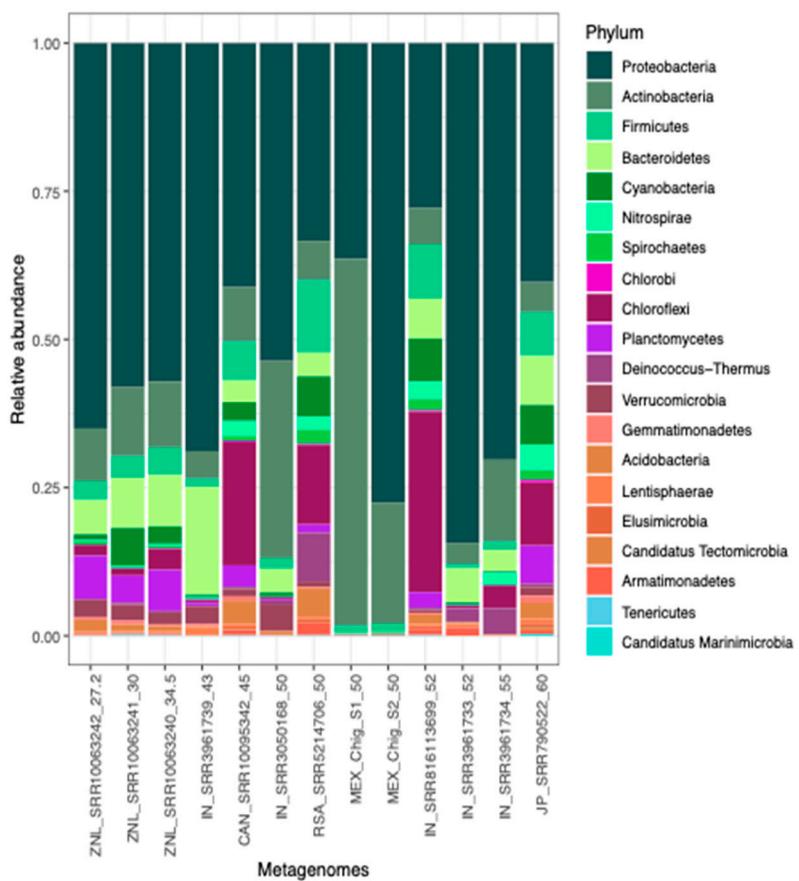
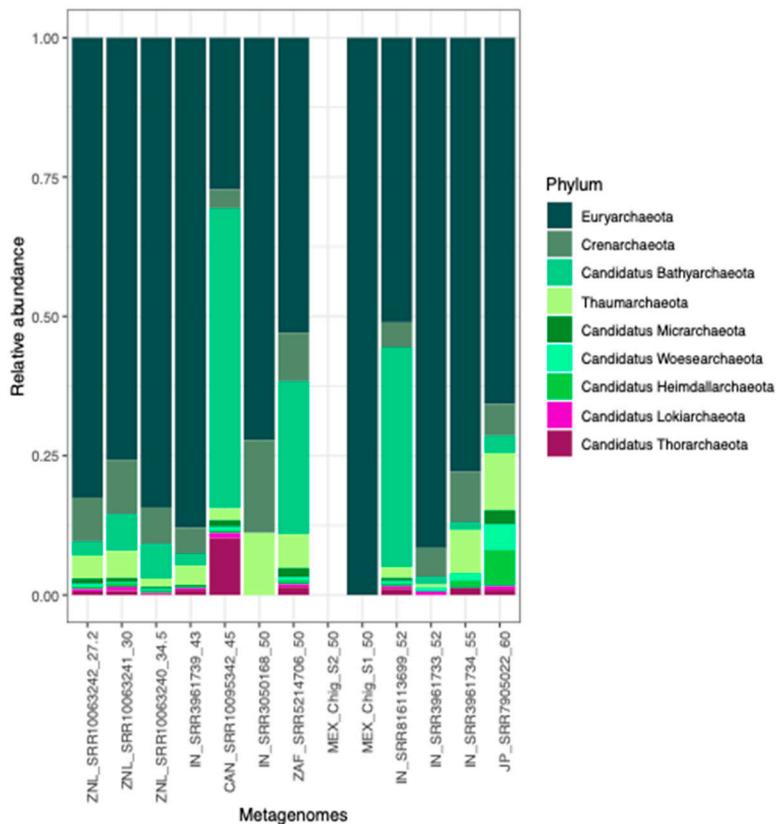
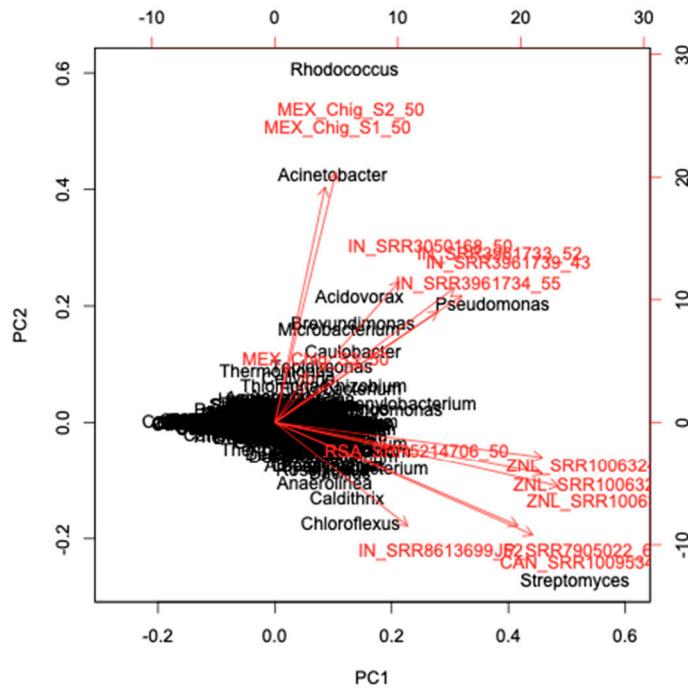


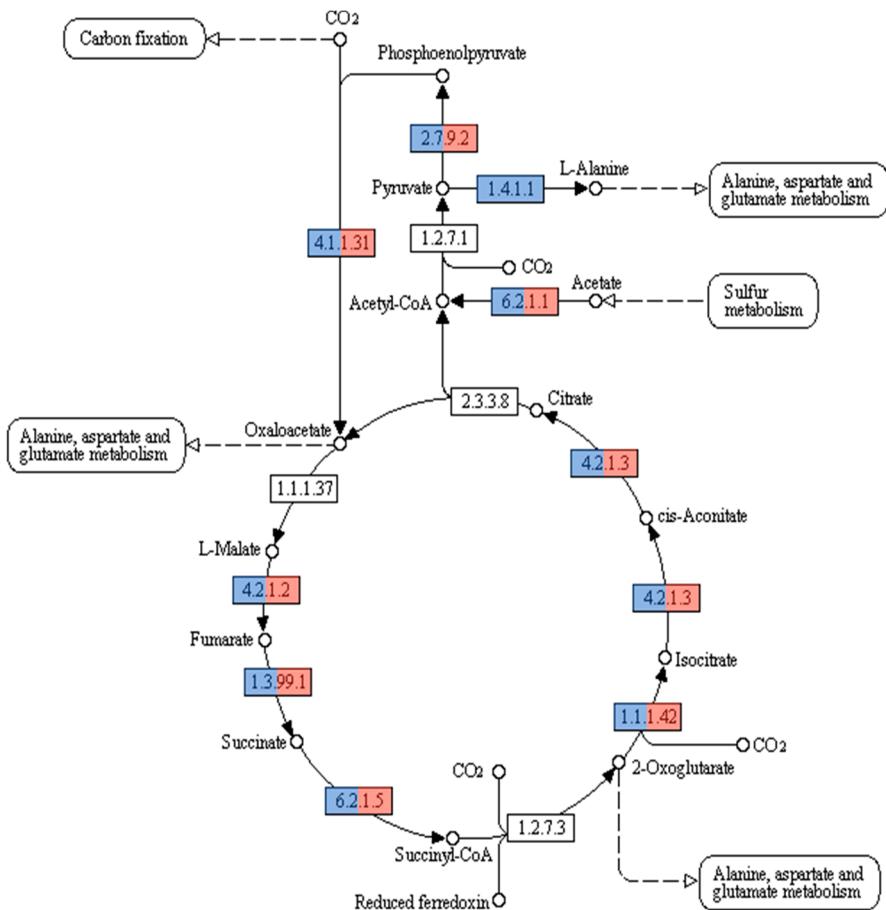
**Figure S1. Taxonomic profiling and community structure comparison at the domain level.** Showed a dominance of Bacteria around 88.4% to 91.8%, followed by Archaea, Viruses, and Eukaryotes. .



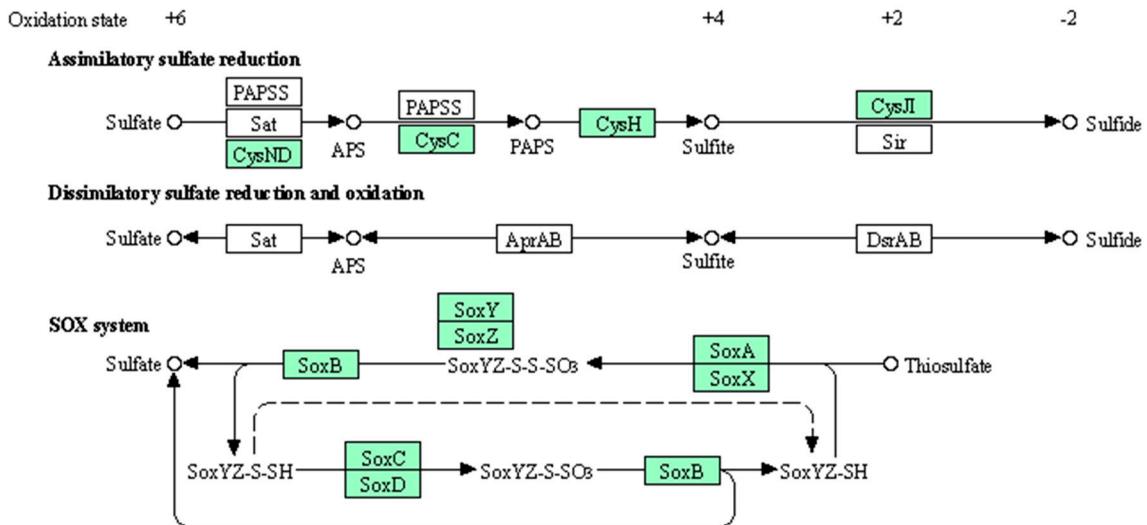
**Figure S2. Stack plots the relative abundances of Archaea and Bacterial at the level of phylum.** A) Archaea domain. Euryarchaeota phylum was dominant in the samples B) Bacteria domain. Proteobacteria phylum was dominant in the samples.



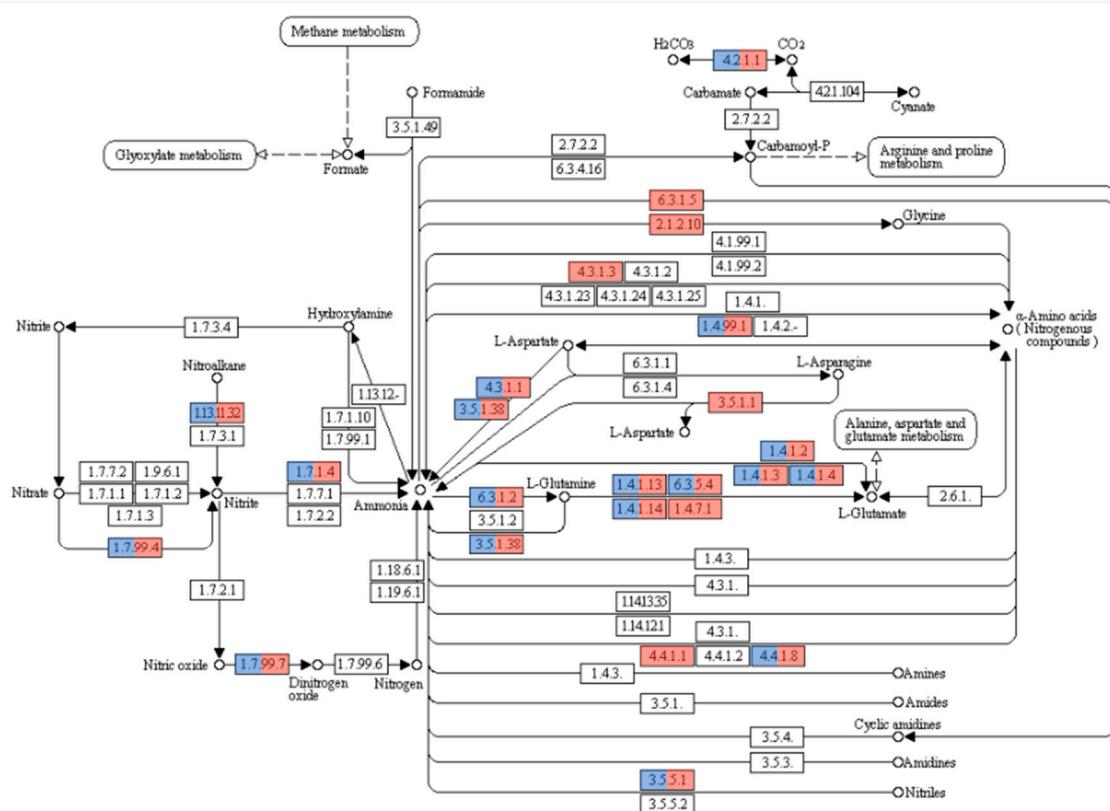
**Figure S3.** Biplot showing an association of genera based on location. The samples are grouped using location.



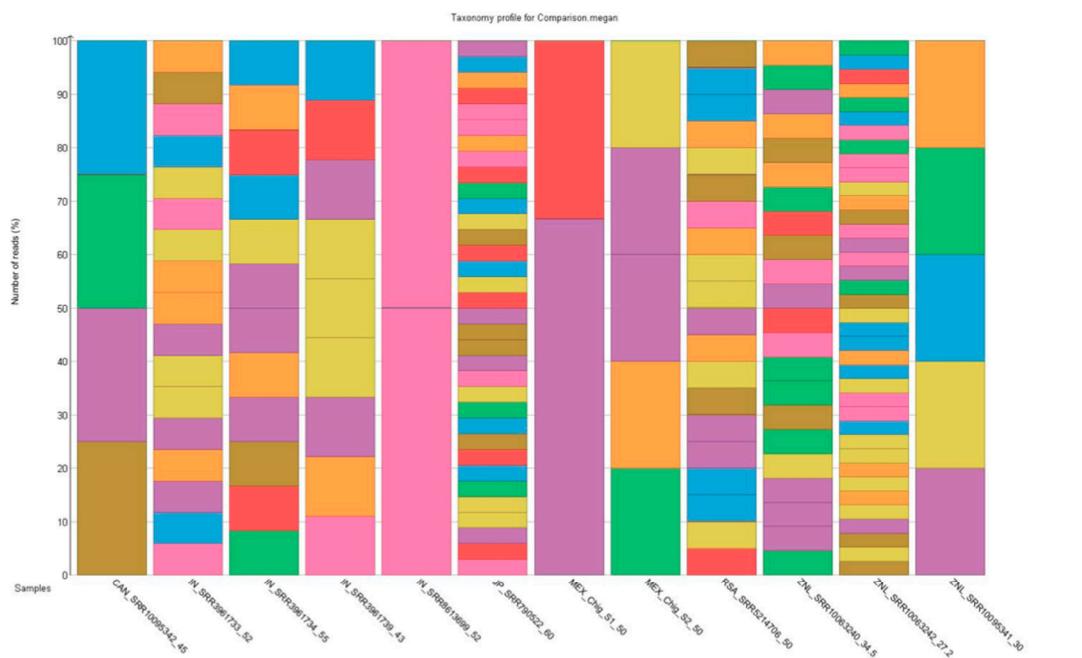
**Figure S4.** Pathway Carbon metabolism from Chignahuapan. Colors indicate enzymes present in metagenomes.



**Figure S5. Pathway Sulfur metabolism from Chignahuapan.** the green color indicates the enzymes present in the metagenome.



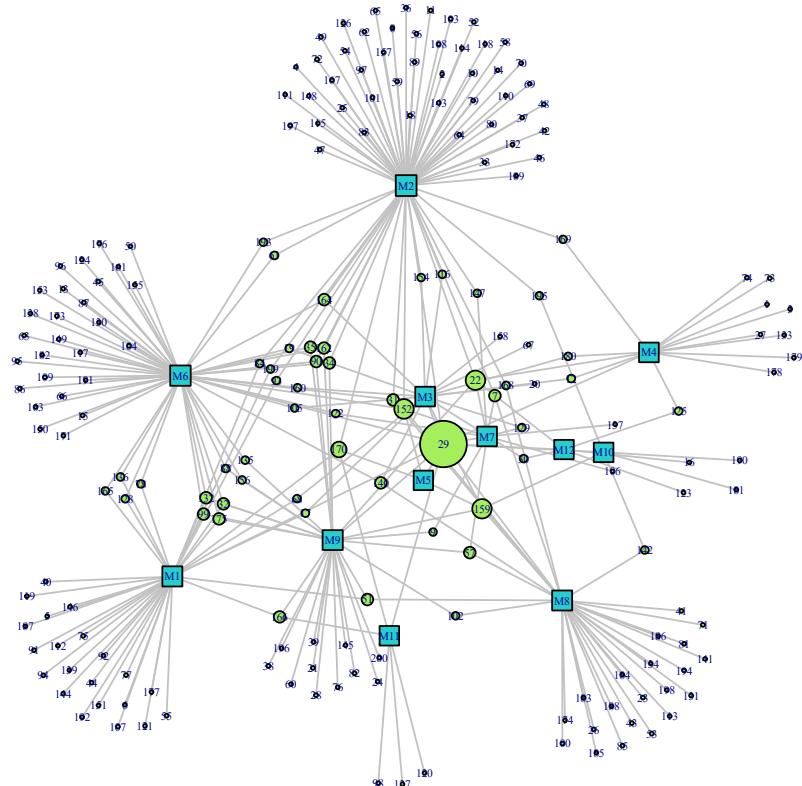
**Figure S6.** Pathway Nitrogen metabolism from Chignahuapan. Colors indicate enzymes present in metagenomes.



**Legend (Taxa):**

- *Sulfolobus* virus STSV1    ■ *Enterobacteriophage* phi-4B\_VeM-Ral2    ■ *Bizunavirus*    ■ *Acidovirus* virus AC171    ■ *Girozobacterium* virus M12    ■ *Pectobacterium* phage CBB    ■ *Campylobacter* phage PCS    ■ *Enterobacter* phage Acya    ■ *Pseudomonas* phage PWP3-9    ■ *Burkholderia* phage K13
- *Burkholderia* phage K5    ■ *Enema* phage EN790    ■ *Ralstonia* phage RSY1    ■ *Stenotrophomonas* phage SmP13    ■ *Pseudomonas* phage PA3/3    ■ *Psuedomonas* phage PA3/3    ■ *Acinetobacter* virus Atug01    ■ *Sphaerotilus* virus Sphaer01    ■ *Sphaerotilus* virus Sphaer01
- *Acinetobacter* phage AB105-1phb    ■ *Achromatospadace* phage B23    ■ *Aurantimonas* phage Amn1    ■ *Bacillus* phage AR9    ■ *Bordetella* phage B\_BtbM\_PbHD0    ■ *Bryadityphloz* phage BU-M1    ■ *Cyanophage* S-RM12    ■ *Cyanophage* S-RM44
- *Deep-sea thermophilic* phage DGE    ■ *Enterobacteriophage* phage pB2    ■ *Lake Bakal* phage Bak-205-Cm8    ■ *Ochrobactrum* phage PPA10A1    ■ *Pachneococcus* phage P-SMSM    ■ *Pachneococcus* phage P-SMSM    ■ *Pachneococcus* phage P-SMSM    ■ *Rhizobium* phage φ\_RiEM\_PPF1
- *Shewanella* phage SCF1    ■ *Shewanella* sp. phage 1/48    ■ *Sheilla* phage SV7    ■ *Sternotomophas* phage IM-E51    ■ *Sternotomophas* phage φ\_SmsUL-D8    ■ *Synechococcus* phage ACG-2014    ■ *Synechococcus* phage R-AC-2014    ■ *Synechococcus* phage S-RM50
- *Thermus* phage TMA    ■ *Ralstonia* phage RS-PB1    ■ *Rhizobium* phage RHE0101    ■ *Pseudomonas* virus KP293    ■ *Dordetella* virus BPB7    ■ *Schererichia* phage phiH0-2011    ■ *Aeromonas* phage PRM-001    ■ *Acinetobacter* phage Ab10\_08
- *Pseudomonas* phage AF    ■ *Pseudomonas* phage TG    ■ *Pencillipuscinus* phage HMO-2011    ■ *Ralstonia* phage DR\_U\_P2    ■ *Sinorhizobium* phage pHMS    ■ *Canthornathus* phage CP2    ■ *Xylella* phage XyA53    ■ *Abdijamin* *Burkholderia* virus AH2    ■ *Mycobacterium* phage 40BC
- *Pseudomonas* phage B100-1    ■ *Pseudomonas* phage B100-2    ■ *Pseudomonas* phage B100-3    ■ *Pseudomonas* phage B100-4    ■ *Pseudomonas* phage B100-5    ■ *Pseudomonas* phage B100-6    ■ *Pseudomonas* phage B100-7    ■ *Pseudomonas* phage B100-8    ■ *Pseudomonas* phage B100-9    ■ *Pseudomonas* phage B100-10    ■ *Pseudomonas* phage B100-11    ■ *Pseudomonas* phage B100-12    ■ *Pseudomonas* phage B100-13    ■ *Pseudomonas* phage B100-14    ■ *Pseudomonas* phage B100-15    ■ *Pseudomonas* phage B100-16    ■ *Pseudomonas* phage B100-17    ■ *Pseudomonas* phage B100-18    ■ *Pseudomonas* phage B100-19    ■ *Pseudomonas* phage B100-20    ■ *Pseudomonas* phage B100-21    ■ *Pseudomonas* phage B100-22    ■ *Pseudomonas* phage B100-23    ■ *Pseudomonas* phage B100-24    ■ *Pseudomonas* phage B100-25    ■ *Pseudomonas* phage B100-26    ■ *Pseudomonas* phage B100-27    ■ *Pseudomonas* phage B100-28    ■ *Pseudomonas* phage B100-29    ■ *Pseudomonas* phage B100-30    ■ *Pseudomonas* phage B100-31    ■ *Pseudomonas* phage B100-32    ■ *Pseudomonas* phage B100-33    ■ *Pseudomonas* phage B100-34    ■ *Pseudomonas* phage B100-35    ■ *Pseudomonas* phage B100-36    ■ *Pseudomonas* phage B100-37    ■ *Pseudomonas* phage B100-38    ■ *Pseudomonas* phage B100-39    ■ *Pseudomonas* phage B100-40    ■ *Pseudomonas* phage B100-41    ■ *Pseudomonas* phage B100-42    ■ *Pseudomonas* phage B100-43    ■ *Pseudomonas* phage B100-44    ■ *Pseudomonas* phage B100-45    ■ *Pseudomonas* phage B100-46    ■ *Pseudomonas* phage B100-47    ■ *Pseudomonas* phage B100-48    ■ *Pseudomonas* phage B100-49    ■ *Pseudomonas* phage B100-50    ■ *Pseudomonas* phage B100-51    ■ *Pseudomonas* phage B100-52    ■ *Pseudomonas* phage B100-53    ■ *Pseudomonas* phage B100-54    ■ *Pseudomonas* phage B100-55    ■ *Pseudomonas* phage B100-56    ■ *Pseudomonas* phage B100-57    ■ *Pseudomonas* phage B100-58    ■ *Pseudomonas* phage B100-59    ■ *Pseudomonas* phage B100-60    ■ *Pseudomonas* phage B100-61    ■ *Pseudomonas* phage B100-62    ■ *Pseudomonas* phage B100-63    ■ *Pseudomonas* phage B100-64    ■ *Pseudomonas* phage B100-65    ■ *Pseudomonas* phage B100-66    ■ *Pseudomonas* phage B100-67    ■ *Pseudomonas* phage B100-68    ■ *Pseudomonas* phage B100-69    ■ *Pseudomonas* phage B100-70    ■ *Pseudomonas* phage B100-71    ■ *Pseudomonas* phage B100-72    ■ *Pseudomonas* phage B100-73    ■ *Pseudomonas* phage B100-74    ■ *Pseudomonas* phage B100-75    ■ *Pseudomonas* phage B100-76    ■ *Pseudomonas* phage B100-77    ■ *Pseudomonas* phage B100-78    ■ *Pseudomonas* phage B100-79    ■ *Pseudomonas* phage B100-80    ■ *Pseudomonas* phage B100-81    ■ *Pseudomonas* phage B100-82    ■ *Pseudomonas* phage B100-83    ■ *Pseudomonas* phage B100-84    ■ *Pseudomonas* phage B100-85    ■ *Pseudomonas* phage B100-86    ■ *Pseudomonas* phage B100-87    ■ *Pseudomonas* phage B100-88    ■ *Pseudomonas* phage B100-89    ■ *Pseudomonas* phage B100-90    ■ *Pseudomonas* phage B100-91    ■ *Pseudomonas* phage B100-92    ■ *Pseudomonas* phage B100-93    ■ *Pseudomonas* phage B100-94    ■ *Pseudomonas* phage B100-95    ■ *Pseudomonas* phage B100-96    ■ *Pseudomonas* phage B100-97    ■ *Pseudomonas* phage B100-98    ■ *Pseudomonas* phage B100-99    ■ *Pseudomonas* phage B100-100    ■ *Pseudomonas* phage B100-101    ■ *Pseudomonas* phage B100-102    ■ *Pseudomonas* phage B100-103    ■ *Pseudomonas* phage B100-104    ■ *Pseudomonas* phage B100-105    ■ *Pseudomonas* phage B100-106    ■ *Pseudomonas* phage B100-107    ■ *Pseudomonas* phage B100-108    ■ *Pseudomonas* phage B100-109    ■ *Pseudomonas* phage B100-110    ■ *Pseudomonas* phage B100-111    ■ *Pseudomonas* phage B100-112    ■ *Pseudomonas* phage B100-113    ■ *Pseudomonas* phage B100-114    ■ *Pseudomonas* phage B100-115    ■ *Pseudomonas* phage B100-116    ■ *Pseudomonas* phage B100-117    ■ *Pseudomonas* phage B100-118    ■ *Pseudomonas* phage B100-119    ■ *Pseudomonas* phage B100-120    ■ *Pseudomonas* phage B100-121    ■ *Pseudomonas* phage B100-122    ■ *Pseudomonas* phage B100-123    ■ *Pseudomonas* phage B100-124    ■ *Pseudomonas* phage B100-125    ■ *Pseudomonas* phage B100-126    ■ *Pseudomonas* phage B100-127    ■ *Pseudomonas* phage B100-128    ■ *Pseudomonas* phage B100-129    ■ *Pseudomonas* phage B100-130    ■ *Pseudomonas* phage B100-131    ■ *Pseudomonas* phage B100-132    ■ *Pseudomonas* phage B100-133    ■ *Pseudomonas* phage B100-134    ■ *Pseudomonas* phage B100-135    ■ *Pseudomonas* phage B100-136    ■ *Pseudomonas* phage B100-137    ■ *Pseudomonas* phage B100-138    ■ *Pseudomonas* phage B100-139    ■ *Pseudomonas* phage B100-140    ■ *Pseudomonas* phage B100-141    ■ *Pseudomonas* phage B100-142    ■ *Pseudomonas* phage B100-143    ■ *Pseudomonas* phage B100-144    ■ *Pseudomonas* phage B100-145    ■ *Pseudomonas* phage B100-146    ■ *Pseudomonas* phage B100-147    ■ *Pseudomonas* phage B100-148    ■ *Pseudomonas* phage B100-149    ■ *Pseudomonas* phage B100-150    ■ *Pseudomonas* phage B100-151    ■ *Pseudomonas* phage B100-152    ■ *Pseudomonas* phage B100-153    ■ *Pseudomonas* phage B100-154    ■ *Pseudomonas* phage B100-155    ■ *Pseudomonas* phage B100-156    ■ *Pseudomonas* phage B100-157    ■ *Pseudomonas* phage B100-158    ■ *Pseudomonas* phage B100-159    ■ *Pseudomonas* phage B100-160    ■ *Pseudomonas* phage B100-161    ■ *Pseudomonas* phage B100-162    ■ *Pseudomonas* phage B100-163    ■ *Pseudomonas* phage B100-164    ■ *Pseudomonas* phage B100-165    ■ *Pseudomonas* phage B100-166    ■ *Pseudomonas* phage B100-167    ■ *Pseudomonas* phage B100-168    ■ *Pseudomonas* phage B100-169    ■ *Pseudomonas* phage B100-170    ■ *Pseudomonas* phage B100-171    ■ *Pseudomonas* phage B100-172    ■ *Pseudomonas* phage B100-173    ■ *Pseudomonas* phage B100-174    ■ *Pseudomonas* phage B100-175    ■ *Pseudomonas* phage B100-176    ■ *Pseudomonas* phage B100-177    ■ *Pseudomonas* phage B100-178    ■ *Pseudomonas* phage B100-179    ■ *Pseudomonas* phage B100-180    ■ *Pseudomonas* phage B100-181    ■ *Pseudomonas* phage B100-182    ■ *Pseudomonas* phage B100-183    ■ *Pseudomonas* phage B100-184    ■ *Pseudomonas* phage B100-185    ■ *Pseudomonas* phage B100-186    ■ *Pseudomonas* phage B100-187    ■ *Pseudomonas* phage B100-188    ■ *Pseudomonas* phage B100-189    ■ *Pseudomonas* phage B100-190    ■ *Pseudomonas* phage B100-191    ■ *Pseudomonas* phage B100-192    ■ *Pseudomonas* phage B100-193    ■ *Pseudomonas* phage B100-194    ■ *Pseudomonas* phage B100-195    ■ *Pseudomonas* phage B100-196    ■ *Pseudomonas* phage B100-197    ■ *Pseudomonas* phage B100-198    ■ *Pseudomonas* phage B100-199    ■ *Pseudomonas* phage B100-200    ■ *Pseudomonas* phage B100-201    ■ *Pseudomonas* phage B100-202    ■ *Pseudomonas* phage B100-203    ■ *Pseudomonas* phage B100-204    ■ *Pseudomonas* phage B100-205    ■ *Pseudomonas* phage B100-206    ■ *Pseudomonas* phage B100-207    ■ *Pseudomonas* phage B100-208    ■ *Pseudomonas* phage B100-209    ■ *Pseudomonas* phage B100-210    ■ *Pseudomonas* phage B100-211    ■ *Pseudomonas* phage B100-212    ■ *Pseudomonas* phage B100-213    ■ *Pseudomonas* phage B100-214    ■ *Pseudomonas* phage B100-215    ■ *Pseudomonas* phage B100-216    ■ *Pseudomonas* phage B100-217    ■ *Pseudomonas* phage B100-218    ■ *Pseudomonas* phage B100-219    ■ *Pseudomonas* phage B100-220    ■ *Pseudomonas* phage B100-221    ■ *Pseudomonas* phage B100-222    ■ *Pseudomonas* phage B100-223    ■ *Pseudomonas* phage B100-224    ■ *Pseudomonas* phage B100-225    ■ *Pseudomonas* phage B100-226    ■ *Pseudomonas* phage B100-227    ■ *Pseudomonas* phage B100-228    ■ *Pseudomonas* phage B100-229    ■ *Pseudomonas* phage B100-230    ■ *Pseudomonas* phage B100-231    ■ *Pseudomonas* phage B100-232    ■ *Pseudomonas* phage B100-233    ■ *Pseudomonas* phage B100-234    ■ *Pseudomonas* phage B100-235    ■ *Pseudomonas* phage B100-236    ■ *Pseudomonas* phage B100-237    ■ *Pseudomonas* phage B100-238    ■ *Pseudomonas* phage B100-239    ■ *Pseudomonas* phage B100-240    ■ *Pseudomonas* phage B100-241    ■ *Pseudomonas* phage B100-242    ■ *Pseudomonas* phage B100-243    ■ *Pseudomonas* phage B100-244    ■ *Pseudomonas* phage B100-245    ■ *Pseudomonas* phage B100-246    ■ *Pseudomonas* phage B100-247    ■ *Pseudomonas* phage B100-248    ■ *Pseudomonas* phage B100-249    ■ *Pseudomonas* phage B100-250    ■ *Pseudomonas* phage B100-251    ■ *Pseudomonas* phage B100-252    ■ *Pseudomonas* phage B100-253    ■ *Pseudomonas* phage B100-254    ■ *Pseudomonas* phage B100-255    ■ *Pseudomonas* phage B100-256    ■ *Pseudomonas* phage B100-257    ■ *Pseudomonas* phage B100-258    ■ *Pseudomonas* phage B100-259    ■ *Pseudomonas* phage B100-260    ■ *Pseudomonas* phage B100-261    ■ *Pseudomonas* phage B100-262    ■ *Pseudomonas* phage B100-263    ■ *Pseudomonas* phage B100-264    ■ *Pseudomonas* phage B100-265    ■ *Pseudomonas* phage B100-266    ■ *Pseudomonas* phage B100-267    ■ *Pseudomonas* phage B100-268    ■ *Pseudomonas* phage B100-269    ■ *Pseudomonas* phage B100-270    ■ *Pseudomonas* phage B100-271    ■ *Pseudomonas* phage B100

**Figure S7.** Species of virus identification A) Vibrant and B) Virsorter.



**Figure S8. Virus network analysis.** Metagenomes (M1) ZNL\_SRR10063242\_27.2, (M2) JP\_SRR7905022\_60, (M3) IN\_SRR3961734\_55, (M4) Mex\_Chig\_S1, (M5) ZNL\_SRR10063241\_30, (M6) ZNL\_SRR10063240\_34.5, (M7) IN\_SRR3961739\_43, (M8) RSA\_SRR5214706\_50, (M9) IN\_SRR3961733\_52, (M10) IN\_SRR8613699\_52, (M11) CAN\_SRR10095342\_45, (M11) Mex\_Chig\_S2. Virus species 1) *Bacillus virus Bobb*, 2) *Bacillus virus Bcp1*, 3) *Nitunavirus*, 4) *Siminovitchvirus* 5) *Enterobacteria phage vB\_KleM-RaK2*, 6) *Bixzunavirus*, 7) *Acidovorax virus ACP17*, 8) *Sinorhizobium virus M12*, 9) *Pectobacterium phage CBB*, 10) *Campylobacter virus Los1*, 11) *Campylobacter phage PC5*, 12) *Enterobacter phage Arya*, 13) *Pseudomonas phage PPpW-3*, 14) *Erwinia phage vB\_EamM\_Parshik*, 15) *Acinetobacter virus ME3*, 16) *Acinetobacter virus LZ35*, 17) *Burkholderia phage KS5*, 18) *Burkholderia phage vB\_BceM\_AP3*, 19) *Ralstonia phage RSY1*, 20) *Stenotrophomonas phage Smp131*, 21) *Pseudoalteromonas phage C5a*, 22) *Agrobacterium virus Atuph07*, 23) *Svunavirus*, 24) *Enterobacter virus PG7*, 25) unclassified *Tequatrovirus*, 26) *Yersinia virus PST*, 27) *Acinetobacter phage Acj9*, 28) *Morganella phage vB\_MmoM\_MP1* 29) *Acidithiobacillus phage AcaML1*, 30) *Acinetobacter phage Ab105-1phi*, 31) *Alteromonadaceae phage B23*, 32) *Aurantimonas phage AmM-1*, 33) *Bacillus phage AR9*, 34) *Bordetella phage vB\_BbrM\_PHB04*, 35) *Bradyrhizobium phage BDU-MI-1*, 36) *Caulobacter phage Cr30*, 37) *Cyanophage S-RIM12*, 38) *Cyanophage S-RIM14*, 39) *Cyanophage S-RIM32*, 40) *Cyanophage S-RIM44*, 41) *Deep-sea thermophilic phage D6E*,

42) *Faecalibacterium* phage FP\_Mushu, 43) Lake Baikal phage Baikal-20-5m-C28, 44) *Ochrobactrum* phage POA1180, 45) *Prochlorococcus* phage P-HM1, 46) *Prochlorococcus* phage P-SSM2, 47) *Prochlorococcus* phage P-SSM7, 48) *Prochlorococcus* phage P-TIM68, 49) *Pseudomonas* phage Lu11, 50) *Pseudomonas* phage PaBG, 51) *Rhizobium* phage vB\_RleM\_PPF1, 52) *Salicola* phage SCTP-2, 53) *Shewanella* phage SFCi1, 54) *Shewanella* sp. phage 1/40, 55) *Shigella* phage SHV, 56) *Stenotrophomonas* phage IME-SM1, 57) *Stenotrophomonas* phage vB\_SmaS-DLP\_6, 58) *Synechococcus* phage ACG-2014f, 59) *Synechococcus* phage ACG-2014g, 60) *Thermus* phage TMA, 61) *Xanthomonas* phage XacN1, 62) *Yersinia* phage phiR1-37, 63) *Edwardsiella* virus MSW3, 64) *Enterobacteria* phage J8-65, 65) *Pseudomonas* phage vB\_PaeP\_PAO1\_Ab05, 66) *Ralstonia* phage RS-PII-1, 67) *Ralstonia* phage RsoP1EGY, 68) *Rhizobium* phage RHEph01, 69) *Erwinia* phage vB\_EamP-S2, 70) *Escherichia* virus Pollock, 71) *Erwinia* virus Frozen, 72) *Pseudomonas* virus KPP25, 73) *Escherichia* phage APC\_JM3.2, 74) *Bordetella* virus BPP1, 75) *Enterobacter* phage Tyrion, 76) *Aeromonas* phage phiARM81mr, 77) *Agrobacterium* phage Atu\_ph08, 78) *Burkholderia* phage vB\_BmuP\_KL4, 79) *Cellulophaga* phage phi46.3, 80) *Cellulophaga* phage phi14:2, 81) *Delftia* phage RG-2014, 82) *Pseudoalteromonas* phage HP1, 83) *Pseudomonas* phage AF, 84) *Pseudomonas* phage TC6, 85) *Pseudomonas* phage ZC08, 86) *Puniceispirillum* phage HMO-2011, 87) *Ralstonia* phage DU\_RP\_II, 88) *Ralstonia* phage RSK1, 89) *Sinorhizobium* phage PBC5, 90) *Sinorhizobium* phage phiM5, 91) *Xanthomonas citri* phage CP2, 92) *Xylella* phage Xfas53, 93) *Burkholderia* virus AH2, 94) *Streptomyces* phage Maneekul, 95) *Mycobacterium* virus Vincenzo, 96) *Mycobacterium* virus Godines, 97) *Mycobacterium* phage 40BC, 98) *Pseudomonas* phage JBD18, 99) *Gordonia* virus Bowser, 100) *Gordonia* virus Britbrat, 101) *Pseudomonas* phage MP42, 102) *Vibrio* virus pVp1, 103) *Rhodobacter* virus RcCronus, 104) *Stenotrophomonas* virus DLP5, 105) *Pseudomonas* phage phi1, 106) *Doucettevirus*, 107) *Mycobacterium* virus Pukovnik, 108) *Mycobacterium* virus Timshel, 109) *Mycobacterium* phage HINdeR, 110) *Escherichia* phage ST2, 111) *Microbacterium* virus Koji, 112) unclassified Laroyevirus, 113) *Vibrio* virus MAR10, 114) Marvinivirus, 115) *Dinoroseobacter* virus D5C, 116) *Mycobacterium* virus Panchino, 117) *Pseudomonas* virus PaMx25, 118) *Pseudomonas* phage JG012, 119) *Gordonia* virus Zirinka, 120) *Gordonia* phage BatStarr, 121) *Pseudomonas* phage AAT-11, 122) *Xanthomonas* phage Xoo-sp2, 123) unclassified Pbi1virus, 124) *Escherichia* phage YDC107\_1, 125) *Streptomyces* virus Jay2Jay, 126) *Gordonia* virus OneUp, 127) *Burkholderia* phage Bcep176, 128) *Burkholderia* phage KS9, 129) unclassified Timquattrovirus, 130) *Arthrobacter* phage vB\_ArS-ArV2, 131) *Azospirillum* phage Cd, 132) *Bacillus* phage vB\_BhaS-171, 133) *Bifidobacterium* phage Bbif-1, 134) *Caulobacter* phage CcrColossus, 135) *Caulobacter* phage Sansa, 136) *Cellulophaga* phage phi19:1, 137) *Corynebacterium* phage LGCM-V4, 138) *Croceibacter* phage P2559Y, 139) *Erysipelothrix* phage phi1605, 140) *Geobacillus* virus E2, 141) *Geobacillus* virus E3, 142) *Gordonia* phage Confidence, 143) *Gordonia* phage GMA1, 144) *Gordonia* phage GMA2, 145) *Gordonia* phage McGonagall, 146) *Halomonas* phage QHHSV-1, 147) *Klebsiella* phage 5 LV-2017, 148) *Lactobacillus* phage PLE3, 149) *Lactococcus* phage PLg-TB25, 150) *Microbacterium* phage Paschalis, 151) *Pseudomonas* phage JBD25, 153) *Pseudomonas* phage JBD44, 154) *Pseudomonas* phage JBD68, 155) *Pseudomonas* phage phiPSA1, 156) *Pseudomonas* phage PS-1, 157) *Pseudomonas* phage YMC11/02/R656, 158) *Psychrobacter* phage Psymv2, 159) *Ralstonia* phage RS138, 160) *Rhizobium* phage 16-3, 161) *Rhizobium* phage vB\_RleS\_L338C, 161) *Rhodobacter* phage RcapMu, 162) *Rhodococcus* phage Jace, 163) *Rhodovulum* phage vB\_RhkS\_P1, 164) *Sinorhizobium* phage phi2LM21, 165) *Sinorhizobium* phage phi3LM21, 166) *Sinorhizobium* phage phiLM21, 167) *Stenotrophomonas* phage S1, 168) *Streptococcus* phage phiZJ20091101-1, 169) *Streptomyces* phage Chymera, 170) *Streptomyces* phage Ibantik, 171) *Streptomyces* phage mu1/6, 172) *Synechococcus* phage S-CBS3, 173) *Synechococcus* virus S-ESS1, 174) *Thiobacimonas* phage vB\_ThpS-P1, 175) *Paenibacillus* phage Dragolir, 176) *Paracoccus* virus Shpa, 177) *Acinetobacter* virus R3177, 178) *Acinetobacter* phage Ab105-2phi, 179) *Acinetobacter* phage vB\_AbaS\_TRS1, 180) *Gordonia* virus Vivi2, 181) *Roseobacter* virus RDJL1, 182) *Pseudomonas* virus LKO4, 183) *Pseudomonas* virus MP1412, 184) *Pseudomonas* virus PAE1, 185) *Bordetella* phage FP1, 186) *Pseudomonas* phage AN14, 187) *Pseudomonas* phage vB\_PaeS\_S218, 188) *Marinomonas* phage YY, 189) *Cyprinid herpesvirus* 2, 190) *Ictalurid herpesvirus* 1, 191) *Megavirus chilensis*, 192) *Moumouvirus*, 193) *Tupanvirus* soda lake, 194) *Paramecium bursaria Chlorella* virus 1, 195) *Ostreococcus tauri* virus 2, 196) *Yellowstone* lake *phycodnavirus* 1, 197) *Yellowstone* lake *phycodnavirus* 2, 198) *Campylobacter* phage A18a, 199) *Synechococcus* phage S.

**Table S1.** Metagenome data considered for the analysis.

Strategy	Accession number	Number of run	Temp °C	pH	Coordinates	Country	Year
wgs	SRX1982251	SRR3961734	55	7.8	22.65N 78.36E	India	2014
wgs	SRX1982250	SRR3961733	52	7.8	22.65N 78.36E	India	2014
wgs	SRX1982257	SRR3961739	43	7.8	22.65 N 78.36 E	India	2014
wgs	SRX6797119	SRR10063240	34.5	6.9	29.263502 S 177.920697 W	New Zeland	2016
wgs	SRX6797117	SRR10063242	27.2	5.43	29.262380 S 177.919075 W	New Zeland	2016
wgs	SRX6797118	SRR10063241	30	5.9	29.262380 S 177.920850 W	New Zeland	2016
wgs	SRX4741380	SRR7905022	60	5.4	34.318 N 139.216 E	Japan	2016
wgs	SRX1499016	SRR3050168	50	7	19°34' N 78°22'E	India	2016
wgs	SRX2525297	SRR5214706	60	5.7	NI	South Africa	2017
wgs	SRX5412735	SRR8613699	42 to 52	7	22°55'30" N 73°12'33" E	India	2019
wgs	SX6827591	SRR10095342	42	7	59.431N 126.1 W	Canada	2019