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Our ENVIS centre has completed twelve years of service to the scientific community now thorough vbarious levels and types of information network. We were also perhaps the first to regularise the “Newsletter” concept that is now a requirement for all centres. Over the years we have grown with experince and input from different groups of readers. There is always , of course room for improvement farther.

We continue our regular activities including publications, reviews, seminar participation etc. The southeast monsoon is over and we are set witness the onset of the reverse monsoon till December. According to IMD, our monsoon was normal though spatially highly skewed. It is unthinakable that parts of northeast experinced some sort of drought while the driest part in Balmer, Rajasthan is still flooded! May be these are the day to the day evidence for claimate change driven monsoon vageries. Only time can tell.

After the Kashmir earthquake last year, no major natural disaster strucjk India so far but many parts of Asia particularly Indonesia has not been so lucky with frewquent bout of Tsunami, earthquake and vocanic activity. This is farther coupled with water pollution due to overflow of metals contaminated mud from oil wells into the rivers and fields in Java. We of course so far faced our usual floods and drought in different parts so far clearly suggesting that man has no anwwer when nature decides to act.

We welcome suggestions from our readers for improving our services farther and comments on both of our web sites.

Prof. V. Subramanian
Editor

Online Monitoring of Nitrogen Elimination in Vienna's Main Sewage Treatment Plant

Vienna's Main Sewage Treatment Plant was expanded in the years of 2004 and 2005, now designed for a population equivalent of 4.0 million and able to clean 680,000 m³ of wastewater per day. In the tender, the operator of the plant had specified online spectrometry to be the method for monitoring of COD, Nitrate and TSS. s::can Messtechnik GmbH, Vienna, obtained the order for on-line instrumentation as a sub-supplier for Siemens AG Austria. In the beginning of 2005, 27 spectrometric probes of different types were purchased, most of them immediately installed and set into operation. The results of a test run for "verification of uniformity & accuracy" during a tough commissioning procedure proved high reliability, low operational costs and best precision of the installed s::can measuring instruments.

Vienna's Main Sewage Treatment Plant

The preliminary mechanical purification of the wastewater collected in the sewers of Vienna removes up to 30% of the organic pollution. In four primary-stage aeration tanks micro-organisms break down the dissolved, largely organic pollutants. 15 secondary-stage aeration tanks consist of three cascades: The first cascade forms a pre-connected non-aerated denitrification tank, connected to two subsequently passed circulation tanks (cascade 2 and 3) in which nitrification and denitrification take place simultaneously. Phosphate precipitation is supported by adding ferric(III)chloride to the aeration tanks. Secondary sedimentation tanks separate sludge from wastewater. Most of the sludge is returned to the aeration tanks to increase the concentration of micro-organisms and to maintain a stable decomposition process. Following secondary clarification the treated water discharges into the Danube Canal.

During heavy precipitation or thunderstorms, Vienna's expanded Main Sewage Treatment Plant has to cope with up to 1.6 million cubic meters of extremely diluted wastewater per day. The wastewater passes through the plant covering a total area of 40 hectares in round 20 hours.

Table 1: Vienna's Main Sewage Treatment Plant: Wastewater figures before and after expansion.

	Before expansion	After expansion
Population equivalent (design)	2,5 million	4,0 million
Purification capacity (BOD5)	85%	> 95%
Nitrogen removal	no legal requirement	> 70 %
Average time wastewater spends in the plant	approx. 5 hours	approx. 20 hours

Table 2: Vienna's Main Sewage Treatment Plant: New Plant Technology

Compressor station	5 turbo compressors: 45,000 Nm ³ /h each
Intermediate pumping station	14 pumps: 2.6 m ³ /s to 2.7 m ³ /s each
Distribution plant	15 inductive flow meters, DN 1200
Aeration tanks	15 tanks, total volume 171,000 m ³

Process Measurement and Control

The new biological purification procedure follows a multistage process controlled by an innovative on-line measuring system. Based on the results of a two-year-long trial series in a specially designed pilot plant, two modes of operation ("bypass-process" and "hybrid-process") are applied. The first priority target is to manage the wastewater treatment process both cost-efficiently and for the highest possible removal of pollution. Ideally, the sensors controlling the processes of nitrification and denitrification have to be operated free of maintenance and free of failure to support this. After 2 years of intensive tests, s::can spectrometer probes had been selected as being best suited, particularly superior as compared to conventional UV probes. Main advantages are the potential to measure several parameters at the same time with one instrument only, and the very much reduced cross-sensitivity between the measured parameters.

In January of 2005 the initial set up of s::can's instruments was carried out by Siemens AG Oesterreich as the main contractor for instrumentation, supported by s::can Messtechnik GmbH as the sub-contractor for spectrometer probes.

Today Vienna's main sewage treatment plant uses 27 s::can instruments (the types are nitro::lyser™, carbo::lyser™ and spectro::lyser™) in order to monitor the primary-stage and the secondary-stage aeration tanks (NOx-N & TS) as well as the influent (COD, NO3-N, TS). In case of the secondary-stage aeration tanks the process of denitrification is controlled in real time by using nitro::lyser™ for managing the operation of the pumps re-circulating the activated sludge from aeration back to denitrification. The challenge to run in this large, complex and most innovative plant within just a few months was met most successfully by the team of plant operators and contractors.

“Verification of Uniformity & Accuracy”

After approximately 5 months of continuous operation the first test phase of the commissioning procedure was accomplished successfully by all s::can instruments without any problems. Furthermore, a test run called “Verification of Uniformity & Accuracy” had to be carried out on site in order to verify the requirements specified in the tender for measurement instrumentation. This challenging trial included eight instruments and was started up by a team consisting of experts both from Siemens AG and s::can GmbH. Three and five nitro::lyser™ respectively had to be operated in parallel, monitoring the process of nitrification/denitrification for a period of two weeks. Even the smallest intervention to the monitoring system was prohibited: It was neither allowed to touch the measurement instrumentation itself physically nor to modify both hardware and software settings.

First of all a special mounting device had to be designed in order to place several nitro::lyser™ next to each other. In addition an individual PLC had to be configured for the purpose: Besides recording and visualizing of the readings also online calculations comparing readings of adjacent instruments had to be carried out.

During this period the operational staff of the treatment plant ran diverse operating modes in order to validate the instrument's performance under most challenging operating conditions. Samples were taken to be analysed using standardized laboratory methods by an external approved laboratory. Target was the validation of the stability of the instruments as well as of the precision, the uniformity and the accuracy of their readings.

Impressive Results

The time series of eight s::can nitro::lyser™ were complete, without any interruption (i.e. no instrumental breakdown), thus the availability of all 8 instruments was 100 %. Using the automatic cleaning with compressed air, no indication of window fouling or instrument drift could be monitored. Caused by different operating conditions the structure and constitution of the activated sludge did change several times. Because of the spectral algorithms s::can spectrometer probes use for compensating any cross-sensitivities, this did not affect the readings of nitrate. There was no need to calibrate the works calibrated instruments (so called “Global Calibration” for WWTP aeration basin) on site.

In opposition to another, more complicated spectrometer buoy recently introduced by another manufacturer, the speed and quality of the nitro::lyser™ measurement is independent of the settling properties of sludge. nitro::lyser™ read NO3-N at +/- 0,05 ppm every single minute, even at floating sludge conditions when the said spectrometer buoy does not provide any NO3 concentrations at all or only with great delay.

As ferric(III)chloride is added to the aeration tanks and some operating conditions require the dosing of organic polymers, the composition of the wastewater varies over hours. A newly developed spectral algorithm compensates cross-sensitivities caused by ferric oxides and/or polymers dissolved in the wastewater and/or precipitating at the optical surfaces of the probes; it was validated successfully. Both substances would have caused unacceptable interferences to conventional UV probes using one or two wavelengths only. The online tests were accompanied by extensive chemical analysis performed by an external approved laboratory. Samples were taken from different measuring points and standardized laboratory methods were used for analysing TSS, TS, NO3-N, NOx-N and COD. These results were compared to the online results of s::can instruments and the detected accuracies were clearly within the limits of the specification.

Results in Nitrification

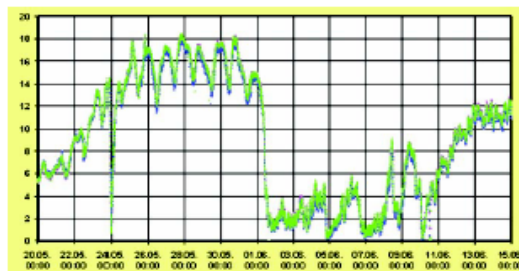


Figure 1: Three s::can nitro::lyser™ running parallel monitoring nitrification

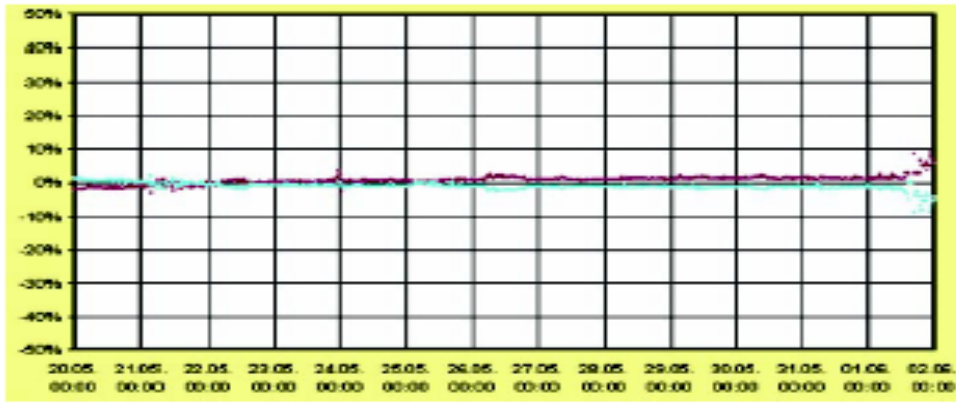


Figure 2: Percentual difference of adjacent s::can nitro::lyser™ running parallel

The time series shown in the following figures were monitored by different s::can nitro::lyser™ placed next to each other, readings of one colour corresponding to one instrument. The time series of three s::can nitro::lyser™ in Figure 3 show identical concentration values respectively in nearly perfect accordance. The readings cover a range of approximately 19 mg/l NO₃-Neq, thus the chosen optical path length of 0,5 mm fulfils the needs of the customer for monitoring the process of nitrification even at very high solids concentrations. The sudden declines of the readings close to 0 mg/l NO₃-Neq (1st and 3rd of June) demonstrate impressively that the automatic cleaning device via compressed air did completely prevent window fouling.

Results in Denitrification

The time series of five s::can nitro::lyser™ (see Figure 3) show identical concentration values respectively in nearly perfect accordance. A range of approximately 7 mg/l NO₃Neq is to be covered, thus the chosen optical path-length of 1,0 mm fulfils the needs of the plant for monitoring and controlling the denitrification process.

The periodical characteristics of the nitrate concentration correspond in detailed pattern to the operational measures carried out by the operators on site. Figure 5 demonstrates impressively that all used s::can nitro::lyser™ monitored the concentration of nitrate reliably. Even in case of smallest nitrate concentrations, changes of the compositions of the local wastewater caused by switching between several operational modes did not cause any noticeable interferences.

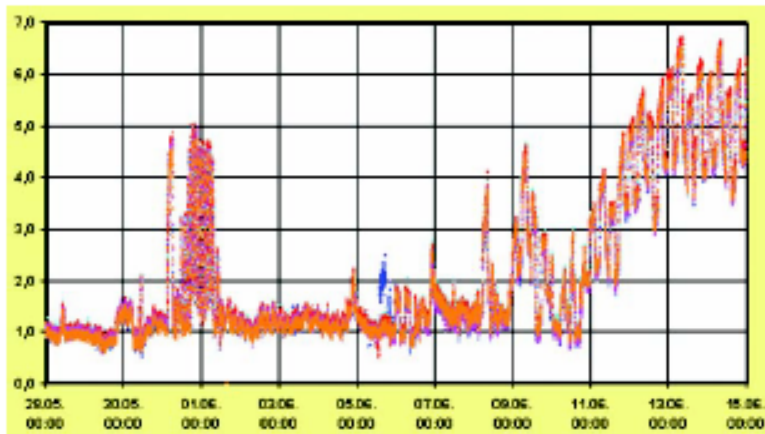


Figure 3: Five s::can nitro::lyser™ running in parallel monitoring the denitrification process.

The percentual differences between nitrate readings of adjacent s::can nitro::lyser™ have been calculated using the results of Figure 3. The inter-instrumental comparability was clearly within the limits of 10% specified by the customer in the tender.

Summary

Vienna's Main Sewage Treatment Plant uses 27 s::can instruments (nitro::lyser™, carbo::lyser™ and spectro::lyser™) in order to monitor/control the processes of nitrification and denitrification as well as the influent and effluent of the plant. An

intensive commissioning procedure took place from January to August of 2005 including long term reliability tests and eight instruments running in parallel for two weeks. All instruments showed identical concentration values respectively in nearly perfect accordance, and inter-instrumental comparability as well as accuracy were clearly within the specified limits. This success is considered a milestone for online sensors and further evidence for the suitability of spectrometric on-line in-situ probes as an efficient means for the control and management of wastewater treatment plants.

(Source: Asian Environmental Technology, Vol. 10 Issue 2, April/ May 2006)

Book Review:

Review of Volume of Abstracts and Souvenir of Second International Conference- Ground Water For Sustainable Development (IGC-2006)

The book of "Volume of Abstracts and Souvenir, IGC- 2006" has compilation of abstracts presented in "*Second International Conference Groundwater for Sustainable Development*", which was held from 1-4 February 2006 at India International Centre (IIC) in New Delhi. The book is edited by Ramanathan AL, Bhattacharya P, Chandrasekharam D, Keshari AK, Thangarajan M and Bundschuh and published by Allied Publishers Private Limited, New Delhi. This volume is divided into two categories of Oral Presentation and Poster Presentation of 246 and 74 abstracts respectively. This conference was organized jointly by School of Environmental Sciences, Jawaharlal Nehru University, New Delhi, KTH, Sweden and IIT Delhi.

The abstracts in Oral Presentation category has been distributed into seven sessions of topics having serious environmental concern like Sustainable Water Resources Assessment, Recharge process and Artificial Recharge, Groundwater Management, Water and Environment, Modelling and Its Application in Soft and hard Rock Aquifer Systems, Arsenic and Fluoride in Groundwater, and Coastal Groundwaters: Impact of Tsunami. It has large numbers of abstracts contributed by authors from India and abroad. Some of the authors are of International repute like Bundschuh J and Bhattacharya P. They have discussed on crucial issue of Arsenic and Groundwater. Their abstracts are entitled "Rural Latin America- A Forgotten Part of the Global Groundwater Arsenic Problem?" and "Mineralogy and Geochemistry of Groundwater Arsenic in the Central Gangetic Plain in Ballia District of UP, India", respectively. It is difficult to summaries each and every abstract contributed by authors in this review, few of them are like Environmental Isotopic Hydrogeochemical Investigation for Characteristics of Groundwater in Tiruvanniyur Coastal Aquifer, Tamil Nadu, India by Shivanna et al.; Sustainable Lei-Drainage Groundwater of Rawalpindi-Islamabad (North Pakistan), and the Potentials of Recharge. Malik AH; Management of The Salalah plain aquifer, Oman by Shamma and Jacks; Local Groundwater Supply and Sanitation in Sunurban Dhaka, Bangladesh by Jacks et al. etc. All the topics mentioned above demonstrate that the organizers have worked hard to ensure a comprehensive coverage of all possible topics on Groundwater and its contamination. For this deserve full compliments, for they ably succeed in including such a wide variety of topics on ground water at one place.

Similarly, Poster presentations category also had topics of environmental concern in four main sessions, Sustainable Water Resources Assessment, Water and Environment, Modelling and Its Application in Soft and Hard Rock Aquifer Systems and Groundwater Management. Causes and Challenges of Surface Water Pollution in India, Macro and Micro Chemical Constitute in Ground Water in Sri Lanka- An Overview, Redesign of the Groundwater Level Monitoring Network in the Nyamandhlovu Aquifer, Zimbabwe etc.

This Volume of Abstracts and Souvenir, IGC- 2006 has important topics for the researchers, policy makers and planners. One may hope that book containing full papers of this important Conference would be published soon which would definitely serve the interests of the scientific community and other interested readers.

SOME RECENT PUBLICATION

Aalto T; Hatakka J; Karstens U; Aurela M; Thum T; Lohila A (2006): Modeling atmospheric CO₂ concentration profiles and fluxes above sloping terrain at a boreal site. *Atmospheric Chemistry & Physics* 6, 303-314

Autumn J. Oczkowski, Brian A. Pellerin, Christopher W. Hunt, et al. The Role of Snowmelt and Spring Rainfall in Inorganic Nutrient Fluxes from a Large Temperate Watershed, the Androscoggin River Basin (Maine and New Hampshire) *Biogeochemistry*, Springer Netherlands, Volume 80, Number 3 pp. 217 - 234

Baker D; Law RM; Gurney KR; Rayner PJ; Peylin P; Denning AS; Bousquet P; Bruhwiler L; Chen YH; Ciais P; Fung IY; Heimann M; John J; Maki T; Maksyutov S; Masarie K; Prather M; Pak BC; Taguchi S; Zhu Z (2006): TransCom 3 inversion intercomparison:

Impact of transport model errors on the interannual variability of regional CO₂ fluxes, 1988-2003 - art. no. GB1002. *Global Biogeochemical Cycles* 20, B1002

- Bartram S; Jux A; Gleixner G; Boland W (2006): Dynamic Pathway Allocation in Early Terpenoid. *Phytochemistry* 67, 1661-1672
- Beer C; Lucht W; Schullius CC; Shvidenko A (2006): Small net carbon dioxide uptake by Russian forests during 1981-1999 - art. no. L15403. *Geophysical Research Letters* 33, 15403
- Börstler B; Renker C; Kahmen A; Buscot F (2006): Species composition of arbuscular mycorrhizal fungi in two mountain meadows with differing management types and levels of plant biodiversity. *Biology & Fertility of Soils* 42, 286-298
- Britta Gribsholt, Eric Struyf, Anton Tramper, et al. Ammonium Transformation in a Nitrogen-Rich Tidal Freshwater Marsh *Biogeochemistry*, Springer Netherlands, Volume 80, Number 3 pp. 319 - 328
- Buchwitz M; de Beek R; Noel S; Burrows JP; Bovensmann H; Schneising O; Khlystova I; Bruns M; Bremer H; Bergamaschi P; Körner S; Heimann M (2006): Atmospheric carbon gases retrieved from SCIAMACHY by WFM-DOAS: version 0.5 CO and CH₄ and impact of calibration improvements on CO₂ retrieval. *Atmospheric Chemistry & Physics* 6, 2727-2751
- Buitenhuis ET; Le Quéré C; Aumont O; Beaugrand G; Bunker A; Hirst A; Ikeda T; O'Brien T; Piontkovski S; Straile D (2006): Biogeochemical fluxes through mesozooplankton - art. no. GB2003. *Global Biogeochemical Cycles* 20, B2003
- Carr ME; Friedrichs MAM; Schmeltz M; Aita MN; Antoine D; Arrigo KR; Asanuma I; Aumont O; Barber R; Behrenfeld M; Bidigare R; Buitenhuis ET; Campbell J; Ciotti A; Dierssen H; Dowell M; Dunne J; Esaias W; Gentili B; Gregg W; Groom S; Hoepffner N; Ishizaka J; Kameda T; Le Quéré C; et al. (2006): A comparison of global estimates of marine primary production from ocean color. *Deep-Sea Research Part II-Topical Studies in Oceanography* 53, 741-770
- Chevallier F; Viovy N; Reichstein M; Ciais P (2006): On the assignment of prior errors in Bayesian inversions of CO₂ surface fluxes - art. no. L13802. *Geophysical Research Letters* 33, 13802
- Coplen TB; Brand WA; Gehre M; Groning M; Meijer HAJ; Toman B; Verkouteren RM (2006): New guidelines for delta C-13 measurements. *Analytical Chemistry* 78, 2439-2441
- Drobniak, A., and Mastalerz, M. (2006) Chemical evolution of Miocene wood: Example from Be³chatów brown coal deposit, central Poland. *International Journal of Coal Geology*, 66, 157-178. <http://dx.doi.org/10.1016/j.coal.2005.06.004>
- Dumitrescu, M., and Brassell, S.C. (2006) Compositional and isotopic characteristics of organic matter for the early Aptian Oceanic Anoxic Event at Shatsky Rise, ODP Leg 198. *Palaeogeography, Palaeoclimatology, Palaeoecology*, 235, 168-191. <http://dx.doi.org/10.1016/j.palaeo.2005.09.028>
- Dumitrescu, M., and Brassell, S.C., Schouten, S., Hopmans, E.C., and Jaap S. Sinninghe Damsté, J.S. (2006) Instability in tropical Pacific sea-surface temperatures during the early Aptian. *Geology*, 34, 833-836. <http://dx.doi.org/10.1130/G22882.1>
- Eliška Rejmánková and Kateřina Houdková Wetland plant decomposition under different nutrient conditions: what is more important, litter quality or site quality? *Biogeochemistry*, Springer Netherlands, Volume 80, Number 3 pp. 275 - 292
- Frankenberg C; Meirink JF; Bergamaschi P; Goede APH; Heimann M; Körner S; Platt U; van Weele M; Wagner T (2006): Satellite cartography of atmospheric methane from SCIAMACHY on board ENVISAT: Analysis of the years 2003 and 2004 - art. no. D07303. *Journal of Geophysical Research-Atmospheres* 111, 7303
- Friedlingstein P; Cox PM; Betts RA; Bopp L; Von Bloh W; Brovkin V; Cadule P; Doney SC; Eby M; Fung IY; Bala G; John J; Jones C; Joos F; Kato T; Kawamiya M; Knorr W; Lindsay K; Matthews HD; Raddatz T; Rayner PJ; Reick C; Roeckner E; Schnitzler KG; Schnur R; et al. (2006): Climate-carbon cycle feedback analysis: Results from the (CMIP)-M-4 model intercomparison. *Journal of Climate* 19, 3337-3353
- Gerbig C; Lin JZ; Munger JW; Wofsy S (2006): What can tracer observations in the continental boundary layer tell us about surface-atmosphere fluxes?. *Atmospheric Chemistry & Physics* 6, 539-554
- Gottlicher S; Knohl A; Wanek W; Buchmann N; Richter A (2006): Short-term changes in carbon isotope composition of soluble carbohydrates and starch: from canopy leaves to the root system. *Rapid Communications in Mass Spectrometry* 20, 653-660

- Gröcke, D.R., A. Schimmelmann, S. Elias, and R.F. Miller (2006) Hydrogen isotopes in beetle chitin: preliminary European data and reinterpretation of North American data. *Quaternary Science Reviews*, 25, 1850-1864. <http://dx.doi.org/10.1016/j.quascirev.2006.01.021>
- Hahn V; Högberg P; Buchmann N (2006): C-14 - a tool for separation of autotrophic and heterotrophic soil respiration. *Global Change Biology* 12, 972-982
- Helsen MM; van de Wal RSW; van den Broeke MR; Masson-Delmotte V; Meijer HAJ; Scheele MP; Werner M (2006): Modeling the isotopic composition of Antarctic snow using backward trajectories: Simulation of snow pit records - art. no. D15109. *Journal of Geophysical Research-Atmospheres* 111, 15109
- Jung M; Henkel K; Herold M; Churkina G (2006): Exploiting synergies of global land cover products for carbon cycle modeling. *Remote Sensing of Environment* 101, 534-553
- Jungkunst HF; Freibauer A; Neufeldt H; Bareth G (2006): Nitrous oxide emissions from agricultural land use in Germany - a synthesis of available annual field data. *Journal of Plant Nutrition & Soil Science-Zeitschrift für Pflanzenernährung und Bodenkunde* 169, 341-351
- Kahmen A; Renker C; Unsicker S; Buchmann N (2006): Niche complementarity for nitrogen: An explanation for the biodiversity and ecosystem functioning relationship?. *Ecology* 87, 1244-1255
- Karstens U; Gloor M; Heimann M; Rödenbeck C (2006): Insights from simulations with high-resolution transport and process models on sampling of the atmosphere for constraining midlatitude land carbon sinks - art. no. D12301. *Journal of Geophysical Research-Atmospheres* 111, 12301
- Lis, G.P., Schimmelmann, Mastalerz, M. (2006) D/H ratios and hydrogen exchangeability of type-II kerogens with increasing thermal maturity. *Organic Geochemistry*, 37, 342-353. <http://dx.doi.org/10.1016/j.orggeochem.2005.10.006>
- Maier, W.D., Andreoli, M.A.G., McDonald, I., Higgins, M.D., Boyce, A.J., Shukolyukov, A., Lugmair, G. W., Ashwal, L.D., Gräser, P., Ripley, E.M., and Hart, R.J. (2006) Discovery of a 25-cm asteroid clast in the giant Morokweng impact crater, South Africa. *Nature*, 441, 203-206. <http://dx.doi.org/10.1038/nature04751>
- Marc Schumacher, Iso Christl, Rolf D. Vogt, et al. Chemical composition of aquatic dissolved organic matter in five boreal forest catchments sampled in spring and fall seasons *Biogeochemistry*, Springer Netherlands, Volume 80, Number 3 pp. 293 - 305
- Mariga, J., Ripley, E. M., and Li, C. (2006) Petrologic evolution of gneissic xenoliths in the Voisey's Bay Intrusion, Labrador, Canada: Mineralogy, reactions, partial melting, and mechanisms of mass transfer. *Geochemistry Geophysics Geosystems*, 7. <http://dx.doi.org/10.1029/2005GC001184>
- Mastalerz, M. and Drobnik, A., G. Filippelli (2006) Mercury content and petrographic composition in coal beds in Indiana. *International Journal of Coal Geology*, 68, 2-13. <http://dx.doi.org/10.1016/j.coal.2005.10.002>
- McKinley GA; Takahashi T; Buitenhuis ET; Chai F; Christian JR; Doney SC; Jiang MS; Lindsay K; Moore JK; Le Quéré C; Lima I; Murtugudde R; Shi L; Wetzel P (2006): North Pacific carbon cycle response to climate variability on seasonal to decadal timescales - art. no. C07S06. *Journal of Geophysical Research-Oceans* 111, S706
- Milcu A; Schumacher J; Scheu S (2006): Earthworms (*Lumbricus terrestris*) affect plant seedling recruitment and microhabitat heterogeneity. *Functional Ecology* 20, 261-268
- Mund M; Schulze ED (2006): Impacts of forest management on the carbon budget of European beech (*Fagus sylvatica*) forests. *Allgemeine Forst und Jagdzeitung* 177, 47-63 [FL]
- Ni J; Harrison SP; Prentice IC; Kutzbach JE; Sitch S (2006): Impact of climate variability on present and Holocene vegetation: A model-based study. *Ecological Modelling* 191, 469-486
- Patra PK; Gurney KR; Denning AS; Maksyutov S; Nakazawa T; Baker D; Bousquet P; Bruhwiler L; Chen YH; Ciais P; Fan SM; Fung IY; Gloor M; Heimann M; Higuchi K; John J; Law RM; Maki T; Pak BC; Peylin P; Prather M; Rayner PJ; Sarmiento JL; Taguchi S; Takahashi T; et al. (2006): Sensitivity of inverse estimation of annual mean CO₂ sources and sinks to ocean-only sites versus all-sites observational networks - art. no. L05814. *Geophysical Research Letters* 33, 5814 pp. 307 - 318
- Prokushkin AS; Knorre AA; Kirdeyanov AV; Schulze ED (2006): Productivity of mosses and organic matter accumulation in the litter of sphagnum larch forest in the permafrost zone. *Russian Journal of Ecology* 37, 225-232
- Raessler M; Hilke I (2006): Ion-chromatographic determination of low concentrations of nitrate in solutions of high salinity. *Microchimica Acta* 154, 27-29

- Reithmaier LM; Gockede M; Markkanen T; Knohl A; Churkina G; Rebmann C; Buchmann N; Foken T (2006): Use of remotely sensed land use classification for a better evaluation of micrometeorological flux measurement sites. *Theoretical & Applied Climatology* 84, 219-233
- Rödenbeck C; Conway TJ; Langenfelds RL (2006): The effect of systematic measurement errors on atmospheric CO₂ inversions: a quantitative assessment. *Atmospheric Chemistry & Physics* 6, 149-161
- S. P. Sah, H. Rita, H. Ilvesniemi 15N natural abundance of foliage and soil across boreal forests of Finland *Biogeochemistry*, Springer Netherlands, Volume 80, Number 3
- Sachse D; Radke J; Gleixner G (2006): delta D values of individual n-alkanes from terrestrial plants along a climatic gradient - Implications for the sedimentary biomarker record. *Organic Geochemistry* 37, 469-483
- Scherber C; Mwangi P; Temperton VM; Roscher C; Schumacher J; Schmid B; Weisser W (2006): Effects of plant diversity on invertebrate herbivory in experimental grassland. *Oecologia* 147, 489-500
- Schimmelmann, A., C.B. Lange, E.B. Roark, and B.L. Ingram (2006) Resources for paleoceanographic and paleoclimatic analysis: A 6,700-year stratigraphy and regional reservoir-age (ΔR) record based on varve counting and 14C-AMS dating for the Santa Barbara Basin, offshore California, USA. *Journal of Sedimentary Research*, 76, 74-80. <http://dx.doi.org/10.2110/jsr.2006.04>
- Schimmelmann, A., Sessions, A.L., and Mastalerz, M. (2006) Hydrogen isotopic (D/H) composition of organic matter during diagenesis and thermal maturation. *Annual Review of Earth and Planetary Sciences*, 34, 501-533. <http://dx.doi.org/10.1146/annurev.earth.34.031405.125011>
- Schrumpf M; Zech W; Axmacher JC; Lyaruu HVM (2006): Biogeochemistry of an afro-tropical montane rain forest on Mt. Kilimanjaro, Tanzania. *Journal of Tropical Ecology* 22, 77-89
- Schulze ED (2006): Biological control of the terrestrial carbon sink. *Biogeosciences* 3, 147-166
- Schulze ED; Turner NC; Nicolle D; Schumacher J (2006): Leaf and wood carbon isotope ratios, specific leaf areas and wood growth of Eucalyptus species across a rainfall gradient in Australia. *Tree Physiology* 26, 479-492
- Schulze ED; Turner NC; Nicolle D; Schumacher J (2006): Species differences in carbon isotope ratios, specific leaf area and nitrogen concentrations in leaves of Eucalyptus growing in a common garden compared with along an aridity gradient. *Physiologia Plantarum* 127, 434-444
- Seibt U; Wingate L; Berry JA; Lloyd J (2006): Non-steady state effects in diurnal O-18 discrimination by Picea sitchensis branches in the field. *Plant, Cell & Environment* 29, 928-939
- Sofie Sjögersten, René van der Wal, Sarah J. Woodin Small-scale hydrological variation determines landscape CO₂ fluxes in the high Arctic *Biogeochemistry*, Springer Netherlands, Volume 80, Number 3 pp. 235 - 246
- Steinbeiß S; Schmidt CM; Heide K; Gleixner G (2006): Delta C-13 values of pyrolysis products from cellulose and lignin represent the isotope content of their precursors. *Journal of Analytical & Applied Pyrolysis* 75, 19-26
- Strapoc, D., A. Schimmelmann, and M. Mastalerz (2006) Carbon isotopic fractionation of coalbed gases CH₄ and CO₂ during canister desorption. *Organic Geochemistry*, 37, 152-164. <http://dx.doi.org/10.1016/j.orggeochem.2005.10.002>
- Sveshnikov D; Ensminger I; Ivanov AG; Campbell DA; Lloyd J; Funk C; Hüner N; Oquist G (2006): Excitation energy partitioning and quenching during cold acclimation in Scots pine. *Tree Physiology* 26, 325-336
- Takeshi Ise and Paul R. Moorcroft The global-scale temperature and moisture dependencies of soil organic carbon decomposition: an analysis using a mechanistic decomposition model *Biogeochemistry*, Springer Netherlands, Volume 80, Number 3 pp. 247 - 261
- Thuille A; Schulze ED (2006): Carbon dynamics in successional and afforested spruce stands in Thuringia and the Alps. *Global Change Biology* 12, 325-342
- Vetter W; Schlatterer J; Gleixner G (2006): Experiments directed to the compound-specific determination of the stable carbon isotope ratios of the Toxaphene congener B8-1413 in two technical mixtures and Antarctic Weddell seal. *Journal of Chromatography A*. 1110, 165-170

Xu R; Niu HS; Lid CS; Wang Y; Wang MX (2006): Uncertainties in up-scaling N₂O flux from field to 1 degrees X 1 degrees scale: A case study for Inner Mongolian grasslands in China. *Soil Biology & Biochemistry* 38, 633-643

Yu Jia, Feng-Min Li, Xiao-Ling Wang, et al. Dynamics of soil organic carbon and soil fertility affected by alfalfa productivity in a semiarid agro-ecosystem *Biogeochemistry*, Springer Netherlands, Volume 80, Number 3 pp. 263 - 274

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National Seminar on Water Resources Development in Management in Nagaland March 7-09, 2006 Organized by Geography & Resource Management, Nagaland University Correspondence Dr. M.S. Rawat, Organising Secretary, Department of Geography & Resource Management,, Nagaland University (Lumani) Mokokchung-798601 Phone 0360 269210 Fax: 0369 268204 Email: msrckr@rediffmail.com

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Recent Held/Forthcoming Conference and workshop

Sub-Regional Workshop on Recreational Water Quality in the OECS

The Caribbean Environment Programme (CEP) Secretariat of the United Nations Environment Programme in collaboration with the Environment and Sustainable Development Unit of the Organization of Eastern Caribbean States (OECS/ESDU) and the Caribbean Environmental Health Institute (CEHI), and with support from the Government of Saint Lucia, will be convening a Sub-Regional Workshop on Recreational Water Quality in the OECS.

The proposed objectives of this Workshop are to:

- § Increase awareness of the importance of marine water quality monitoring to senior decision makers by emphasizing linkages of poor recreational water quality with impacts on Human Health, Fisheries, Coral Reefs, and Tourism;
 - § Provide an overview of the status of marine water quality in the Eastern Caribbean including an assessment of marine pollution;
 - § Raise awareness of the importance of the LBS Protocol and National Programmes of Action (NPAs) as tools for improving environmental management within the framework of National Environmental Management Strategies (NEMS) in the OECS Sub-Region.
- Generate High level Government Commitment to address marine water quality issues, pollution reduction and prevention measures through accession to, and implementation of the LBS Protocol.

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