Geophysical Research Abstracts,
Vol. 10, EGU2008-A-01804, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-01804
EGU General Assembly 2008

Integrated Applications of Remote Sensing and Hydrodynamic Modeling for Improved Water Quality Monitoring and Prediction of the Nile River (Rosetta Branch)

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This study is of two folds, the first is a comparison between remote sensing reflectance and model retrieved water quality products and the second is establishing a coupled model to estimate model predications from remote sensing reflectance. In the first fold it is illustrated that the concentrations of suspended particulate matter (SPM) estimated from the inversion of remote sensing reflectance are strongly correlated with model predictions of dissolve oxygen (82%). The absorption coefficient of dissolved organic matter (DOM) has also a good correlation with model-estimated nitrate (66%). This finding is already reported in the literature from *in situ* observations, however. The spatial variations of remote sensing estimated parameters is analyzed and a transient zone (TZ) is defined to be between 30˚15'N and 30˚45'N. This zone is found to be between two distinctive ranges of concentrations for all retrieved water quality parameters. Below this transient zone the concentrations of DOM and SPM are, respectively, 50% and 17% higher than those above the TZ. The retrieved values of Chlorophyll-a below the transient zone are 12% lower than those above TZ.

In the second fold a coupled model was developed to estimate model predictions from remote sensing reflectance using multiple regression analysis. Model regression co-

efficients are estimated such that direct relationships are established between model-estimated parameters and remote sensing reflectance. The results of the developed model for a transect section along the Rosetta branch are strongly correlated with model outputs with correlation coefficients of 92%, 85% and 80% for dissolved oxygen, total dissolved sediment and nitrate, respectively. These regression coefficients have local and temporal applicability. However they can be improved using time series analysis and model reconfigurations.