A brief update/refresher on nitrate/pH sensor performance, QC/adjustments and algorithm updates

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MBARI

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Publications/Products

- **Deep-Sea DuraFET: A Pressure Tolerant pH Sensor Designed for Global Sensor Networks**

  Kenneth S. Johnson, *Hans W. Jannasch*, *Luke J. Coletti*, *Virginia A. Elrod*, *Todd R. Martz*, *Yuichiro Takeshita*, *Robert J. Carlson*, and *James G. Connery*
  Anal. Chem., **2016**, *88* (6), pp 3249-3256
  Publication Date (Web): February 18, 2016 (Article)
  DOI: 10.1021/acs.analchem.5b04653
  Increasing atmospheric carbon dioxide is driving a long-term decrease in ocean pH which is superimposed on daily to seasonal variability. These changes impact ecosystem processes, and they serve as a record of ecosystem metabolism. However, the temporal ...

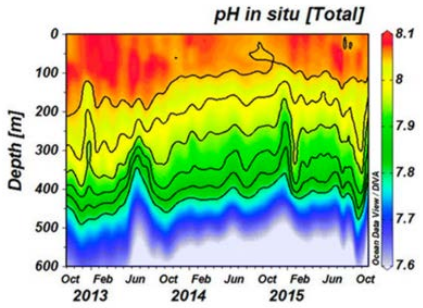

Figure 1 of 8

Geophysical Research Letters

RESEARCH LETTER
10.1002/2016GL068539

Key Points:
- Algorithms are developed for estimation of pH from biogeochemical floats

Empirical algorithms to estimate water column pH in the Southern Ocean

N. L. Williams[1], L. W. Juranek[1], K. S. Johnson[2], R. A. Feely[3], S. C. Riser[4], L. D. Talley[5], J. L. Russell[6], J. L. Sarmiento[7], and R. Wanninkhof[8]

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Year 2 Progress

	Oxygen			Nitrate			pH			Bio-optics		
	Total	Bad	% Good	Total	Bad	% Good	Total	Bad	% Good	Total	Bad	% Good
EAGER Sensors	12	0	100	8	4	50	7	1	86	10	0	100
EAGER Profiles	1076	1	100	701	185	74	782	62	92	827	0	100
SOCCOM Sensors	41	0	100	41	0	100	39	7	82	22	0	100
SOCCOM Profiles	1179	0	100	1179	6	99	1066	118	89	1033	1	100

- Data from http://soccom.ucsd.edu/floats/SOCCOM_float_stats.html and 5 floats not yet in QC process

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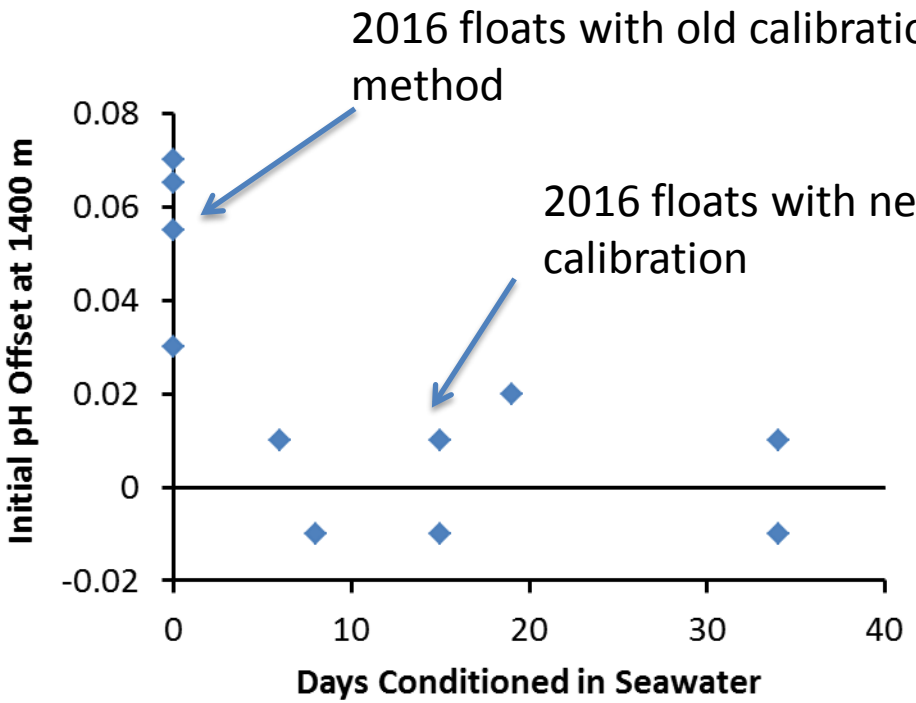
What's working, what not, what's next?

(subjects for later Discussion)

- pH sensor calibration and drift largely corrected.



Mean pH sensor drift	
Deploy-ment	pH/yr
1 (P16S)	-0.084
2 (A12)	-0.028
3 (SOTS)	-0.014*
4(2016)	0**

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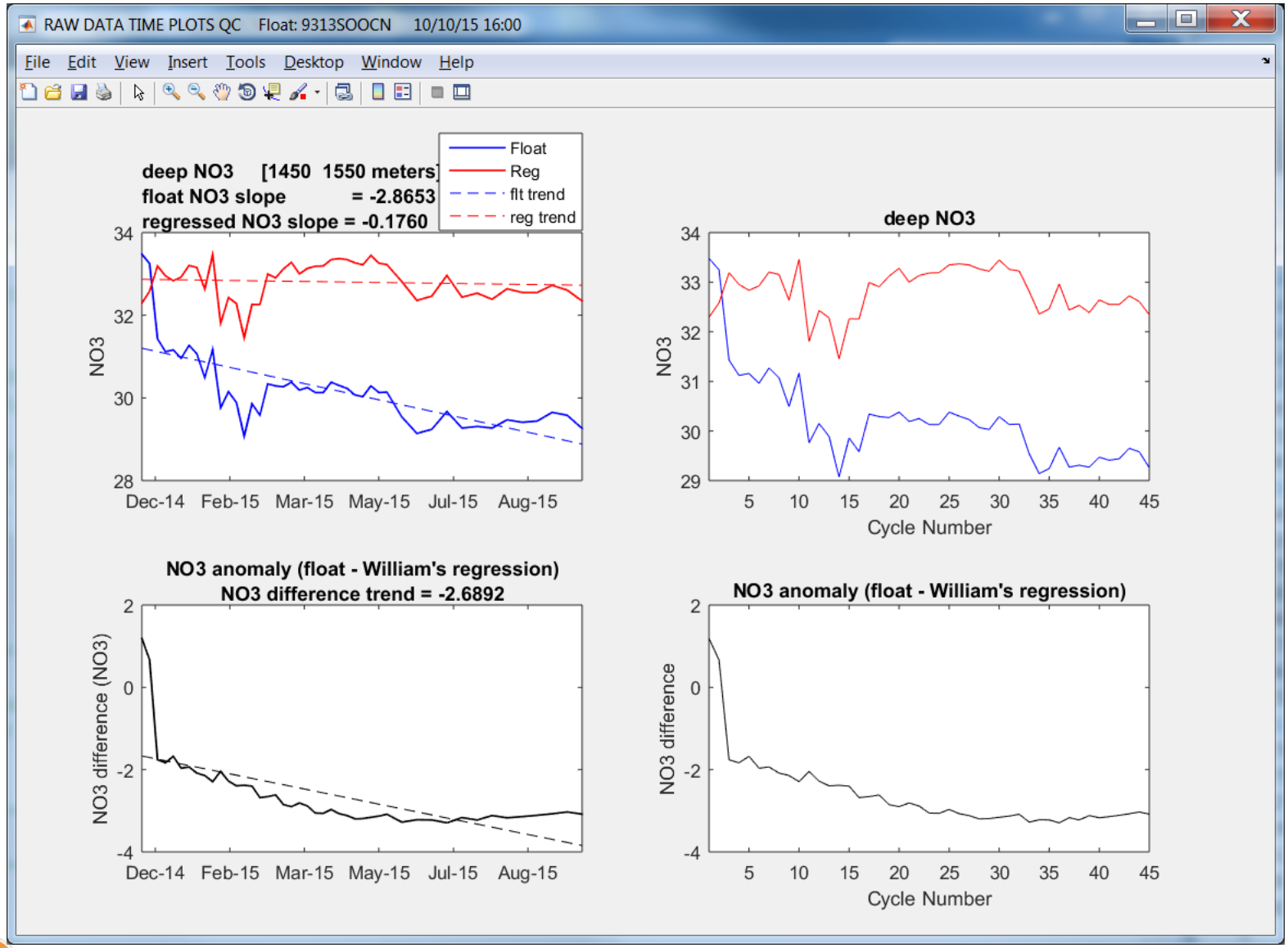
RAW DATA TIME PLOTS QC Float: 9313SOOCN 10/10/15 16:00
File Edit View Insert Tools Desktop Window Help
deep NO3 [1450 1550 meters]
float NO3 slope = -2.8653
regressed NO3 slope = -0.1760
Float
Reg
flt trend
reg trend
NO3
Dec-14 Feb-15 Mar-15 May-15 Jul-15 Aug-15
deep NO3
Cycle Number
NO3 anomaly (float - William's regression)
NO3 difference trend = -2.6892
NO3 difference (NO3)
NO3 anomaly (float - William's regression)
NO3 difference
Cycle Number

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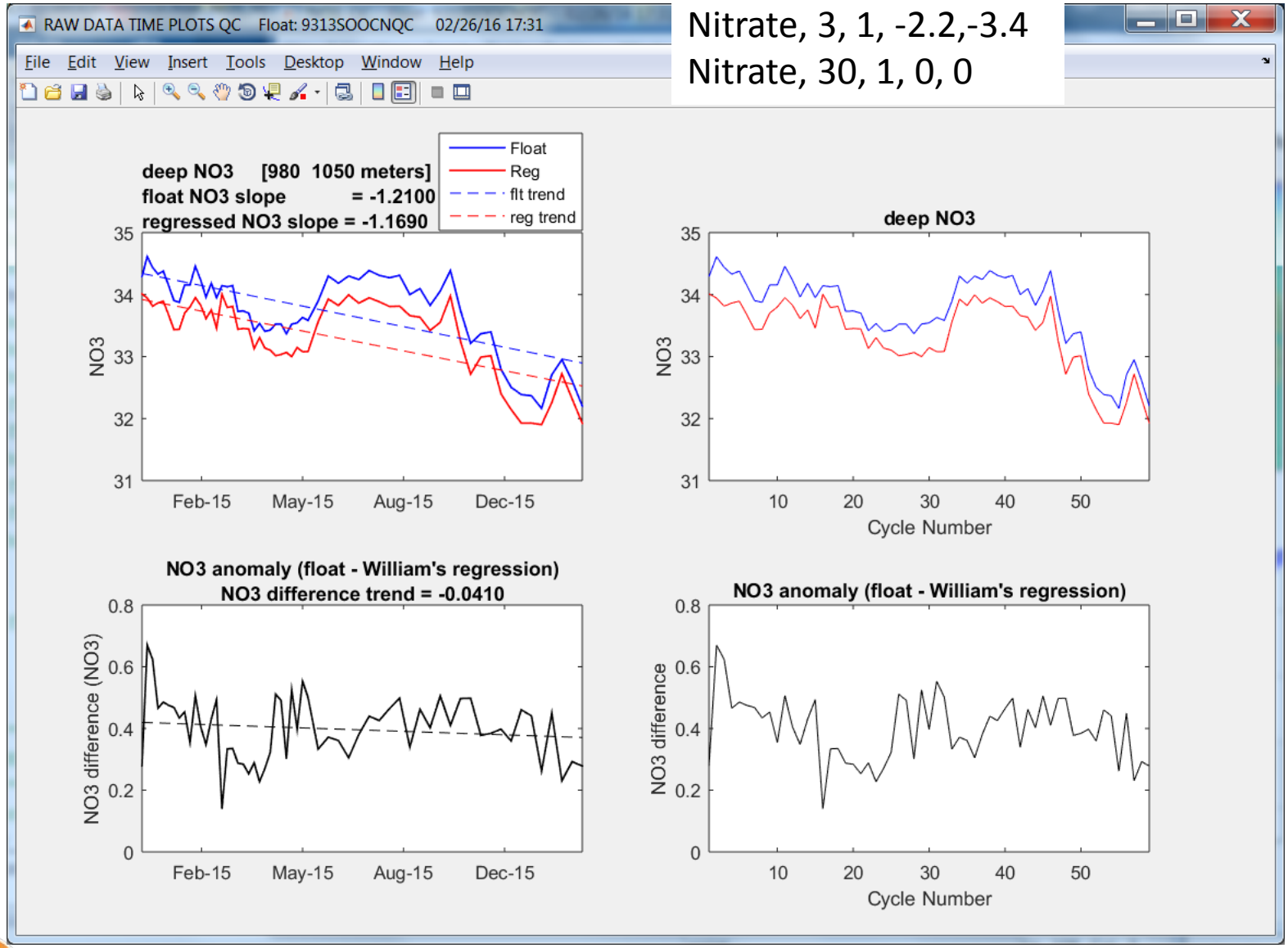
Float 9313 adjusted data

Nitrate, 1, 1, 0, 0
Nitrate, 2, 1, -1, 0
Nitrate, 3, 1, -2.2,-3.4
Nitrate, 30, 1, 0, 0



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AGU PUBLICATIONS

JGR

Journal of Geophysical Research: Oceans

RESEARCH ARTICLE

10.1002/2015JC011103

Seasonal variability of nutrient concentrations in the Mediterranean Sea: Contribution of Bio-Argo floats

Orens Pasqueron de Fommervault[1,2,3], Fabrizio D'Ortenzio[1,2], Antoine Mangin[3], Romain Serra[3], Christophe Migon[1,2], Hervé Claustre[1,2], Héloïse Lavigne[4], Maurizio Ribera d'Alcalà[5], Louis Prieur[1,2], Vincent Taillandier[1,2], Catherine Schmechtig[1,2], Antoine Poteau[1,2], Edouard Leymarie[1,2], Aurélie Dufour[1,2], Florent Besson[1,2], and Grigor Obolensky[1,2]

Key Points:

- Five profiling floats equipped with nitrate sensors were deployed in the Mediterranean Sea
- Annual cycles of nutrient concentrations depicted with an

Argue for a 2%/km pressure reduction in the bromide absorption spectrum of seawater.

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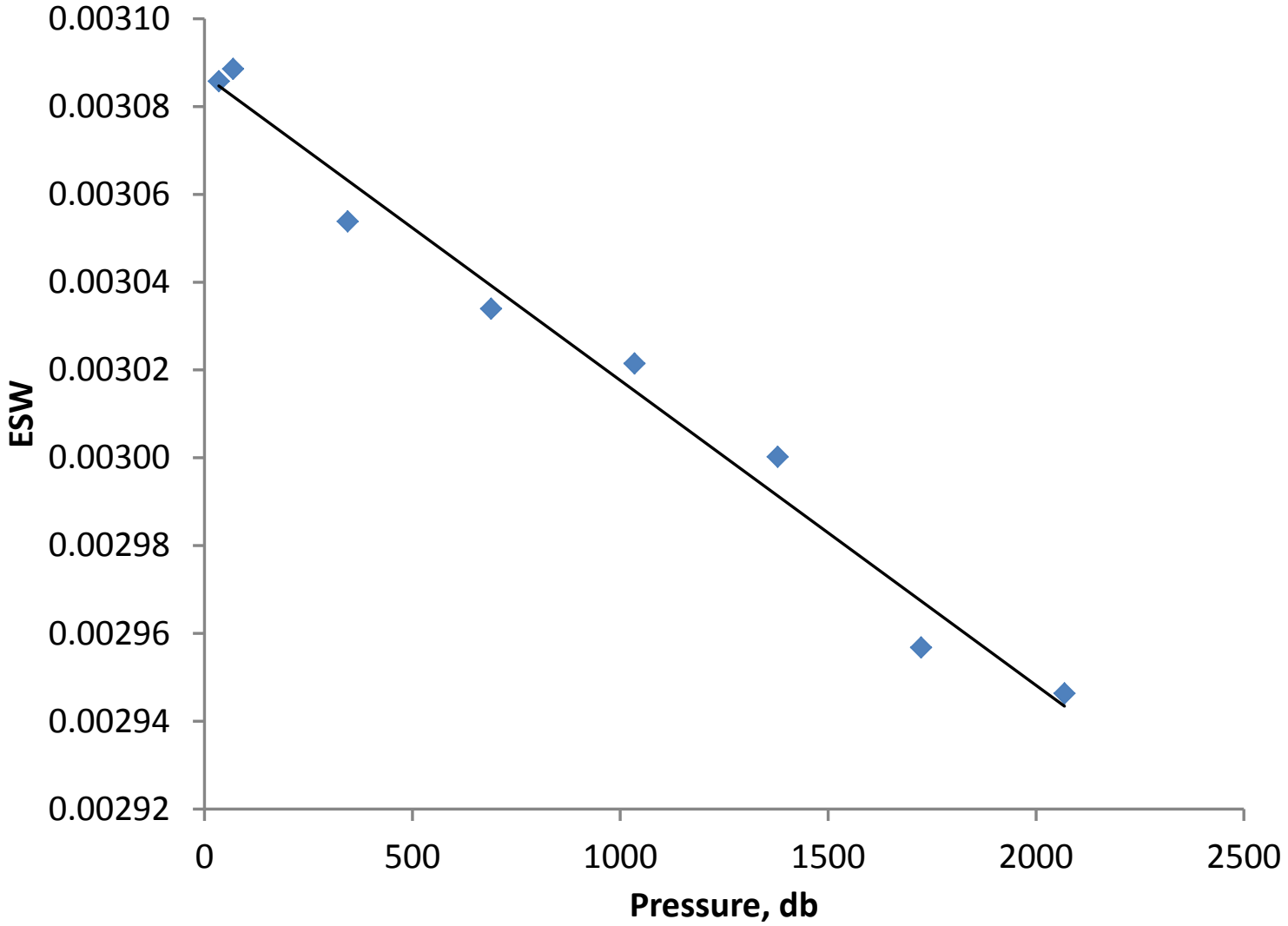
ESW @ 217 nm 1.8°C 240-260 nm baseline corrected



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Argo data management
DOI: http://dx.doi.org/xxx

Processing Bio-Argo nitrate concentration at the DAC Level

Version 1.0
May 3rd 2016

3.2 Pressure effect

Some studies conducted in low nutrient concentrations highlighted a possible pressure dependency of the bromide absorption spectrum (Pasqueron de Fommervault et al., 2015). Some experiments in lab will be performed soon at MBARI.

The equation 4 is changed in:

$$ABSORBANCE\_COR\_NITRATE(R) = ABSORBANCE\_SW(R) - (E\_SWA\_INSITU(R) * PSAL)*[1 - (0.02 * PRES / 1000)]$$

(Eq. 7)