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Other news
Climate change and palaeoclimatology
Geobiology, palaeontology, and evolution
Geochemistry, mineralogy, petrology and volcanology
Geomorphology
Planetary, extraterrestrial geology, and meteoritics
Tectonics

******As pessoas interessadas em receber nossa newsletter via mail, podem escrever para revistadegeologia@yahoo.com.br pedindo sua adesão.***

IMAGEM DA SEMANA

CURSOS
CONGRESSOS

Federal de Ouro Preto realiza concurso para 37 vagas docentes

Período de inscrição termina em 4 de janeiro
Estão abertas, até 4 de janeiro, as inscrições para candidatos ao concurso para professor da Universidade Federal de Ouro Preto (Ufop). Serão disponibilizadas 37 vagas, sendo 23 para professor adjunto e 14 para professor assistente, em diversas áreas do conhecimento.
Para se inscrever, o candidato deve preencher o formulário eletrônico disponível no site www.concurso.ufop.br.
Após o preenchimento e confirmação via internet da ficha de inscrição, o candidato deve efetuar o pagamento da taxa de inscrição de R$ 93 para a classe de assistente e R$ 146 para a classe de adjunto, utilizando o boleto disponibilizado no ato da inscrição.
O processo seletivo será feito mediante duas etapas. A primeira é composta por provas de conhecimento (escrita, didática, quando houver, e projeto, quando houver) e exame dos títulos e do currículo, de caráter classificatório.
Para mais informações, acesse o edital no site www.concurso.ufop.br

Ministério do Meio Ambiente lança concurso com 200 vagas para candidatos de nível superior

O Ministério do Meio Ambiente (MMA) divulgou, no fim de novembro, o edital de abertura da seleção que oferece 200 oportunidades para o cargo de analista ambiental, referente à carreira de especialista em meio ambiente.
O certame será organizado pelo Centro de Seleção e de Promoção de Eventos da Universidade de Brasília (Cespe/UnB) e constará apenas de provas objetivas e discursivas, que serão aplicadas em 26 capitais brasileiras e também no Distrito Federal no dia 6 de fevereiro de 2011.
Há chances para as áreas de concentração I (Recursos Humanos), II (Planejamento Estratégico), III (Política Nacional de Recursos Hídricos), IV (Mudança Climática) e V (Biodiversidade). Para participar do concurso, basta ter graduação em qualquer curso de nível superior reconhecido pelo Ministério da Educação (MEC).
Interessados podem se inscrever, até 27 de dezembro, http://www.cespe.unb.br/concursos/mma_2010/

ARTIGO DA SEMANA

NEWS METEORITICA DA SEMANA

ÍNDICE DE NOTÍCIAS

AMBIENTE BRASIL

Mudanças climáticas colocam em perigo tesouros arqueológicos

A desertificação, o degelo, o aumento das chuvas torrenciais e dos furacões como consequência das mudanças climáticas podem destruir diversos tesouros arqueológicos, como templos maias, alertaram especialistas.

Acordo sobre Protocolo de Kyoto pode destravar reunião de Cancún

O controle das emissões é 'a maior questão que precisa ser resolvida de alguma forma', disse John Ashe, presidente da seção da conferência que discute o futuro do Protocolo de Kyoto.

Brasil está com 'o maior pepino' das negociações climáticas, diz Minc

País deve, com o Reino Unido, conseguir saída para Protocolo de Kyoto. Se conseguir, delegação 'marcará gol' na COP 16, opina ex-ministro.

Bangladesh se declara como país mais vulnerável à mudança climática

O país pediu ações e compromissos imediatos do mundo para evitar uma tragédia maior.

Tropa de choque fica de prontidão para conter protesto na COP 16

Manifestantes estariam a caminho do local da reunião. Conferência do Clima entra em seus dias decisivos.

Fórum Econômico quer eficiência energética como prioridade da COP-16

Para o Fórum Econômico Mundial, as residências e todos os setores da economia, incluindo transportes, podem contribuir para o uso eficiente de energia.

Na COP-16, grupo apresenta 3 pontos "inegociáveis" para mudança climática

O ministro do Ambiente da Índia, Jairam Ramesh, assinalou ainda que é preciso desembolsar imediatamente US$ 30 bilhões do financiamento rápido para o período 2010-2012, além de adotar um mecanismo para transferir tecnologia dos países mais ricos aos menos desenvolvidos.

Brasil é responsável por 52% dos gases do efeito estufa na América Latina

Um relatório das Nações Unidas, divulgado na segunda-feira (6) na Cúpula sobre Mudança Climática, adverte que as emissões globais de dióxido de carbono na América Latina em 2006, excluindo as por mudança no uso da terra, foram de 38,754 bilhões de toneladas métricas.

Em Cancún, ministra e Marina Silva tentam barrar novo Código Florestal

A aprovação do polêmico relatório do deputado Aldo Rebelo (PCdoB-SP) no plenário da Câmara causaria contrangimentos ao Brasil na conferência do clima dias depois de o país ter anunciado a menor taxa de desmatamento da história.

Fundo Amazônia recebe doação de 18 milhões de Euros

O acordo foi formalizado durante a COP16, que acontece em Cancún, no México. A Alemanha é o segundo país a doar recursos para o Fundo Amazônia. O primeiro foi a Noruega.

Lula diz que vetará proposta sobre royalties do petróleo

Para o presidente, pré-sal tem recursos suficientes para beneficiar os Estados produtores.

Pesquisa: desmatamento é maior preocupação ambiental no Brasil

Em seguida aparecem a poluição da água, citada por 32%, o aquecimento global (26%), o tratamento do lixo e a poluição do ar, empatados com 22% das citações.

Licença do Ibama para instalação do canteiro de obras de Belo Monte deve sair ainda este ano

O coordenador de Energia Hidrelétrica e Transposições do Ibama, Thomaz Miazak de Toledo, explicou que, para que seja concedida a licença de instalação do canteiro de obras, parte das condicionantes precisa ser cumprida.

Ibama proíbe reprodução de leões e grandes felinos exóticos no país

Decisão foi publicada nesta terça-feira (7) no Diário Oficial da União. Medida deve-se ao elevado número de casos de abandono e maus-tratos.

População de gorilas de montanha aumenta na África Central

Crescimento de 25% no número de indivíduos ocorreu nos últimos 7 anos. Três países da região participaram do censo animal.

ONG britânica oferece cursos para salva-vidas de baleia

Entidade tem 2.500 voluntários de prontidão para salvar mamíferos marinhos encalhados na costa da Grã-Bretanha.

Animais silvestres são apreendidos na BR-101 na Bahia

No total, foram apreendidos um macaco e 27 aves de diversas espécies. Bichos foram encaminhados para o Ibama.

Cientistas contestam estudo sobre bactéria composta por arsênio

Reportagem do site Slate consultou especialistas que reprovaram estudo. Material avaliado poderia ter adquirido o elemento químico por acidente.

Sonda japonesa se aproxima de Vênus para entrar em órbita

'Akatsuki' vai tirar fotos do planeta, diz agência espacial japonesa. Observações no planeta podem ajudar na compreensão da Terra.

Construção de hidrelétricas desrespeita povos indígenas, afirma relatório

O relatório Direitos Humanos no Brasil 2010, elaborado pela Rede Social de Justiça e Direitos Humanos, chama ainda a atenção para as 489 Terras Indígenas que aguardam o reconhecimento.

Paleontólogos acham pequeno dino chifrudo na Coreia do Sul

O achado está ajudando pesquisadores a resolver o mistério de como dinossauros com chifres evoluíram de pequenas criaturas da Ásia para grandes dinossauros, como os Triceratops, que andavam pela América do Norte.

Aspirina diária reduz risco de morte por câncer, diz estudo

Segundo pesquisa, consumo de 75 mg diários da droga reduziu em até 20% os riscos de morte.

Dengue preocupa município do Rio

De 1º de janeiro até esta terça-feira (7), o Rio de Janeiro registrou 2.432 casos de dengue.

EXCLUSIVO: UFSC promove debate sobre comunidades quilombolas e UCs

O encontro tem como objetivo abrir espaço para que pesquisadores, poder público, movimentos sociais e pesquisadores possam debater sobre situações que envolvem processos de reconhecimento de territórios quilombolas em Unidades de Conservação.

Textos da COP 16 ainda são muito 'complicados', avalia União Europeia

Duas principais linhas da Conferência do Clima têm rascunhos. UE voltou a enfatizar que países pobres precisam aceitar transparência.

Presidente da COP 16 nega rumores sobre texto secreto

Chanceler mexicana reiterou que reunião pode criar 'pacote balanceado'. Brasil e Reino Unido tentam saída para impasse sobre Protocolo de Kyoto.

Movimento climático cria 'carta de amor' do Protocolo de Kyoto

Desabafo sentimental fictício é para países que rejeitam renovar acordo. Novo período do tratado é ponto polêmico da COP 16, em Cancún.

Brasil quer usar boa relação com China para mediar acordo sobre clima

Maiores poluidores, chineses temem que critérios de medição das emissões interfiram em assuntos nacionais.

Lula diz que país cumprirá metas de redução de desmatamento antes do previsto

"Quando nós fomos a Copenhague (a cúpula do Clima) no ano passado e levamos uma proposta de diminuir as emissões de gases do efeito estufa em 39% até 2020, e nos comprometemos de diminuir o desmatamento da Amazônia em 80%, muita gente pensava que era impossível."

Chefe da ONU contra desertificação pede avanços em Cancún

Estima-se que 4% das emissões anuais de gases nocivos ao clima procedam de terras áridas, cuja degradação libera carbono, mas quando recuperadas adquirem capacidade de estocá-lo.

Escândalo do Wikileaks chega às negociações do clima

Segundo o jornal britânico The Guardian, telegrama americano revela um encontro entre o principal negociador dos EUA para a Mudança Climática, Jonathan Pershing, e a comissária europeia Connie Hedegaard em 11 de fevereiro.

Na COP-16, ONGs brasileiras destacam biocombustíveis e combate ao desmatamento

Produção sustentável de biocombustíveis, ação empresarial e combate ao desmatamento serão temas das discussões propostas pelas ONGs na Conferência das Nações Unidas sobre clima.

Para ser potência verde, Brasil deve fazer mudanças na matriz energética

País desperdiça enorme potencial de energias renováveis, dizem especialistas.

Angra 2 volta a gerar energia nuclear para o Sistema Interligado Nacional

Durante a parada programada de Angra 2, além do reabastecimento de um terço do combustível, os cerca de 1,4 mil especialistas em usinas nucleares do país e do exterior contratados para reforçar a equipe da Eletronuclear fizeram outras 3.500 tarefas na unidade.

Estudo aponta motivo para pandas gigantes não comerem carne

Pandas gigantes teriam deixado de comer carne graças a gene.

Elefantes gêmeos atraem turistas na Tailândia

Animais nasceram em vila no norte; país tem segundo par de elefantes gêmeos em um ano.

Pesquisador se veste de panda para cuidar de filhote na China

O bebê panda de quatro meses é o primeiro criado em cativeiro a ser treinado para reintrodução na natureza.

Combate à desertificação terá sistema de alerta em 2011

A ideia é criar um instrumento que possa avançar na produção de conhecimentos sobre os diversos aspectos da desertificação no País.

Egito pede que especialistas investiguem ataques de tubarão

Governo quer descobrir razões da rara série de ataques em Shark el-Sheik, no Mar Vermelho.

Tornado pode ter sido o primeiro a ser registrado em MG, diz especialista

Meteorologista diz não conhecer registro do fenômeno no estado mineiro. Moradores de Uberlândia gravaram o tornado fraco neste

domingo (5).

Cobra da Ásia praticamente voa ao criar efeito aerodinâmico com o corpo

Um estudo no qual cientistas jogaram cobras de uma torre de 15 metros e registraram a descida dos animais em vídeo sugere que as cobras são voadoras ativas, manipulando seu corpo para obter um efeito aerodinâmico.

Escamas flexíveis explicam velocidade do tubarão-mako

As escamas são parecidas com dentes incrustados na pele.

Lula pede que autoridades e população redobrem cuidados para evitar aumento de casos de dengue

Lula afirmou que é preciso manter as cidades limpas e conscientizar a população sobre as medidas necessárias para evitar a proliferação do mosquito Aedes aegypti, vetor da doença.

Erro de programação pode ter causado falha em foguete russo

O incidente representa um revés embaraçoso na tentativa russa de colocar em funcionamento o sistema de navegação por satélite Glonass, para rivalizar com os Estados Unidos e o sistema europeu Galileu.

24 cidades correm risco de surto de dengue, diz governo

Nordeste concentra o maior número de localidades em situação crítica. Segundo levantamento do governo, 154 municípios estão em alerta.

JORNAL DA CIÊNCIA

Edição 4154 - Notícias de C&T - Serviço da SBPC

1. Associação Interciencia e SBPC apontam ações para Amazônia
2. Ministro Sergio Rezende lança livro na sede da SBPC
3. Laboratório aberto de nanociência e nanotecnologia será inaugurado nesta sexta-feira
4. Finep começa segunda avaliação do Programa de Subvenção Econômica
5. Inpe anuncia novo coordenador do CPTEC
6. MCT investe na revitalização de 33 CVTs no Ceará
7. Edital apoiará atividades de pesquisa no setor mineral
8. Chip do boi está pronto para comercialização
9. Regulamentação da clonagem de animais é aprovada na Comissão de C&T do Senado
10. FAP do Ceará lança edital em parceria com a França
11. SBF reformula Brazilian Journal of Physics
12. Universidade Federal de São Carlos homenageia seus pioneiros
13. A força da palavra, artigo de Maria Alice Setubal e Antonio Matias
14. Orçamento do Meio Ambiente para 2011 preocupa, diz ministra
15. Plano de florestas é única esperança
16. Ceticismo sobre acordo vinculante domina negociação em Cancún
17. Falta coragem em Cancún, diz diplomata
18. EUA e China se uniram para sabotar conferência do clima
19. Energia limpa pode atrair US$ 2,3 trilhões até 2020, mostra estudo
20. MDA entra no conselho da Embrapa
21. Espaço privatizado
22. "Ciência Hoje On-line": A reinvenção da vida, coluna de Jerry Borges
23. Física de partículas em DVD
24. Edital 2011 do Programa Ciência na Escola no Amazonas está disponível
25. Revolta da Chibata tem exposição on-line
26. Simpósio discute parcerias tecnológicas e ambiente jurídico de propriedade intelectual
27. Inpe promove curso de Meteorologia Sinótica
28. Pós-doutorado em organometálicos com bolsa da Fapesp
29. Federal de Ouro Preto realiza concurso para 37 vagas docentes

Edição 4153 - Notícias de C&T - Serviço da SBPC

1. SBPC encaminha lista tríplice para composição do Conselho Deliberativo do CNPq
2. Próximo PNE terá meta de investimento de 7% do PIB
3. Pisa 2009: 'Precisamos colocar os dados em perspectiva histórica', entrevista com Fernando Haddad
4. Pisa 2009: Houve avanços, mas há necessidade de investir no professor, artigo de Jorge Werthein
5. Ano da Alemanha no Brasil: conferência debate educação superior
6. Vencedores do Prêmio Capes de Tese são agraciados em Brasília
7. Lançado edital para estimular a inclusão digital
8. RNP alcança Manaus com 1 Gbps de velocidade
9. Ministro da C&T inaugura novas estruturas no Inpa
10. Coleta de dados do Censo 2010 dos grupos de pesquisa é encerrada
11. Sai resultado de edital para campi estaduais e municipais

12. A nova cartografia da ciência, artigo de Odenildo Sena
13. Ciência brasileira deve dar um salto qualitativo e ganhar o interior
14. Fundo Amazônia recebe doação de 18 milhões de euros
15. China nega ter aceitado cortes obrigatórios de gases de efeito estufa
16. Tudo errado em Cancun, artigo de Marcelo Leite
17. Escândalo sobre clima foi uma crise espúria, entrevista com Rajendra Kumar Pachauri
18. Terra da garoa agora é berço de tempestades, entrevista com Carlos Nobre
19. São Paulo na COP-10, artigo de Pedro Ubiratan Escorel de Azevedo
20. Manual de capacitação sobre mudanças do clima tem 2ª edição
21. Tentativa de votação de Código Florestal surpreende governo
22. Lançado, no CLA, o foguete de treinamento Orion V3
23. Biocombustível mais limpo
24. Eric Kandel, um cientista exemplar, artigo de Wanderley de Souza
25. Descoberto novo processo de produção de medicamento contra colesterol
26. Cientistas contestam estudo sobre bactéria composta por arsênio
27. Resumos para seminário de estudos culturais e educação até 15 de dezembro
28. UFSCar seleciona recém-doutores na área de química
29. Inscrições abertas para mestrado em Geociências e Análises de Bacias na UFS

Edição 4152 - Notícias de C&T - Serviço da SBPC

1. Inscrições para a 63ª Reunião Anual da SBPC começam na próxima semana
2. Brasil avança, mas permanece entre os últimos em ranking internacional de educação
3. Alunos brasileiros de escolas públicas ficam atrás em avaliação internacional
4. Para continuar avanço, investimento no professor tem que ser prioridade, diz Haddad
5. CNPq e Capes formatam programa de mobilidade na pós-graduação
6. Ministro aponta avanços e desafios do sistema de C&T
7. Para secretário executivo do MCT é preciso repensar o modelo de parques tecnológicos
8. Anpei apresentará proposta para agilizar processo de obtenção de patente
9. Competitividade depende de políticas para cadeias produtivas
10. Joinville (SC) firma parceria com parque de inovação espanhol
11. Com 21 projetos, fundo de inovação do BNDES vende primeira empresa
12. Natura divulga vencedores de prêmio de inovação
13. Regulamentação de pesquisa e comércio de clones de animais na pauta do Senado
14. CNPq divulga resultado de cinco editais
15. FAP do Pará enfrenta dificuldade para pagar bolsas
16. FAP da Bahia lança edital com instituição francesa
17. O clima, de mal a pior
18. Cúpula do clima tem injeção de ânimo
19. 'Não adianta assumir metas, tem que cumprir', entrevista com Marina Silva
20. Reserva legal é inútil, diz senadora
21. Mudanças climáticas, oportunidade de avanços, artigo de Thomas Shannon
22. Vazamento sobre negociações climáticas ecoa na COP 16
23. China diz que aceita tornar obrigatória meta para emissões
24. Embrapa e UFRJ identificam gene que confere tolerância à seca
25. Museu Goeldi inaugura Laboratório de Biologia Molecular
26. "Ciência Hoje On-line": Inimigos desnudados
27. Pesquisadores do Inpe lançam livro
28. Patrimônio Científico em debate no Museu de Astronomia (Mast)
29. PUC-Rio seleciona professores de química

Edição 4151 - Notícias de C&T - Serviço da SBPC

1. Indicação de Mercadante para ministro da C&T é dada como certa
2. Comissão finaliza "Livro Azul" nesta semana
3. Brasil sediará Fórum Mundial de Ciências em 2013
4. O Confap e o Sistema Nacional de CT&I, artigo de Mario Neto Borges
5. Sai lista de ganhadores do Prêmio FCW 2010
6. País alcançará meta de redução do desmatamento muito antes de 2020, diz presidente
7. Negociações do clima enfrentam atraso
8. Para ser potência verde, Brasil deve fazer mudanças na matriz energética
9. Mudança climática pode provocar 1 milhão de mortes a partir de 2030
10. Alemanha investe em sol e vento para obter mais e melhor energia
11. O educador Darcy Ribeiro: da inquietação ao Beijódromo, artigo de Isaac Roitman
12. Revolução na educação pública, artigo de Jair Ribeiro
13. Financiamento a faculdades pagas está estagnado
14. USP investe R$ 28 milhões em infraestrutura
15. Grupo ligado a órgão da UnB é condenado
16. Prazo para aderir ao ProUni vai até dia 22
17. Prorrogado prazo para inscrições em edital na área de toxinologia
18. Abertas inscrições para Reunião Anual da SBQ
19. Alcântara tenta lançar foguete
20. Cern dá novo passo para revelar segredos da antimatéria
21. Químicos transformam leite e argila em plástico
22. Esterco de animais vira energia no Paraná

23. Mais caminhos para o etanol brasileiro
24. Brasil prepara centro de biologia "ET"
25. USP de Ribeirão usa supercomputador contra a dengue
26. Ásia já responde por um terço dos erros graves na ciência
27. Inpa recebe visita de comitivas internacionais
28. "Ciência Hoje On-line": Propaganda antitabaco em xeque
29. Pós-doutorado em química com Bolsa da Fapesp

MUNDOGEO

Veículo lançador falha e três satélites do sistema Glonass caem no Oceano Pacífico
GNSS (GPS, Galileo, Glonass e Compass)

Google firma parceria de conteúdo em mapas com o site Catraca Livre
GeoWeb, WebGIS e Web Mapping

Grupo de geodésia espacial da Unesp realiza encontro com o tema GNSS em tempo real
GNSS (GPS, Galileo, Glonass e Compass)

Empresa busca profissionais para trabalharem com geoprocessamento em São Paulo
Geoprocessamento e GIS

IBGE lança o primeiro mapa da cobertura e uso da terra no Brasil
Agrimensura, Cartografia e Cadastro

Cursos online de AutoCAD Map e MapInfo estão com incrições abertas
Geoprocessamento e GIS

Empresa com sede em São Paulo busca profissional para o cargo de analista de geoprocessamento pleno
GeoWeb, WebGIS e Web Mapping

O setor de geotecnologia está em plena expansão. Confira essas vagas e garanta a sua!
Imagens de Satélite e Sensoriamento Remoto

IBGE sedia reunião do Comitê Permanente para Infraestrutura de Dados Geoespaciais das Américas
Geoprocessamento e GIS

Câmara dos Deputados lança estudo sobre a política espacial brasileira
GNSS (GPS, Galileo, Glonass e Compass)

Amazônia Legal já conta com um novo macrozoneamento ecológico-econômico
Agrimensura, Cartografia e Cadastro

SCIENCE

Application of the surface azimuthal electrical resistivity survey method
to determine patterns of regional joint orientation in glacial tills
Douglas Carlson
Environmental Geosciences. 2010; 17(4): p. 175-192
http://eg.geoscienceworld.org/cgi/content/abstract/17/4/175?ct=ct

Comparative Biogeography: Discovering and Classifying Biogeographical
Patterns of a Dynamic Earth
Andres Moreira-Munoz
Syst Biol. 2011; 60(1): p. 110-112
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Mineralogical characterization of fibrous zeolites from the Kahrizak
volcanic suite, south Tehran, Iran
M. Kusehlar, F. Tutti, H. Mirnejad, and A. E. Lalonde
Clay Minerals. 2010; 45(4): p. 507-517
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Characterizing oil field salinization using airborne, surface, and borehole
geophysics: An example from the Upper Colorado River Basin, Texas
Jeffrey G. Paine and Edward W. Collins
Environmental Geosciences. 2010; 17(4): p. 193-207
http://eg.geoscienceworld.org/cgi/content/abstract/17/4/193?ct=ct

Neotectonics and Paleoseismology of the Limon and Pedro Miguel Faults in
Panama: Earthquake Hazard to the Panama Canal
Thomas Rockwell, Eldon Gath, Tania Gonzalez, Chris Madden, Danielle

Verdugo, Caitlin Lippincott, Tim Dawson, Lewis A. Owen, Markus Fuchs, Ana Cadena, Pat Williams, Elise Weldon, and Pastora Franceschi
Bulletin of the Seismological Society of America. 2010; 100(6): p. 3097-3129
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Janice M. Murphy, Gary S. Fuis, Trond Ryberg, William J. Lutter, Rufus D. Catchings, and Mark R. Goldman
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EARTH PAGES

November 2010

Every geoscientist will salute the fortitude and bravery of the 33 Chilean miners rescued from a refuge 700 m below ground, that of the 5 volunteer rescuers who descended the 80 cm shaft, not knowing if it was safe and the skills of voluntary engineers whose drill managed to find the small refuge, despite its depth. Many geologists have been in underground mines, though only a minority have worked in them, but all admire the mental and physical resilience of the 33. Trapped by the caved-in access tunnel on 5 August, the miners faced and survived 17 days with fading lamps and tiny supplies of food and liquids. The final rescue came with remarkable swiftness during 13-14 October. Apart from one with a chest infection all seemed little the worse for wear. The growing tension during the rescue was almost palpable, even at a distance of more than 11 000 km: would the narrow tunnel collapse; would the rescue shuttle jam? The likelihood of either grew with each rescue

The rise in gold and copper price since the global crash of 2008 has seen the reopening of dozens of once uneconomic mines, kept for years on a 'care and maintenance' basis. Not knowing when the metal-price boom would collapse, mine owners have rushed to restart operations, paying locally premium wages to attract miners. The San José mine near Copiapo, was one such mine, whose fabric had deteriorated after years of neglect. It would be unsurprising if another disaster, with less happy outcomes, occurred during the current metal-mining boom.

Sabotage in science

November 2010

Scientists are supposedly objective but a recent case in Michigan USA sheds a worrying light on a dark reality of research. A former post-doctoral researcher at the Ann Arbor campus of the University of Michigan has been found guilty of changing the experimental results of a PhD student who worked in the same lab; the charge was malicious destruction of personal property, which in the USA usually means vandalism. The postdoc claims his otherwise inexplicable actions stemmed from internal pressures and that he intended to slow down the student's work (Maher, B. 2010. Sabotage. *Nature*, v. 467, p. 516-518). At first the student believed that she was making mistakes herself, but then realised some unknown person had swapped labels on her samples. When she aired her suspicions she was told she was being paranoid and going through a bad patch in her studies. She persisted despite such resistance, until her supervisor alerted the university's security officers. They launched an investigation into the student herself! After two interrogations and a lie-detector test, the university police installed cameras in the lab, which led to the culprit being caught red-handed.

Research misconduct is notoriously difficult to apprehend, institutional authorities often balk at clear evidence and end up in what amounts to a whitewash to protect the institution's integrity. Daniele Fanelli of the University of Edinburgh UK has made a study of malpractice in science, ranging from this kind of wilful derailing of a research project to withholding information and vindictive reviews

that are rarely considered misconduct. She has found that up to 30% of scientists admit (anonymously) to lesser but still baleful issues, and a staggering 70% say they have witnessed deliberate damage to fellow researchers. This malice that dare not speak its name, even were it to be rarer than Famelli has discovered, is a blight that should be recognised by institutional authorities rather than ignored or actually turned against the complainants.

Crowd science

November 2010

Malice and/or mendacity are not the sole ways to get on unfairly. A mild form is somehow to join a team, preferably in an ever-so humble position. 'Brownie-points' in the promotion stakes are guaranteed nowadays by authorship in peer-reviewed journals: senior or sole author is best; next being in a small authors list in a journal that demands an account of the role of each; but even being an also-ran or last of a great many can go nicely on your CV. Does one have to have some *je ne sais quoi* to be accepted by a team? Well it depends on what the *quois* might be. Some might say seniority or prestige as that helps the paper to be accepted; others that having the only accessible scientific machine for the topic more or less guarantees a place; but is it possible merely to lurk in the corridor and still get on board? Probably the vast majority of author lists are completely honest, but there is a definite tendency for them to get longer as time goes by. During the days when analysis of lunar rocks from the Apollo Missions was booming a team of geochemists – the Lunatic Asylum – was formed at the California Institute of Technology (incidentally, Caltech changed its name from Throop University – after Amos Gager Throop, former Mayor of Pasadena – in 1920). Its founder and leader was and remains Gerry Wasserburg, and occasionally papers were published under the anonymity of the group, so it is hard to tell just how many of them were involved. The Atlas experiment at the CERN Large Hadron Collider has given rise to a paper authored by 230 individuals from 169 institutions (The ATLAS Collaboration *et al*. 2008. The ATLAS Experiment at the CERN Large Hadron Collider. *Journal of Instrumentation*, v. 3, doi: 10.1088/1748-0221/3/08/S08003), but that consortium does not hold the record. As far as I know, the biscuit is taken, for the moment, by Members of the Genetic Investigation of ANthropocentric Traits (GIANT) consortium (Allen, H.L *et al*. 2010. Hundreds of variants clustered in genomic loci and biological pathways affect human height. *Nature*, v. 467, p. 832-838) whose title is self-explanatory. Of its 7 pages, 3 are taken up by the names of its 287 authors, their 203 institutions and a not inconsiderable number of funding agencies. Interestingly, reviewers of the paper are not acknowledged; 10 of the authors (the first 6 and last 4 – the list is not alphabetical) 'contributed equally to this work', and 4 authors are affiliated with 5 institutions (with no overlap). By comparison, geosciences is definitely little league, but opportunities there surely are.

Climate change and palaeoclimatology

Antipodean glaciers confirm complementary southern warming during the Younger Dryas

November 2010

Studies of air-temperature proxies in cores from the Antarctic ice cap show a roughly mirrored climate record to that found in the Greenland ice. While the Northern Hemisphere underwent a sudden climate collapse into almost full-glacial conditions around 12.9 ka and an equally dramatic warming around 11.7 ka, Antarctica steadily warmed over the same period to reach full interglacial conditions by 11.5. That this climatic inversion reached relatively low southern latitudes is confirmed by a record of the changing size of glaciers on mountains in New Zealand's South Island (Kaplan, M.R. and 9 others 2010. Glacier retreat in New Zealand during the Younger Dryas stadial. *Nature*, v. 467, p. 194-197). The US-New Zealand-Norwegian-French partnerships used detailed geomorphological mapping, and cosmogenic isotope studies of exposed rock fragments to show that after about 13 ka glaciers retreated by more than a kilometre in the succeeding 1500 years in contrast to the dramatic glacial advances in northern areas such as the Scottish Highlands.

Record of rising sea-level in the tropics

November 2010

Areas beyond the zones of isostatic depression by ice-loading and recovery during glacial-interglacial cycles passively undergo sea-level fall and inundation. They best record the progress of Holocene ice-sheet melting and sea-level rise since 11.5 ka, especially if they are tectonically stable. The island state of Singapore, 1.5 º north of the Equator, is a near-ideal place for study (Bird, M.I. *et al*. 2010. Punctuated eustatic sea-level rise in the early mid-Holocene. *Geology*, v. 38, p. 803-806). The Australian and British geoscientists analysed a core through sediments in a mangrove swamp now just below sea level. The top 14 m penetrated a uniform though laminated sequence of marine muds, calibrated to time by radiocarbon dating of mollusc shells, mainly focused on the period from 9 to 6ka period that the global oxygen-isotope record of ice volume suggests to have been the main period of final melting after the Younger Dryas.

Sedimentation was very rapid (~1 cm y^{-1}) from 8.5 to 7.8 ka, probably as sea level rose too rapidly for the coast to be protected by mangrove growth. Then for 400 years it slackened off to ~0.1 cm y^{-1} to rise again to 0.5 cm y^{-1} by 6.5 ka. The last date is the time of the mid-Holocene sea level highstand, after which sedimentation rate soon declined to 0.05 cm y^{-1}, when mangroves became established at the site. Stable isotopes of carbon in the core ($d^{13}C$) show how the relative input of marine and terrestrial (mainly mangroves) organisms shifted over the period and are a proxy for the distance to the coastline and hence sea level. From 8.5 to 6.5 ka this was erratic from a starting point about 10 m lower than nowadays, showing rapid rises and falls that culminated in a sea level in Singapore about 3 m above present during the mid-Holocene sea level highstand that slowly declined to that of the present.

The team's findings tally with evidence for the melting record of the North American ice sheet. An interesting aspect is that they also cover the period when rice cultivation in swampy areas of SE Asia got underway (~7.7 ka). Very rapid sedimentation would have encouraged development of the substrate for the highly fertile delta plains that now support the largest regional population densities on Earth. In turn they culminated in a series of early south and east Asian civilisations based on class societies

Geobiology, palaeontology, and evolution

Correction to marine biodiversity record and mass extinctions

November 2010

The mainstay of geobiologists' efforts to chart the timing and pace of mass extinctions and diversification since 1997 has been the monumental collation of information in fossil collections undertaken by the late Jack Sepkoski from the 1980s until shortly before his death in 1999. It was his plotting of marine fossil genera numbers against their time ranges that first quantified the 'Big Five' and lesser mass extinctions, and the course of re-diversification that followed in their wake. One problem that Sepkoski was unable to account for was the inherent biases in collections: under-representation of earlier genera than younger ones; different representation from different areas partly because developed-world collections are larger than those from the majority world and partly because modern diversity changes with latitude; and varying preservation of less-substantial organisms. Well aware of the shortcomings of his initial compilations, Sepkoski with others set up the Palaeobiology Database (PBDB) that now encompasses almost 100 thousand collections. Sadly, Sepkoski did not live to analyse this record with statistical methods that lessen the influence of bias, but one of his successors has done just that (Alroy, J. The shifting balance of diversity among major marine animal groups. *Science*, v. 329, p. 1191-1194). Alroy's approach sets out to represent the rare with a fair weighting relative to common groups of organisms, using a complex multivariate method called 'shareholder' sampling, which corrects some of the artefacts in Sepkoski's work and earlier manipulation of the PBDB.

One important feature is that Alroy's method does not assume that all groups follow the same 'rules' of diversification and adaptive radiation, particularly after mass extinctions. The upshot is a history with ups and downs, but not such a prominent growth in diversity in the late-Mesozoic and Cenozoic Eras as that in Sepkoski's original compilation, although life did become richer. For someone, like me, who has not followed the developments since Sepkoski's original work, there is another significant difference. There are 7 or 8 significant falls in diversity rather than 5. The Triassic-Jurassic boundary no longer shows a mass extinction, but the opposite. Major extinctions show up for the mid-Carboniferous, mid- and end-Jurassic and the Oligocene, where none were noticeable in the original plots by Sepkoski. Finally diversity peaks in the Siluro-Devonian and the Permian figure as prominently as that of the late-Cretaceous. Clearly, rules are few and one that was almost an assumption, that diversification of marine life after mass extinctions was exponential, is no longer borne out. Whether or not this new approach will bear fruit in refining or redefining the ecological dynamics that shaped and continue to shape life on Earth remains to be seen. It is tempting to be a bit cynical: is it all punctuated chaos?.

Comet impacts' candidature for origin of life

November 2010

Most researchers concerned with the origin of life acknowledge that some preparatory organic chemicals would have been required, whose origin Darwin ascribed to a 'warm, little pool', and Haldane and Oparin to electrical discharges in the early atmosphere; both lines having been followed-up in practice by more recent scholars. A variety of biologically useful chemical 'building blocks' have also been recognised in comets, some meteorites – carbonaceous chondrites – and even in interstellar dust clouds. So one school looks to their supply from outside the Earth system. One possibility has had more scanty attention – the effects of impacts, as the power involved seems overwhelming for the survival of delicate organic molecules. Nir Goldman and his colleagues at the Lawrence Livermore National Laboratory in California have had a second look at this unlikely scenario (Goldman, N. *et al*. 2010. Synthesis of glycine-containing complexes in impacts of comets on early Earth. *Nature Chemistry*, v. 2, p. 949–954). Their approach has been to examine the implications of impact shock at likely collision speeds followed by post-shock expansion on mixtures of water, ammonia, carbon monoxide and dioxide, and methanol that are almost guaranteed in the make-up of most cometary ices. Their modelling suggests that carbon-nitrogen bonds form under shock conditions in long chain compounds. In the aftermath of huge collision shock the impact products undergo rapid expansion and cooling during which the chains can break down to simpler molecules, including some akin to amino acids such as glycene. The bombardment of Earth in the Hadean Eon (4.5-3.8 Ga) involved huge masses of material, almost certainly some delivered by icy comets that would have greatly increased the amount of water and the number of CHON compounds in the early Earth's outer parts.

Geochemistry, mineralogy, petrology and volcanology

Phosphorus, Snowball Earth and origin of metazoans

November 2010

As any gardener knows, the element phosphorus is an essential plant nutrient or fertiliser, along with potassium and nitrogen plus a host of minor elements that are rarely mentioned as sufficient amounts are generally available in soils. The same necessities for life apply to oceans too, in which amounts vary a great deal from place to place and whose relative proportions have changed through geological time. For the oceans the main source of phosphorus is the continental crust, where the element resides mainly in the mineral apatite ($Ca_5(PO_4)_3(F,Cl,OH)$). This is not an easily dissolved mineral, which is why for agricultural fertiliser it is generally made available in the soluble form of calcium superphosphate ($Ca(H_2PO_4)_2$) that is produced by reaction between apatite and sulfuric acid. Since the land surface was colonised by plants about 450 Ma ago, biological processes made phosphorus more readily available to solution in river water by their break-down of apatite; supply by rivers to the ocean nowadays is of the order of 109 kg y^{-1}. Ups and downs of P dissolved in ocean water though geological time would be expected to have influenced its overall biological productivity, controlled by photosynthetic phytoplankton and prokaryotes. Variations of carbon isotopes ($\delta^{13}C$) in organic and carbonate sediments are know to have occurred episodically since Archaean times, suggesting wide fluctuations in both bioproductivity and burial of dead organic matter. However, it has been hard to judge any geochemical reasons underpinning such variations. Since it is now clear that the common iron mineral goethite (FeOOH) 'mops up' many chemical species including phosphate ions by adsorption on its grain surfaces, measuring the P/Fe ratios in marine ironstones containing these minerals is a potential guide to the changing phosphorus concentration in the oceans (Planavsky, N.J. *et al*. 2010. The evolution of the marine phosphate reservoir. *Nature*, v. 467, p. 1088-1090).

The US-French-Canadian researchers charted P/Fe ratios in banded iron formations and ironstones precipitated around ocean-floor hydrothermal vents since the Archaean. What emerged were four episodes: from 2900 to 1700 Ma with generally low ratios; the Neoproterozoic from 750 to 635 Ma with much higher ratios; the Phanerozoic from Cambrian to Jurassic with low ratios and post-Cretaceous high ratios. There are several significant gaps in the record of ocean phosphate levels, notable one a billion years long from 750 to 1700 Ma. One factor that probably affected the variation is the way that dissolved silica (SiO_2) drives down the proportion of phosphate adsorbing onto goethite. The rapid evolution and expansion since the Cretaceous of diatoms that secrete silica probably reduced SiO_2 concentration in ocean water as their remains rained down to be buried on the ocean floor; that explains the high P/Fe ratios since about 100 Ma. Earlier Phanerozoic oceans are estimated to have had as much as seven times the present concentration of dissolved SiO_2, thereby explaining the low values of P/Fe in ironstones deposited in the 100-540 Ma range. From 1700 to 3000 Ma the low P/Fe suggests oceanic phosphorus levels equivalent to those from the Jurassic to Cambrian (but perhaps up to 4 times that, depending on the poorly constrained SiO_2 concentrations).

The Neoproterozoic phosphorus 'spike', at a time when dissolved SiO_2 would have been no different from that in earlier times, suggests a massive influx of phosphate to the oceans at that time. It coincides with the two greatest glacial epochs the Earth has experienced: 'Snowball' Earth when glacial ice existed at tropic latitudes. In themselves the massive glaciations offer an explanation for high phosphorus delivery from the continents through glacial erosion and massive run-off during melting. More exciting is that the P/Fe 'spike' occurred at a time of massive perturbations in stable carbon isotopes ascribed to huge explosions of phytoplankton and organic carbon burial, which would have been permitted by high dissolved phosphate in the oceans. A large increase in primary biological productivity, i.e. photosynthesis, would have boosted oxygen levels; a necessity for the emergence of metazoan life forms soon after the end of 'Snowball' Earth conditions. But that begs the question of how glacially ground-up apatite, abundant as it would have been together with vast amounts of other rock debris, came to be dissolved. In today's oceans crystalline apatite is barely soluble. It seems that apatite's solubility decreases as temperature rises, and increases with pH – in alkaline conditions. As well as being cold, Neoproterozoic ocean water around the time of the 'Snowball' Earths was saturated with carbonate ions that helped thick, almost pure limestones to form globally after each glaciation. That spells alkaline conditions favouring phosphate solution. The authors speculate that global geochemical conditions during the Cryogenian Period (850-635 Ma) may have fostered the origin of the metazoans. Maybe, but their data have a billion-year gap immediately before that Period, and genomic molecular clocks suggest that the root metazoans emerged as much as half a billion years earlier.

See also: Filippelli, G.M. 2010. Phosphorus and the gust of fresh air. *Nature*, v. 467, p.1052-1053.

Geomorphology

Threat to landscape from alien crayfish?

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The stealthy invasion of rivers in Europe by the tasty American signal crayfish *Pacifastacus leniusculus* poses a threat not only to theindigenous European species *Astacus astacus* (*P. leniusculus* carries a fungal infection as well as being formidably armed), but conceivably to the very landscape itself (Johnson, M.F. *et al*. 2010. Topographic disturbance of subaqueous gravel substrates by signal crayfish (Pacifastacus leniusculus). *Geomorphology*, v. 123, p. 269-278). Johnsson and colleagues from the University of Loughborough, UK used captive alien crayfish to model the effects of their bioturbation under controlled laboratory conditions, assessing their activity by the use of millimetre-resolution gravel-surface elevation data generated by a laser altimeter. The sturdy little beasts behave like frenzied bulldozers creating mounds and pits in the gravel substrate, displacing on average about 1.7 kg of gravel every day over an area of 1 m2 thereby completely disrupting the perfectly flat substrate onto which they were introduced in about 3 days. By this activity they render the surface more prone to erosion by flowing water so that greater grain transport ensues; they could effect bother erosion and deposition by increasing transportation of grains. To my knowledge, this is the first experimental study of bioturbation in the context of hydrology. We can expect more now that the technology is available: the burrowers as well as the diggers of the animal world. While the Phanerozoic is best know for having begun with the Cambrian Explosion of multicellular life, a sometimes overlooked attribute is that it coincided with the start of bioturbation. That may well have had a profound effect on sediment transport as the American invader suggests.

See also: Newton, A. 2010. Crayfish at work. *Nature Geoscience*, v. 3, p. 592

Planetary, extraterrestrial geology, and meteoritics

Whizz-bang hypothesis for the Younger Dryas bites the dust

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Such has been the urge to leap on the impact theory of Earth system change, that virtually every drastic event recorded in the geological timescale has been linked by someone or other to the effects of bombardment by extraterrestrial objects. The most recent concerns the Younger Dryas and the extinction of the mammoths (see *Whizz-bang view of Younger Dryas* and *Impact cause for Younger Dryas draws flak* in EPN July 2007 and May 2008). The hypothesis stemmed from reports of an association of tiny magnetic spherules, soot and purported nanodiamonds and fullerenes (carbon molecules bonded into 'geodesic' spheres) with the onset of the Younger Dryas, the roughly coincident disappearance of Clovis tools and the demise of several large North American mammal species, including mammoths. Regular columnist for *Science* magazine, Richard Kerr, reports that independent searches for all the evidential materials at the sites where they were said to occur have drawn unrelieved blanks (Kerr, R.A. 2010. Mammoth-killer impact flunks out , *Science*, v. 329, p. 1140-1141). Nonetheless, the core supporters of the hypothesis are clinging to their guns.

Tectonics

Hard-core continental lithosphere

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The oldest and most stable parts of the continents are known as cratons, after the Greek word for strength κράτο (kratos). All the present continents have at least one craton (Africa and South America have 4 each, and Eurasia 6 or 7). Each has remained unaffected by major deformation for a billion years or more, even during continent-to-continent collisions in which they participated. Almost all cratons began to form during the Archaean Eon before 2500 Ma, but most became rigid long after. Several theories have been suggested to account for their durability, one commonly accepted being that somehow the crust 'ripened' so that most of the heat-producing radioactive isotopes of U, Th and K were moved by igneous and metamorphic processes to the uppermost crust, along with water; most cratons expose fragments of anhydrous granulites of tonalitic composition. These bear evidence of having formed at the base of the continental crust and have been heavily depleted in "granitophile" trace elements. As a result they cannot undergo partial melting under normal geothermal conditions and where they remain at great depth are much cooler than younger, deep crust. The other dominant feature of cratonic lithosphere is a mantle portion that is anomalously thick (sometimes down to 250 km); in some cases there is little if any sign of asthenosphere beneath such 'keels'. Research on rocks brought up from the 'roots' of cratons by the kimberlite magmas famous for their diamonds points to that deep mantle itself having conferred great rigidity and thus longevity (Peslier, A.H. *et al*. 2010. Olivine water contents in the continental lithosphere and the longevity of cratons. *Nature*, v. 467, p. 78-81).

The presence of water in minerals that make up igneous and metamorphic rocks enables them to begin melting at lower temperatures than their dry equivalents, and also to behave in a more plastic fashion under stress. Anne Peslier of NASA in Houston and her US and German colleagues analysed the minerals in ultramafic mantle rocks dragged upwards by kimberlites that punched through the Kaapvaal craton in southern Africa long after it formed. The dominant mantle mineral is olivine (50-80%), generally thought of as anhydrous but typically containing a few hundred parts per million by weight. Olivines in the Kaapvaal mantle xenoliths become drier with increasing depth of their formation (determined from their mineralogy in which garnet is stable at the deepest levels). At depths around 150-250 km low water content in olivine makes it and the mantle itself 20 to 3000 times stronger than the asthenosphere, which protects it from the underlying flow associated with tectonic motions.

How such root zone of continents may have formed has been addressed by two papers on seismic structure beneath the best studied craton; that of the Canadian Shield (Yuan, H. & Romanowicz, B. 2010. Lithospheric layering in the North American craton. *Nature*, v. 466, p. 1063-1068; Miller, M.S. & Eaton, D.W. 2010. Formation of cratonic mantle keels by arc accretion: Evidence from S receiver functions. *Geophysical Research Letters*, v. 37, doi:10.1029/2010GL044366).In the first, Yuan and Romanowicz of the Berkeley Seismological Laboratory, California use a form of seismic tomography to map anisotropy in the mantle along transects that cross the ancient core of the North American continent. Their results chart the depth of the base of the lithosphere and also define two layers in the lithospheric mantle. The upper layer (down to 150 km) only occurs beneath the Archaean craton, and the top of the asthenosphere ranges from 100-240 km down: at its deepest beneath the craton. The sub-craton mantle they ascribe to chemical depletion of its upper part during early lithospheric evolution, and later addition of the less chemically evolved deeper layer. Miller and Eaton of the Universities of California USA and Calgary Canada used S-wave data from eight seismic stations extending from WSW to ENE over the western cordillera and the Canadian Shield to the Arctic islands of Canada. Their results show a similar variation in dept of the base of the lithosphere and resolve several roughly eastward-dipping boundaries in the sub-craton lithospheric mantle, which they link to Precambrian volcanic arcs preserved in the upper crust above them; i.e. suggesting that the upper layer in the first paper stems from a major episode of arc accretion that built the Canadian Shield.