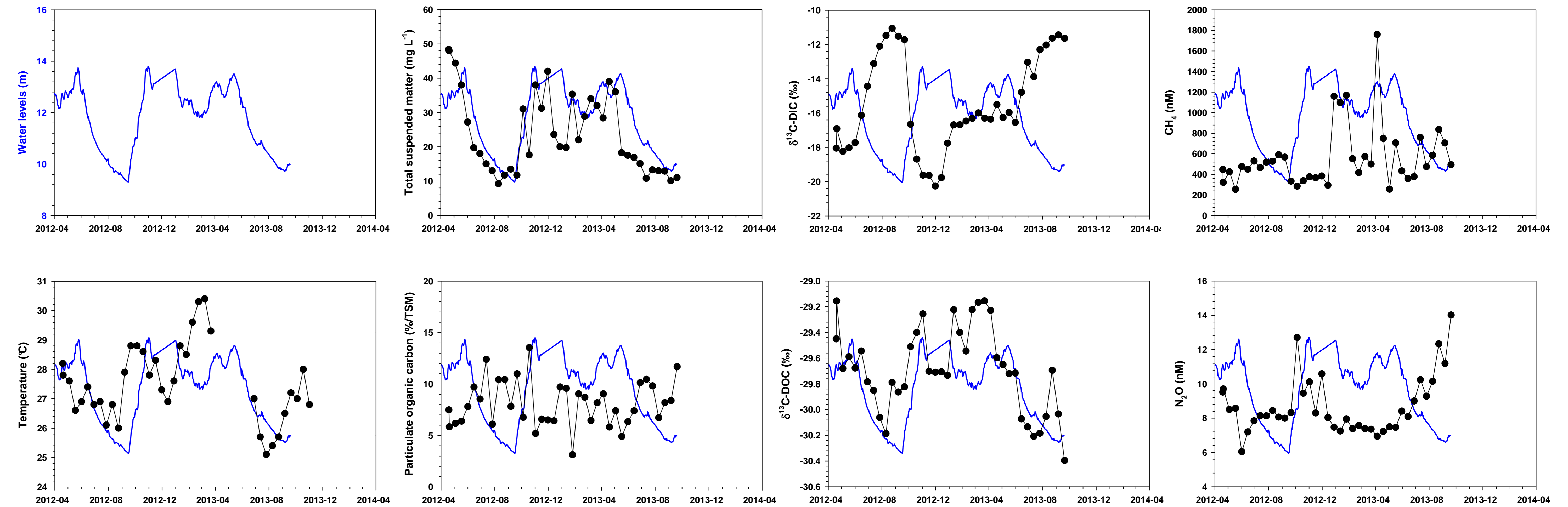


# Biogeochemistry, transport fluxes and emission of greenhouse gases from the Ogooué River (west central Africa): preliminary results after two years of monitoring

F Darchambeau<sup>1</sup>, S Bouillon<sup>2</sup>, B Alhou<sup>3</sup>, T Lambert<sup>1</sup>, AV Borges<sup>1</sup>  
<sup>1</sup>Université de Liège, Belgium <sup>2</sup>KULeuven, Belgium <sup>3</sup>Université Abdou Moumouni, Niger



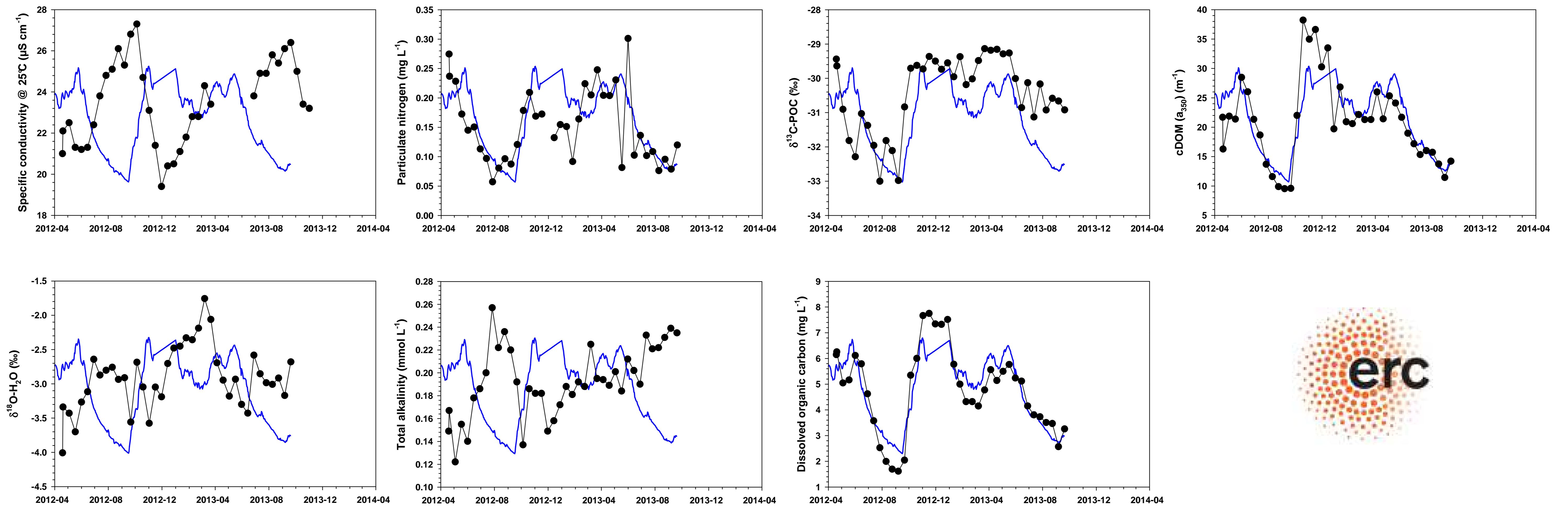
The Ogooué River is the fourth largest river in Africa by discharge. The Ogooué Basin mostly consists of undisturbed rainforest with some savanna grassland. Yet, there is no information on the biogeochemistry, transport fluxes and greenhouse gases in this river. Here, we report initial results of a monitoring campaign whereby 2-weekly samples were collected at Lambaréné (Gabon) [10.24°E 0.69°S] between April 2012 and March 2014 for a suite of physico-chemical and biogeochemical characteristics, including total suspended matter (TSM) concentrations, concentration and stable isotope composition of particulate organic carbon (POC and  $\delta^{13}\text{C-POC}$ ) and particulate nitrogen (PN and  $\delta^{15}\text{N-PN}$ ), chromophoric dissolved organic matter (CDOM), dissolved organic carbon (DOC and  $\delta^{13}\text{C-DOC}$ ), dissolved inorganic carbon (DIC and  $\delta^{13}\text{C-DIC}$ ), concentration of greenhouse gases (GHGs) ( $\text{CO}_2$ ,  $\text{CH}_4$  and  $\text{N}_2\text{O}$ ), as well as major elements, total alkalinity, and oxygen isotope signatures of water ( $\delta^{18}\text{O-H}_2\text{O}$ ).

The water flow showed a typical bimodal structure during the study period with a first rising discharge from March to May and a second rising discharge from September to December.

The mean water temperature was 27.5°C with a lowering during the dry season. Oxygen concentrations were always near saturation in surface waters.

Low discharge is characterized by higher conductivity. The pH appeared neutral around 6.8 with small fluctuations.

Total suspended matter (TSM), particulate organic carbon (POC) and dissolved organic carbon (DOC) concentrations were positively correlated to water levels ( $R^2 = 0.55$ , 0.48 and 0.79, respectively) indicating the allochthonous origin of organic matter in the Ogooué. DOC dominated over POC throughout the hydrological year. CDOM was positively correlated to water levels ( $R^2=0.63$ ) and DOC concentrations ( $R^2=0.79$ ).



$\delta^{13}\text{C}$  signatures of POC and DOC showed relatively strong seasonal variations. The  $\delta^{13}\text{C-POC}$  and DOC values during high discharge conditions can be assumed to reflect the signature of topsoil and litter-derived terrestrial organic C. Overall,  $\delta^{13}\text{C}$  data in POC and DOC suggest the dominance of C3 vegetation in the Ogooué watershed.

Total alkalinity (TA) varied between 0.12 and 0.26 mmol.L<sup>-1</sup> and displayed a decreasing pattern during high-flow conditions.  $\delta^{13}\text{C}$  signatures of dissolved inorganic carbon (DIC) was positively correlated to TA ( $R^2=0.57$ ).

Concentrations of dissolved  $\text{CH}_4$  were oversaturated throughout the hydrological year but did not present reliable seasonal patterns.  $\text{N}_2\text{O}$  concentrations were slightly oversaturated (~117 %).

