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- **EARTH PAGES**

Anthropology and geoarchaeology
Climate change and palaeoclimatology
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Planetary, extraterrestrial geology, and meteoritics
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ǂ CONCURSOS

Professor Doutor efetivo Adjunto Nível I Dedicação Exclusiva, para a UFG Campus II de Goiânia
Edital de abertura de Concurso Público para contratação de Professor Doutor efetivo Adjunto Nível I Dedicação Exclusiva, para a UFG Campus II de Goiânia, com formação em Geologia (graduação e doutorado) específico para áreas Ambiental e/ou Recursos Hídricos, para atuar no Instituto de Estudos Sócio-Ambientais, junto aos cursos de Geografia e de Ciências Geoambientais.

Concurso Público da Universidade Federal de Sergipe - UFS
Edital 117, disponível no site: www.ufs.br).
As matérias de ensino são:
- MINERALOGIA E CRISTALOGRAFIA, GEOLOGIA ECONÔMICA E PROSPECÇÃO MINERAL (01 Vaga)
- GEOFÍSICA, GEOESTATÍSTICA E GEOPROCESSAMENTO (01 Vaga)
- PALEONTOLOGIA, BIOESTRATIGRAFIA E PALEOCOLOGIA (01 Vaga)
Dra. Maria de Lourdes da Silva Rosa
Universidade Federal de Sergipe
Núcleo de Geologia - NUGEO

Concursos públicos para Professor Assistente (nível de Mestrado) para o Curso de Geologia da UFES
Em atenção à solicitação do Prof. Paulo Fortes (UFES), favor divulgar URGENTE entre os associados da SBG-RJ (e solicitar divulgação através da SBG-Sede - Ivete) a realização dos concursos públicos para Professor Assistente (nível de Mestrado) para o Curso de Geologia da UFES nas seguintes áreas:
- Geomática e Sensoriamento Remoto
- Geotecnia
- Petrologia Metamórfica e Geoquímica.
As inscrições se encerram em 03/02/2009 e o Edital de no. 58 está disponível na página www.cca.ufes.br

Edital de abertura de Concurso da UNIFESP - Campus Diadema
Concurso da Unifesp, as inscrições estão abertas, até o dia 06/02/2009, para provimento de 01 cargo de Professor Adjunto I na área de conhecimento em Educação e Gestão Ambiental na UNIFESP - Campus Diadema.
Os candidatos devem ter graduação em Geologia e título de Doutor, com experiência na área ambiental.
Para maiores informações, acessar o edital disponível no site: http://concurso.unifesp.br/

ǂ CURSOS

XXVIII Curso Latinoamericano de Metalogenia
A UNESCO/SEG/SGA confirmou a realização do XXVIII Curso Latinoamericano de Metalogenia para o período entre 19 e 26 de Maio, em Belo Horizonte e Quadrilátero Ferrífero de Minas Gerais. O curso será teórico / pratico e contará com a participação de nove especialistas do exterior e brasileiros. O curso é organizado e elaborado internacionalmente pela UNESCO, a SEG (Society of Economic Geology) e a SGA (Society of Geology Applied), com a participação de especialistas dessas instituições. O coordinador internacional do Curso em Belo Horizonte será o Dr. Fernando Tornos

(SEG e IGME, Espanha). A coordinação local será desenvolvida por Francisco Javier Rios (CDTN) e Carlos A. Rosiere (IGC-UFMG).
Todas as informações sobre o evento (em espanhol e português) estão disponíveis na home page oficial do Curso UNESCO/SEG/SGA :
http://www.unige.ch/sciences/terre/mineral/seminars/belo_horizonte09/belo_horizonte09.html
http://www.unige.ch/sciences/terre/mineral/seminars/latinometal.html
As inscrições estão abertas até o dia 20 de fevereiro.
O Curso Latino-americano de Metalogenia UNESCO-SEG-SGA está orientado a todos os profissionais, pesquisadores e estudantes de pós-graduação que queiram aumentar ou atualizar seus conhecimentos no campo dos depósitos minerais. Está estruturado de acordo com as exigências do desenvolvimento moderno no campo das Ciências da Terra. Este evento internacional, de reconhecido prestígio na América Latina, tem como objetivo a difusão de conhecimentos recentes e desenvolvimentos alcançados em estudos relacionados com a gênese, exploração de jazimentos minerais e os aspectos de impacto sobre o meio ambiente de atividades geológico-minerais. É a primeira vez que o curso será desenvolvido no Brasil e constará de duas etapas: (a) teórico - prática, e (b) visitas a jazimentos e prospectos (trabalho de campo). Para a primeira parte (teórico-prática) número máximo de inscritos é de 60. Para a segunda parte (campo) o número máximo é de 40 participantes. Instrutores: Dr. Fernando Barra, Universidad de Arizona, Tucson, USA; Dr. Steffen Hagemann (CET, University of Western Australia) ; Dr. Christoph A. Heinrich (ETH Zurich, Suisse); Dra. Lydia Lobato (Universidade Federal de Minas Gerais, Brasil); Dr. Carlos Alberto Rosiére (Universidade Federal de Minas Gerais, Brasil); Dr. Fernando Tornos, Instituto Geológico y Minero de España, España; Dr. Raimundo Netuno Nobre Villas (Universidade Federal do Pará, Brasil); Dr. Roberto Perez Xavier (UNICAMP- Universidade de Campinas, Brasil)
Endereço para contato: Coordenação Acadêmica: Francisco Javier Rios CDTN/CNEN, Caixa Postal 941 CEP 30123-970 Belo Horizonte, Minas Gerais, Brasil, Telefone: (+55)31 3069 3354 / 3140, Mail: javier@cdtn.br
Secretaria Executiva: Sônia Pinto Prates CDTN/CNEN, Caixa Postal 941 CEP 30123-970, Belo Horizonte, Minas Gerais, Brasil, Mail: pratess@cdtn.br

ǂ CONGRESSOS E SIMPÓSIOS

III Simpósio Luso Brasileiro de Cartografia Histórica
Divulgação do evento em Ouro Preto, veja site:
http://www.cgp.igc.ufmg.br/IIISLBCH

ǂ ÍNDICE DE NOTÍCIAS

ǂ AMBIENTE BRASIL

Interior da Antártida também sofre com aquecimento global, diz estudo
Dados anteriores pareciam sugerir que continente estava esfriando. Na verdade, aquecimento é geral, com destaque para oeste antártico.
União Europeia quer taxa do clima para países ricos
A ideia para arrecadação de fundos é a mais específica até agora vinda de um bloco ou país rico no que diz respeito a como persuadir os países em desenvolvimento a concordar com passos concretos a fim de evitar as emissões de gases-estufa.
Schwarzenegger pressiona Obama a mudar lei de emissão de gases veiculares

O governador da Califórnia quer que a Agência de Proteção Ambiental mude uma resolução de 2007 feita no governo Bush, que impede os Estados de determinar os próprios índices de tolerância de emissão de gases em carros novos, picapes e veículos utilitários.

MME: exportação de etanol sobe 45% em 2008

O maior comprador do etanol brasileiros foram os Estados Unidos, que importaram 2,8 bilhões de litros.

Inpe adquire componentes para o satélite Amazônia-1

Com lançamento previsto para 2011, este será o primeiro satélite de observação da Terra desenvolvido pelo Brasil e o primeiro a utilizar a Plataforma Multimissão.

Governo vai editar MP para desburocratizar regularização fundiária na Amazônia

O objetivo é utilizar parte das 11 legislações existentes que se referem ao assunto e permitir que cerca de 290 mil posseiros tenham acesso a títulos permanentes em no máximo 120 dias.

Governo não vai criar instituto para cuidar de regularização fundiária na Amazônia, diz Cassel

Segundo o ministro do Desenvolvimento Agrário, todo o processo referente a terras na Amazônica vai continuar sob a coordenação de sua pasta.

Cérebro de macaco faz 'aquecimento' antes de realizar tarefa, diz estudo

Descoberta põe em xeque conclusões de estudos com ressonância. Técnica mede fluxo sanguíneo, e não atividade neuronal.

Ações levam à apreensão de tatus e aves no sul do Maranhão

Ibama incinerou 20 carcaças de tatu. Aves foram encontradas vivas em casa em Imperatriz.

Cágado ataca pomba em Porto Alegre/RS

Réptil capturou e arrastou ave para o fundo do lago do Parcão. Coordenador do Projeto Chelonia-RS disse que comportamento é normal.

Temperatura chega a 6ºC em pleno verão em SC

Massa de ar frio provocou frio, diz Inmet. Nesta sexta-feira (23), temperatura deve aumentar.

Especialista em desastres naturais da ONU critica o Brasil

Diretora do Centro de Pesquisa sobre a Epidemiologia dos Desastres diz que falta vontade política ao País.

Governo estuda criar lei para acabar com queimada em lavoura de cana

Carlos Minc disse que objetivo é acabar com a prática até 2020. País terá zoneamento agrícola para a cultura para dobrar a produção.

Pacote não deve ter medida para agricultura, diz Stephanes

'Agricultura vem sendo tratada de forma específica, com política de crédito ou dinheiro para comercialização'.

Stephanes: Código Florestal eliminará 1 mi de produtores

Em uma provocação à área ambiental, com a qual tem mostrado divergências, o ministro da Agricultura disse que existe uma diferença entre ser ambientalista e ter formação e conhecimento em meio ambiente.

Cientista diz que modelo da árvore da vida de Darwin é equivocado

Charles Darwin projetou em 1837 uma árvore imaginária para mostrar como as espécies podiam ter evoluído, árvore que veio rapidamente a simbolizar a teoria da evolução por meio da seleção natural.

Brasil contará com R$ 400 milhões extras por ano para saneamento

Os recursos serão provenientes de desconto de 35% que as concessionárias de energia irão conceder nas contas de luz das empresas de tratamento de água e esgoto de todo o país.

Ioga e terapia serão usadas para prevenir doença mental

A novidade faz parte de um instituto recém-criado, que envolve 11 universidades e

que pretende desenvolver ações para detectar e tratar na infância transtornos psiquiátricos que só são diagnosticados na vida adulta.
Brasil entra na maior rede mundial de doadores de medula óssea
Diário Oficial da União publicou portaria que autoriza envio de amostras de células-tronco. As amostras enviadas podem ser de medula óssea ou sangue.
Austrália descarta ação legal pelo fim da caça às baleias
Kevin Rudd afirmou. no entanto, que seu governo manterá pressão diplomática sobre o Japão.
Verba para ciência sofre redução de 18% em 2009
Ministro de Ciência e Tecnologia diz que corte no orçamento é irresponsável; segundo ele, caso situação não seja revertida, bolsistas terão de ser mandados embora.
País só erradicará doença de Chagas daqui a 50 anos, afirma estudo
Destruição do principal transmissor da moléstia não é suficiente. Acompanhamento de atuais doentes ainda exigirá décadas de cuidado.
Paraná intensifica combate à malária
Foram registrados 11 casos na região de Santa Helena. Equipe técnica avalia situação.
Prefeito de cidade catarinense é mantido refém por índios
Outras cinco pessoas também estão em poder dos indígenas. Grupo reivindica ampliação de reserva e protesta contra desmatamento.
Indução humana
Levantamento com cientistas de dezenas de países aponta consenso com relação à ação do homem como uma das prováveis causas do aumento na temperatura global.
Etanol brasileiro poderá ganhar espaço no mercado americano, diz especialista
Barack Obama já se mostrou simpático a causas ambientais. Com isso, os Estados Unidos podem se tornar patrocinadores das energias renováveis.
Satélite de alta resolução pode ajudar Acre a recuperar florestas
Estado usa equipamento que consegue enxergar destruição de 4 m². Maior parte do desmatamento na região ocorre em pequenas áreas.
Aos 140 anos, lagosta reconquista liberdade
Lagosta de 9 kg decorava o aquário de um restaurante na cidade de Nova York (EUA).
Chegada do frio "anima" pandas mais do que filme pornô
Zoológico tailandês tenta unir o casal de pandas.
Promiscuidade feminina melhora espermatozóides de peixes
Fêmea que copula com vários machos incentiva disputa biológica. Estudo é da Universidade de Upsalla, na Suécia.
Tartaruga ameaçada é campeã em gastos com proteção ambiental nos EUA
Em dez anos, governo gastou quase US$ 100 milhões com réptil. Soma é maior do que a dedicada a salvar ursos, lobos e águias.
Jacaré é encontrado em córrego em Cuiabá/MT
Moradores da região acharam animal. Bombeiros devolveram filhote à natureza.
Crianças resgatam filhote de quati abandonado em Goiás
Bombeiros tentaram encontrar grupo de animal, na mata. Ele foi encaminhado a um centro de triagem do Ibama.
Ave rara no Brasil nasce no Refúgio Biológico de Itaipu/PR
Filhote de harpia deve permanecer em estufa por 30 dias. Animal é alimentado cinco vezes por dia para ganhar peso.
Minas Gerais já tem 100 cidades em estado de emergência
Mais três cidades decretaram situação de emergência devido às fortes chuvas que atingem MG desde setembro.
Atingidos pela crise, catadores de material reciclável pedem providências

Atividade foi sensivelmente prejudicada pela crise financeira internacional.
Criado afrodisíaco para conter praga de 'peixe-vampiro'
Substância sintética atraiu parasita para armadilhas nos Grandes Lagos.
Barco que derramou óleo no Acre não tinha licença
Acidente espalhou óleo diesel por mais de 300 km no Rio Purus. Governo do Acre informa que empresa responsável será multada.
Pessoas calmas têm menos risco de demência, diz estudo
Risco de desenvolver doença é 50% menor; pesquisa envolveu 506 idosos.
Mente feminina é mais propensa a pensar em comida
Estudo foi feito com 13 mulheres e 10 homens de peso normal, com média de Índice de Massa Corporal de 24,8, considerado normal.
Homem é preso nos EUA por roubar tubarão de aquário
Elbert Starks teria escondido o animal dentro da jaqueta ao sair da loja.
Descoberto planeta semelhante a Netuno fora do Sistema Solar
HAT-P-11b foi descoberto ao passar na frente de sua estrela, num fenômeno conhecido como trânsito.
Terremotos e mudança no clima destruíram cidades peruanas há 3.600 anos
Caral-Supe, no Peru, foi uma das primeiras grandes civilizações sul-americanas.
China registra quatro casos de gripe aviária em um mês
Jovem de 16 anos morreu após contrair doença, o que se dá no contato com aves.
Quilombola vence rixa com agência espacial
Área disputada há 26 anos com base de lançamento de foguetes em Alcântara ficará com os povos tradicionais por determinação do Incra.
Geleiras desaparecerão até a metade do século, diz estudo
Estatísticas mostram que, embora as taxas de derretimento tenham caído em significativamente em 2007, com relação aos níveis do ano anterior, ainda assim a perda de gelo foi a terceira pior já registrada.
Lula acredita que negociação sobre mudanças climáticas deve avançar com Obama
Os Estados Unidos foram o único país a não assinar o Protocolo de Kyoto, que prevê metas para redução de emissão de poluentes responsáveis pelo aquecimento global.
Expedição acha 300 novas espécies marinhas na Austrália
Cientistas usaram submarino-robô a profundidades de até 4 mil metros para realizar descobertas.
Em momento de confusão, dragão-de-komodo morde a tratadora que lhe daria comida
Dragões-de-komodo são répteis que podem atingir o comprimento de três metros e alcançar o peso de até cerca de 165 kg.
Fiscais do Ibama transformam praia em 'maternidade' de tartarugas
Profissionais protegem nascimento dos animais nas margens do Tapajós. Até fevereiro é esperada a soltura de 800 mil filhotes.
Já são 97 as cidades de MG em situação de emergência
De acordo com a Defesa Civil Estadual , 139 municípios foram atingidos pelas chuvas, prejudicando 776.264 pessoas.
Natureza é fonte de inspiração para artesãos no CE
Artistas usam barro retirado de encostas de rios e lagoas. Mais de 200 famílias de município dependem do artesanato para viver.
Seleção do festival de cinema Sundance destaca temas ambientais
Filmes cujo tema é o meio ambiente, com mensagens de preservação da natureza, ganharam espaço e se tornaram protagonistas da 25ª edição do Festival realizado nos EUA.
Prevfogo/RO tem balanço positivo em 2008
Projeto piloto de formação de brigadas municipais reduziu drasticamente os focos de calor em seis municípios.

Cientistas britânicos testarão células-tronco para tratar derrame
Médicos esperam que as células regenerem áreas danificadas do cérebro e elevem capacidade de movimento.
Chocolate pode atrapalhar a saúde do sono
Segundo pesquisa, a cafeína presente em uma barra da guloseima pode permanecer no corpo por, em média, de três a quatro horas - chegando a 12 horas em pessoas mais sensíveis.
Descoberto como HIV permanece latente no genoma humano
Vírus conta com mecanismo que o oculta durante processo de transcrição da cromatina.
Dieta materna gordurosa pode afetar fígado do feto, diz estudo
Feto é 'altamente vulnerável' ao excesso de lipídios na gravidez, independente de a mãe ser gorda ou magra.
MPF-PA acusa grupo de ajudar grileiros
Entre os 12 denunciados estão um ex-servidor do próprio MPF que foi demitido, servidores do Incra e advogados.
Adolescente morre no RS com suspeita de febre amarela
Exames para descobrir a causa da morte devem estar prontos daqui duas semanas, informou a secretaria.
China registra 2ª morte em humanos por gripe aviária
Autoridades locais não informaram se mulher de 27 anos teria manipulado aves infectadas.
Marinha faz ações de combate à dengue no Rio de Janeiro
Operação com 100 Fuzileiros navais em São Gonçalo visa identificar possíveis focos de larvas ou de mosquitos transmissores da dengue em cada casa, além de orientar moradores como prevenir a doença.
Paraguai detecta novo caso de dengue na divisa com o Brasil
Pessoa teria supostamente teria contraído a doença durante uma viagem à cidade boliviana de Santa Cruz.
Mesmo com queda de casos, dengue deixa RJ em alerta
A capital fluminense, que sofreu em 2008 com uma das maiores epidemias dos últimos anos, registrou apenas 42 casos de dengue na primeira quinzena de janeiro.
Mapas e GPS viram armas de caboclos na Amazônia
Um mapa lançado na sexta-feira (16) mostra que quase um quarto das comunidades de pequenos agricultores nos municípios de Santarém e Belterra foram reduzidas em razão da expansão das fazendas de grão. Duas delas desapareceram.
Tubarão está em risco : cerca de 100 milhões são mortos ao ano
Os tubarões estão no topo da cadeia alimentar marinha. São um predador poderoso que não tinha concorrente em seu reino aquático, até o homem entrar no oceano.
Polícia apreende 53 aves silvestres em feira no Recife/PE
Animais foram encaminhados ao Ibama, onde ficam em quarentena. Pássaros deverão ser devolvidos ao meio ambiente.
Aumento das chuvas acelera degelo
Glaciologista britânico afirma que a chuva é muito corrosiva para as geleiras.
Crise mundial, meio ambiente e minorias devem ser assuntos mais debatidos em evento
O Fórum Social Mundial é organizado por um comitê internacional formado por organizações da sociedade civil e movimentos sociais de todo o planeta. Evento começa no próximo dia 27 de janeiro em Belém (PA).
Obama insere os Estados Unidos na luta contra o aquecimento global
Presidente eleito dos EUA pretende fazer com que o mundo esqueça a política de negação do problema promovida em oito anos de administração Bush.
Greenpeace faz protesto contra falta de implementação de reserva extrativista no

Pará
Um boi de seis metros de altura foi inflado e colocado estrategicamente como forma de protesto em uma área desmatada ilegalmente dentro da reserva por fazendeiros de gado da região.
Volume de lixo nas rodovias paulistas aumenta 20% nas férias
Mensalmente são retirados cerca de 900 caminhões de lixo das estradas.
Proposta de novo código ambiental gera polêmica em Santa Catarina
Ambientalistas catarinenses criticam vários pontos do projeto e o consideram inconstitucional.
Médicos dão consulta por videoconferência na Amazônia
Exame do paciente é feito pela internet. Tecnologia beneficia cidades isoladas.
Governo estima que mais de 250 mil pessoas têm HIV e não sabem
Teste é gratuito em todo o país e resultado fica pronto em 15 minutos. 3,3 milhões de kits para exames serão distribuídos em 2009.
Com resistência, governo britânico aprova ampliação de aeroporto
Construção encontra resistência das organizações ambientalistas, de deputados e de associações de moradores.
Astrônomos querem 1 milhão de brasileiros olhando para o céu
Meta foi adotada para a celebração brasileira do Ano Internacional da Astronomia, que é comemorado em 2009.
Cientistas investigam por que o mesmo mosquito nos pica várias vezes
Pesquisadores levantam várias hipóteses para o caso. A mais simples é a de que o pernilongo não se satisfez na primeira picada.
Cientistas usam talco fluorescente em roedores para procurar vírus
O vírus Sin Nombre é perigoso para os humanos. Pesquisa foi conduzida em Utah, nos Estados Unidos.
Celulares "verdes" são tendência para 2009
A "onda verde" tem crescido com força entre as fabricantes de telefones celulares.
Estoque de vacina está baixo no País
Na reserva de emergência são 30 mi de doses a menos que o recomendado; não faltará produto, diz laboratório.
China anuncia uma segunda morte por gripe aviária em um mês
A jovem, de 27 anos, ficou doente em 5 de janeiro e morreu no sábado (17) à noite.

ǂ JORNAL DA CIÊNCIA

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2. Setor espacial é o mais afetado por corte de verba
3. CNPq divulga resultado das bolsas de Produtividade em Pesquisa
4. MEC institui programa para incentivar mobilidade acadêmica entre instituições federais de ensino superior
5. Currículo da educação básica em debate
6. Como ensinar nossas crianças a ler?, artigo de Naercio Menezes Filho
7. Fiel às origens, USP completa 75 anos
8. Esalq comemora formatura do agrônomo 10 mil
9. Faperj lança o primeiro edital de 2009
10. Faperj e Capes detalham acordo de cooperação técnica e acadêmica
11. CNPq lança edital para apoiar cursos e estágios na França
12. Desmatamento na Amazônia Legal cai 82%
13. União doa pequenas terras a posseiros na Amazônia
14. Brasil poderá desenvolver satélite geoestacionário com apoio de PPP

15. Dois satélites entram na luta contra o aquecimento global
16. EUA aprovam teste com células-tronco de embriões
17. Com Obama, ciência 'em seu devido lugar'
18. Novas perspectivas nos Estados Unidos, artigo de Wanderley de Souza
19. Hora de mudar, não de paralisia, artigo de Washington Novaes
20. Capes e a política de capacitação no exterior, artigo de Nagib Nassar
21. Mais de 25 mil teses digitais
22. Físico teletransporta um átomo
23. Cientistas descobrem nova síndrome genética no RN
24. Trauma pode modificar cérebro
25. "Ciência Hoje On-line": No sangue do pirarucu
26. Incubadora Softex Campinas recebe inscrições para programa da Microsoft
27. Concurso para docente na Universidade Federal de Alfenas, MG
28. Universidade Federal de Goiás (UFG) seleciona professor de Museologia
29. Tome Ciência, neste fim de semana: Vacinas, o melhor remédio

Edição 3686 - Notícias de C&T - Serviço da SBPC
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2. SBPC crítica corte no orçamento do MCT
3. Verba para ciência sofre redução de 18% em 2009
4. Nova agência avaliará universidades estaduais do RJ
5. Alga entra no "menu" dos biocombustíveis
6. Área de plantio de cana será aumentada
7. Ministro Magabeira Unger visitará Nordeste
8. Por uma expansão global do saber, artigo de José Monserrat Filho
9. Obama traz novas esperanças para as mulheres na ciência
10. Antártica em alerta
11. Geleiras do Chile em retração
12. Estações do ano chegam dois dias antes
13. UnB emitirá selo de eficiência energética
14. Fundação Araucária lança edital de apoio à capacitação docente
15. Consecti reformula portal
16. China revela planos para ter o seu próprio sistema de navegação por satélites até 2015
17. Rússia corta turismo espacial para a ISS
18. Brasileiros descobrem 'réptil' com cara de mamífero no Rio Grande do Sul
19. Anabolizantes maquiados
20. Preciosidades na web
21. Dados pouco usados
22. País só erradicará doença de Chagas daqui a meio século
23. Brasil entra na maior rede de doadores de medula
24. Universidade Estadual do Ceará (Uece) ganhará laboratório para fertilização in vitro de animais
25. Uma nova arma na luta contra o câncer, artigo de Fernando Reinach
26. Para viver um longo amor, artigo de Suzana Herculano-Houzel
27. "Ciência Hoje On-line": Marcas cerebrais do transtorno do pânico
28. Cientistas reúnem-se em Campinas para divulgar pesquisas em escalas moleculares e atômicas
29. RJ sedia o II Congresso Brasileiro de Biologia Marinha

Edição 3684 - Notícias de C&T - Serviço da SBPC
1. Lula acredita que negociação sobre mudanças climáticas deve avançar com Obama

2. A política energética de Obama, artigo de José Goldemberg
3. Em direção ao futuro, artigo de Pedro Sirgado
4. Indução humana
5. Efeito estufa condena pequenas geleiras ao desaparecimento
6. Grupo de Trabalho do MCT estudará medidas para cumprir determinações do TCU às fundações de apoio e Ifes
7. Planetário do Rio sediará abertura do Ano Internacional da Astronomia no Brasil
8. Uma só realidade
9. Universidade Federal da Bahia promove curso de extensão em Astronomia
10. Finep: Mudanças no edital de Subvenção Econômica 2009
11. Publicados mais 39 projetos contemplados pelo Edital de Subvenção Econômica 01/2008
12. ProUni tem 23% das instituições com nota baixa
13. O Brasil não prioriza o que sabe fazer bem em Ciência, artigo de Wanderley de Souza
14. Fapemig substitui relatório técnico final
15. Câmaras de Assessoramento da Fapeam: novos membros serão eleitos online
16. Instituído o Estatuto de Museus
17. Cientistas revelam como HIV se esconde
18. Boca contém receptores de nicotina, diz estudo
19. Gene aponta risco cardíaco
20. Mente feminina é mais propensa a pensar em comida
21. Terremotos e mudança no clima destruíram cidades peruanas há 3.600 anos
22. Micróbios da obesidade
23. LNLS recebe propostas
24. USP organiza exposição com 60 fotos da construção da Cidade Universitária
25. "Ciência Hoje On-line": 'Países à venda. Tratar aqui. E ali.', coluna de Jean-Remy Guimarães
26. Estratégias para inovar
27. Concurso para antropólogo na Universidade Federal de Pelotas
28. Universidade Federal Fluminense abre concursos para professores

Edição 3683 - Notícias de C&T - Serviço da SBPC
1. Ministérios da C&T e do Desenvolvimento definem prioridades da política industrial e tecnológica nacional
2. Conselho Técnico-Científico do Centro Brasileiro de Pesquisas Físicas (CBPF) tem novo membro
3. Código Florestal tumultua Esplanada
4. USP, Unesp e Unicamp iniciarão pós a distância para professor em agosto
5. Bônus para docente cria polêmica no Rio
6. Desafios à universidade, artigo de Paulo Nathanael Pereira de Souza
7. Reitor da Federal do Piauí é acusado de improbidade
8. Sobre a Fapesp, artigo de Celso Lafer
9. Brasil quer que 1 milhão de pessoas olhem o céu através de um telescópio
10. O 'new deal' de Obama
11. Obama pedirá ao Congresso fim da proibição para financiamento público de pesquisas com células-tronco embrionárias
12. Estoque de vacina está baixo no país
13. Cresce o interesse pela cara e arriscada energia nuclear, editorial do "Valor Econômico"
14. Mapas e GPS viram armas de caboclos na Amazônia
15. Celebrando (o estudo d)a vida, artigo de Marcelo Gleiser
16. As cinzas de Drygalski, artigo de Marcelo Leite

17. Brasil antártico, editorial da "Folha de SP"
18. Micróbio muda tradução de informações do DNA
19. Ano-novo, vida nova, artigo de Alysson Muotri
20. Grupo põe neurociência social em dúvida
21. Teóricos resolvem enigma da formação de estrela gigante
22. Arma química matou soldados romanos
23. Plaquetas subestimadas
24. BID lança Prêmio Juscelino Kubitschek
25. Uma dupla em 40 mil pacientes
26. Orgânicos terão selo de origem
27. Estação Ciência grátis no aniversário da cidade de São Paulo
28. "Ciência Hoje On-line": O mensageiro das estrelas, coluna de Adilson de Oliveira
29. Universidade Federal de Roraima abre 10 vagas para professor efetivo

ǂ MUNDOGEO

Embrapa Monitoramento por Satélite seleciona bolsistas para atuar em projeto de gestão territorial
Oportunidades de Trabalho
MundoGEO 10 Anos: sociedade como um todo se beneficia dos dados precisos sobre as propriedades rurais
Agrimensura, Cartografia e Cadastro
Imagem do satélite GeoEye-1 mostram a posse de Barack Obama em alta resolução
Imagens de Satélite e Sensoriamento Remoto
Fórum Urbano Mundial será realizado pela primeira vez no Brasil
Agrimensura, Cartografia e Cadastro
MundoGEO 10 Anos: Brasil entra na era dos sistemas de aumentação GPS
GNSS (GPS, Galileo, Glonass e Compass)
Últimos dias para inscrições ao encontro de software livre na administração pública Portugal
Games de última geração utilizam tecnologia de modelagem 3D para a criação de ambientes e personagens
GeoWeb, GIS Móvel e Web Mapping
China revela planos para ter o seu próprio sistema de navegação por satélites até 2015
GNSS (GPS, Galileo, Glonass e Compass)
Curso sobre elaboração de projetos para comercialização de créditos de carbono será realizado na Amazônia
Agrimensura, Cartografia e Cadastro
Últimos dias para inscrições ao encontro de software livre na administração pública Portugal
Games de última geração utilizam tecnologia de modelagem 3D para a criação de ambientes e personagens
GeoWeb, GIS Móvel e Web Mapping
China revela planos para ter o seu próprio sistema de navegação por satélites até 2015
GNSS (GPS, Galileo, Glonass e Compass)
MundoGEO 10 Anos: uma visão corporativa das Infraestruturas de Dados Espaciais
GEO Summit Latin America
Curso sobre elaboração de projetos para comercialização de créditos de carbono será realizado na Amazônia
Agrimensura, Cartografia e Cadastro

MundoGEO 10 Anos: imagens de satélite dizem, e muito, sobre o que acontece na Terra
Imagens de Satélite e Sensoriamento Remoto
Inpe adquire componentes para o desenvolvimento do satélite Amazônia-1
Imagens de Satélite e Sensoriamento Remoto
Google disponibiliza informações sobre o fundo dos oceanos no Google Earth
GeoWeb, GIS Móvel e Web Mapping
Novas regras garantem segurança da Anotação de Responsabilidade Técnica
Agrimensura, Cartografia e Cadastro
Programa das Nações Unidas para o desenvolvimento contrata consultor na área ambiental
Oportunidades de Trabalho
Cientistas de Coimbra criam modelo para planos de evacuação de qualquer cidade do mundo
Portugal
Mestrado em ciências geodésicas e tecnologias da geoinformação da UFPE abre inscrições
Geoprocessamento e GIS
MundoGEO 10 Anos: aquisição de 80 estações de referência GNSS pelo Incra é um marco na cartografia nacional
GNSS (GPS, Galileo, Glonass e Compass)
União Europeia lança Atlas Urbano para planejamento territorial inteligente
Agrimensura, Cartografia e Cadastro
MundoGEO 10 Anos: Infraestruturas de Dados Espaciais tornam transparente o acesso a informações
Geoprocessamento e GIS
Concursos, empregos e estágios, confira as vagas da semana
Oportunidades de Trabalho
Projeto Convias vai disponibilizar ferramenta para gestão do uso do subsolo em São Paulo
Agrimensura, Cartografia e Cadastro
Concursos públicos podem abrir mais de cem mil vagas em 2009
Oportunidades de Trabalho

ǂ SCIENCE

Redefining Science Education
Bruce Alberts
http://www.sciencemag.org/cgi/content/summary/323/5913/437

Research Summaries

This Week in Science
Editor summaries of this week's papers.
http://www.sciencemag.org/content/vol323/issue5913/twis.dtl

Editors' Choice
Highlights of the recent literature
http://www.sciencemag.org/content/vol323/issue5913/twil.dtl

News of the Week

EUROPE: Acquittals in CJD Trial Divide French Scientists
Three French judges acquitted six doctors and pharmacists last week of charges of involuntary homicide and aggravated fraud after a prolonged investigation centering on the distribution of human growth hormone contaminated with deadly prions in the 1980s.
http://www.sciencemag.org/cgi/content/summary/323/5913/446

ECOLOGY: Western U.S. Forests Suffer Death by Degrees
Mortality rates in seemingly healthy conifer stands have doubled in the past several decades, and often, new trees aren't replacing dying ones, forest ecologists report on page 521 of this issue of Science. Warmer temperatures and subsequent water shortfalls are the likely cause of the trees' increased death rate, they say.
http://www.sciencemag.org/cgi/content/summary/323/5913/447

CONSERVATION BIOLOGY: Debate Continues Over Rainforest Fate--With a Climate Twist
Depending on whom you talk to, the future of tropical rainforest biodiversity is either "truly catastrophic" or not as bad as feared. That's the verdict from two symposia held to evaluate recent evidence on the threat to tropical biodiversity.
http://www.sciencemag.org/cgi/content/summary/323/5913/448

WILDLIFE BIOLOGY: Confused Pelicans May Have Lingered Too Long Up North
In recent weeks, hundreds of disoriented and emaciated brown pelicans have turned up in strange places along the Pacific coast from the Baja peninsula to Washington state, prompting concern for this once-imperiled bird now on the verge of removal from the endangered species list.
http://www.sciencemag.org/cgi/content/summary/323/5913/449a

AWARDS: Two Americans Win Japan Prize
This year's Japan Prize goes to two U.S. academics, one a longtime advocate for sustainability and the other a radiologist who pioneered a standard tool for medical imaging.
http://www.sciencemag.org/cgi/content/summary/323/5913/449b

AGRICULTURE: European Pesticide Rules Promote Resistance, Researchers Warn
Despite intense opposition from farmer groups and scientists, the European Parliament voted last week to approve new regulations that could ultimately outlaw up to one-quarter of the pesticides on the European market.
http://www.sciencemag.org/cgi/content/summary/323/5913/450

EMERGING INFECTIOUS DISEASES: Scientists Puzzle Over Ebola-Reston Virus in Pigs
An international team of human- and animal-health experts is in the Philippines this month, studying the first known outbreak of Ebola-Reston virus in pigs. Experts are concerned because pigs live in close proximity to humans.
http://www.sciencemag.org/cgi/content/summary/323/5913/451a

TEACHING EVOLUTION: Educators Decry New Louisiana Policy
Science teachers in Louisiana have been given permission to use supplementary material in the classroom in a move that many scientists and educators regard as a backdoor attempt to allow creationism and its variants into the classroom.
http://www.sciencemag.org/cgi/content/summary/323/5913/451b

THE TRANSITION: Proposed Regulatory Czar Has Long and Perplexing Track Record
President-elect Barack Obama's choice to manage the regulatory policies of his new Administration, law professor Cass Sunstein, has triggered a mixture of consternation and delight among conservatives and liberals.
http://www.sciencemag.org/cgi/content/summary/323/5913/452a

BIOTECHNOLOGY: U.S. Appellate Court Weighs 'Obvious' Patents
A federal court is mulling a case that could make it harder for researchers to patent scientific discoveries, say biotech lawyers, stymieing innovation and investment.
http://www.sciencemag.org/cgi/content/summary/323/5913/452b

PHYSICS: Photon Sieve Lights a Smooth Path to Entangled Quantum Weirdness
Physicists report on page 483 of this week's issue of Science that they have found a way to create entangled pairs of light particles, or photons, by simply passing ordinary photons through a novel optical filter.
http://www.sciencemag.org/cgi/content/summary/323/5913/453

Random Samples
http://www.sciencemag.org/content/vol323/issue5913/r-samples.dtl

Newsmakers
http://www.sciencemag.org/content/vol323/issue5913/newsmakers.dtl

News Focus

SOCIAL SCIENCE: Friendship as a Health Factor
In a string of hot articles, two social scientists report that obesity, smoking, and other behaviors "spread" in networks. As the two friends expand their theory, doubters sharpen their questions.
http://www.sciencemag.org/cgi/content/summary/323/5913/454

SOCIAL SCIENCE: With Isolation Comes Ill Health
Social isolation, the flip side of social networks, is believed to have dire consequences, increasing the risk of certain diseases and earlier death. But attempts to transform this knowledge into action have had discouraging results.
http://www.sciencemag.org/cgi/content/summary/323/5913/456

FALL MEETING OF THE AMERICAN GEOPHYSICAL UNION: Galloping Glaciers of Greenland Have Reined Themselves In
Ice loss in Greenland has had some climatologists speculating that global warming might have brought on a scary new regime of wildly heightened ice loss and an ever-faster rise in sea level. But glaciologists reported at the American Geophysical Union meeting that Greenland ice's Armageddon has come to an end.
http://www.sciencemag.org/cgi/content/summary/323/5913/458a

FALL MEETING OF THE AMERICAN GEOPHYSICAL UNION: Tang Hints of a Watery Interior for Enceladus
At the American Geophysical Union meeting, planetary scientists reported that Saturn's E ring, formed from icy particles spewed out of the planet's moon Enceladus, contains the chemicals they would see if a salty ocean lurks beneath the moon's surface.
http://www.sciencemag.org/cgi/content/summary/323/5913/458b

FALL MEETING OF THE AMERICAN GEOPHYSICAL UNION: The Many Dangers of Greenhouse Acid
Geochemists reported at the American Geophysical Union meeting that most sorts of calcifying organisms--creatures that grow calcium carbonate skeletons or shells--suffered when pH sank much below the 8.2 of surface ocean seawater, not just the iconic coral reefs.
http://www.sciencemag.org/cgi/content/summary/323/5913/459a

FALL MEETING OF THE AMERICAN GEOPHYSICAL UNION: Snapshots From the Meeting
Snapshots from the American Geophysical Union meeting include mostly upbeat news in the search for martian water and an ice core suggesting that changes in the far south of the Southern Ocean helped drive greenhouse warming at the end of the last ice age, 18,000 years ago.
http://www.sciencemag.org/cgi/content/summary/323/5913/459b

Letters

Bailing Out Creatures Great and Small
http://www.sciencemag.org/cgi/content/full/323/5913/460a

Proposed French Reforms Miss the Mark
http://www.sciencemag.org/cgi/content/full/323/5913/460b

Ban Impact Factor Manipulation
http://www.sciencemag.org/cgi/content/full/323/5913/461a

GOP Must Embrace Science Again
http://www.sciencemag.org/cgi/content/full/323/5913/461b

A Word of Caution on the Coca-Cola Way
http://www.sciencemag.org/cgi/content/full/323/5913/461c

Books et al.

WATER RESOURCES: Data Drought, Data Flood
Jared Farmer
Powell discusses how drought, dams, and climate change threaten to produce a long-term water resources crisis in the American West.
http://www.sciencemag.org/cgi/content/summary/323/5913/462

LINGUISTICS: Pondering Grammar and God
Andreea S. Calude
Everett weaves together discussions of his fieldwork in the Amazonian jungle, the ethnography of the Pirahã people, and his conclusions about the implications of their language for linguistics.
http://www.sciencemag.org/cgi/content/summary/323/5913/463a

Books Received
http://www.sciencemag.org/cgi/content/summary/323/5913/463b

Policy Forum

GLOBAL BIOLOGICAL RESOURCES: Could Access Requirements Stifle Your Research?
S. Jinnah and S. Jungcurt
As the rules for foreign access to biological resources are being negotiated, academic researchers and organizations should make their opinions known.
http://www.sciencemag.org/cgi/content/summary/323/5913/464

Perspectives

IMMUNOLOGY: Ex Uno Plura
S. Feau and S. P. Schoenberger
T cells that respond quickly to infection and later to reinfection arise from a single precursor cell type.
http://www.sciencemag.org/cgi/content/summary/323/5913/466

ANTHROPOLOGY: Where Bacteria and Languages Concur
Colin Renfrew
Genetic data from human gastric bacteria provide independent support for a linguistic analysis of Pacific population dispersals.
http://www.sciencemag.org/cgi/content/summary/323/5913/467

PHYSICS: Teleporting a Quantum State to Distant Matter
M. S. Kim and J. Cho
A quantum state is teleported between two atoms that are 1 meter apart through their entanglement with photons.
http://www.sciencemag.org/cgi/content/summary/323/5913/469

ATMOSPHERE: Sources of Asian Haze
Sönke Szidat
Radiocarbon analysis elucidates the sources of the pollutants responsible for the "brown clouds" over South Asia.
http://www.sciencemag.org/cgi/content/summary/323/5913/470

GEOCHEMISTRY: Life on an Anaerobic Planet
Frances Westall
It remains highly challenging to unambiguously identify signatures of small anaerobic life forms on the early Earth.
http://www.sciencemag.org/cgi/content/summary/323/5913/471

CELL BIOLOGY: Protein Filaments Caught in the Act
Grant J. Jensen
Advances in electron microscopy have allowed bacterial DNA-segregating protein filaments to be visualized.
http://www.sciencemag.org/cgi/content/summary/323/5913/472

Review Articles

Membrane Fusion: Grappling with SNARE and SM Proteins
T. C. Südhof and J. E. Rothman
http://www.sciencemag.org/cgi/content/abstract/323/5913/474

Brevia

Earth's Degassing: A Missing Ethane and Propane Source

G. Etiope and P. Ciccioli
Natural gas seepage contributes far more methane, ethane, and propane to the atmosphere than formerly realized.
http://www.sciencemag.org/cgi/content/abstract/323/5913/478

Research Articles

Language Phylogenies Reveal Expansion Pulses and Pauses in Pacific Settlement
R. D. Gray et al.
Geographical distribution of Austronesian languages reveals the rate and direction of migrations from Taiwan 5200 years ago.
http://www.sciencemag.org/cgi/content/abstract/323/5913/479

Reports

An Entanglement Filter
R. Okamoto et al.
A useful tool for quantum information processing transmits entangled photons only when they have the same polarization.
http://www.sciencemag.org/cgi/content/abstract/323/5913/483

Quantum Teleportation Between Distant Matter Qubits
S. Olmschenk et al.
Transporting quantum states between trapped ions one meter apart may enable local storage of information in quantum memories.
http://www.sciencemag.org/cgi/content/abstract/323/5913/486

Femtosecond XANES Study of the Light-Induced Spin Crossover Dynamics in an Iron(II) Complex
Ch. Bressler et al.
X-ray absorption spectroscopy resolves the dynamics of spin-state interconversions, which take place in less than a picosecond, in a well-studied class of iron compounds.
http://www.sciencemag.org/cgi/content/abstract/323/5913/489

Complementary Active Sites Cause Size-Selective Reactivity of Aluminum Cluster Anions with Water
P. J. Roach et al.
Water dissociates at similar active sites on anionic aluminum clusters that have different sizes and electronic structure.
http://www.sciencemag.org/cgi/content/abstract/323/5913/492

Brown Clouds over South Asia: Biomass or Fossil Fuel Combustion?
O. Gustafsson et al.
Biomass burning accounts for at least one-half of carbon-rich aerosols in the Asian atmospheric brown cloud that forms each winter.
http://www.sciencemag.org/cgi/content/abstract/323/5913/495

Genetic Interactions Between Transcription Factors Cause Natural Variation in Yeast
J. Gerke et al.
Adaptive differences in yeast sporulation arise from single-nucleotide mutations in transcription factors regulating sex.
http://www.sciencemag.org/cgi/content/abstract/323/5913/498

Different T Cell Receptor Signals Determine CD8+ Memory Versus Effector Development
E. Teixeiro et al.
Point mutations in the T cell receptor decide the fate of killer T cells and the development of immunological memory.
http://www.sciencemag.org/cgi/content/abstract/323/5913/502

Secondary Replicative Function of CD8+ T Cells That Had Developed an Effector Phenotype
O. Bannard et al.
Killer T cells that developed during a primary antiviral response can become memory T cells in secondary infections.
http://www.sciencemag.org/cgi/content/abstract/323/5913/505

Electron Cryomicroscopy of E. coli Reveals Filament Bundles Involved in Plasmid DNA Segregation
J. Salje et al.
The actin-like filaments that power movement of DNA during bacterial cell division form small bundles of three to five filaments near the nucleoid.
http://www.sciencemag.org/cgi/content/abstract/323/5913/509

Alternative Zippering as an On-Off Switch for SNARE-Mediated Fusion
C. G. Giraudo et al.
A structural motif in the protein complexin may act as a switch during membrane fusion.
http://www.sciencemag.org/cgi/content/abstract/323/5913/512

Complexin Controls the Force Transfer from SNARE Complexes to Membranes in Fusion
A. Maximov et al.
The protein complexin may act as a forcetransferring switch during membrane fusion.
http://www.sciencemag.org/cgi/content/abstract/323/5913/516

Widespread Increase of Tree Mortality Rates in the Western United States
P. J. van Mantgem et al.
Regional warming is contributing to the recent acceleration of tree deaths seen in undisturbed forests of the western U.S.
http://www.sciencemag.org/cgi/content/abstract/323/5913/521

The Sphingolipid Transporter Spns2 Functions in Migration of Zebrafish Myocardial Precursors
A. Kawahara et al.
Normal heart development in zebrafish requires the function of a lipid transporter in a membrane surrounding the yolk, a tissue outside of the embryo proper.
http://www.sciencemag.org/cgi/content/abstract/323/5913/524

The Peopling of the Pacific from a Bacterial Perspective
Y. Moodley et al.
The geographical distribution of strains of a specific human pathogen helps to define patterns of colonization out of Taiwan.
http://www.sciencemag.org/cgi/content/abstract/323/5913/527

Rapid Membrane Disruption by a Perforin-Like Protein Facilitates Parasite Exit from Host Cells
B. F. C. Kafsack et al.
The human and animal parasite that causes toxoplasmosis escapes from host cells by using a perforin-like protein to make holes in the intracellular vacuole in which it resides.
http://www.sciencemag.org/cgi/content/abstract/323/5913/530

Rebels, Mavericks, and Heretics in Biology
Robert Root-Bernstein
JAMA. 2009; 301(3): p. 333-334
http://jama.ama-assn.org/cgi/content/extract/301/3/333?ct=ct

A NEW FUSULINOIDEAN GENUS DILATOFUSULINA FROM THE LOPINGIAN (UPPER PERMIAN) OF SOUTHERN TIBET, CHINA
Yue Wang and Katsumi Ueno
Journal of Foraminiferal Research. 2009; 39(1): p. 56-65
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FIRST RECORD OF THE CO-OCCURRENCE OF WESTERN TETHYAN AND INDO-PACIFIC LARGER FORAMINIFERA IN THE BURDIGALIAN OF THE MEDITERRANEAN PROVINCE
Ercan Ozcan and Gyorgy Less
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From the Cover: A new feather type in a nonavian theropod and the early evolution of feathers
Xing Xu, Xiaoting Zheng, and Hailu You
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EARLY DANIAN PLANKTIC FORAMINIFERA FROM CRETACEOUS-TERTIARY INTERTRAPPEAN BEDS AT JHILMILI, CHHINDWARA DISTRICT, MADHYA PRADESH, INDIA
G. Keller, S. C. Khosla, R. Sharma, A. Khosla, S. Bajpai, and T. Adatte
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ASYNCHRONOUS CALCIFICATION IN JUVENILE MEGALOSPHERES: AN ONTOGENETIC WINDOW INTO THE LIFE CYCLE AND POLYMORPHISM OF PENEROPLIS
Martin R. Langer, Walid A. Makled, Stephanie J. Pietsch, and Anna Weinmann
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RECENT LITERATURE ON FORAMINIFERA
Jennifer A. Jett
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A brief history of the Department of Geology at the University of Pretoria
Patrick Eriksson
South African Journal of Geology. 2008; 111(2-3): p. 143-158
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Carbonate Assimilation in Open Magmatic Systems: the Role of Melt-bearing Skarns and Cumulate-forming Processes
Mario Gaeta, Tommaso Di Rocco, and Carmela Freda
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Platinum-group elements in the UG1 and UG2 chromitites, and the Bastard reef, at Impala platinum mine, western Bushveld Complex, South Africa: Evidence for late magmatic cumulate instability and reef constitution
Wolf Maier and Sarah-Jane Barnes
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Compositional and textural peculiarities of gold-rich alloys from the Merensky Reef
Roland Merkle, Wiebke Grote, and Peter Graser
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ǂ JEM

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On the front cover - The cover shows Northern Atlantic Spain's coastal marine sediments influenced by industrial effluents from a nearby shipyard and nearby yachting marina. Picture courtesy of David Antizar and reproduced by permission of Blanca Antizar-Ladislao See http://xlink.rsc.org/?DOI=10.1039/b808668k

On the inside front cover - Hepatotoxic cyanobacterial morphotypes in the Nile Delta region Image reproduced by permission of Rehab El-Shehawy. See http://xlink.rsc.org/?DOI=10.1039/b814319f

Hot Papers

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⸸ EARTH PAGES

Anthropology and geoarchaeology
Technology, culture and migration in the Middle Palaeolithic of southern Africa

The period between 300 and 30 ka was critical for the evolution of modern humans. Our mitochondrial DNA indicates that fully modern humans emerged around 200 ka. Projectile weapons that help define the epoch first appeared. Clear signs of self-

adornment and symbolism also turn up during the Middle Palaeolithic. All of these developments took place in Africa, and the last two are reflections of the increased efforts by archaeologists in the continent from which we all originated. There is a long way to go to match the density of sites from which later periods in human history have been outlined in Europe, but progress is accelerating. One great hindrance has been dating sites, for the Middle Palaeolithic lies in a time zone where the Ar-Ar and 14C methods are ineffective. A developing chronological 'workhorse' for this difficult period depends on the way in which exposure of sand grains to sunlight 'heals' the defects in their molecular structure formed when radioactive isotopes in soils emit ionising radiation. Artificial illumination of sand grains containing these defects causes them to luminesce. The degree of luminescence is related to the time over which the defects have built up. Optical dating relies on grains having been exposed at the surface for a time to 'reset' the luminescence clock, and then being buried so that new defects can accumulate. Having lots of sunlight and a superabundance of bare sand, Australia has become a hotbed of research into optical dating of events associated with its peopling during the last ice age. Expertise developed there has been applied to many Middle Palaeolithic sites in Southern Africa (Jacobs, Z. et al. 2008. Ages for the Middle Stone Age of Southern Africa: Implications for human behaviour and dispersal. Science, v. 322, p. 733-735).

Archaeological work in South Africa and Namibia has revealed two distinct stone industries in the Middle Palaeolithic, both of which made hafted weapons that would have made hunting more efficient than the whatever weapons were used in earlier times – the most distinctive of the preceding Lower Palaeolithic tools was the bifacial hand axe, whose use is obscure. Both cultures involved the earliest recognisable ornamentation, such as shell beads and materials engraved with symbols, together with indirect evidence for the use of hematite and goethite pigments for body painting (see When and where 'culture' began in EPN of November 2007). Genetic evidence famously places modern human origins and their global migration out of Africa within this time frame. So, dating the archaeological sites as accurately as possible is a crucial importance, and a tremendous start has been made by the multinational team lead by Zenobia Jacobs of the University of Woolangong in Australia. Optical ages span 90 to 30 ka, with clusters between 71.9 to 71 ka and 64.8 to 59.5 ka, with a statistically significant gap of about 6.7 thousand years between them. When compared with climatic-change indicators from the Antarctic ice record the developmental episodes do not seem to correlate clearly with any specific warm of cool periods, though the earlier spans the time of the Toba super-eruption in Indonesia and the later one was a period of warming. So any environmental cause for the technological and cultural changes is unclear. However, both fall within the estimated time span of the genetic 'bottleneck' between 80 and 60 ka, and the most likely times for the initial 'Out of Africa' migrations, probably across the Straits of Bab el Mandab linking Eritrea and Arabia across the Red Sea shallowed by ice-cap linked falls in global sea level.

Childhood and families

Human females are unlikely to break 10 seconds for the 100 metres because of their sashaying gait. It can't be helped, being due to the evolution of the pelvic girdle of bipedal females to deal with birthing of infants with increasingly large heads. Supposedly, the human female pelvis is now close to the limit that will permit walking on two legs. Such problems do not plague other living primates partly because their young have small heads relative to their bulk, and pelvic anatomy is not constrained by an habitually upright gait. It seems not to have been an 'issue' for

australopithecines either: they did not possess 'child-bearing hips'. The intermediate species, Homo erectus, despite having a 1 Ma fossil record (maybe as long as 1.8 Ma for the Asian form) only recently provided substantial pelvic remains (Simpson, S.W. et al. 2008. A female Homo erectus pelvis from Gona, Ethiopia. Science, v. 322, p. 1088-11092). In the words of the authors, this pelvis is 'obstetrically capacious' and demonstrates that female skeletal evolution responded to increasing foetal brain size: it would have permitted infants with heads 30 to 50% of the adult size to have been born. Homo erectus has been widely supposed to have had a tall willowy frame analogous to that of fully modern human inhabitants of tropical savannahs, yet the Gona woman was stocky. So, environmental influences seem to have had less of an evolutionary role than the advantages of greater brain development before birth. That places H. erectus even more firmly on the human line; indeed greater in utero brain development seems to have taken place than in modern humans.

The Gona pelvis demands re-evaluation of how foetal and childhood development has progressed over the last two million years (Gibbons, A. 2008. The birth of childhood. Science, v. 322, p. 1040-1043), the unique attributes having appeared during the evolution of our own genus. Among chimpanzees, infants can fend for themselves, with a little help from elders, after 3 years old. Street children from Asia and South America need to be 6 before they can survive without parental care. Growth lines on teeth that appear week by week reveal that previous age estimates for a number of immature australopithecines whose first adult molars had erupted were large overestimates: instead of 6 they point to 4 years old. Another signal feature of human development is the lengthy period to full development (marked by the eruption of the 3rd molar as well as the end of significant growth in stature). The average age when human child bearing begins is around 19, while chimpanzees start at about 11. A fresh examination of the famous Turkana Boy's skeleton, an H. erectus, that uses tooth microstructure reduces his age at death from 13 to 8, suggesting an earlier onset of independence than in modern children. He grew much more quickly too, and would have reached adulthood somewhat earlier: around 14.5 years old. The picture with Neanderthals is not completely clear, some tooth studies suggest that their children grew significantly more quickly than modern ones, other studies point to the same rates or even longer development if adult brain sizes of Neanderthals are taken into account (larger on average than those of modern humans). Using average life expectancy of gatherer-hunter humans and chimps who survive dependent childhood – 45 and 70 years respectively – along with evidence for child development, suggests that australopithecines could have reached 45 while H. erectus adults could have expected to reach 60 years old.

There are other differences that begin to slot into space with the new data. Both human and chimpanzee females have a similar child-bearing period of around 20-25 years. The difference is that, on average, the natural interval between births is about half as long for human mothers as for chimpanzees. The greater number of human offspring gives a greater chance of the survival of some to reproduce themselves. On the other hand, slower child development places a greater burden on mothers, even after weaning. So there is quite a contradiction between the evolutionary effects, if only child-mother relationships are taken into account. This contradiction was resolved, to some extent, by a seminal paper in the late 20th century by a group of anthropologists from the Universities of Utah and California (see O'Connell, J.F., Hawkes, K. & Blurton Jones, N.G. 1999. Grandmothering and the evolution of Homo erectus. Journal of Human Evolution, v. 36, p. 461-485). They focussed on the potentialities of the early onset of infertility or the menopause among women relative to its appearance among female chimpanzees, which gives, on average, a 30 year

non-child-bearing period to older women. This approximately coincides not only with child-rearing periods for their daughters, but for their granddaughters as well. The 'grandmothering' hypothesis for human development centres on the great evolutionary advantages of post menopausal women assisting with child rearing. O'Connell et al. suggested that this arose among H. erectus, as far back as 1.8 Ma, and the Gona pelvis together with other new views of H. erectus development add considerable weight to that concept. As well as freeing younger women for food gathering, the cultural significance of older women caring for children adds another dimension that may link to the advantages of delayed post-weaning development that we see today, albeit in many annoying contexts!

Climate change and palaeoclimatology
Mantle rock and carbon dioxide sequestration

The peridotite mantle sequence of ophiolites often shows signs of having been altered by processes that form calcite and magnesite ($CaCO_3$ and $MgCO_3$) veins. It is a mundane feature and few geologists have paid it any heed, other than to note the veining. Such theories as there are generally suggest that the veining took place at the time of obduction of the ophiolitic masses onto continental margins, which was generally accompanied by some metamorphism. Nonetheless, the veins must have taken up carbon dioxide from some reservoir, either hydrothermal fluids derived from seawater or groundwater, but ultimately from the atmosphere: there are no primary carbonates in ophiolites. Dating the veins was deemed impossible, but someone had a go at veins in the Oman ophiolite using the 14C method (Keleman, P.B. & Matter, J. 2008. In situ carbonation of peridotite for CO_2 storage. Proceedings of The National Academy of Sciences of the USA, v. 105, p. 17295-17300), discovering a great surprise; the veins are very much younger than the Eocene age of ophiolite emplacement. Their ages span 1.6 to 43 ka, about the same as the period over which a surface tufa deposit formed. Calcite and magnesite form by the breakdown of olivine and clinopyroxene in the presence of slightly acid water in which CO_2 is dissolved, their young ages suggesting the veins formed during weathering by rainwater, the tufa deposits probably forming through related processes. Keleman and Matter estimated the volume of veins in peridotites exposed in new road cuttings at about 1%. The 15 m thick weathering horizon in the exposed Oman peridotite therefore corresponds to about 1012 kg of CO_2, which accumulated at an average rate of around 4 x107 kg of CO_2 per year. If this could be increased by 100 thousand times, the Oman peridotite could sequester about 10% of anthropogenic emissions. Is that possible?

Higher temperatures could speed up the carbonation reactions. The reactions are exothermic and sustaining a temperature around 185ºC is feasible by stimulating the reactions through shallow drilling and pumping carbon dioxide and water into shattered rock. Interestingly, the reactions might be capable of limited geothermal power generation. The potential absorption by such a plant in the Oman ophiolite could be up to 1 billion tonnes of CO_2, and there are many other ophiolites rich in olivine. But that is not the end of the story: other olivine breakdown reactions involving water generate hydrogen, as discovered by Australian hydrogeologist Gordon Stanger. While conducting his PhD field work in Oman as part of the Open University Oman Ophiolite Project, Stanger discovered natural springs from which hydrogen gas was bubbling (Stanger, G. 1986. The hydrogeology of the Oman mountains. Unpublished PhD thesis, The Open University, Milton Keynes, UK).

Environmental geology and geohazards

Arsenic risk in the Mekong Delta of Cambodia

Since the awful discovery in the 1980s that millions of people in the delta plains of the northern Indian subcontinent were at risk of chronic arsenic poisoning if they drank water drawn from wells in alluvium, that hazard has been found to exist in other alluvial areas close to sea level. The arsenic is of natural origin and is released when iron hydroxide, the most common sediment colorant and powerful medium for adsorption of many elements including arsenic, breaks down. Iron hydroxide is destabilised in strongly reducing environments, when its component Fe3+ gains an electron to become soluble Fe2+. The most common source of reducing conditions is vegetation buried in alluvial sediments. In Bangladesh and West Bengal, India, the problem is peat layers buried by rapid sedimentation since about 7 thousand years ago that filled channels cut by rivers when sea level was much lower during the ast glacial maximum. The risky areas in the Mekong Delta are more complex (Papacostas, N.C. et al. 2008. Geomorphic controls on groundwater arsenic distribution in the Mekong River Delta, Cambodia. Geology, v. 36, p. 891-894). Areas at risk are strongly focused by recent landforms associated with channel migration, rather than extending across entire flood plains as in Bangladesh. Features such as meander scrolls, point bars and islands that have grown to be incorporated in older floodplains show the highest arsenic concentration in groundwater. These accumulate organic debris in large amounts, whose decay releases arsenic from iron hydroxide veneers on sand grains. Older features of the same kinds show less arsenic contamination in their groundwater, suggesting that eventually either the reductants become exhausted or available arsenic is flushed out. So, careful mapping and dating of fluviatile geomorphology may be a means of screening for arsenic risk in the Mekong and other low-lying delta plains.

Geobiology, palaeontology, and evolution
Broody dinosaurs

The most likely ancestors of birds evolved in the Jurassic from a group of nimble and mainly carnivorous theropod dinosaurs known as Deinonychosaurs, which included the now famed Velociraptor. One of the oddest fossils ever found was the skeleton of one of these preserved together with eggs of what were originally thought to have been laid by Protoceratops. This Mongolian animal, seemingly caught in the act, was given the name Oviraptor or 'egg seizer'. Specimens of Oviraptor and closely related dinosaurs found subsequently show them sitting on eggs; clear evidence of bird-like brooding. If this wasn't a sufficient surprise, the clutches were enormous: 20 to 30 eggs. Detailed study of the skeletons shows that they are all males (Varricchio, D.J. et al. 2008. Avian parental care had dinosaur origin. Science, v. 322, p. 1826-1828). About 90% of all living bird species involve males in care of chicks, including sharing of incubation (5% of mammals share parental care). However, only among ratites (ostriches and the like) and tinamous do males brood eggs clutches continuously. This behaviour is generally associated with polygamy and large clutches. So the misnamed Oviraptor and its kin were not only progenitors of birds but may well have passed on the peculiarities of avian parenting.
Molecular evidence for the environment of the universal ancestor

If ever there were a 'holy grail' for palaeobiologists, it would be the nature and ecology of the original beings from which all life on Earth subsequently evolved. That is, the primitive organism – among perhaps many that were extinguished 'intestate' – whose genetic 'footprint' alone survived to be common to all three domains of modern life: Archaea, Bacteria and Eucarya. For some time, attention has focused on

extant heat-tolerant Archaea and Bacteria species (hyperthermophiles; ? 80ºC)) found in hot springs, whose genetics seem primitive. This, together with other features such as the adaptation of heat-shock proteins to other functions and the abundance of metals at the cores of other widespread proteins, has led to notions that life originated under high-temperature conditions such as those around sea-floor hydrothermal vents. The ongoing explosion in nucleic acid analysis and software to sift through vast amounts of molecular data from many sources potentially may provide the key to more concrete ideas of the origin of Earth's life. A recent comparative study of both ribosomal RNA and protein sequences among representatives of all three of life's domains gives a clue to surprises ahead for palaeobiologists (Boussau, B. et al. 2008. Parallel adaptations to high temperatures in the Archaean eon. Nature, v. 456, p. 942-945). 'Exobiologists', who nurture great, but perhaps folorn, hopes of being alive and sentient when extraterrestrial life forms are 'bagged' may also find themselves perplexed; such is the fate of hubris without substance.

The team of francophone biochemists claims that their analyses show signs of a two-fold adaptation to changing environments during the earliest period of surviving life. Rather than having emerged from high-temperature conditions, the last common universal ancestor, or LUCA, probably adapted to more temperate conditions (? 50ºC), the hyperthermophile Bacteria, Archaea and Eucarya evolving from it. Heat tolerance then declined as the later mass of life forms developed. Sadly, the authors do not address the issue of deep ocean-floor origins in their discussion, preferring to speculate about Archaean climate change and rather odd notions about adaptation to high-temperature meteoritic ejection from extraterrestrial sources. It may be that they too are in for surprises when more mature investigations hit the press.

When bacteria became more sturdy

It's easy for geologists to forget that most of the genetic diversity on Earth is and always has been in organisms that rarely if ever fossilise; those with only a single cell, among the Archaea, Bacteria and Eucarya. All that is known is from those still alive, and they occupy a vast range of environments, most of which are not 'friendly' to multi-celled eukaryotes. Unsurprisingly, they don't look very different from one another; just tiny bags full of water and a tiny amount of complicated biochemistry. They become distinct from their molecular make-up and also from what they do and where they live, some tending to reproduce best within the bodies of eukaryotes, such as ourselves sometimes with no noticeable effect, sometimes beneficially, but most spectacularly when they make us ill. Bacteria and Archaea have long histories, so their genetic material and proteins are easily distinguishable from group to group. This makes them amenable to the use of a 'molecular clock' approach in seeking out when and how they evolved. Analysis of these differences among more than 250 species of bacteria in the context of their living in water or under terrestrial conditions has thrown up some surprises (Battistuzzi, F.U. & Hedges, S.B. 2008. A major clade of prokaryotes with ancient adaptations to life on land. Molecular Biology and Evolution, doi:10.1093/molbev/msn247). Two thirds seem to stem from a common ancestor that had colonised the land around 3.2 Ga ago, 800 Ma before preservation of the first undisputed fossils. To live on the continental surface, all have to have evolved or inherited resistance to environmental hazards such as drying out, UV radiation and high salinity. Many pathogenic bacteria belong to the Gram-positive group, whose cell walls are distinctly adapted to terrestrial life. Despite having to live in eukaryote-free world for a billion years or more, their ancestors were especially well-suited to infesting multi-celled life when it emerged, and to being notoriously adaptable when they are threatened with toxicity

themselves.

Planetary, extraterrestrial geology, and meteoritics
So, when did the core form?

Sometime early in its history the Earth underwent two gigantic redistributions of its chemistry: a gargantuan collision that formed the Moon; separation of a metal plus sulfide core from a silicate remainder. These 'set the scene' for all subsequent geological (and perhaps biological) evolution. The current theory about core formation stems from a marked disparity between Hf-W and U-Pb geochronology of the mantle. The first suggests a metal-secreting event about 30 Ma after formation of the Solar System – tungsten is siderophile and would have become depleted in the mantle following segregation of a metallic core. The second points to lead partitioning into a sulfide mass descent to the core around 20-100 Ma later; assuming that lead is chalcophile. The key to explaining the disparity and validating the dual core formation hypothesis lies in establishing just how chalcophile lead is, relative to other metals that are present in the mantle (Lagos, M. et al. 2008. The Earth's missing lead may not be in the core. Nature, v. 456, p. 89-92). The German and Russian geochemists set up experiments to determine directly the partition coefficients of lead and the other 'volatile' elements cadmium, zinc, selenium and tellurium between metal, sulfide and silicate melts at mantle pressures. They found that Pb and Cd are moderately chalcophile and lithophile, but never siderophile; Zn favours silicate melts, and is exclusively lithophile under mantle conditions; Se and Te are both chalcophile and siderophile, so would enter the core in both molten sulfide and metal.

The measured partition coefficients give a basis for comparing the relative proportions of the volatile elements estimated in the mantle with those predicted by the two-event model of core formation. This elegant approach strongly suggests that sulfide or iron-nickel metal segregation from the mantle to the core can explain neither the mantle abundances of the five 'volatile' elements nor the lead-isotope ratios in the mantle. It even questions the existence of terrestrial sulfur in the core. The postulated Moon-forming mega-impact alone could have produced the measured geochemical features of the mantle as a result of vaporisation of 'volatile' elements.
Mantle heat transfer by radiation

After some early speculation about efficient heat transfer in the mantle by radiation, it became generally accepted that convection and conduction dominate at depth in the Earth. Yet the Stefan-Boltzmann law has the radiant energy flux of a body increasing proportionally to the fourth power of its absolute temperature. So at deep mantle temperatures of up to 4300 K radiation ought to be significant unless mantle minerals become opaque at high pressures. Mantle mineralogy is dominated by iron-magnesium silicates that adopt the perovskite structure. High-pressure experiments with perovskites reveal surprisingly high transparency to visible and near-infrared radiation (Keppler, H. et al. 2008. Optical absorption and radiative thermal conductivity of silicate perovskite to 125 gigapascals. Science, v. 322, p. 1529-1532). It seems that a higher than expected radiative contribution to heat transfer should stabilise large plume structures in the zone above the core-mantle boundary.

Sedimentology and stratigraphy
Cycling on Mars

High-resolution remotely sensed data (HiRISE) from the Red Planet is free of charge to registered investigators (it did cost quite a bit to acquire), whereas the Earthly equivalent costing would set you back at least US$25 per square kilometre (for Quickbird. They are wonderfully clear, as Mars's thin atmosphere causes no haze except during dust storms. They are also in stereo, providing both 3-D views and digital terrain elevation data with a precision of 1 m. HiRISE data have revealed detail equivalent to that from aerial photos of Earth taken from about 5 km above. Not surprisingly, they show a lot of geology, including an area around 500 to 1000 km2 with clear signs of layered sediments (Lewis, K.W. et al. 2008. Quasi-periodic bedding in the sedimentary rock record of Mars. Science, v. 322, p. 1532-1535). Where large craters have exposed sequences in their walls it is possible to measure bedding thickness and count individual strata. In Becquerel crater the layering is very regular, comprising two size ranges around 3.6 and 37 m, the second being made up of several of the first sized layers. The two sets of thickness remain consistent through about 300 m of section, so probably represent cyclical processes on Mars. The most likely driving forces are rotational and orbital, as they are for the Earth's Milankovich climatic pacing. The 10:1 ratio between the two frequencies of bedding is twice that dominating the Milankovich time series (rotational precession and orbital eccentricity). One possibility for the Martian cycles is the estimated variation of orbital eccentricity on 120 ka, 1.2 Ma and 2.4 Ma timescales, although axial tilt changes through tens of degrees; far more than does that of the Earth's rotational axis. Thankfully, the authors stick to variations in wind-driven sedimentation to explain the bedding cycles. Changes in insolation on Mars would affect condensation and evaporation of CO2 ice at the poles, and consequently the density of the atmosphere and its ability to move and deposit sediment. Less fortunately, they suggest water must have been involved to lithify the layers. That hardly seems necessary on a planet with low atmospheric pressure, as unconsolidated wind-blown loess in western China maintains the integrity of its layering with little cementation.

Snowball Earth challenged again

Nobody doubts that in the Neoproterozoic there were several massive climate changes that brought frigid conditions to low latitudes. Some demand that the Earth then entered a runaway cooling because the increased albedo cause by continental ice cover would have reflected away a large amount of solar radiation; the Snowball Earth hypothesis is that the entire planet then became icebound. Evidence for the global glacial epochs is in the form of sediments clearly influenced by deposition of debris carried by ice. Later glacial episodes of Late Ordovician and Carboniferous-Permian age left thin tillites – lithified boulder clay - on glaciated land surfaces in northern and southern Africa and other parts of the southern continents, but the main evidence for the much deeper chills of late Precambrian age are thick piles of sediment studded with dropstones from floating ice. These are glaciomarine diamictites as opposed to tillites. Philip Allen and James Etienne of Imperial College, London and Neftex Petroleum Consultants of Abingdon, UK have paid particular attention to the Neoproterozoic diamictites of Oman (Allen, P.A. & Etienne, J.L 2008. Sedimentary challenge to Snowball Earth. Nature Geoscience, v. 1, p. 817-825). These prime candidates for typical products of low-latitude frigidity are over 1 km thick, and therefore require massive supply of precipitation to drive the large ice flows that could transport such large amounts of sediment. Moreover, within the sequence are many sediments that show little sign of glacial influence yet abundant signs of water transport, such as deltaic bedforms. Other strata are marine and contain ripples formed by wave action; a process that would be impossible with total ice cover. Cyclicity is present, as it is in other Neoproterozoic diamictites. That

suggests repeated climate change. Snowball Earth aficionados, and others besides, claim just two and possibly three cryogenic episodes in the Neoproterozoic, but Allen and Young point to the wide range of maximum and minimum ages for those diamictites that are amenable to absolute dating. They suggest that, apart from glaciers being able to develop on land at lower latitudes than in subsequent glacial epochs, the late Precambrian was not 'special, being merely a period of prolonged climate instability akin to those of later times paced by astronomical factors.

Tectonics
Are sheeted dykes significant?

More than abyssal sediments, pillow basalt, differentiated gabbro and depleted peridotite sheeted dyke complexes have long been a primary identifier for oceanic lithosphere preserved in ophiolites. That assumption has recently been questioned (Robinson, P.T. et al. 2008. The significance of sheeted dyke complexes in ophiolites. GSA Today, v. 18 (November 2008), p. 4-10). Ian Gass first discovered units made up solely of dykes that intrude one another with no intervening screens of other host rocks in the Troodos ophiolite of Cyprus in 1968. Sheeted dyke complexes became widely regarded as characteristic of extensional, sea-floor spreading environments connected to basaltic magma chambers, each increment of extension being filled with magma. They have also been imaged in eroded walls of ocean fracture systems and cut through by ocean drill cores, supporting this notion. In fact, many ophiolites are devoid of sheeted complexes, despite having all the other components of mafic-ultramafic lithosphere. Robinson et al. argue that sheeted dykes only form where spreading rates and magma supply are balanced, as expected at true constructive plate margins but far less likely at other extensional zones associated with plate tectonics, such as those in back-arc basins above subduction zones. Even at true spreading centres that generate new ocean floor magma supply may not balance extension, for instance where spreading rates are slow. Moreover, a great many ophiolites show geochemical affinities that are more akin to supra-subduction magmatic processes than those that produce mid-ocean ridge basalt.
Plate tectonics in time and space

Seismic tomography becomes increasingly revealing as the capacity of supercomputers grows. On top of that, more sophisticated software allows present-day mantle cross sections to be reverse modelled with surface plate motions to reconstruct an idea of mantle dynamics back to Mesozoic times. Geophysicists at the California Institute of Technology give a taste of the possibilities from the subduction history of North America (Liu, L. et al. 2008. Reconstructing Farallon plate subduction beneath North America back to the Late Cretaceous. Science, v. 322, p. 934-938). Investigating 3-D evolution is the key to connecting rigid plate tectonics and fluid convection that has long been postulated but remains obscure. However, while reasonable reconstructions of global plate motions are possible using sea-floor magnetic stripes that go back to the Cretaceous, seismic tomography only images the mantle's present structure. So it might seem that generating a 3-D 'geomovie' is more of an expensive illusion than a model of past realities.

The logic behind the modelling is that today's mantle temperature structure – that is what tomograms show – stems from past plate activity. For instance, a deep cold, slab-like anomaly dipping eastward beneath eastern North America can reasonably be inferred to be a relic of the Farallon Plate, which formerly constituted floor of the eastern Pacific. That plate was subducted beneath the west edge of the continent until around 40 Ma, when the East Pacific Rise that had driven it was subducted. The

present thermal structure shown by the tomogram has, in a sense, 'faded' as a result of thermal relaxation of the original anomalies by heat diffusion. Choosing geologically reasonable starting conditions for long-term evolution of a mantle segment enables iterative forward modelling to try and achieve the present set-up. While there is an element of circularity in this logic, such a dynamic model has a predictive aspect; i.e. as cold, dense material in the mantle sinks it tends to pull the surface downwards, allowing marine flooding of continental interiors. During the Late Cretaceous this did happen spectacularly in North America, and Liu et al's model shows this. Yet sea level also rose globally at the time, thereby amplifying the inundation. Although geeomodellers will be excited by Liu et al's developments, it is modelling and even the simplest of models is acutely sensitive to the chosen starting conditions, as meteorologists with vastly more real data at hand have discovered again and again.

See also: Steinburger, B. 2008. Reconstructing Earth history in three dimensions. Science, v. 322, p. 866-868