**Abstract** *(with insertions/deletions):*

We report on concentrations of dissolved $CH_4$, $N_2O$, $O_2$, $NO_3^-$ and $NH_4^+$, and corresponding $CH_4$ and $N_2O$ emissions for river sites in savannah, swamp forest and tropical forest, along the Congo main stem and in several of its tributary systems of the Western Congo Basin, Republic of Congo (ROC), during November 2010 (41 samples; "wet season") and August 2011 (25 samples; "dry season"; $CH_4$ and $N_2O$ only). Dissolved inorganic nitrogen (DIN: $NH_4^+ + NO_3^-$; wet season~~; $NH_4^+ + NO_3^-$~~) was dominated by $NO_3^-$ (63 ± 19% of DIN), total DIN concentrations (1.5-45.3 µmol $L^{-1}$) ~~being~~ are consistent with ~~negligible~~ near absence of agricultural, domestic and industrial sources. *Question: Is this true for all the three land types?* Dissolved $O_2$ (wet season) was mostly under-saturated in swamp forest (36 ± 29%) and tropical forest (77 ± 36%) rivers but predominantly super-saturated in savannah rivers (100 ± 17%). The dissolved concentrations of $CH_4$ and $N_2O$ ~~were~~ are within ~~previously reported ranges~~ the range of values reported earlier for sub-Saharan African rivers. ~~While~~ Dissolved $CH_4$ was ~~always~~ found to be super-saturated (11.2 - 9553 nmol $L^{-1}$; 440-354400% *Comment: Check this number);* whereas $N_2O$ ranged from strong under-saturation to ~~strong~~ super-saturation (3.2-20.6 nmol $L^{-1}$; 47-205%). Evidently, rivers of the ROC are persistent local sources of ~~tropospheric~~ $CH_4$ ~~but~~ and can be ~~small~~ a minor source~~s~~ or sink~~s~~ for $N_2O$. During the dry season, ~~concentration~~ mean~~s~~ and range~~s~~ of $CH_4$ and $N_2O$ concentrations were ~~indistinguishable~~ quite similar for all the three land types; ~~and~~ whereas seasonal differences in the mean~~s~~ and range~~s~~ were not significant for $N_2O$ concentration ~~for~~ in any land type or for $CH_4$ in savannah rivers. The latter observation is consistent with seasonal buffering of river discharge by an underlying sand~~y~~-sandstone aquifer. ~~By~~ In contrast, $CH_4$ concentration in swamp and forest river~~s~~ ~~$CH_4$~~ was significantly higher in the wet season, ~~possibly reflecting~~ suggesting that $CH_4$ can be derived from floating macrophytes during flooding and/or enhanced methanogenesis in adjacent ~~flooded~~ soils in flood bank. Swamp rivers also exhibit~~ed~~ both low (47%) and high (205%) $N_2O$ saturation~~s~~ but wet season values were overall significantly lower than in either tropical forest or savannah rivers. These ~~which~~ rivers were always super-saturated (103-266%) and for which the overall mean~~s~~ and range~~s~~ of $N_2O$ were not significantly different. In swamp and forest rivers ~~%~~ $O_2$-saturation (%) ~~co-~~varied ~~negatively~~ inversely with ~~log~~ ~~%~~ $CH_4$ saturation (log %) and ~~positively~~ linearly with ~~%~~ $N_2O$ saturation (%). ~~The strong~~ A significant positive correlation for $N_2O$ - $O_2$ ~~correlation~~ saturation in swamp rivers ~~was~~ ~~coincident~~ is consistent with ~~strong~~ $N_2O$ and $O_2$ under-saturation, indicating $N_2O$ consumption ~~by~~ during denitrification in the sediment~~s~~. ~~denitrification.~~ In savannah rivers persistent $N_2O$ super-saturation and a negative $N_2O$ - $O_2$ correlation ~~may indicate~~ suggest $N_2O$ production mainly by nitrification, consistent with ~~a stronger~~ significant correlation between $N_2O$ and $NH_4^+$ than between $N_2O$ and $NO_3^-$. Our range ~~in~~ of values for $CH_4$ and $N_2O$ emission~~s~~ fluxes (33-48705 µmol $CH_4$ $m^{-2}$ $d^{-1}$; 1-67 µmol $N_2O$ $m^{-2}$ $d^{-1}$)~~,~~ ~~is~~ are within the range previously estimated for sub-Saharan African rivers ~~but it includes~~ and associated with uncertainties ~~deriving~~ arising from our use of "basin-wide" values for $CH_4$ and $N_2O$ gas transfer velocities. ~~Even so, because~~ Furthermore, as we did not account for any contribution from ebullition, which is quite likely for $CH_4$ ~~is likely to be~~ (at least 20%), our emission~~s~~ fluxes ~~estimates~~ for $CH_4$ are ~~probably~~ rather conservative estimates.

**Abstract** *(with all make up):*

We report on concentrations of dissolved $CH_4$, $N_2O$, $O_2$, $NO_3^-$ and $NH_4^+$, and corresponding $CH_4$ and $N_2O$ emissions for river sites in savannah, swamp forest and tropical forest, along the Congo main stem and in several of its tributary systems of the Western Congo Basin, Republic of Congo (ROC), during November 2010 (41 samples; "wet season") and August 2011 (25 samples; "dry season"; $CH_4$ and $N_2O$ only). Dissolved inorganic nitrogen (DIN: $NH_4^+ + NO_3^-$; wet season) was dominated by $NO_3^-$ (63 ± 19% of DIN), total DIN concentrations (1.5-45.3 µmol $L^{-1}$) are consistent with near absence of agricultural, domestic and industrial sources. *Question: Is this true for all the three land types?* Dissolved $O_2$ (wet season) was mostly under-saturated in swamp forest (36 ± 29%) and tropical forest (77 ± 36%) rivers but predominantly super-saturated in savannah rivers (100 ± 17%). The dissolved concentrations of $CH_4$ and $N_2O$ are within the range of values reported earlier for sub-Saharan African rivers. Dissolved $CH_4$ was found to be super-saturated (11.2 - 9553 nmol $L^{-1}$; 440-354400% *Comment: Check this number);* whereas $N_2O$ ranged from strong under-saturation to super-saturation (3.2-20.6 nmol $L^{-1}$; 47-205%). Evidently, rivers of the ROC are persistent local sources of $CH_4$ and can be a minor source or sink for $N_2O$. During the dry season, mean and range of $CH_4$ and $N_2O$ concentrations were quite similar for all the three land types; whereas seasonal differences in the mean and range were not significant for $N_2O$ concentration in any land type or for $CH_4$ in savannah rivers. The latter observation is consistent with seasonal buffering of river discharge by an underlying sand-sandstone aquifer. In contrast, $CH_4$ concentration in swamp and forest rivers was significantly higher in the wet season, suggesting that $CH_4$ can be derived from floating macrophytes during flooding and/or enhanced methanogenesis in adjacent flooded soils. Swamp rivers also exhibit both low (47%) and high (205%) $N_2O$ saturation but wet season values were overall significantly lower than in either tropical forest or savannah rivers. These rivers were always super-saturated (103-266%) and for which the overall mean and range of $N_2O$ were not significantly different. In swamp and forest rivers $O_2$-saturation (%) varied inversely with $CH_4$ saturation (log %) and linearly with $N_2O$ saturation (%). A significant positive correlation for $N_2O$ - $O_2$ saturation in swamp rivers is consistent with $N_2O$ and $O_2$ under-saturation, indicating $N_2O$ consumption during denitrification in the sediments. In savannah rivers persistent $N_2O$ super-saturation and a negative $N_2O$ - $O_2$ correlation suggest $N_2O$ production mainly by nitrification, consistent with significant correlation between $N_2O$ and $NH_4^+$ than between $N_2O$ and $NO_3^-$. Our range of values for $CH_4$ and $N_2O$ emission fluxes (33-48705 µmol $CH_4$ $m^{-2}$ $d^{-1}$; 1-67 µmol $N_2O$ $m^{-2}$ $d^{-1}$) are within the range previously estimated for sub-Saharan African rivers and associated with uncertainties arising from our use of "basin-wide" values for $CH_4$ and $N_2O$ gas transfer velocities. Furthermore, as we did not account for any contribution from ebullition, which is quite likely for $CH_4$ (at least 20%), our emission fluxes for $CH_4$ are rather conservative estimates.