2016
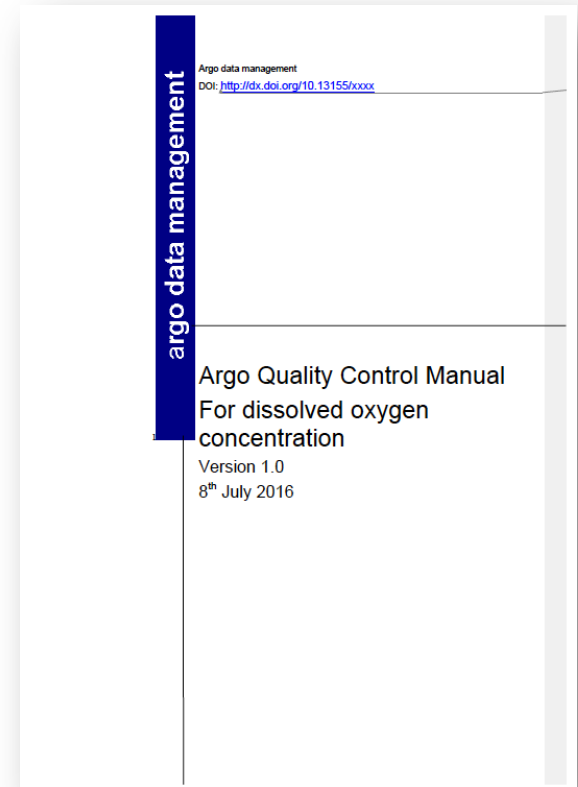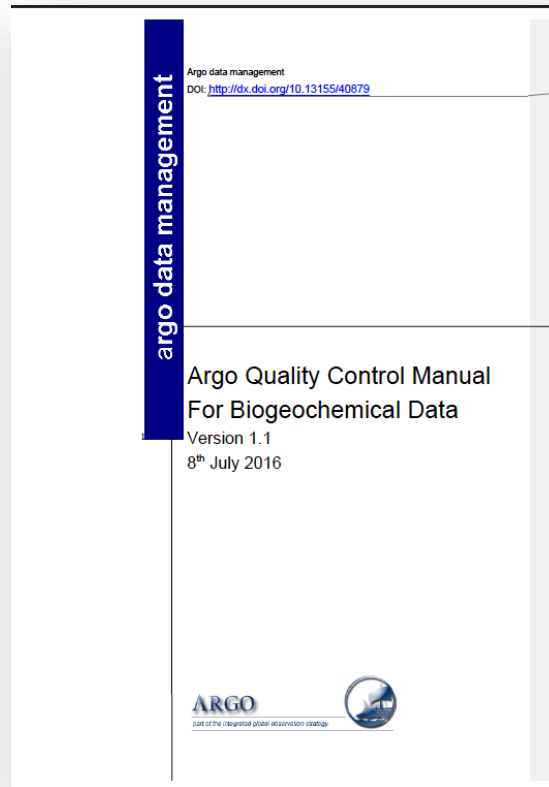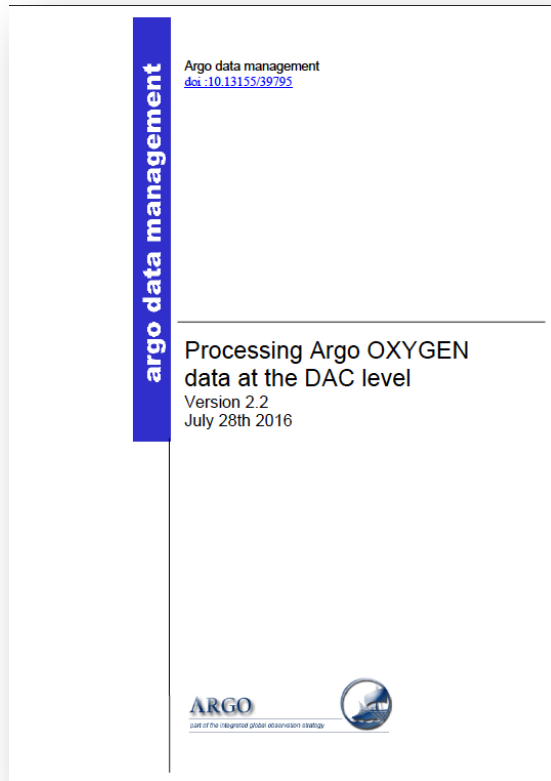
DOXY processing cookbook

- First part describes all the different equations to compute DOXY from the raw data transmitted by the floats

- Second part describes for different cases how to decode and store data and metadata. This part is organized in cases depending on

CASE_*SensorModelId*_*InputParamId*_*ComputationMethodId*

Sensor Model			Input parameter										
			201	202	203	204	205	206	207	208	209	210	211
			MOLAR_DOXY	BPHASE_DOXY	DPHASE_DOXY	TPHASE_DOXY	C1PHASE_DOXY & C2PHASE_DOXY	VOLTAGE_DOXY	FREQUENCY_DOXY	PHASE_DELAY_DOXY	MLPL_DOXY	LED_FLASHING_COUNT_DOXY & COUNT_DOXY	COUNT_DOXY
	101	SBE43_IDO						206 (9.2.1)					
	102	SBE43F_IDO							206 (9.2.2)				
	103	SBE63_OPTODE								307 (9.2.5) 308 (9.2.6)	301 (9.2.7) 309 (9.2.8)		
	201	AANDERAA_OPTODE_3830	301 (9.2.11)	202 (9.2.12) 204 (9.2.13) 302 (9.2.14) 304 (9.2.15)	202 (9.2.16) 204 (9.2.17) 302 (9.2.18) 304 (9.2.19)								
	202	AANDERAA_OPTODE_4330 AANDERAA_OPTODE_4330F	301 (9.2.22)			202 (9.2.23) 203 (9.2.24) 204 (9.2.25) 205 (9.2.26) 302 (9.2.27) 303 (9.2.28) 304 (9.2.29) 305 (9.2.30)	202 (9.2.31) 203 (9.2.32) 204 (9.2.33) 205 (9.2.34) 302 (9.2.35) 303 (9.2.36) 304 (9.2.37) 305 (9.2.38)						
	301	ARO_FT										401 (9.2.40)	

Sensor model			O₂ response model (~Type of calibration sheet)									
			electro-chemical sensors	optical sensors								
				internal calculation	20-term polynomial	28-term polynomial	28-term polynomial + 2 points adjustment	(old) Stern-Volmer	SVU Stern-Volmer	SVU Stern-Volmer + 2 points adjustment	SBE Stern-Volmer	JAC Stern-Volmer
	101	SBE43_IDO	**206_206** (9.2.1)									
	102	SBE43F_IDO	**207_206** (9.2.2)									
	103	SBE63_OPTODE		**209_301** (9.2.7)							**208_307** (9.2.5)	
				209_309 (9.2.8)							**208_308** (9.2.6)	
	201	AANDERAA_OPTODE_3830		**201_301** (9.2.11)	**202_202** (9.2.12)			**202_204** (9.2.13)				
					202_302 (9.2.14)			202_304 (9.2.15)				
					203_202 (9.2.16)			**203_204** (9.2.17)				
					203_302 (9.2.18)			203_304 (9.2.19)				
	202	AANDERAA_OPTODE_4330 or AANDERAA_OPTODE_4330F		**201_301** (9.2.22)		204_202 (9.2.23)	204_203 (9.2.24)		204_204 (9.2.25)	204_205 (9.2.26)		
						204_302 (9.2.27)	204_303 (9.2.28)		**204_304** (9.2.29)	**204_305** (9.2.30)		
						205_202 (9.2.31)	205_203 (9.2.32)		205_204 (9.2.33)	205_205 (9.2.34)		
						205_302 (9.2.35)	205_303 (9.2.36)		**205_304** (9.2.37)	**205_305** (9.2.38)		
	301	ARO_FT										**210_401** (9.2.40)

Table 6: Configurations for the calculation of DOXY as function of the sensor model and O2 response model. The recommended configurations are highlighted in bold.

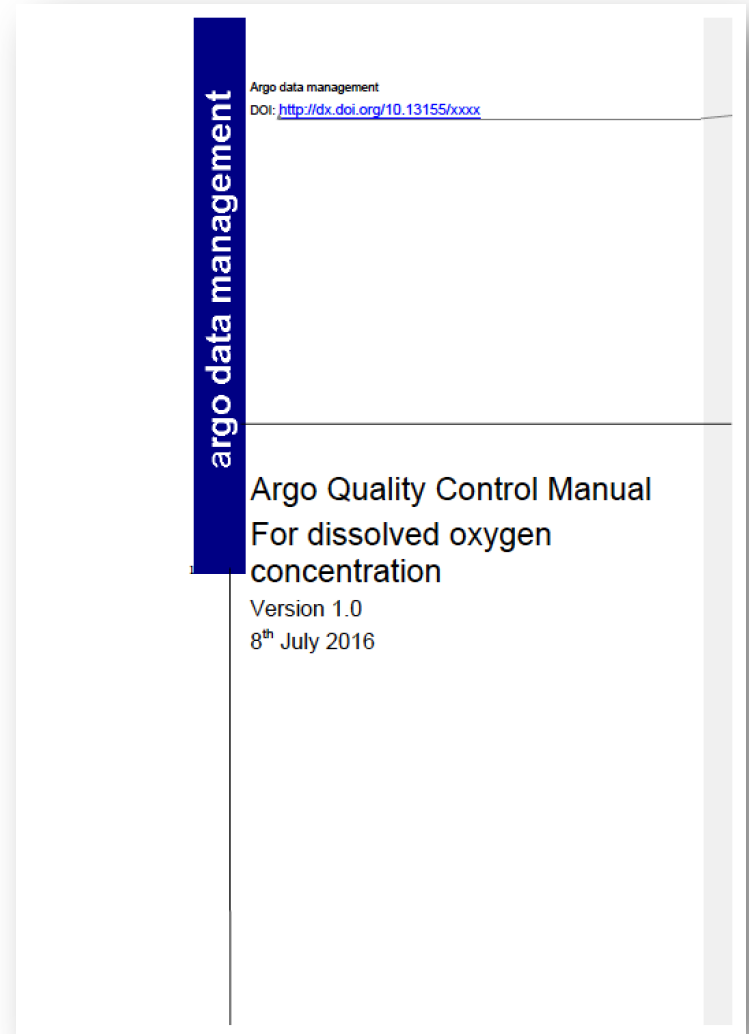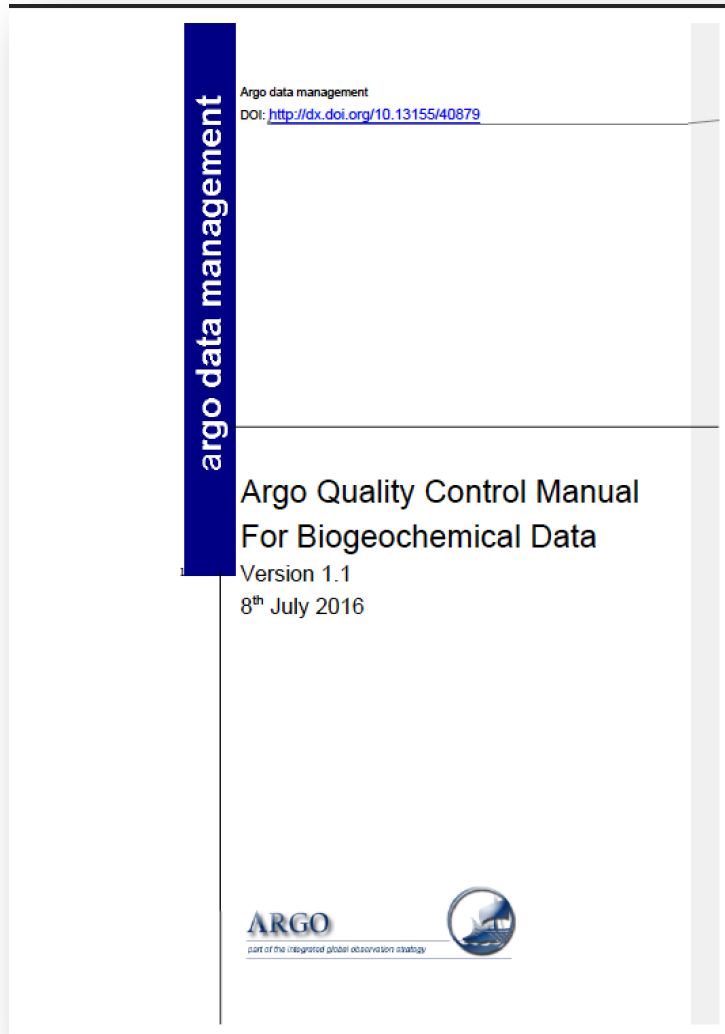# Cookbook updates since last ADMT

- **Updates take into account all new equations provided by the scientific community; but written to allow the use of older equations/coefficients**
- New coefficients (SCOR WG 142) for the salinity compensation equations
  - ➢ The corresponding salinity coefficients are now considered as input parameters
- Modification of the pressure compensation equations (Bittig et al, 2016)
  - ➢ Pressure equation coefficients are also considered as input parameters
- PPOX_DOXY computation added
- Specification of TEMP/TEMP_DOXY use

Suggested update

Remove the tau correction in the computation of DOXY from SBE43

$$
\begin{aligned}
MLPL\_DOXY = \Big\{ S_{oc}. \Big(&VOLTAGE\_DOXY + V_{offset} \\
&+ tau20.\, e^{(D_1.PRES + D_2(TEMP-20))}.\frac{\partial VOLTAGE\_DOXY}{\partial t} \Big) \Big\}. O_{xsol}(TEMP, PSAL).(1.0 \\
&+ A.TEMP + B.TEMP^2 + C.TEMP^3).\, e^{\left(\frac{E.PRES}{K}\right)}
\end{aligned}
$$

QC cookbooks

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RT QC tests for DOXY and XXX_DOXY parameters

- **Cookbooks define RT QC tests**
- **Suggested modifications**
  - **We decided to relax the QC tests for deep data (initially DOXY_QC=3 if PRES>2000db)**
  - **Use greylist for DOXY**

- **PSAL_QC=4 case**
  - PSAL is used to compute DOXY and also during the DOXY adjustment procedure.
  - in general PSAL is not bad enough to justify to put a QC=4 to DOXY or DOXY_ADJUSTED
  - **We decided to set a QC=3 to DOXY if PSAL_QC=4**

- **New QC to be defined**
  - **Need to define a QC tests for the "hook"**
  - **Need to define QC tests for traj data**

- **Real-time adjustment will be possible with in-air measurements. A procedure for such adjustment will be provided next year**