high accuracy, too. Accurate positioning within dense forest environments still pose a challenge and would not be possible without specialised equipment such as the Leica Systems provided by the GEF.

Conclusions and Recommendations

Models that quantify the exchanges of carbon dioxide and water vapour between the Earth's surface and the atmosphere can be evaluated using flux-tower measurements. However, uncertainty in the source area of these point measurements leads to large errors in the calculation of the CO2 and H2O budgets. This project consisting of three airborne surveys with coincident ground based field surveys provides crucial information to evaluate this uncertainty.

Airborne and ground based measurements can only be successfully linked if positions are known in high enough accuracy and quality. These specifications could be met thanks to the GPS equipment and support provided by GEF.

For positioning within dense forest environments we recommend setting up base station locations in forest clearings as close as possible to the area of survey and to limit the distance between base station and rover to 1 to 2 km depending on terrain and density of the trees and understorey.

Publications and Conference Papers

Kljun, N., L. Chasmer, C. Hopkinson, E. van Gorsel, J.A.J. Berni, A.G. Barr, C. Bernhofer, T.A. Black, R. Leuning, A. Lindroth, H. McCaughey, E. Moors, R. Petrone. Airborne LiDAR and Hyperspectral Data for Flux Tower Sites. *Fluxnet-Specnet Workshop*, Berkeley CA, USA, 7-10 June 2011.

Kljun, N., L. Chasmer, C. Hopkinson. Airborne LiDAR and Hyperspectral Data to Characterise Heterogeneity at Flux Tower Sites. Invited presentation at *Nordflux Workshop*, Risø National Laboratory for sustainable energy, DTU, Roskilde, Denmark, 16-17 November 2011.

Los, S.O., J.A.B. Rosette, N. Kljun, P.R.J. North, L. Chasmer, J.C. Suarez, C. Hopkinson, R.A. Hill, E. van Gorsel, C. Mahoney, and J.A.J. Berni. Vegetation height and cover fraction between 60º S and 60º N from ICESat GLAS data. *Geoscientific Model Development*, submitted.

Additional manuscripts in preparation.