



## **Degraded peatlands as a source of riverine organic carbon and enhanced river outgassing in Sumatra, Indonesia**

Francisca Wit (1) and Tim Rixen (1,2)

(1) Leibniz Center for Tropical Marine Ecology, Biogeochemistry, Bremen, Germany (francisca.wit@zmt-bremen.de), (2) Institute of Biogeochemistry and Marine Chemistry, University of Hamburg, Bundesstrasse 55 D-20146 Hamburg (tim.rixen@zmt-bremen.de)

Sumatra, Indonesia, is well known for its widespread tropical peat lands. However, silvi- and agricultural purposes are currently inducing large-scale degradation of peat lands, transforming the landscape into mainly palm-oil plantations. The degradation induces loss of carbon via direct CO<sub>2</sub> emissions, but also via riverine outflow of dissolved and particulate organic carbon (DOC and POC, respectively) due to leaching. This organic carbon is then decomposed along the way towards the coast and is hypothesized to enhance coastal and river outgassing of CO<sub>2</sub>. In the framework of SPICE III, Science for the Protection of Indonesian Coastal Ecosystems, we are quantifying these carbon budgets and fluxes in the rivers and coastal areas of northeast Sumatra.

Using underway instruments, we have gathered continuous measurements of various parameters, including pCO<sub>2</sub>, pH, temperature, salinity and oxygen. In addition, water samples were obtained for DOC, POC, δ<sup>13</sup>CDIC, alkalinity and nutrient analyses.

The results of the first analyses show that pCO<sub>2</sub> values in the coastal areas range between 400-600 μatm. However, in the vicinity of the rivers pCO<sub>2</sub> concentrations increase tremendously, ranging from 600 near the estuaries to a staggering 9000 μatm further upstream. These values are much higher than the marine pCO<sub>2</sub> value of 390 μatm in the South China Sea. When adding carbon isotope results into the story, while knowing that upstream river life is greatly reduced due to oxygen depletion as a result of high DOC decomposition, it appears to be clear from the values, which range between -20 to -24‰ δ<sup>13</sup>CDIC, that the main source of the organic carbon is indeed originating from the degrading peat lands.

In conclusion, our hypothesis can be deemed correct: degrading peat lands enhance organic carbon outflow and therefore elevated decomposition in the rivers, which results in increased river outgassing of CO<sub>2</sub>. Further analyses will be conducted to precisely quantify the budgets and fluxes in order to strengthen our findings.