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DICA DA SEMANA

1ª Feira de Ciência e Mostra Científica Estadual em Geodiversidade

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AMBIENTE BRASIL

SCIENCE

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1ª Feira de Ciência e Mostra Científica Estadual em Geodiversidade

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De 08 a 11 de outubro de 2012, será realizada a 1ª Feira de Ciência e Mostra Científica Estadual em Geodiversidade, na Universidade Federal do Rio de Janeiro (UFRJ), RJ, Brasil. O evento é direcionado as áreas das Ciências Matemáticas da Natureza e da Terra, Ciências da Saúde e Ciências Humanas, porque envolve a relação entre as pessoas, a paisagem e a cultura, sendo portanto um evento interdisciplinar.

Um dos objetivos da feira é estimular os estudantes a conhecerem diferentes áreas de conhecimento e a sua importância, de modo a aumentar os interesses dos alunos nas aulas.

O público alvo do evento são professores, estudantes do ensino fundamental, médio e técnico, e visitantes.

Mostra de trabalhos, palestras e visitas monitoradas são algumas atividades da programação.

Estudantes universitários podem se inscrever também como voluntários na preparação e manutenção do evento (monitoria).

Há espaço para expositores.

Visite, exponha, seja um voluntário ou leve sua escola, enfim participe!

Mais informações e inscrições no site: <http://www.igeo.ufrj.br/femcegeo/o-evento>

ÍNDICE DE NOTÍCIAS

JORNAL DA CIENCIA

Edição 4587 - Notícias de C&T - Serviço da SBPC

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Edição 4586 - Notícias de C&T - Serviço da SBPC

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Edição 4585 - Notícias de C&T - Serviço da SBPC

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Edição 4584 - Notícias de C&T - Serviço da SBPC

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Edição 4583 - Notícias de C&T - Serviço da SBPC

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10. Nova geração da robótica pretende fazer paraplégicos voltarem a andar
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17. Tome Ciência: É medicina ou não é?
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19. O corpo humano na cultura e arte africanas é tema de exposição na Fiocruz

AMBIENTE BRASIL

China e UE selam parceria para reduzir emissões de gases estufa
 Europa vai fornecer assistência técnica e financeira à China. País asiático é o maior emissor mundial de dióxido de carbono.

Gatos e guepardos têm mesmo mecanismo para determinar cor dos pelos
 Pesquisadores descobriram gene responsável pelo padrão malhado, de listras ou manchas dos felinos.

Degelo recorde no Ártico coloca cientistas em "território desconhecido"
 Cientistas dizem que observam mudanças fundamentais na cobertura de gelo marinho. O Ártico costumava ser dominado por gelo de várias camadas, que sobrevivia ao longo de muitos anos.

Previsão é de que o calor diminua no Sudeste e no Centro-Oeste

A máxima deve ser de 26°C em Campo Grande e de 29°C no Rio. Em São Paulo, a temperatura não passa de 22°C, e em Curitiba, de 19°C.

Cientistas encontram pássaros com malária em regiões do Alasca

Doença tropical está se espalhando devido a mudança climática, diz estudo. Contaminação pode ser mortal para aves do Ártico, segundo cientistas.

Animais ganham polenta, gelatina e até brigadeiro em zoológico no RS

Zoológico de Gramado preparou cardápio diferente para os bichos. Veterinários criam atividades para estimular exercícios físicos aos animais.

Pontos turísticos de Chapada dos Guimarães reabrem após incêndio

Fogo no Morro de São Jerônimo foi controlado na noite de quarta-feira (19). Mais de três mil campos de futebol foram queimados pelo fogo no parque.

Produção sustentável no Pará

Cem produtores familiares do Araguaia discutem fortalecimento dos produtos da sociobiodiversidade.

Rio Paraguai atinge nível mais baixo em quatro décadas

O rio, o mais importante da região, atingiu 83 centímetros. Bancos de areia impedem a navegação. Em alguns pontos os barcos precisam ser rebocados.

Árvore da vida

Dia mundial é comemorado no dia 21 de setembro há 30 anos no Brasil. Nesta sexta-feira, o Ibama tem programação especial.

Sonda acha indícios de que Vesta já teve água

Vesta é considerado por pesquisadores como um protoplaneta - já que parou no meio do caminho de sua formação como planeta.

Força Nacional atuará em dez estados na Operação Defesa da Vida e para evitar conflitos indígenas

Nos estados do Acre, do Amazonas, do Amapá, de Mato Grosso, do Pará, de Rondônia, de Roraima, de Tocantins e do Maranhão, na Amazônia Legal, os homens atuarão na Operação Defesa da Vida. Em Mato Grosso do Sul, a permanência da Força Nacional será estendida devido a conflitos indígenas.

Fósseis de baleia azul de 6 mil anos são encontrados em Iguape/SP

Pesquisadores da Unesp de São Vicente recolheram amostras para estudo. Estimativa é que animal pesava entre 20 e 30 toneladas.

Rio promove fórum para incentivar uso da bicicleta como meio de transporte na cidade

A cidade do Rio de Janeiro é líder no país em quilômetros de ciclovias construídas. O município conta atualmente com 282 quilômetros de malha cicloviária em operação e deverá alcançar 300 quilômetros antes do final do ano.

Povo bosquímano se diversificou antes dos ancestrais humanos saírem da África

Maior estudo genético deste povo mostrou que diversificação ocorreu há 100 mil anos e que é possível que humanos modernos tenham surgido de um grupo não homogêneo.

Novo material transforma calor em eletricidade

Apresentado como mais eficiente do mundo, material transforma entre 15% e 20% do calor residual em eletricidade útil e abre novas perspectivas para as energias renováveis.

Itamaraty sedia reunião do 'Basic' sobre mudanças climáticas

Grupo 'Basic' é formado por Brasil, China, África do Sul e Índia. Objetivo é unificar propostas para acordos internacionais sobre o clima.

Ártico tem maior degelo já registrado, afirma instituição dos EUA

Desde março deste ano, 11,8 milhões de km² derreteram devido ao calor. Último recorde negativo foi registrado em 2007.

Cultura do café passará por mudança com novo clima mundial, diz cientista

Na Colômbia, por exemplo, plantações podem 'migrar' para áreas elevadas. No Ártico, espécies como a raposa podem sofrer com redução de alimentos.

Endeavour chega a Houston em sua viagem final

Ônibus espacial será transportado até Los Angeles, onde será exposto em um museu.

Equipes identificam destroços de tsunami em praias americanas

Bolas e banheiro estão entre objetos encontrados; acredita-se que eles continuarão chegando nos próximos anos.

Tempo abre na maior parte do sul do país nesta quinta (19)

Tempestades devem avançar para o Centro-Oeste e Sudeste. Risco é maior em São Paulo, Rio de Janeiro, Minas Gerais, Goiás, Mato Grosso do Sul e Mato Grosso.

Altas temperaturas podem aumentar risco de morte do coração, diz estudo

Cientistas australianos coletaram dados de calor e óbitos de 1996 a 2004. Cada milhão de habitantes 'perdeu' 72 anos de vida por infarto e derrame.

MP do Código Florestal: Sarney deve convocar para terça-feira esforço concentrado
A MP foi aprovada na terça-feira (18) na Câmara e agora depende da aprovação dos senadores para ir à sanção presidencial.

Estudo revela como leão-marinho evita doença descompressiva ao mergulhar
Animal armazena ar nos brônquios e traqueia, local onde os tecidos não conseguem dissolver o nitrogênio na corrente sanguínea.

Para governo brasileiro, é preciso definir rapidamente regras da segunda etapa do Protocolo de Kyoto
O tratado, que define metas e limites de emissão de gases de efeito estufa para os países desenvolvidos, expira no final deste ano. O Brasil defende que as novas obrigações sejam estabelecidas a tempo de começarem a valer a partir de janeiro de 2013.

Governo anuncia instalação de 11 estações meteorológicas na Amazônia em 2013
Cada uma das estações tem capacidade para processar dados como temperatura, radiação solar, pressão atmosférica, umidade relativa do ar e velocidade e direção do vento.

Japão aprova plano para reduzir energia nuclear no país
Governo descartou eliminar totalmente essa forma de energia até 2030. Iniciativa foi tomada após acidente de 2011, em Fukushima.

Nesta quarta-feira, Rio de Janeiro teve o dia mais quente do ano
De acordo com o Inmet, a temperatura atingiu a marca de 41,2 graus Celsius (°C) no bairro de Santa Cruz, na zona oeste da cidade.

Filhote de peixe-boi é encontrado em poça d'água em Manacapuru, no AM
Polícia desconfia que a mãe tenha sido abatida por pescadores da região. Animal foi resgatado por bombeiros e encaminhado à capital amazonense.

Desenvolvimento sustentável promove inclusão em comunidades pacificadas do Rio
Moradores de comunidades carentes têm a oportunidade de participar de curso de capacitação em técnicas de plantio de mudas e de árvores, como parte do projeto Comunidades Verdes, da Secretaria Estadual do Ambiente do Rio de Janeiro.

Indonésia registra nascimento de bebê elefante ameaçado de extinção
Filhote de elefante-de-Sumatra nasceu nesta terça-feira, em Aceh Java. ONG afirma que espécie pode desaparecer em menos de 30 anos.

Espelhos de supertlescópio são 'embalados' em latas para transporte
Partes do instrumento começam a chegar a unidade da Nasa nos EUA. James Webb deve ser lançado ao espaço até 2018 e substituir Hubble.

Astrônomos descobrem galáxia com mais de 13 bilhões de anos
A galáxia, descoberta por Wei Zheng, do departamento de Física e Astronomia da Universidade americana Johns Hopkins, e sua equipe, tem mais de 13,2 bilhões de anos.

Ártico perdeu gelo equivalente ao território de PE por dia, em agosto
Para órgão da ONU, degelo diário no Ártico foi de 91,7 km² no último mês. Agosto é considerado o mês mais seco do ano, diz organização.

Derretimento do Ártico coloca espécie de foca em risco, diz estudo
Cientistas preveem redução na espessura do gelo com aquecimento global. Área de reprodução de focas aneladas deve ser reduzida em 70% até 2100.

Câmara aprova texto-base da medida provisória do Código Florestal
Para permitir votação, governo fez acordo para aprovar texto de comissão. Planalto defendia texto de medida provisória, com reflorestamento maior.

Mais de 30 brigadistas tentam apagar fogo em morro de Parque Nacional
Área fica dentro do Parque Nacional de Chapada dos Guimarães, em MT. Incêndio atinge o Morro de São Jerônimo desde esta segunda-feira.

Funcionária de centro de reabilitação é internada com suspeita de H3N2
Santa Casa de Casa Branca (SP) tem leitos isolados para casos suspeitos. Clínica do Cocaís enfrenta surto; um idoso morreu vítima da doença.

Nepal utilizará aeronave não tripulada para monitorar crimes ambientais
Vant foi adquirido por governo para vigiar parques nacionais. Objetivo é combater caça de animais ameaçados e desmatamento no país.

França premia antropólogo especialista em índios da Amazônia
Professor do Collège de France desde o ano 2000 na cátedra de Antropologia da Natureza, o antropólogo francês Philippe Descola, é especializado na "relação estabelecida pelas sociedades humanas com a natureza".

RO integra estudo que vai analisar emissão de gases na Amazônia
Durante 30 dias qualidade do ar da região será monitorada. Mais de 60 pesquisadores e um avião britânico estão envolvidos no estudo.

Cerrado discute CAR
Goiás, Maranhão, Mato Grosso do Sul, Minas Gerais, Tocantins, Piauí e do Distrito Federal tratam da regularização ambiental de imóveis rurais.

Neandertais usavam penas como adorno, diz estudo
Para autores, esse é um sinal da inteligência do hominídeo. Espécie desapareceu há cerca de 30 mil anos.

Bolívia declara boto-cor-de-rosa como patrimônio natural do país
Lei promulgada pelo presidente Evo Morales protege 'golfinho' da Amazônia. Morales afirmou que é obrigação das Forças Armadas proteger espécie.

Suporte ambiental das cidades
Conama discute regulamentação do ambiente urbano nos moldes das unidades de conservação.

Pesquisadores monitoram tubarões-brancos na costa leste dos EUA
Projeto Oearch quer entender a movimentação da espécie pelo Atlântico. Equipe atrai os animais e retira amostras de sangue, sêmen e tecidos.

Produtores no norte do Rio são notificados por queima de cana-de-açúcar
Segundo a legislação, a queima pode ser feita somente no período da noite e deve ser respeitada a distância de 50 metros das rodovias e ferrovias e de 200 metros de unidades de conservação.

Agosto de 2012 é o segundo mês mais quente da história
Temperatura média da Terra só ficou atrás do registro feito em 1998 e se igualou aos de 2001 e 2011.

Expansão urbana global ameaça 205 espécies de animais, diz estudo
Até 2030, novas cidades do planeta ocuparão 1,2 milhão de km² de área. Mata Atlântica, Cerrado e outros biomas do mundo podem ser degradados.

Mais prazo para prêmio da A3P
Inscrições para o prêmio Melhores Práticas da Agenda Ambiental na Administração Pública vão até 2 de outubro.

Fogo volta a atingir Parque Nacional e consome Morro de São Jerônimo
Brigadistas e aviões ajudam a controlar o fogo em Chapada dos Guimarães. Incêndio já consumiu área de 3 mil campos de futebol, diz coordenação.

Prática de observação de pássaros atrai estrangeiros em reserva do ES
Área de Mata Atlântica mantida pela Vale abriga ao menos 380 espécies. Alguns animais encontrados por lá estão ameaçados de extinção.

Nave Soyuz aterrissa com três tripulantes a bordo no Cazaquistão
Cosmonautas russos e astronauta americano ficaram 4 meses na ISS. Pouso aconteceu na madrugada desta segunda-feira, no Cazaquistão.

Após 5 gestações imaginárias, panda dá à luz filhote em zoo dos EUA
Nascimento ocorreu na noite deste domingo (16), em Washington. Há sete anos zoológico não registrava nascimento de exemplares da espécie.

Curso treina profissionais para realizar pesquisas com jacarés, no AM
Serão nove vagas, abertas a estudantes, técnicos ou cientistas. Interessados deverão enviar inscrição até 05 de outubro.

MPF investiga instalação de garimpo na região do Xingu
O MPF questiona a instalação de um empreendimento do porte de uma mina de ouro em uma área que ficará fragilizada com a construção da Usina de Belo Monte.

ANP multa Chevron em R\$ 35 milhões por vazamento de petróleo
Diretora-geral da ANP disse que petrolífera foi notificada na sexta-feira. Valor corresponde a 24 das 25 infrações analisadas pela ANP.

Marinha deve iniciar reconstrução de base antártica em 2013, diz ministro
Celso Amorim disse que navios partem em outubro para remover destroços. Estação Antártica Comandante Ferraz pegou fogo em fevereiro.

Câmara se concentra nesta semana na MP do Código Florestal
Medida perde a validade se não for apreciada até 8 de outubro. Em meio ao recesso branco, Senado não tem votações previstas.

Testes de DNA ajudam na descoberta de 4 espécies de morcego na África
Estudo foi realizado por cientistas de universidade da África do Sul. Análise do sistema sonar de morcegos ajudou a diferenciar animais.

Conhecer para incluir
Cadastro procura identificar 13 diferentes grupos familiares para inclusão nos programas sociais do governo federal.

Satélite da Nasa detecta nevascas de dióxido de carbono em Marte
Os flocos de neve de dióxido de carbono, conhecidos também como "gelo seco", requerem temperaturas abaixo dos menos 125 graus centígrados e dão ao extremo meridional do Planeta Vermelho uma aparência similar à da Terra.

Mato Grosso detém a maioria dos focos de calor na Amazônia Legal, revela boletim
Dados foram levantados pelo monitoramento do Inpe, que identificou mais de 10 mil focos de calor em toda a Amazônia Legal, no período de 10 a 16 de setembro.

Estudantes participam de soltura de peixes em Sacramento/MG

Trabalho começa em setembro e vai até janeiro. O peixamento é uma ação Cemig nos locais onde há usinas.

Fórum de Meio Ambiente discutirá destino de resíduos sólidos

Fórum no próximo dia 20, em Curitiba (PR), vai debater políticas públicas existentes, disseminar a conscientização ambiental e comentar soluções para o setor.

10 / 09 / 2012 São Paulo tem o dia mais quente do inverno com 33,1°C

Segundo o CGE, temperatura não era registrada desde 1955. Defesa Civil chegou a decretar estado de atenção por causa do tempo seco.

10 / 09 / 2012 Pesquisadores desvendam técnica de corrida dos guepardos

Felinos chegar a atingir 96,5km/h em menos de três segundos; trata-se do primeiro mapeamento dos músculos do animal já feito.

10 / 09 / 2012 Brigadistas tentam combater fogo em área próxima a parque de MT há 3 dias

Incêndio atinge área próxima ao Parque Nacional de Chapada dos Guimarães. Cerca de 35 brigadistas tentam evitar que fogo chegue ao parque.

10 / 09 / 2012 Pesca do peixe surubim está ameaçada no Maranhão

Atividade é considerada principal fonte de renda e sustento no povoado Paiol. Moradores dizem que escassez é causada por pescadores de outros locais.

10 / 09 / 2012 Mais de 100 baleias são avistadas durante sobrevoo em praias de SC

Animais foram vistos pelos pesquisadores no sobrevoo de setembro. Filhote albino e Olívia, já conhecidos, foram novamente encontrados.

10 / 09 / 2012 Pássaros sentem o cheiro do medo

Novos estudos mostram que aves usam muito mais o olfato do que se acreditava anteriormente.

10 / 09 / 2012 Lontras ajudam indiretamente a reduzir CO2 na atmosfera, diz estudo

Animais espantam ouriços-do-mar, que consomem algas marinhas. Um dos papéis das algas é absorver grande quantidade de gás carbônico.

10 / 09 / 2012 EUA: filhote de panda-gigante é um menino, anuncia zoológico

O zoológico afirma que segue a tradição cultural chinesa de nomear o panda-gigante apenas após ele ter 100 dias de vida.

10 / 09 / 2012 Felino ameaçado de extinção é encontrado em fazenda no ES

Gato mourisco foi recolhido pela Polícia Ambiental, na Serra. Após o recolhimento, foi encaminhado ao Cereias.

10 / 09 / 2012 Ministério da Pesca vai entregar cinco novas lanchas-patrolha à Marinha

As embarcações serão usadas prioritariamente na fiscalização da atividade pesqueira e no combate à pesca ilegal.

10 / 09 / 2012 Nave Voyager faz 35 anos de viagens no limite do Sistema Solar

Carregando um disco de ouro com imagens e sons da Terra e informações científicas, a nave marcou época por ser a primeira "mensagem na garrafa" cósmica enviada pelo nosso planeta -um recado para possíveis civilizações extraterrestres que derem a sorte de encontrá-la.

10 / 09 / 2012 Estudo mostra que desmatamento da Amazônia afeta chuvas na Argentina

Florestas ajudariam a umedecer o ar ao longo de quilômetros de viagem pelo continente, dizem cientistas.

10 / 09 / 2012 Mudança no gelo do mar do Ártico veio para ficar

O gelo atingiu 4,1 milhões de quilômetros quadrados na semana passada, a menor medida feita por satélite desde que esse tipo de dado começou a ser recolhido, no fim dos anos 1970.

10 / 09 / 2012 Emissão de gases de efeito estufa cai 2,5% na Europa em 2011, diz agência

Ao menos 15 países da União Europeia reduziram suas emissões. Inverno menos rígido reduziu uso de aquecedor e consumo de gás natural.

10 / 09 / 2012 Mais de 90% das áreas de recife do Caribe não têm mais coral, diz estudo

Poluição, pesca excessiva e aquecimento global ameaçam ecossistemas. Texto foi apresentado em congresso sobre conservação na Coreia do Sul.

11 / 09 / 2012 Caranguejo no fundo do mar usa visão ultravioleta para comer

Espécie vive a cerca de 800 metros de profundidade, onde não há luz. Capacidade de enxergar no escuro permite distinguir alimento de veneno.

11 / 09 / 2012 Picos de calor mantêm média histórica de fim de inverno no Sudeste brasileiro

O período tem apresentado frequência atípica de frentes frias, abaixo do normal, embora a média dos meses anteriores tenha ficado dentro das variações históricas.

11 / 09 / 2012 Pesquisa encontra acampamento romano mais antigo da Alemanha

Acampamento de Hermeskeil já era conhecido, mas sua idade ainda não. Até 10 mil soldados moraram no local em 50 antes de Cristo.

11 / 09 / 2012 Setembro quente e seco produz 62% mais queimadas que mesmo mês do ano passado
Em dez dias, mais de 24,5 mil focos de incêndio foram identificados no país.

11 / 09 / 2012 Simulação por computador indica que pode haver vida em vários outros planetas
Cientistas criam modelo que põe em cheque teoria da 'zona habitável', que procurava água líquida apenas nas superfícies dos planetas; pesquisadores escoceses miram reservatórios subterrâneos.

11 / 09 / 2012 Bebês-tartarugas são soltos em praia da Indonésia e atingem o mar
Tartarugas-oliva chegam a pesar 65 kg e ficam maduras até os 18 anos. ONG diz já ter liberado mais de 20 mil ovos de animais em praias do país.

11 / 09 / 2012 Primeira etapa de vacinação contra a febre aftosa alcança 97,85% do rebanho nacional
A primeira etapa da Campanha de Vacinação contra Febre Aftosa de 2012 teve início em março e foi encerrada em junho. A maioria dos estados realizará a segunda etapa da vacinação do rebanho em novembro.

11 / 09 / 2012 Operação policial na Tailândia acha tigres presos em apartamento
Seis animais foram encontrados em terraço de prédio em Bangcoc. Suspeito de 28 anos alegou ter licença para criar dois deles; ele foi preso.

11 / 09 / 2012 Plano nacional para reprimir pesca ilegal deve ser concluído até fim do ano, diz ministro
Uma das propostas do plano é identificar as áreas onde mais ocorre a pesca ilegal.

11 / 09 / 2012 Festa para o Cerrado
Setembro será dedicado às ações de estímulo à conservação e uso sustentável dos recursos naturais do bioma.

11 / 09 / 2012 Aliança pela Amazônia quer reduzir emissões de CO2 e conservar aldeias
Congresso na Coreia do Sul vai debater conservação de índios na floresta. Aldeias terão plano diretor 'de vida' das terras, diz especialista brasileiro.

11 / 09 / 2012 Pesquisa tenta desvendar 'efeito placebo'
Biólogo e equipe fizeram simulação com roedores para explicar fenômeno que ocorre nos seres humanos.

11 / 09 / 2012 Ianomâmis negam que tenha havido massacre na Venezuela
Índigenas negaram massacre denunciado pela ONG Survival International. Segundo versão, 80 índios teriam sido mortos por garimpeiros brasileiros.

11 / 09 / 2012 'Balão gigante' de magma cresce sob ilha paradisíaca grega, revela estudo
Em 15 meses, região aumentou tamanho de 15 estádios olímpicos. Vulcão localizado em Santorini teve sua última erupção há 3.600 anos.

11 / 09 / 2012 Pela 1ª vez, vacina tem eficácia parcial contra a dengue
Segundo um estudo publicado na edição desta terça-feira da revista médica The Lancet, uma "vacina candidata" desenvolvida pela companhia farmacêutica francesa Sanofi Pasteur demonstrou eficácia de 30,2% em um teste de fase 2, realizado com 4 mil crianças da Tailândia.

Estudo diz que chuva cairá mais em zonas secas e questiona modelos
Teorias sobre efeitos da mudança climática subestimariam riscos da seca. Cientistas afirmam que solos áridos criariam ventos de tempestade fortes.

Buraco da camada de ozônio está menor que no ano passado, diz ONU
Proibição dos CFCs, na década de 1980, deteve aumento da destruição. Camada bloqueia raios ultravioleta do sol, que fazem mal à pele.

Especialista diz que reciclagem no Brasil alcança menos de 2% de todo o potencial
O Brasil ainda tem 4 mil lixões e apenas 30% a 40% do lixo total coletado no país são dispostos em aterros sanitários adequados.

Zoo da Austrália mantém programa para reprodução de 'gambá dourado'
Cusu-de-orelhas-grandes, marsupial raro, recebe tratamento no local. Cor dourada ocorre devido aos baixos níveis de melanina do bicho.

Fóssil de marsupial gigante pré-histórico é encontrado na Austrália
Esqueleto fossilizado de diprotodonte descoberto em fazenda de gado pode ajudar a explicar desaparecimento do marsupial na Terra.

Espécies do Ártico 'surfam' em corrente marinha para fugir do calor
Crustáceo que vive nas profundezas do gelo já busca regiões mais frias. Fenômeno é chamado de 'hipótese Nemo', em alusão a filme da Disney.

Grande parte do lixo separado pelo brasileiro não é coletada de forma seletiva
Apenas 40% do lixo separado dentro de casa são posteriormente coletados de forma coletiva quando chega à rua. Isso mostra que muitos brasileiros separam seus resíduos dentro de casa, mas depois grande parte deles é misturada ao lixo comum.

Japão anuncia meta de abandonar energia nuclear até década de 2030
Mas governo quer reativar reatores até implementar as mudanças. Acidente na usina de Fukushima Daiichi mudou os planos do país.

Empresa de limpa-fossa é autuada por envenenamento de árvore, no AM

Fiscais encontraram óleo queimado no tronco da árvore. Crime ambiental foi descoberto durante fiscalização de rotina.

Parque da Bolívia tem maior biodiversidade mundial, diz entidade
Reserva de Madidi reúne 11% das espécies de pássaros do mundo.

Município do litoral gaúcho terá um dos maiores complexos eólicos da América Latina
Serão instalados ao todo 129 aerogeradores, distribuídos em dez parques. O empreendimento é uma parceria da Eletrosul com o Fundo de Investimentos em Participações Rio Bravo, que detém 51% do negócio. Os 49% restantes pertencem à estatal. O investimento previsto é aproximadamente R\$ 1 bilhão.

França anuncia que fechará central nuclear mais antiga do país em 2016
Ação é parte de plano de transição energética; anúncio foi feito por Hollande. Presidente pediu ainda que conferência da ONU sobre clima ocorra no país.

Protocolo de Montreal: Missão cumprida
Ministra Izabella Teixeira afirma que o Brasil atingiu as principais metas do Protocolo de Montreal para reduzir os danos na camada de ozônio.

Equipe 'pesca' tubarões ameaçados em esforço de preservação
Um terço das espécies em águas britânicas são consideradas vulneráveis.

Pontos turísticos de Parque Nacional de MT são fechados por causa de incêndios
Mais de 3 mil ha de Chapada dos Guimarães foram consumidas pelo fogo. Visitaç o est  suspensa at  domingo (16), conforme coordena o do parque.

C mara pode votar MP do C digo Florestal na pr xima semana
A medida quer estabelecer uma regra escalonada de recupera o das APPs derrubadas ilegalmente nas beiras dos rios at  22 de julho de 2008.

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EARTH PAGES

Are Martian clays magmatic in origin?

Posted on September 16, 2012 by Steve Drury | Leave a comment

Artist's Concept of Curiosity's touchdown(credit: Wikipedia)

The remote detection of spectral features in the infrared that suggest abundant clay minerals on the surface of Mars is the basis for a

widely-held view that Mars may once have had moist climatic conditions that encouraged life to form (see The Martian 'sexy beast' in September 2012 EPN). The presence of clays, along with suggestive landforms, has also been used to speculate that Mars once harboured long-lived lakes and perhaps even a huge ocean on its northern hemisphere, between 3.7 to 4.1 Ga. It was the clays that pitched the recently arrived Curiosity (aka Mars Exploration) Rover at the Gale crater and its central Aeolis Mons. The latter, also known as Mount Sharp, preserves about 5 km of layered rocks, the lowest of which are clay-rich and hypothesised to be sediments laid down in a lake that filled the crater. Provided Curiosity operates according to plan, we will know soon enough whether or not the layered rocks of Mount Sharp are indeed sediments, but a soon-to-be-published article suggests another explanation than weathering for the production of abundant clay minerals on Mars (Meunier, A. et al. 2012. Magmatic precipitation as a possible origin of Noachian clays on Mars. *Nature Geoscience*, published online 9 September 2012; DOI: 10.1038/NGEO1572).

Layered rocks on the flanks of Mount Sharp in Gale crater from Curiosity's Mastcam (NASA Goddard via Flickr)

The French-US team provides evidence from terrestrial lavas that abundant iron- and magnesium-rich clays, known as smectites, may form at a late stage during crystallization of magma. If magma contains water – and most magmas do – as more and more anhydrous silicates crystallise during cooling water builds up in the remaining liquid. Once silicate crystallisation is complete there remains a watery fluid capable of reacting with some of the silicates to form clay minerals; a process often referred to as pneumatolysis. How much clay is formed depends on the initial water content of the magma. Pneumatolysis operates on hot lava, whereas weathering occurs at ambient temperature provided the climate is able to support liquid water at the surface. Mars is currently far too cold for that, and ideas of a wet surface environment earlier in the planet's history demand an explanation for a much warmer climate. Clay minerals do not appear to be present in Mars's younger rocks, so Meunier and colleagues suggest that as the planet's mantle evolved early water-rich magmas were gradually replaced by ones with less water: interior Mars was gradually de-gassed and its magmas lost the ability to alter minerals that crystallised from them.

Now, clay minerals are extremely resistant to change except through high-temperature metamorphism. Once formed they can be blown around – Mars has probably always been a very windy place – to end up in aeolian sediments that are plentiful on Mars. Also, if occasionally water flowed on the surface perhaps by subsurface water venting suddenly, fine-grained pneumatolytic clays would easily be picked up, concentrated as flow speed lessened and deposited in waterlain sedimentary layers. A dilemma that faces the Curiosity science team is what significance to assign to clays in sediment layers, when they no longer provide unequivocal evidence of weathering. But will the resistant layers on Mount Sharp turn out to be pneumatolytically altered lava flows?

→ Leave a comment

Posted in Planetary, extraterrestrial geology, and meteoritics

Tagged Clay minerals, Curiosity rover, Life on Mars, Mars, Mars Science Laboratory

Brittle-ductile deformation in subduction zones

Posted on August 25, 2012 by Steve Drury | Leave a comment

Eclogite: the red-brown mineral is garnet, omphacite is green and there is some white quartz. (credit: Kevin Walsh via Wikipedia)

The ultra-dense form of basalt, eclogite made from mainly garnet and a strange high-pressure, low-temperature pyroxene (omphacite) that forms from plagioclase and some of the basalt's ferromagnesian minerals, is possibly the most important rock there is. Without the basalt to eclogite transition that takes place when ocean-floor is subducted the density of the lithosphere would be insufficient to pull more ocean floor to destruction and maintain the planetary circulation otherwise known as plate tectonics. Since the transition involves the formation of anhydrous eclogite from old, cold and wet basalt water is driven upwards into the mantle wedge that lies over subduction zones. The encourages partial melting which creates andesite magmas and island arcs, the ultimate source of the Earth's continental crust.

Despite being cold and rigid, subducted oceanic lithosphere somehow manages to be moved en masse, showing its track by earthquakes down to almost 700 km below the Earth's surface. A major ophiolite in the Western Alps on the Franco-Italian border escaped complete loss to the mantle by rebounding upwards after being subducted and metamorphosed under high-P, Low-T condition when the Alps began to form. So the basaltic crustal unit is eclogite and that preserves a petrographic record of what actually happened as it descended (Angiboust, S. et al. 2012. Eclogite breccia in a subducted ophiolite: A record of intermediate depth earthquakes? *Geology*, v. 40, p. 707-710). The French geologists found breccias consisting of gabbroic eclogite blocks set in a matrix of serpentinite and talc. The blocks themselves are breccias too, with clasts of eclogite mylonite set in fine-grained lawsonite-bearing eclogite. The relationships in the breccias point to possibly earthquake-related processes, grinding and fracturing basalt as it was metamorphosed: an essentially brittle process, yet the shearing that forms mylonites does seem reminiscent of ductile deformation too.

The deformation seems to have been at the middle level of oceanic crust where oceanic basalt lavas formed above cumulate gabbro, their plutonic equivalents. Yet much deformation was also at the gabbro-serpentinite or crust-mantle boundary, where water loss from serpentine may have helped lubricate some of the processes. Clearly the Monviso ophiolite will soon become a place to visit for geophysicists as well as metamorphic petrologists.

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Posted in Geochemistry, mineralogy, petrology and volcanology

Tagged Alps, Eclogite, Oceanic crust, Subduction

Whence Earth's water?

Posted on August 25, 2012 by Steve Drury | Leave a comment

Carbonaceous chondrite meteorite. (credit: Mila Zinkova via Wikipedia)

Comet Hyakutake. (credit: E. Kolmhofer & H. Raab via Wikipedia)

Because they can be so big, consist mainly of water ice and there are probably a great many lurking in the outer reaches of the solar system impacting comets have long been thought to have delivered the water that makes the Earth so dynamic and, so far as we know, the only place in near-space that hosts complex life. Remote sensing studies of the isotopic composition of water in one comet (Hartley 2) caused great excitement in 2011 by showing that its ratio of deuterium to hydrogen was very similar to that of Earthly ocean water. Other D:H ratios have recently been published from a suite of meteorites gleaned from the surface of Antarctic ice (Alexander, C.M.O'D.

et al. 2012. The provenances of asteroids, and their contributions to the volatile inventories of the terrestrial planets. *Science*, v. 337, p. 721-723). These meteorites are carbonaceous chondrites thought to be the source of much of the solid material in planets of the Inner Solar System. To cut short a long and closely argued argument, it seems that the CI-type chondrites' water is isotopically quite different from that in analysed comets, knocking another popular hypothesis on the head; that comets and carbonaceous chondrites formed in the same part of the Solar System.

Since hydrocarbons in comets – known from interplanetary dust particles – contain hydrogen with a far richer complement of its heavy isotope deuterium than does cometary water ice, the crashing of entire comets onto planets such as the Earth would not produce the observed terrestrial D:H ratio even though their water ice alone does match it. The US, British and Canadian meteoriticists conclude what seems to be a unifying explanation whereby CI chondritic solids and volatiles alone would have been able to form the Inner Planets and their various complements of water by initial accretion. Comets as a second-stage source, in this account, are relegated to mere curiosities of the Solar System with little role to play other than occasional big impacts that may, or may not, have influenced evolution by the power that they delivered not through their chemistry.

Related articles

Earth's water piggybacked on asteroids, not comets (newscientist.com)

2 Solar System puzzles solved (esciencenews.com)

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Posted in Planetary, extraterrestrial geology, and meteoritics

Tagged Carbonaceous chondrite, Comet, Earth's water

Is there misconduct in geoscientific research?

Posted on August 25, 2012 by Steve Drury | Leave a comment

Dreaming Spires (credit: Steve Daniels via Wikipedia)

Brian Deer, the British investigative journalist who exposed Andrew Wakefield's methods that implicated the MMR vaccine as a cause of autism, has broadened his scope to research misconduct throughout science (Deer, B. 2011. *Doctoring the evidence: what the scientific establishment doesn't want you to know*. The Sunday Times, 12 August 2012, p. 16). His article comes in the wake of several related articles in leading scientific journals (Enserink, M. 2012. *Fraud-detection tool could shake up psychology*. *Science*, 6 July 2012, p. 21-22. Macilwain, C. 2012. *The time is right to confront misconduct*. *Nature*, 2 August 2012, p. 7. Godlee, F. 2012. *Helping institutions tackle research misconduct*. *The British Medical Journal*, 10 August 2012). The focus has shifted in the last decade from a major campaign against plagiarism by students tempted by the information largesse of Wikipedia, Google and other electronic treasure troves to unwholesome behaviour among university academics. In an age when redundancy at universities has become an issue for the first time in nine centuries, many academics – frenzied by looming cuts – are engaged in a Gaderene rush for promotion and funding. The now obligatory stream of 'learned' papers seeks to justify their own puff and, equally as important, the puff of their departments, faculties and institutions trying to blag their corporate way through funding shortages. Misconduct is the child of education-as-commodity.

There are three mortal sins of academic fraudulence: plagiarism, including self-plagiarism (see *Self-plagiarism*, 6 January 2011); data falsification, including fiddling with those of other people (see *Sabotage in Science*, 4 November 2010), and fabrication of data, such as starting with a made-up graph and then using it to create plausible values in a table. Venial sins include publishing much the same data and interpretations again and again. The last highlights one of the reasons why miscreants get away with their chicanery and benefit from it; sloppy academic editing and even sloppier peer review.

Deer observes that 'The science establishment's consensus is that there is no need for outside scrutiny because ... science is above that kind of misconduct that has tainted the Roman Catholic church, politics, the press and, of course, the banks.' But, as in these notorious cases, the lid is coming off scientific misconduct, largely through the bravery of 'whistle-blowers' within the system. Yet the offenders who have been unmasked were unfortunate enough to work in institutions that have appropriate investigative mechanisms and the will at high office to use them. That determination to maintain the highest ethical standards is perhaps not as widespread as it once was.

Geoscientists have yet to figure much in the rogues' gallery of malfeasants, except for the odd light-fingered palaeontologist. That may have something to do with the vagueness of much of their scope, epitomised by the trajectory of a lithological boundary on a geological map of poorly exposed ground. Indeed, virtually every aspect of the science is open to many interpretations, and errors of omission are perhaps more common than those of commission – any field worker knows that they will inevitably have missed something. But there are quantitative, laboratory-based aspects of the science, such as radiometric dating, that are more readily scrutinised for malpractice. In the early days of using radioactive isotopes and their daughter products to work out an age for an igneous or metamorphic event a common analytical tool was the isochron plot, as in the Rb-Sr method. A 'good' age was signified by all the data points falling on or very close to the line of best fit from which an age was calculated. Consequently, there may well have been cases where errant data were conveniently 'lost', but there was no way of telling.

That it did happen emerged from the honesty of those isotope geochemists who openly admitted that some mass-spectrometry runs had been omitted because the samples showed some signs of 'contamination' or 'open-system behaviour'. For that they were merely taken to task by those who disagreed with their findings, but excused by those whose ideas the results supported: ethically honest. But how many Rb-Sr runs never made it to a published data table? Things are now a great deal more sophisticated than the days of punched tape and IBM cards in the geochemistry lab, geophysical software and that used for the growing cottage industry of process modelling. So much data and such a wealth of corrections that vast spreadsheets develop in the course of analysis, correction and calculation: few peer reviewers are going to go through data-processing steps with a fine-tooth comb, even if they have been lodged in public data repositories. Such settings provide ample scope for data invention, 'fiddling', 'fudging' and, in labs with a cavalier attitude to security, stealing but little way of pinning down any malpractice: that is, unless a culprit is either carelessly overconfident or a serial offender. A simple test that any peer reviewer might apply, most usefully at random, is to ask for a copy of laboratory notes associated with a manuscript. If one is not forthcoming, then suspicions will arise naturally.

Ivory Towers, Chancery Lane, London. (credit: Colin Smith via Wikipedia)

Time cannot be far off when the laser-beam spot moves across geoscience labs. Are they audited by disinterested peers and in such a small tightly-knit discipline are there such individuals? Do managing academics scrupulously keep records themselves and demand that

their research fellows do likewise? Are there victims or witnesses brave enough to blow the whistle on any spite, fraud or slovenly methods, or will our science remain in its habitual state of bliss?

Related articles

Scientific Fraud Prevalent Among Science-Based Medicines (sott.net)

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Posted in Ethics, and the philosophy and practice of science

Hominin round-up

Posted on August 10, 2012 by Steve Drury | Leave a comment

Neanderthal 'high-carb' diet and self-medication

Reconstruction of a Neanderthal man (H. Neumann / Neanderthal Museum)

There is no doubt that the reconstruction of DNA from Neanderthal and Denisovan fossils is the most important forensic breakthrough as regards hominin evolution and relationships, but another approach has is starting to shed light on past lifestyles. Most workers have regarded Neanderthals as being predominantly meat-eaters from the evidence for their big-game hunting feats. In an attempt to get close to their actual diet some researchers have begun to exploit the lack of dental hygiene among fossil hominins: many teeth bear plaque or dental calculus (hardy, K. and 16 others 2012. Neanderthal medics? Evidence for food, cooking, and medicinal plants entrapped in dental calculus. *Naturwissenschaften*, v. 99, p. 617-626). Karen Hardy of the Universitat Autònoma de Barcelona and British, Spanish and Australian colleagues used gas chromatography and mass spectrometry and analysis of trapped microfossils in Neanderthal teeth to explore their everyday lives.

The results show signs of wood smoke: a good indicator of cooking and perhaps smoke preservation. Bitumen traces help confirm its use in hafting tools. But the most interesting feature is the consistent identification of cooked carbohydrate residues, enzyme activity on which would have produced the sugars strongly implicated in the formation of substantial plaque deposits. The data suggest that nuts, grass seeds, and possibly even green vegetables were a major part of the Neanderthal diet, A fascinating outcome is the discovery of molecules of the compounds that confer bitterness on a number of herbs with known medicinal properties, such as yarrow and chamomile. That does not prove that Neanderthals were accomplished herbalists, for many primates seek out such plants when feeling ill and even domestic cats will be seen eating grass if they have digestive problems or worms. Yet practical knowledge of herbal remedies cannot be ruled out. This novel, hi-tech approach to life-style analysis will surely blossom for most fossilized hominin dentition bears plenty of plaque. We await with interest the first signs of regular use of tooth-cleaning with woody fibres.

Neanderthals and Aurignacians survived massive volcanic disaster

About 39 thousand years ago the famous volcanic field of the Campi Flegrei west of Naples underwent a massive explosive eruption that created a huge ash plume whose deposition blanketed most of southeastern and eastern Europe with the Campanian Ignimbrite. The ashfall and the probable disruption of climate and ecosystems over a number of years would have greatly stressed both Neanderthal and modern human (Aurignacian) populations of the area. There are a few sites in the Ukraine and Russia where tools occur below, within and above the ash deposit, but little to suggest the extent to which both populations were affected. However, tangible ash deposits are not the only evidence for volcanic events in human history: fine ash would have permeated everything during the eruption. A host of European geologists and archaeologists have sought microscopic evidence of the Campanian Ignimbrite in sediments within caves that were occupied at this time (Lowe, J. and 41 others 2012. Volcanic ash layers illuminate the resilience of Neanderthals and early modern humans to natural hazards. *Proceedings of the National Academy of Sciences* doi/10.1073/pnas.1204579109): ignimbrite events are signified in cave deposits by ash dominated by minute glassy shards, whose shape is distinctive. The study was able to show that although the effects of the 39 ka eruption must have been devastating for local humans, both groups pulled through. The fact that Neanderthals survived the eruption and attendant prolonged climatic cooling suggests indirectly that their eventual demise was probably not a result of ecological disaster and more likely to have reflected their incapacity to compete successfully with the Aurignacian and later fully-modern human cultures.

Quite a crowd

Olduvai gorge Tanzania (credit: Ingvar via Wikipedia) See also:

http://upload.wikimedia.org/wikipedia/commons/archive/5/51/20080801124518%21Olduvai_Gorge.jpg

Who was the earliest human? Initially this accolade went to *Homo habilis*, first found by Louis Leakey at Olduvai Gorge, Tanzania in 2 Ma old sediments. Similar fossils turned up at Koobi Fora on the shores of Lake Turkana (formerly Lake Rudolr) in Kenya also thanks to the Leakey dynasty. Yet as more remains of that antiquity were found differences among them began to emerge, which some ascribed to different species and others to effects of sexual dimorphism among *H. habilis*. The majority view emerged of two distinct species *H. habilis* and *ergaster* but the possibility of a third cohabiting member of the early East African human family was clung to in the shape of the single-fossil '*H. rudolfensis*'. There the issue stood for more than two decades. Then, in the manner of London Transport, fossils of three individual humans were unearthed at Koobi Fora by the determined Leakey family (Leakey, M.G. et al. 2012. New fossils from Koobi Fora in northern Kenya confirm taxonomic diversity in early *Homo*. *Nature*, v. 488, p. 201-204). They seem to have confirmed three separate cohabiting species of human in Kenya in the period between 1.8 and 2.0 Ma: *habilis*, *rudolfensis* and *erectus/ergaster*. Now, this is quite odd as the threefold morphological distinction ought to reflect three lifestyles sufficiently different to support the species over several hundred thousand years. Hopefully, there are teeth and dental plaque...

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The Martian 'sexy beast'

Posted on July 27, 2012 by Steve Drury | [Leave a comment](#)

Artist's concept of NASA's Mars Science Laboratory (Curiosity) near a canyon on Mars. (Credit: NASA-JPL via Wikipedia)

Why is 'Curiosity' the latest Mars rover aimed to land at Gale Crater? It seems to have been filled with stratified sediments deposited in the crater over perhaps as long as two billion years after it formed by a meteorite impact. The sediments now occur as a relic of later aeolian erosion at the centre of the crater in the form of a large mound that Curiosity is designed to climb and sample. The big attraction is the detection of clays and sulfate minerals in the sediments using multispectral remote sensing. They clearly suggest the influence of water in the formation of the sediments, hence the suggestion that they are lake sediments. On that assumption, Gale Crater is hoped to be a fruitful site for seeking signs of former biological processes: given the technical circumstances of the mission it is deemed the best site there is on Mars for NASA's Mars Science Laboratory.

Sulfates on Mars have excited geologists enormously, along with their companion clays, because they signify the influence of abundant acid water in the breakdown of Martian primary igneous rocks from which the sediments have undoubtedly been derived. Their formation is undoubtedly the geoscientific 'sexy beast' of the last four or five years. Given multi-channel remotely sensed data – and Mars labs are awash with them from several previous missions – sulfates are easy to detect from their distinctive reflectance spectra so there has been abundant pay-back for geologists involved with the Red Planet. But there is water and there is...water. It is hoped to be proved that the depositional medium was standing water or at least abundant subsurface aqueous fluids, which may have lingered for long enough for living organisms to have formed. But there is a possibility that sulfates can form, and so too clays, by superficial weathering processes beneath a humid atmosphere.

An oblique view of Gale crater showing the landing site and the mound of layered rocks that NASA's Curiosity rover will investigate. The landing site is outlined in yellow. (Credit: NASA-JPL via Wikipedia)

Erwin Dehouck and team of French geochemists set out experimentally to recreate conceivable atmospheric and climatic conditions from Mars's early history to mimic weathering processes (Dehouck, E. et al. 2012. Evaluating the role of sulfide-weathering in the formation of sulfates or carbonates on Mars. *Geochimica et Cosmochimica Acta*, v. 90, p. 47-63). The experiment involved liquid water and hydrogen peroxide (detected in Mars's present atmosphere and probably produced photochemically from water vapour) in contact with a CO₂ atmosphere. Martian surface conditions were simulated by evaporation of H₂O and H₂O₂ to mix with dominant CO₂, which allowed 'dew' to form on the experimental samples. The samples consisted of ground up olivine and pyroxene, important mineral constituents of basalt – feldspar was not used. – mixed with the iron sulfide pyrrhotite, commonly found in terrestrial basalts and meteorites judged to have come from Mars. Samples of each pure mineral and mixtures with the sulfide were left in the apparatus for four years and then analysed in detail.

Even in such a short exposure the silicate-sulfide mixtures reacted to produce sulfate minerals – hexahydrite (MgSO₄·6H₂O), gypsum (CaSO₄·2H₂O) and jarosite (KFe₃(OH)₆(SO₄)₂), together with goethite (FeOOH) and hematite (Fe₂O₃). Without the presence of sulfides, the silicate minerals barely broke down under the simulated Martian conditions but did produce traces of magnesium carbonate. The sulfate bearing assemblages look very like those reported from many locations on Mars. The acid conditions produced by weathering of sulfides to yield sulfate ions are incompatible with preservation of carbonates, as the experiment indicates. However, there are reports of Martian sediments that do contain abundant carbonate minerals.

The researchers' conclusions are interesting: "These results raise doubts on the need for a global acidic event to produce the sulfate-bearing assemblages, suggest that regional sequestration of sulfate deposits is due to regional differences in sulfide content of the bedrock, and pave the way for reevaluating the likelihood that early sediments preserved biosignatures from the earliest times". Weathering by dew formation seems quite adequate to match existing observations.

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The oldest impact structure

Posted on July 26, 2012 by Steve Drury | [Leave a comment](#)

Ilulissat Greenland (credit: Wikipedia)

Various lines of evidence, such as sedimentary deposits of glass spherules and shocked minerals or signs of unusual isotopic chemistry (see Ejecta from the Sudbury impact and Evidence builds for major impacts in Early Archaean in EPN April 2005 and August 2002) point to the predicted intensity of meteorite or comet bombardment of the early Earth, and evidence is growing for some events that had global effects. Yet no actual impact sites from the Archaean Eon have been found, until recently. That is not entirely unexpected because erosion during the last few billion years will have removed all trace of the characteristic surface craters. But perhaps there is cryptic evidence in Archaean terrains for the deeper influence of impacts: after all, the depth of penetration of large meteoritic 'missiles' would have been of a similar order to their diameter where shock structures in minerals would slowly anneal and impact-generated melts would crystallise slowly enough to masquerade as plutonic igneous rocks.

Close to the Arctic Circle in SW Greenland Archaean gneisses are associated with a roughly 200 km wide geomagnetic anomaly and regionally curvilinear features that suggest a series of concentric closed structures over a 100 km diameter area (Garde, A.A. et al. 2012. Searching for giant, ancient impact structures on Earth: The Mesoarchaean Maniitsoq structure, West Greenland. *Earth and Planetary Science Letters*, v. 337, p. 197-210). Adam Garde and colleagues from the Greenland Geological Survey, Cardiff University UK and Lund University Sweden focused on the central part of these anomalies where gneisses are extensively brecciated with signs of annealed shock-induced lamellae in quartz, feldspar melting and fluidization of highly comminuted mylonites. They ascribe this assemblage of features on a variety of scales to the effects of a major meteorite impact on 25 km deep continental crust. The metamorphic complex contains the famous Amitsoq Gneisses that once had the status of the world's oldest rocks at around 3.8 Ga, but is dominated by migmatites formed around 3.1 Ga that are akin to the Nuuk Gneisses from further south.

The possible signs of a deeply penetrating impact are cut through by small ultramafic intrusions, zircons from which yield $^{207}\text{Pb}/^{206}\text{Pb}$ ages between 3.01 and 2.98 Ma, confirming the structures' Mesoarchean age. An interesting and unanswered question concerns the origin of these magmas together with marginally younger, voluminous granites. Were the ultramafic magmas generated by high degrees of partial melting of mantle as a result of the immense energy of impact? Having temperatures well above those of basaltic melts, could the ultramafic intrusions in turn have induced crustal melting within the depths of a large impact basin?

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Burrowers: knowing front from back

Posted on July 10, 2012 by Steve Drury | Leave a comment

In sedimentary rocks below the base of the Cambrian there is not only a dearth of body fossils, but signs of creatures burrowing and stirring up the sediment are most uncommon. A burrower needs several criteria to be fulfilled: a supply of oxygen; sufficient food; a body able to penetrate and an ability to move back and forth, but forth would probably do fine, provided the animal could turn corners. The amount of oxygen in bottom waters would have influenced its availability beneath the seabed. Whatever the conditions, dead organic matter falls and is buried by sediment before it is oxidised away, even nowadays. There is little sign that there was any marked change between the oxygenation of the planet just before and after the start of the Cambrian Period, so the main control over burrowing is that of animal morphology.

Many modern burrowing animals are pretty flaccid but moving sediment aside and upwards demands some muscle power. Most important, the creature needs a means of navigation, albeit of a rudimentary kind, and since what goes in beneath the surface – food – must go out – excreta – there must be a front- and a back end. That 'fore-and-aft' symmetry is the essential feature of bilaterian animals. Only a limited range of animal taxa don't have that built-in. Sponges are the most obvious example, having no discernible symmetry of any kind. Radially symmetrical animals such as jellyfish and coral polyps only have a top and a bottom. An absence of inbuilt horizontal directionality stops non-bilaterians from burrowing in any shape or form. But, so what?

The vast majority of animals have some kind of bilateral symmetry; even echinoderms have it from their 5-fold symmetry that is also the simplest kind of radiality. By the start of the Cambrian, not only had bilaterians split off from the less symmetrical but almost all the phyla living today, and several that became extinct in the last 542 Ma, have representatives in the Cambrian fossil record. The only logical conclusion is that emergence of bilaterians and their fundamental diversification took place in the Precambrian: they are absent from earlier strata only because they had no hard parts. Comparing the DNA of living representatives of the main bilaterian phyla and with that of non-bilaterians can help date the times of genetic and morphological separation, but only crudely. This 'molecular clock' approach points to some time between 900 and 650 Ma ago for the last common ancestor of bilaterians.

Uruguayan fossil burrows from late Neoproterozoic (Credit: Pecoits, E. et al. 2012)

Getting a handle on the minimum time for the split depends either on finding fossils or unequivocal signs of bilaterian activity. The oldest unequivocally bilaterian fossils occur in rocks about 550 Ma old, which doesn't take us much further back than the base of the Cambrian. But there are trace fossils that are significantly more ancient (Pecoits, E. et al. 2012. Bilaterian burrows and grazing behaviour at >585 million years ago. *Science*, v. 336, p. 1693-1696). They are tiny burrows in fine-grained sediments from Uruguay, so tiny that there is a chance that they may be traces of grazing bacterial films on the seabed rather than beneath it. The decider is the mechanics of trace fossil formation. Surface tracks only a millimetre or so across would only penetrate the biofilm, so on lithification they would simply disappear. Burrows on the other hand penetrate the sediment itself to get at food items. Even if this was a biofilm, the track would be in sediment above the film, so compaction would preserve it. The Uruguayan exam- [les are exquisite horizontal burrows, and they push back the minimum age for the origin of the bilaterians to at least 40 Ma older than the start of the Cambrian. In fact 585 Ma is a minimum age for the sediments as it is the U-Pb age of zircons in a granite that intrudes and metamorphoses them.

An equally significant observation is that the burrows only appear towards the end of a glacial episode – probably the last of the Neoproterozoic 'Snowball Earth' events – as marked by tillites below the burrowed shales and occasional 'dropstones' in them. Could it be that the climatic and other stresses of a global glaciation triggered the fundamental division among the Animalia?

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Eats barks leaves nuts and fruits

Posted on July 10, 2012 by Steve Drury | Leave a comment

The Malapa valley South Africa, where *Australopithecus sediba* was found. (Credit: Lee R. Berger via Wikipedia)

The first stone tools and bones that had been cut by them, found in rocks dated at 2.5-2.6 Ma in the Bouri area of Ethiopia's Afar Depression, have generally been taken as a sign that their invention was connected with more easily accessing meat for food. A corollary of this idea is that it was the introduction of meat into the hominin diet that helped 'fuel' the growth of their brains: meat-tools-brain interrelated in an evolutionary sense. There is a spatial link between such tools and fossils of *Australopithecus*, but direct attribution of the tools to these australopithecines has not been widely accepted. It is more generally accepted that a link to tools can be made with *Homo habilis*, but they lived, at the earliest, 200 to 300 ka later. The wear patterns on their teeth and association with animal bones bearing cut marks has been taken to indicate that at least part of their diet was meat.

Another approach to diet is to analyse the proportions of stable carbon isotopes (^{13}C and ^{12}C) in tooth enamel, which can discriminate between the ultimate plant source in their diet, i.e. between grasses that use the C_4 photosynthetic pathway and the C_3 version used by woody and herbaceous plants. The isotopic 'signature' of plants is also passed on to animals, depending on what vegetation they eat,

and so up the food chain to predators and the scavengers that depend on their leavings. South African *Au. africanus* of around 2.5 Ma ago show a definite C4 preference as do local paranthropoids ('robust' australopithecine-like creatures) from around 1.8 Ma. The early humans *H. habilis* and *H. ergaster* also show the C4 isotopic proportions, which in both cases may be from a meaty diet or from a vegetarian component. The main point from these similar results, whatever the plant-meat proportions being consumed, is that these hominins were very different from chimpanzees in their eating habits, and probably as regards their habitats: savannah rather than woodlands respectively.

There are no reports of C-isotope research on *Au. garhi* teeth, but results from 2 Ma old *Au. sediba* found in South Africa have just been published (Henry, A.G and 8 others 2012. The diet of *Australopithecus sediba*, *Nature*, v. 487, p. 90-93) along with plant materials from dental plaque and tooth wear patterns. *Au. sediba* is notable for its very modern-looking hands and other 'advanced' features(<http://earth-pages.co.uk/2011/10/12/another-candidate-for-earliest-direct-human-ancestor/>). Some believe it to have been closer to the direct line of human descent than a number of other hominin species, including the poor quality remains of *H. habilis*. So, did *sediba* eat meat? The forensic evidence suggests something unexpected. The C-isotope data points towards food dominated by C3 plants – less grasses and sedges, and more shrubbery. Tooth wear suggests bark was eaten, while plant remains from plaque indicate fruit leaves and wood. This is a feeding pattern more like that of chimpanzees than *Homo* species, *Au. africanus* and the paranthropoids that are roughly contemporary with *Au. sediba*. Ecological analysis of the sediments which buried the hominin specimens suggest a seasonal climate and savannah biome with abundant C4 plants that supported grazing herds, mixed with possibly some denser woodland along drainages. This is a pattern familiar from living savannah chimpanzee bands.

The hand and forearm of *Australopithecus sediba* (Credit: Peter Schmid, courtesy Lee R. Berger via Wikipedia)

So, despite being an 'advanced' hominin, by carrying clear signs of foods that were not consumed by meaty potential prey animals *Au. sediba* probably was not a meat eater. Yet species with strong C4 'signatures' cannot be assigned to carnivory on C-isotope evidence alone. One has to decide from other data, such as tooth-wear and plaque, whether this or that hominin ate grasses, those that clearly did not becoming candidates for dominantly meat-eating. How to detect a tool-using species with a mixed diet, akin to more modern humans, is a tough nut to crack.

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A mighty sag or a big wrench for Mars

Posted on July 10, 2012 by Steve Drury | Leave a comment

Colour-coded relief map of the Tharsis bulge on Mars, with Valles Marineris at left centre (Credit: Goddard Space Flight Center, NASA, via Wikipedia)

In the Solar System topographic features don't come larger than Valles Marineris on Mars. At between 5 to 10 kilometres deep and extending along a fifth of the planet's circumference, it makes the Grand Canyon and The Gorge of the Nile look puny.

The base and margins of this stupendous valley contains all manner of evidence for erosion, huge landslips and signs of collapse into voids in Mars's crust. Much of the erosion on Mars seems to have stemmed from catastrophic floods several billion years ago, though whether they were all of water or if some were volcanic in origin is being debated (Leverington, D.W. 2011. A volcanic origin for the outflow channels of Mars: Key evidence and major implications. *Geomorphology*, v. 132, p. 51-75 http://www.webpages.ttu.edu/dleverin/leverington_mars_outflow_channels_geomorphology_2011.pdf , but see <http://www.universetoday.com/94367/did-water-or-lava-carve-the-outflow-channels-on-mars/>)

It is difficult to imagine anything other than some kind of fault control over the almost straight, roughly east-west trend of Valles Marineris, but the scale suggests, again, an unmatched scale of tectonics. It has long been thought that the massive canyon resulted from extensional rifting that created a major weakness etched out by later erosion and/or collapse into huge subsurface voids in the crust. Yet there is little sign of commensurately large faults, though there are some. But the structure is an integral part of yet another superlative. It is on the eastern flank of the mighty Tharsis bulge on which several humongous volcanoes, including Mons Olympus, developed: perhaps there is a causal link between the two dominating features.

Jeffrey Andrews-Hanna of the Colorado School of Mines in the US has tried to model the bulge-chasm pair, coming to the conclusion that there is little sign of major extension. The finale of his study zeroes-in on the possibility of dominant subsidence producing the structure (Andrews-Hanna, J.C. 2012. The formation of Valles Marineris: 3. Trough formation through super-isostasy, stress, sedimentation, and subsidence. *Journal of Geophysical Research*, v. 117, E06002, doi:10.1029/2012JE004059).

In this model, the Tharsis bulge and its associated volcanic province rose so high that on the scale of the planet it must have created a large positive gravitational anomaly. This remains for the most part, but in the Valles Marineris region the crust is now either in isostatic balance or has large negative gravity anomalies, complicated by the fact that the very carving of the canyon system must have resulted in some uplift through unloading. For a while the whole bulge was supported in this gravitationally unstable state by the strength of the Martian lithosphere, and most of it is still in a state of disequilibrium.

Andrews-Hanna's novel view is that a small amount of extension allowed residual magma to rise in linear zone along the eventual length of Valles Marineris as dykes. The magmas and their heating effect reduced the strength of the lithosphere, locally removing support for the huge load, which subsided. By creating greater slope on the surface of Tharsis the subsidence would have become a focus for both erosion and sedimentation, the increased sedimentary load adding to the subsidence to give the present stupendous depth of the canyons and chasms.

Simulated oblique view of the topography of Valles Marineris looking westwards (Credit: Goddard Space Flight Center, NASA, via Wikipedia)

But this isn't the only model for the canyon system (Yin, A. Structural analysis of the Valles Marineris fault zone: Possible evidence for large-scale strike-slip faulting on Mars. *Lithosphere*, v. 4 doi:10.1130/L192.1). An Yin of the University of California used a combination of remote sensing data from Mars Reconnaissance Orbiter and Mars Odyssey to perform detailed lithological and structural mapping along Valles Marineris. What emerged were several fault zones up to 2000 km long. Instead of an expected extensional sense of movement they are strike-slip faults, with displacements of the order of 100 km in a left-lateral sense. Yin's model is that the canyon system be an as a zone of transtensional deformation: very different from that of Andrews-Hanna. It also begs the question of the underlying tectonic processes, because strike-slip zone on Earth are usually associated with distributed stress from plate tectonics.

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For an entertaining, if sometimes bizarrely speculative tour of the Martian landscape, check out http://www.youtube.com/watch?feature=player_embedded&v=2wOogk2LSSw#!

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