README for data supplement to "Quantifying air-sea gas exchange using noble gases in a coastal upwelling zone"
Modified June 29, 2016 to update article citation

Reuse instructions
If reusing this data, please cite our paper:
Manning, C.C., R.H.R. Stanley, D.P. Nicholson, and M.E. Squibb (2016). Quantifying air-sea gas exchange using noble gases in a coastal upwelling zone. *IOP Conference Series: Earth and Environmental Science*, 35, 012017 (13 pp). doi: 10.1088/1755-1315/35/1/012017

Please also contact MBARI to obtain written permission to reuse the humidity and sea level pressure data from Mooring M1 (email Dr. Judith Connor <conn@mbari.org> and Dr. Francisco Chavez <chfr@mbari.org>).

Data description Data are provided in .csv format.

Column	Variable	Description	Units
1	station	1 for all data near mooring M1, 2 for samples at offshore station and while transiting to offshore station.	--
2	cast	CTD cast number, or number of closest cast for underway samples	--
3	bottle	Niskin bottle number (1-12), 0 for underway samples	--
4	duplicate	0 indicates the first sample analyzed at a specific time and depth, and 1 indicates the second sample	--
5	latitude	latitude (positive N)	^{o}N
6	longitude	longitude (positive E)	^{o}E
7	yyyy	year, local time	UTC-7h
8	mm	month, local time	UTC-7h
9	dd	day, local time	UTC-7h
10	HH	hour, local time	UTC-7h
11	MM	minutes, local time	UTC-7h
12	SS	seconds local time	UTC-7h
13	depth	depth	m
14	SP	practical salinity	PSS
15	pt	potential temperature referenced to 0 dbar	^{o}C
16	sigma_theta	potential density anomaly, referenced to 0 dbar	kg/m^3
17	slp	sea level pressure	atm
18	rh	relative humidity, fractional (0.5 = 50%)	%
19	CHe	He concentration	mol/kg
20	CNe	Ne concentration	mol/kg
21	CAr	Ar concentration	mol/kg
22	CKr	Kr concentration	mol/kg
23	CXe	Xe concentration	mol/kg
24	DHe	He saturation anomaly, LJ15 solubility	%
25	DNe	Ne saturation anomaly, HE04 solubility	%
26	DAr	Ar saturation anomaly, HE04 solubility	%
27	DKr	Kr saturation anomaly, LJ15 solubility	%

28	DXe	Xe saturation anomaly, LJ15 solubility	%
29	DHe_W71	He saturation anomaly, W71 solubility	%
30	DKr_WK78	Kr saturation anomaly, WK78 solubility	%
31	DXe_WC66	Xe saturation anomaly, WC66 solubility	%

Notes

Columns 19-23: Sample collection and analysis methods are described in the main text. The method gives gas concentration in cm^3_{STP}/g and these concentrations were converted to mol/kg using molar volumes of 22426, 22425, 22393, 22352, 22258 cm^3/mol for He, Ne, Ar, Kr, and Xe respectively at STP (1 atm, 273.15 K). These molar volumes are from:
Dymond, J H, Marsh, K N, Wilhoit, R C, and Wong, K C (2002). Inorganic Compounds, Second Virial Coefficients. *In:* Virial Coefficients of Pure Gases and Mixtures. Landolt–Börnstein, New Series IV/21A.

Columns 24-28 are saturation anomalies calculated from the same solubility functions used in the main paper. Saturation anomalies are defined with respect to local sea level pressure and humidity at the time the sample was collected, as described in the main text.

Columns 29-31 are saturation anomalies calculated from the solubility functions used in the Supporting Information. When reusing these data, saturation anomalies should be calculated with respect to the most accurate solubility functions available at the time.

NaN: Samples with concentrations set to NaN had air contamination or were lost during extraction or analysis.

Solubility function abbreviations and MATLAB functions.

LJ15: Lott and Jenkins (personal communication, 2015). Currently unpublished data.

HE04: Hamme R and Emerson S **2004** *Deep-Sea Res. I* 51 1517–1528.
See gsw_Arsol_SP_pt.m and Nesol.m.

W71: Weiss R F **1971** *J. Chem. Eng. Data* 16 235–241.
See gsw_Hesol_SP_pt.m.

WK78: Weiss R F and Kyser T K **1978** *J. Chem. Eng. Data* 23 69–72.
See gsw_Krsol_SP_pt.m.

WC66: Wood D and Caputi R **1966** Technical report. U.S. Naval Radiological Defense Laboratory, San Francisco, CA. Fit by Hamme following procedure in HE04.
See Xesol.m.

gsw_Arsol_SP_pt.m and others are from the Gibbs-SeaWater toolbox (http://www.teos-10.org/software.htm). There is an error in gsw_Nesol_SP_pt.m *prior* to GSW v3.05 release 2 (released 23 Sept 2015) so we have provided a correct version, Nesol.m, in our gas_toolbox of MATLAB functions.