This file is an annex to the document "Requirement for Copernicus Ocean Colour Vicarious Calibration Infrastructure" and is a deliverable of the project funded by the European Commission and EUMETSAT under contract EUM/CO/16/4600001772/EJK.

The uncertainty budget in next sheet is primarily a breakdown list of all sources of uncertainty identified in the vicarious gain computation (column C) with a reference to the requirement item of the document (column B).

The uncertainty values provided for each component and each wavelength (S3/OLCI sensor), from columns D to W, are examples to provide an overall uncertainty on vicarious gain, following simplified error propagation and based on case-study parameters given in the "Input parameters" table. The exact uncertainty budget should be conducted as detailed in the main document, taking into account variability of each match-up.

All uncertainties refer to standard uncertainty, i.e. coverage factor k=1. They are expressed in relative unit of Lw (top rows) or gain (bottom rows). For Lw, this means that numbers in columns D to W do not refer to the initial source of uncertainty but the actual effect on Lw.

The uncertainty values provided for each component and each wavelength (S3/OLCI sensor), from columns D to W, constitutes only a guideline to provide an overall uncertainty on vicarious gain

OC-VCAL ID	Uncertainty source	rel_unc(400)		rel_unc(412)		rel_unc(443)		rel_unc(490)		rel_unc(510)		rel_unc(560)		rel_unc(620)		rel_unc(665)		rel_unc(673)		rel_unc(681)	
		rand.	syst.	rand.	syst.	rand.	syst.	rand.	syst.	rand.	syst.	rand.	syst.	rand.	syst.	rand.	syst.	rand.	syst.	rand.	syst.
In situ Lw measurement																					
OC-VCAL-RD-14	Spectral resolution		0.50%		0.50%		0.50%		0.50%		0.50%		0.50%		0.50%		0.50%		0.50%		0.50%
OC-VCAL-RD-15	Spectral calibration		0.10%		0.10%		0.10%		0.10%		0.10%		0.10%		0.10%		0.10%		0.10%		0.10%
OC-VCAL-RD-16	Stray-light		0.75%		0.75%		0.75%		0.75%		0.75%		0.75%		0.75%		0.75%		0.75%		0.75%
OC-VCAL-RD-17	Radiometric calibration & stability		2.00%		2.00%		2.00%		2.00%		2.00%		2.00%		2.00%		2.00%		2.00%		2.00%
OC-VCAL-RD-18	Angular response																				
OC-VCAL-RD-19	Immersion factor	0.25%		0.25%		0.25%		0.25%		0.25%		0.25%		0.25%		0.25%		0.25%		0.25%	
OC-VCAL-RD-20	Thermal stability	0.30%		0.30%		0.30%		0.30%		0.30%		0.30%		0.30%		0.30%		0.30%		0.30%	
OC-VCAL-RD-21	Dark current																				
OC-VCAL-RD-22	Polarisation sensivity	0.20%		0.20%		0.20%		0.20%		0.20%		0.20%		0.20%		0.20%		0.20%		0.20%	
OC-VCAL-RD-23	Non-linearity response		0.10%		0.10%		0.10%		0.10%		0.10%		0.10%		0.10%		0.10%		0.10%		0.10%
OC-VCAL-RD-24	Noise characterisation																				
OC-VCAL-RD-25	Environ. conditions (like-to-like rule)	0.50%		0.50%		0.50%		0.50%		0.50%		0.50%		0.50%		0.50%		0.50%		0.50%	
OC-VCAL-RD-26	Shading		0.25%		0.25%		0.25%		0.25%		0.25%		0.25%		0.75%		0.75%		0.75%		0.75%
OC-VCAL-RD-27	Tilting & BRDF	0.30%		0.30%		0.30%		0.30%		0.30%		0.30%		0.30%		0.30%		0.30%		0.30%	
OC-VCAL-RD-28	Depth-extrapolation	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%
OC-VCAL-RD-29	Surface propagation	0.25%		0.25%		0.25%		0.25%		0.25%		0.25%		0.25%		0.25%		0.25%		0.25%	
OC-VCAL-RD-30	Data reduction	2.10%		2.10%		2.10%		2.10%		2.10%		2.20%		3.00%		3.00%		3.00%		3.00%	
	Spare line for other effects																				
Total uncertainty on in situ Lw		2.45%	2.43%	2.45%	2.43%	2.45%	2.43%	2.45%	2.43%	2.45%	2.43%	2.54%	2.43%	3.25%	2.53%	3.25%	2.53%	3.25%	2.53%	3.25%	2.53%
Total uncertainty on in situ Lw (rand. + syst)		3.45%		3.45%		3.45%		3.45%		3.45%		3.51%		4.12%		4.12%		4.12%		4.12%	
In situ Lw post-processing and match-up																					
OC-VCAL-RD-35-36	Environmental variability against satellite	5.00%		5.00%		5.00%		5.00%		5.00%		5.00%		5.00%		5.00%		5.00%		5.00%	
OC-VCAL-RD-41	Spectral integration to satellite SRF		0.20%		0.20%		0.20%		0.20%		0.20%		0.20%		0.20%		0.20%		0.20%		0.20%
OC-VCAL-RD-42	Normalisation & BRDF corr. to satellite geometry	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%
OC-VCAL-RD-43-44-45	Match-up process	5.00%		5.00%		5.00%		5.00%		5.00%		5.00%		5.00%		5.00%		5.00%		5.00%	
Total uncertainty on targeted LwN		7.55%	2.63%	7.55%	2.63%	7.55%	2.63%	7.55%	2.63%	7.55%	2.63%	7.58%	2.63%	7.85%	2.73%	7.85%	2.73%	7.85%	2.73%	7.85%	2.73%
Total uncertainty on targeted LwN (rand. + syst.)		8.00%		8.00%		8.00%		8.00%		8.00%		8.02%		8.31%		8.31%		8.31%		8.31%	
SVC gains																					
OC-VCAL-RD-46	Individual gains (Eq. 26)	0.38%	0.13%	0.38%	0.13%	0.53%	0.18%	0.60%	0.21%	0.53%	0.18%	0.45%	0.16%	0.31%	0.11%	0.16%	0.05%	0.08%	0.03%	0.08%	0.03%
OC-VCAL-RD-47	Averaging (Eq. 24)	0.05%	0.13%	0.05%	0.13%	0.07%	0.18%	0.09%	0.21%	0.07%	0.18%	0.06%	0.16%	0.04%	0.11%	0.02%	0.05%	0.01%	0.03%	0.01%	0.03%
Total uncertainty on mission average gain (rand. + syst.)		**0.14%**		**0.14%**		**0.20%**		**0.23%**		**0.20%**		**0.17%**		**0.12%**		**0.06%**		**0.03%**		**0.03%**	

Input parameters at the OC-VCAL site	400	412	443	490	510	560	620	665	673	681
tg*t*LwN/Lt	5.00%	5.00%	7.00%	8.00%	7.00%	6.00%	4.00%	2.00%	1.00%	1.00%
Cq (BRDF correction)	1	1	1	1	1	1	1	1	1	1
Number of match-ups	50	50	50	50	50	50	50	50	50	50