

Supplementary Materials for

## **A global viral oceanography database (gVOD)**

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Table S1. Sources and methods of viral abundance data. EFM: counted by epifluorescence microscopes. FCM: counted by flow cytometer. TEM: counted by transmission electron microscopy. Data marked by \* are those collected in a previous dataset (Wigington et al., 2016).

Region	Number of data	Method	References
Canadian Arctic Shelf *	259	EFM	(Payet and Suttle, 2013)
Gulf of Alaska, Arctic *	292	EFM	(Balsom, 2003)
Franklin Bay (Arctic Ocean)	4	EFM	(Wells and Deming, 2006)
Greenland Sea, Arctic	79	FCM	(Boras et al., 2010a)
Greenland Sea *	124	EFM	(Wigington et al., 2016)
Arctic Ocean	56	FCM	(Finke et al., 2017)
Kora Sea (Arctic Ocean)	18	EFM	(Kopylov et al., 2019)
North Sea	16	EFM	(Weinbauer et al., 2002)
North Sea	9	EFM	(Winter et al., 2005)
North Sea	39	FCM	(Parada et al., 2008)
North Sea *	191	FCM	(Wigington et al., 2016)
North Sea *	95	FCM	(Wigington et al., 2016)
North Sea	23	FCM	(Winter et al., 2004)
North Atlantic	5	TEM	(Proctor and Fuhrman, 1990)
North Atlantic *	188	FCM	(Li and Dickie, 2001)
North Atlantic	11	EFM	(Auguet et al., 2005)
North Atlantic	6	FCM	(Parada et al., 2007)
North Atlantic	20	TEM	(Bettarel et al., 2008)
North Atlantic	31	EFM	(Rowe et al., 2008)
North Atlantic *	772	FCM	(De Corte et al., 2012)
North Atlantic	9	FCM	(Muck et al., 2014)
North Atlantic *	206	FCM	(Mojica et al., 2015)
North Atlantic	41	EFM	(Parsons et al., 2015)
North Atlantic	10	FCM	(Winter et al., 2018)
North Atlantic	39	FCM	(Finke et al., 2017)
Gulf of Mexico	14	TEM	(Jiang and Paul, 1996)
Gulf of Mexico	9	EFM	(Weinbauer and Suttle, 1996)
Gulf of Mexico	12	TEM	(Cochran and Paul, 1998)
Gulf of Mexico	7	EFM	(Weinbauer and Suttle, 1999)
Gulf of Mexico	25	EFM	(Williamson et al., 2002)
Gulf of Mexico	28	EFM	(Long et al., 2008)
Chesapeake Bay	7	EFM	(Winget and Wommack, 2009)

Chesapeake Bay *	84	EFM	(Wang et al., 2011)
Sargasso Sea *	1382	EFM	(Parsons et al., 2012)
Tropical Atlantic	10	EFM	(Winter et al., 2008)
Tropical Atlantic	154	FCM	(De Corte et al., 2010)
Atlantic Ocean	426	FCM	(Lara et al., 2017)
South Atlantic	3	EFM	(Bettarel et al., 2011b)
South Atlantic	172	FCM	(Liang et al., 2014)
South Atlantic	3	FCM	(Gregoracci et al., 2015)
South Atlantic *	430	FCM	(De Corte et al., 2016)
Guanabana Bay (South Atlantic)	246	FCM	(Cabral et al., 2017)
Adriatic (Mediterranean)	35	TEM	(Weinbauer et al., 1993)
Mediterranean	25	EFM	(Bettarel et al., 2002)
Mediterranean and Baltic Sea	30	EFM	(Weinbauer et al., 2003)
Adriatic (Mediterranean)	4	EFM	(Bongiorni et al., 2005)
Mediterranean	48	EFM	(Magagnini et al., 2007)
Mediterranean	24	FCM	(Boras et al., 2009)
Mediterranean	3	EFM	(Motegi et al., 2009)
Mediterranean	43	FCM	(Winter et al., 2009)
Mediterranean	9	EFM	(Fonda Umani et al., 2010)
Mediterranean	6	FCM	(Bouvier and Maurice, 2011)
Mediterranean	10	EFM	(Maurice et al., 2011)
Mediterranean	338	FCM	(Magiopoulos and Pitta, 2012)
Mediterranean	45	EFM	(Maurice et al., 2013)
Mediterranean	1	FCM	(Motegi et al., 2014)
Mediterranean	2	FCM	(Thompson et al., 2014)
Mediterranean	21	EFM	(Ordulj et al., 2017)
Baltic Sea	6	FCM	(Holmfeldt et al., 2010)
Baltic sea	9	FCM	(Kostner et al., 2017)
Baltic sea	4	EFM	(Šulčius et al., 2018)
Indian Ocean *	52	EFM	(Wigington et al., 2016)
Indian Ocean	93	FCM	(Liang et al., 2014)
Cochin Estuary (Indian)	35	EFM	(Parvathi et al., 2013)

Cochin Estuary (Indian)	20	EFM	(Jasna et al., 2017)
Cochin Estuary (Indian)	39	EFM	(Jasna et al., 2018)
Indian Ocean	271	FCM	(Lara et al., 2017)
Indian Ocean	33	EFM	(Parvathi et al., 2018)
Red Sea	51	FCM	(Sabbagh et al., 2020)
Bering Sea	12	TEM	(Steward et al., 1996)
Bering Sea	15	FCM	(Finke et al., 2017)
Santa Monica Bay	7	EFM	(Noble and Fuhrman, 2000)
Japan sea	12	EFM	(Hwang and Cho, 2002)
Masan Bay	24	EFM	(Choi et al., 2003)
North Pacific	36	EFM	(Taylor et al., 2003)
North Pacific (HOT)	8	EFM	(Brum, 2005)
San Pedro Channel (North Pacific)	386	EFM	(Fuhrman et al., 2006)
North Pacific	11	EFM	(Hewson and Fuhrman, 2007)
Strait of Georgia (North Pacific) *	67	EFM	(Clasen et al., 2008)
Bach Dang Estuary (North Pacific)	15	TEM	(Bettarel et al., 2011a)
North Pacific *	355	FCM	(Yang et al., 2014)
Northwestern Pacific	39	FCM	(Li et al., 2014)
Pearl River Estuary (North Pacific)	19	FCM	(Ni et al., 2015)
North Pacific	4	EFM	(Pasulka et al., 2015)
Bohai sea	8	FCM	(Ma et al., 2016)
North Pacific *	9	EFM	(Wigington et al., 2016)
North Pacific	399	FCM	(Finke et al., 2017)
North Pacific	37	EFM	(Gainer et al., 2017)
Western Pacific	244	FCM	(Liang et al., 2017)
Western Pacific	222	FCM	(Zhao et al., 2020)
Jiulong Estuary (North Pacific)	27	FCM	(Chen et al., 2019)
South China Sea	751	FCM	unpublished
South China Sea	6	FCM	(Zhang et al., 2007)
South China Sea	13	FCM	(Chen et al., 2011)
South China Sea	5	EFM	(Nguyen-Kim et al., 2015)

Mariana Trench	6	FCM	(Li et al., 2018)
Pacific Ocean	171	FCM	(Liang et al., 2014)
Pacific Ocean	331	FCM	(Lara et al., 2017)
South Pacific *	12	EFM	(Wilhelm et al., 2003)
South Pacific	31	EFM	(Strzepek et al., 2005)
South Pacific	2	EFM	(Motegi C and Nagata T, 2007)
South Pacific *	24	EFM	(Rowe et al., 2012)
South Pacific	10	EFM	(Bouvy et al., 2012)
South Pacific *	16	EFM	(Matteson et al., 2012)
South Pacific *	542	FCM	(Yang et al., 2014)
Southern Ocean (Indian sector)	14	FCM	(Evans et al., 2009)
Southern Ocean (Indian sector)	10	FCM	(Malits et al., 2014)
Southern Ocean (Atlantic sector) *	33	FCM	(Evans and Brussaard, 2012)
Southern Ocean (Atlantic sector)	25	EFM	(Brum et al., 2016)
Southern Ocean (Pacific sector)	161	FCM	(Vaque et al., 2017)

Table S2. Sources and methods of VP data. FPB: Calculated by multiplying fraction of viral infected cells, prokaryotic production and burst size; RIA: radioactive incorporation approach; FLVT: fluorescently labeled viral tracers method; VRA: virus reduction approach (see main text section 2.3 for details). MC: Virus reduction approach with addition of inducing agent such as Mitomycin C (see main text section 2.4 for details).

Region	#lytic VP	Method of lytic VP	# lysogenic VP	Method of lysogenic VP	References
Canadian Arctic Shelf	14	VRA	-	-	(Payet and Suttle, 2013)
Franklin Bay (Arctic Ocean)	3	VRA	-	-	(Wells and Deming, 2006)
Greenland Sea, Arctic	17	VRA	7	MC	(Boras et al., 2010b)
North	9	VRA	-	-	(Winter et al., 2005)
North Sea	28	VRA	-	-	(Parada et al., 2008)
North Atlantic	26	VRA	-	-	(Rowe et al., 2008)
North Atlantic	18	VRA	10	MC	(De Corte et al., 2012)
North Atlantic	9	VRA	9	MC	(Muck et al., 2014)
North Atlantic	10	VRA	-	-	(Winter et al., 2018)
Chesapeake Bay	7	VRA	-	-	(Winget and Wommack, 2009)
Tropical Atlantic	9	VRA	8	MC	(De Corte et al., 2010)
Baltic Sea	6	VRA	-	-	(Holmfeldt et al., 2010)
Baltic Sea	9	VRA	-	-	(Kostner et al., 2017)
Baltic Sea	4	VRA	-	-	(Šulčius et al., 2018)
Mediterranean	24	VRA	11	MC	(Boras et al., 2009)
Adriatic (Mediterranean)	4	VRA	-	-	(Bongiorni et al., 2005)
Mediterranean	9	VRA	-	-	(Fonda Umani et al., 2010)
Mediterranean	1	VRA	-	-	(Motegi et al., 2014)
Mediterranean	21	VRA	-	-	(Ordulj et al., 2017)
Cochin Estuary (Indian)	35	RIA	-	-	(Parvathi et al., 2013)
Cochin Estuary (Indian))	20	VRA	-	-	(Jasna et al., 2017)
Indian Ocean	10	VRA	-	-	(Parvathi et al., 2018)
Bering Sea	12	FPB	-	-	(Steward et al., 1996)

Santa Monica Bay	7	FLVT	-	-	(Noble and Fuhrman, 2000)
Subtropics Atlantic, Pacific, Indian Ocean	30	VRA	27	MC	(Lara et al., 2017)
North Pacific (HOT)	4	VRA	-	-	(Brum, 2005)
North Pacific	9	VRA	-	-	(Hewson and Fuhrman, 2007)
North Pacific	18	VRA	-	-	(Gainer et al., 2017)
South Pacific	16	VRA	-	-	(Matteson et al., 2012)
Mariana Trench	6	VRA	-	-	(Li et al., 2018)
Western Pacific	38	VRA	-	-	(Li et al., 2014)
Japan Sea	12	FPB	-	-	(Hwang and Cho, 2002)
Masan Bay	24	FPB	-	-	(Choi et al., 2003)
Bach Dang Estuary (North Pacific)	7	VRA	-	-	(Bettarel et al., 2011a)
South China Sea	13	VRA	-	-	(Chen et al., 2011)
South China Sea	5	FLVT	-	-	(Nguyen-Kim et al., 2015)
Jiulong Estuary (North Pacific)	27	VRA	27	MC	(Chen et al., 2019)
Southwestern Pacific	9	VRA	-	-	(Rowe et al., 2012)
Southern Ocean (Indian sector)	14	VRA	-	-	(Evans et al., 2009)
Southern Ocean (Indian sector)	10	VRA	-	-	(Malits et al., 2014)
Southern Ocean (Pacific sector)	16	VRA	8	MC	(Vaque et al., 2017)
Southern Ocean (Atlantic sector)	5	VRA	-	-	(Weinbauer et al., 2009)
Southern Ocean (Atlantic sector)	33	VRA	12	MC	(Evans and Brussaard, 2012)

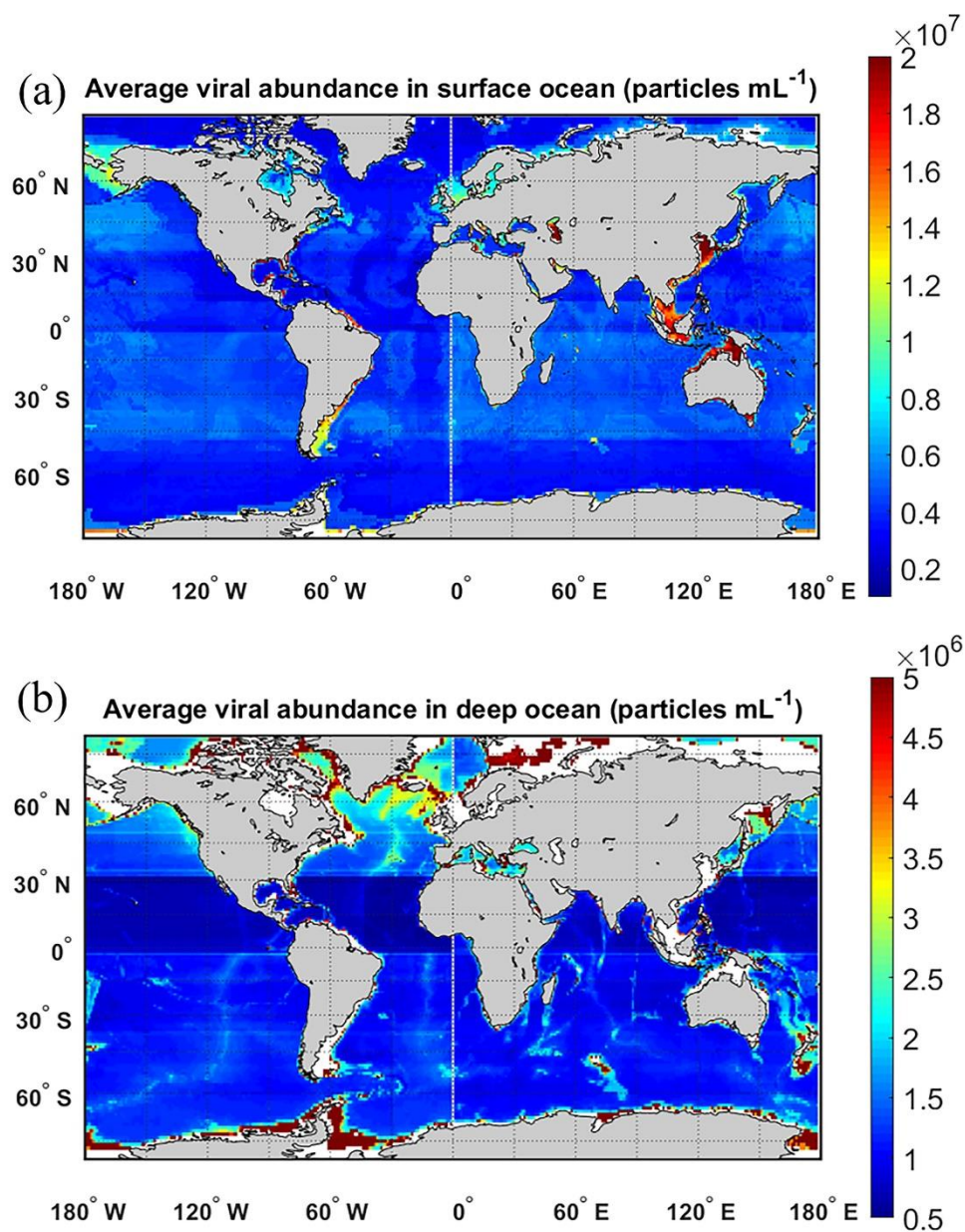


Figure S1. Viral abundance projected using the random forest, showing average in **(a)** surface 200 m and **(b)** deep (>200 m) oceans.



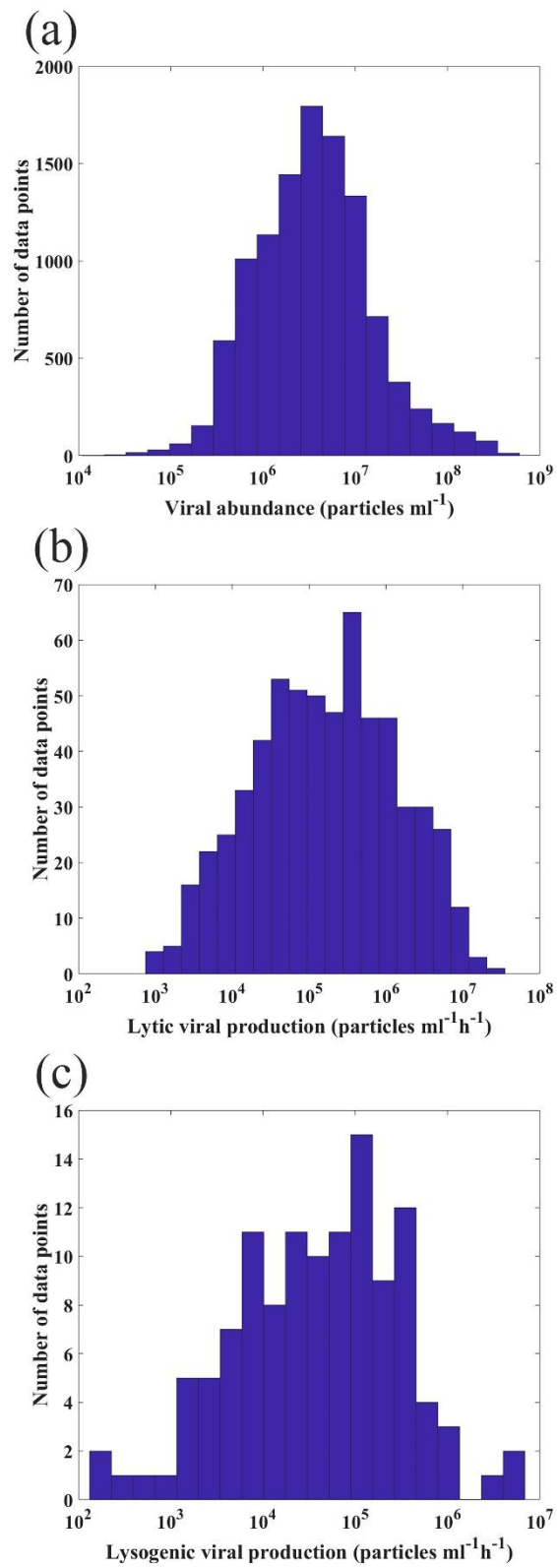


Figure S2. Histogram of data points on logarithmic scale, (a) viral abundance, (b) lytic viral production, and (c) lysogenic viral production.

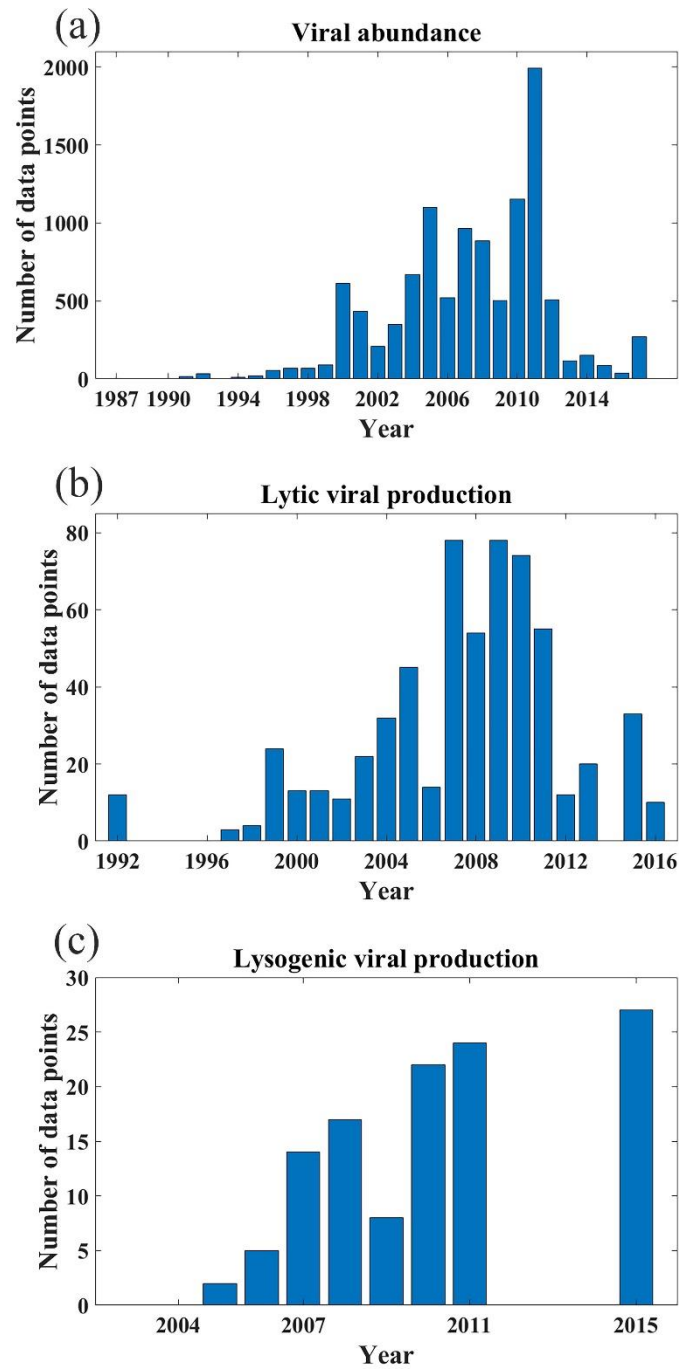


Figure S3. Number of samples in each year for (a) viral abundance, (b) lytic viral production and (c) lysogenic viral production.

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