

INFORME GEOBRASIL

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Fotos tiradas do site da Nasa

✧ **FOTO DA SEMANA**
Uma Superbolha Cósmica

✧ **NOTICIAS METEORITICAS**
Meteorito encontrado na China

✧ **ÍNDICE DE NOTÍCIAS**

✧ **JORNAL DA CIENCIA**

Edição 4305 - Notícias de C&T - Serviço da SBPC

Edição 4304 - Notícias de C&T - Serviço da SBPC

Edição 4303 - Notícias de C&T - Serviço da SBPC

Edição 4302 - Notícias de C&T - Serviço da SBPC

Edição 4301 - Notícias de C&T - Serviço da SBPC

✧ **AMBIENTE BRASIL**

✧ **SCIENCE**

✧ **EARTH PAGES**

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✦ FOTO DA SEMANA

Uma Superbolha Cósmica



O Very Large Telescope do ESO capturou esta imagem extraordinária da nebulosa que envolve o enxame estelar NGC 1929 situado na Grande Nuvem de Magalhães, uma galáxia satélite da nossa própria Via Láctea. Esta maternidade estelar é dominada por o que os astrónomos chamam uma superbolha. Este objecto está a ser esculpido tanto pelos ventos ejetados pelas estrelas brilhantes jovens como pelas ondas de choque originárias das explosões de supernovas.

Este texto é a tradução da Nota de Imprensa do ESO eso1125, cortesia do ESON, uma rede de pessoas nos Países Membros do ESO, que servem como pontos de contacto local para os media em ligação com os desenvolvimentos do ESO, Notas de Imprensa, etc. O representante do nodo português é João Fernandes, do Departamento de Matemática da Universidade de Coimbra. A nota de imprensa foi traduzida por Margarida Serote.

✦ NOTÍCIAS METEORITICAS

Meteorito encontrado na China

http://www.chinadaily.com.cn/photo/2011-07/19/content_12932999.htm



Astrônomos inspecionaram um grande meteorito que foi encontrado na prefeitura Altay, Xinjiang Uygur Região Autónoma, em 17 de julho de 2011. A parte acima da terra da rocha é de 2,2 metros de comprimento e 1,25 metros de altura, com uma largura de 1,2 metros (dados médios). Seu peso é estimado em 25 toneladas.

Photo / Xinhua

‡ ÍNDICE DE NOTÍCIAS

‡ JORNAL DA CIÊNCIA

Edição 4305 - Notícias de C&T - Serviço da SBPC

1. A logística do lixo
2. Administração é o curso que mais formou profissionais com bolsas do ProUni
3. Vale e Petrobras acertam megaprojeto de potássio
4. Tecnologia torna genoma de US\$ 1.000 possível, diz firma
5. Aluno de universidade pública poderá prestar serviço obrigatório
6. Depósito definitivo de rejeito radioativo será escolhido por meio de licitação pública até 2018
7. Angelo Padilha visita o Ipen
8. Pela primeira vez, ouro para o Brasil na Olimpíada Internacional de Física
9. Financiamento da energia elétrica
10. Bunge inaugura usina de etanol para abastecer Norte e Nordeste
11. De olho no pré-sal
12. Telescópio Hubble acha quarta lua em Plutão, o planeta rebaixado
13. Argentina triplicou o setor de TI com a criação de leis de incentivo
14. Dinâmica do exoesqueleto
15. Mosquito da Dengue pode sobreviver se alimentando apenas de plantas
16. PUC-RIO sedia em agosto Conferência sobre aerossóis
17. Unicamp abre inscrições para Mestrado e Doutorado em Odontologia
18. Fórum Internacional SPDM: Saúde em 2021
19. Universidade Estadual da Bahia abre concurso para professores de Química

Edição 4304 - Notícias de C&T - Serviço da SBPC

1. Lei florestal pode encarecer indenizações
2. Rios em péssimas condições
3. Nordeste perde um quinto dos reservatórios de água em 2010
4. Brasil supera Índia em lista de inovação
5. Brasil assume liderança do Programa Ibero-Americano de Inovação
6. Mais trabalhadores estrangeiros
7. Ciência de apenas um estudo baseou alterações no Código Florestal
8. Meus chutes, aguardando o planejamento
9. Biblioteca da vida
10. De volta para casa
11. Bolsas para estrangeiros têm inscrições abertas até dia 29
12. PLS 387/2011: Uma Nova Esperança para o Acesso Livre no Brasil
13. Estados Unidos registra 2,7 milhões de 'empregos verdes'
14. Aberta seleção de candidatos ao cargo de diretor do CBPF
15. A nutrição de peixes e a fome mundial
16. Conexões entre a Ciência e Literatura
17. Unesco e governo do Japão oferecem bolsas de doutorado
18. Seminário sobre museologia
19. UFPB abre concurso para professor de Farmácia

Edição 4303 - Notícias de C&T - Serviço da SBPC

1. Governo faz plano para País ter mais médicos
2. Curso superior de formação geral ganha espaço
3. Estudo faz diagnóstico atualizado da situação da água e de sua gestão no Brasil
4. Marinha anuncia produção de submarinos com tecnologia francesa
5. China quer investir mais em energia e agricultura
6. O futuro do Brasil depende da educação
7. Reciclagem invisível
8. Inovar é preciso
9. Sentido invertido
10. Cientistas alemães descobrem fóssil de inseto de cerca de 145 milhões de anos
11. Colóquio trata sobre projeto de lasers de elétrons livres no CBPF
12. Tocantins lança nesta terça o "Acerte os ponteiros com o Enem"
13. Programa seleciona leitores para universidades estrangeiras
14. Processo seletivo da Incubadora de Empresas da Coppe vai até 15 de agosto
15. Olimpíada de História alcança todos os estados brasileiros
16. Universidade Estadual do Paraná abre concurso para professor de biologia
17. Prorrogadas as inscrições para 12º Salão de Iniciação Científica da PUCRS
18. PD em radioastronomia com Bolsa da Fapesp
19. CET/UnB contrata gestor de projetos

Edição 4302 - Notícias de C&T - Serviço da SBPC

1. 63ª Reunião Anual da SBPC se encerra com mais de 8 mil participantes
2. Maranhão já se organiza para receber a SBPC 2012
3. Belo Monte esquentando debate em Goiânia
4. Pesquisador defende que o Brasil continue investindo em energia nuclear
5. Ciência sob encomenda baseou alterações no Código Florestal
6. Somente 4% dos brasileiros visitam museus
7. Ensino americano abandona aos poucos a escrita em cursivo
8. Logística de guerra para montar Belo Monte no Pará
9. Os problemas mundiais de energia
10. Mitos ambientais
11. Cadê minha bandeira?
12. PAISS recebe 57 propostas de financiamento
13. Projeto aposta no cultivo da seringueira como fonte de renda e sustentabilidade
14. Profissionais do setor hidrológico podem se inscrever no curso à distância sobre meteorologia por satélite
15. Fapesp abre chamada com universidades de Toronto e Western Ontario
16. Fapemig investe mais de R\$ 6 milhões em dois editais
17. Unisc promove 5º Colóquio Nacional Leitura e Cognição
18. FEI abre inscrições para Mestrado em Engenharia Elétrica
19. Conferência discutirá o futuro da Biologia e da Medicina no Brasil

Edição 4301 - Notícias de C&T - Serviço da SBPC

1. Diretoria e Conselho da SBPC tomam posse
2. Jurista propõe medidas para desburocratizar compras, importação de insumos e acesso à biodiversidade
3. Produção científica precisa de estímulos no novo marco legal para acompanhar avanço do PIB
4. Ciência em Ebulição discute reforma do Código Florestal
5. Programa Espacial Brasileiro necessita de R\$ 20 bilhões
6. Especialistas debatem a qualidade nas avaliações
7. Qualidade da educação depende de cumprir metas
8. Governo vai realizar concurso para atrair cientistas estrangeiros para o País
9. Educação inferior
10. 'Só minimizo impacto', diz chefe do IBAMA
11. Twitter e Facebook podem ser usados para prever epidemia de dengue
12. De coro indesejável
13. Brasileiros ganham prêmio em olimpíada de tecnologia da Microsoft
14. "A questão do aquecimento global é uma ação individual", afirma diretor do Inpa
15. Unisc assina convênio com Angola
16. Capes lança Pró-Equipamentos
17. Tome Ciência: A vida no computador
18. Cena sedia Fórum sobre plantas ricas em taninos
19. Instituto de Física da UFBA abre concurso para professor

‡ AMBIENTE BRASIL

[Britânico compara adiar acordo climático a tentar acalmar Hitler](#)

Ministro de Mudança Climática disse que governos precisam redobrar esforços para criar substituto ao Protocolo de Kyoto.

Desmatamento com 'correntão' é flagrado em fazenda no Pará

Agentes do Ibama encontraram derrubada ilegal de 2,3 milhões de m². Corrente com elos grandes é arrastada por tratores para destruir a mata.

Chuva faz rio subir 13 metros acima do nível normal no RS

Cidade de São Sebastião do Caí decretou situação de emergência. Chuvas atingem 8 cidades e deixam mais de mil desabrigados no estado.

Onda de calor mata mais de 20 pessoas nos Estados Unidos

Cerca de 140 milhões de americanos estão sofrendo com a onda de calor que já atinge 32 estados, onde foi até decretado estado de alerta. A região central do país é a mais afetada.

MMA seleciona projetos na Mata Atlântica até 30 de julho

Serão investidos R\$ 640 mil em iniciativas de pesquisa e diretrizes para manejo sustentável do fruto da juçara, erva-mate e pinhão e de promoção da cadeia de valor do pinhão no centro-sul do estado do Paraná e região metropolitana de Curitiba.

Tubarão de 500 kg pula dentro de barco na África do Sul

Animal ficou se debatendo dentro da embarcação e precisou ser içado por cordas

Cidade de SP inicia mapeamento geográfico de áreas de rios

Objetivo é aumentar a segurança e incentivar o ecoturismo e a pesquisa.

Ibama retira os últimos cem animais silvestres do zoo de Niterói, no RJ

Liminar para impedir a remoção chegou ao final da operação, diz Ibama. Bichos vão para outros zoológicos e criadouros autorizados.

Vítima de caça, filhote de peixe-boi é resgatado de cativeiro no Amazonas

Animal tem um mês de vida e foi encontrado a 68 km de Manaus. Mamífero foi encaminhado a instituto para receber cuidados médicos.

Leão que estava separado de leoa chega ao Zoológico Brasília

Animais foram separados em fevereiro, quando Elza veio de Niterói (RJ). Reencontro dos animais deve acontecer somente após quarentena.

Aumenta o número de bovinos com suspeita de contaminação radioativa no Japão

O governo japonês proibiu na terça-feira (19) a venda de carne de gado criado em Fukushima, quatro meses após o acidente nuclear na região.

Pesquisadores reproduzem em laboratório movimentos celulares

Padrão de movimento dos filamentos é igual ao da "ola" em estádios. Estudo pode criar materiais capazes de transportar fluidos.

Estudo aponta sete medidas para evitar Alzheimer

Pesquisadores afirmam que, entre outros fatores, está o combate à depressão e a melhoria no nível de educação.

Fim do programa de ônibus espacial gera incerteza aos astronautas

Funcionários da Nasa terão que procurar serviço em empresas particulares.

Depósito definitivo de rejeito radioativo será escolhido por meio de licitação pública até 2018

Os municípios interessados poderão se candidatar para receber as medidas compensatórias que serão ofertadas em edital.

Diamantes revelam movimentos da Terra há 3 bilhões de anos

Estudo foi feito com base em incrustações minerais encontradas dentro de pedras preciosas.

Pela última vez na história, ônibus espacial pousa na Flórida/EUA

Missão foi a última tripulada da história da Nasa. Atlantis pousou, como previsto, às 6h56 desta quinta-feira (horário de Brasília).

Chile enfrenta as piores nevascas dos últimos 30 anos

O governo declarou a região sul do país como zona de catástrofe.

Chip consegue sequenciar genoma mais rápido e com custo menor

Nova tecnologia faz com que aparelho "veja a química", segundo criador.

Antártida já foi paraíso tropical, diz cientista

Segundo pesquisadora britânica, animais, incluindo dinossauros, viviam na região há cerca de 40 milhões de anos.

Nordeste perdeu 1/5 dos reservatórios de água em 2010

Segundo a Agência Nacional de Águas, a perda de reservatórios no Nordeste se deve à menor quantidade de chuvas em 2010.

Bombeiros encontram tartaruga morta em GO com anzol na boca

A tartaruga tinha cerca de dez anos, mas a espécie pode passar dos cem.

Estudo com animais atropelados vai ajudar no combate a doenças graves

Pesquisadores da Unesp analisam contaminação de espécies. Informações vão contribuir no combate a endemias em determinados locais.

Morre baleia que encalhou em praia do Espírito Santo

A baleia da espécie Jubarte mede aproximadamente 11 metros, diz biólogo. Instituto Orca afirma que foi o primeiro encalhe registrado no ES em 2011.

Leão depressivo e solitário em MS pode ganhar novo lar em SP

Desde 2005, felino vive em zoológico desativado em Ivinhema. Animal entrou em depressão após morte de companheira, em 2010.

Terremoto de 6,2 graus atinge sudeste das Ilhas Salomão

Situado ao leste de Papua Nova Guiné, o arquipélago de Salomão se assenta sobre o 'Anel de Fogo' do Pacífico, uma área de grande atividade sísmica e vulcânica que é golpeada cada ano por 7 mil tremores, a maioria moderados.

Nepal vai medir Everest para encerrar polêmica com China

Medição da montanha mais alta do mundo é questionada por incluir no cálculo camada de gelo sobre o monte.

Tripulação do Atlantis se prepara para o último pouso de um ônibus espacial

Os astronautas checaram os sistemas e treinam o pouso no computador. Aterrissagem está marcada para a manhã desta quinta-feira.

SP: paleontólogos retomam retirada de titanossauro de 13 m

O titanossauro foi descoberto em abril de 2009 pelo paleontólogo William Nava. Os cientistas acreditam que o animal tinha entre 11 e 13 m de comprimento.

Astrônomos descobrem uma quarta lua na órbita de Plutão

Nome provisório de satélite do planeta anão é P4. Telescópio espacial Hubble possibilitou o achado.

OMS pede fim de teste sorológico para tuberculose

Testes seriam imprecisos na detecção de um em cada dois casos.

Motivo da morte de casal no PA foi conflito de terra, diz polícia

O inquérito policial apontou como mandante das mortes o agricultor José Rodrigues Moreira, 42. Em 2010, ele comprou duas áreas com total de 790 mil metros quadrados no assentamento Praialta Piranheira, em Nova Ipixuna, o que é ilegal.

Nova técnica permite sequenciamento genético rápido e barato

Descoberta promete mapear DNA humano por 1.500 reais em até duas horas.

Cidades sustentáveis em debate no MMA

Processo insustentável de urbanização, saneamento, excesso de automóveis, carência de parques e inclusão do tema ambiental nas obras públicas serão enfocados em oficina.

Terra preta de índio pode enriquecer o solo pobre em nutrientes da Amazônia

Pesquisa multidisciplinar coordenada pela Embrapa realiza pela primeira vez estudo para desenvolver modelo de fertilização para ajudar na agricultura.

Inscrições abertas para o 3º Prêmio Melhores Práticas da A3P

Serão premiados os três melhores colocados nas categorias de gestão de resíduos; uso sustentável dos recursos naturais - água e energia; e inovação na gestão pública.

Madeira em tora ilegal apreendida pelo Ibama na divisa de Rondônia com o Amazonas

Órgão tem intensificado suas ações de fiscalização também nos distritos de Extrema, Nova Califórnia em Rondônia e no Sul de Lábrea no Amazonas.

Furacão "Dora" ganha força no Pacífico e atinge categoria 2

"Dora" é o quarto furacão da atual temporada no Pacífico, depois da passagem de "Adrian", "Beatriz" e "Calvin".

Estudo aponta água ruim ou péssima em 9% dos pontos de medição

Agência Nacional de Águas divulgou avaliação de 1.747 lugares pelo país. São 7% de água ruim e 2% de qualidade péssima; boa e ótima somam 75%.

Apesar de problemas com água, ministra do Meio Ambiente vê avanço

Isabella Teixeira diz que estudo divulgado nesta terça-feira (19) mostrou áreas críticas, mas também revelou melhoras onde chegou saneamento básico.

Irrigação é responsável por 69% do consumo de água, diz estudo da ANA

Segundo Agência Nacional de Águas, são 986,4 mil litros por segundo. Consumo nas cidades corresponde a 10% do total; e industrial é de 7%.

Grã-Bretanha estuda abate em massa de texugos

Objetivo da lei seria conter a transmissão da tuberculose bovina aos rebanhos.

Raro kiwi branco torna-se símbolo de preservação na Nova Zelândia

Nascimento em cativeiro inédito de pássaro sagrado dos maoris mobiliza o país.

Enchentes na Paraíba mataram duas crianças e há duas pessoas desaparecidas

29 municípios já decretaram situação de emergência no Estado.

Chuva atinge quase 5 mil pessoas em Pernambuco

Já são 12 municípios atingidos pela chuva no estado. Foram confirmadas nove mortes.

Japão usa robôs para consolar vítimas de tsunami

Focas robôs foram disponibilizadas em abrigos de japoneses que ainda não voltaram para casa depois de terremoto.

Encontro no Xingu reúne governos e sociedade civil

Com a presença de representantes das três esferas de governo e de representantes da sociedade civil, foram debatidos temas prioritários para o desenvolvimento sustentável do município, como a pavimentação da BR Transamazônica, regularização fundiária, saúde, educação e saúde pública.

Cidade reforça segurança para temporada de caça de golfinhos

Guarda policial será criada no Japão para evitar enfrentamento entre grupos de ecologistas e pescadores.

MMA investiga produtos químicos industriais

Informações sobre problemas causados por substâncias perigosas estão sendo apuradas para atendimento à Convenção de Roterdã, que trata do comércio mundial desses produtos que trazem risco à humanidade e à vida silvestre.

Ataques de ursos ao gado multiplicam-se na Sibéria

Comportamento fora do comum está intrigando autoridade ambiental. Ursos estão formando grupos para atacar bovinos.

Ibama promove audiência pública para discutir projeto de hidrelétrica no Rio Paraíba do Sul

A Usina Hidrelétrica de Itaocara será instalada no Rio Paraíba do Sul e terá impactos diretos em três municípios de Minas Gerais e cindo do estado do Rio de Janeiro.

Astronauta tuita passagem por cima do Rio de Janeiro

Ron Garan é parte da tripulação da Estação Espacial Internacional. Americano conversou com internautas.

Animais silvestres "fogem" para as cidades devido as queimadas em MT

O fogo atinge a vegetação de cerrado e os morros que circundam a cidade. Muitos animais não conseguem escapar e morrem queimados, os que fogem vão parar na área urbana.

Governo obtém recurso de R\$ 13 mi para controlar queimadas em MT

Recursos serão liberados pelo Fundo Nacional de Meio Ambiente. Até hoje já foram detectados 1,7 mil focos de incêndio no estado.

Animais marítimos aparecem mortos em praias da Flórida/EUA

Os testes realizados até o momento detectaram a presença de dois tipos de algas que, embora não sejam tóxicas, podem ter reduzido a presença de oxigênio na água a ponto de forçar os animais a irem para a margem e acabar sendo asfixiados.

A falta dos grandes predadores

Diminuição de animais no topo da cadeia alimentar, por conta da ação humana, tem efeitos ecológicos drásticos, indica estudo internacional publicado na Science.

Cientistas questionam eficácia de antidepressivos contra Alzheimer

Em pesquisa, remédios desse tipo não superaram placebos em resultados. Psicotrópicos e antidepressivos são os mais receitados.

Hominídeos andavam eretos há 3,7 milhões de anos

Pegadas fossilizadas mostram que bipedalismo estava presente entre ancestrais do ser humanos 2 milhões de anos antes do previsto.

Inundações no nordeste da Índia afetam mais de 200 mil pessoas

Os transbordamentos e desmoronamentos já levaram destruição em 350 localidades, embora fontes do Governo regional de Assam citadas pela agência indiana "Ians" elevaram o número de povoados afetados para 800.

China inicia mercado de emissões de CO2 em caráter experimental

O plano inclui um aumento da diferença de tarifas entre as indústrias de alto consumo energético e o resto, assim como vantagens fiscais a projetos de conservação energética.

Alterações climáticas: quase 20% dos municípios decretaram emergência ou calamidade em 2010

No total, 1.084 municípios notificaram às autoridades problemas graves como enchentes ou estiagem.

Sobe para nove o número de mortos em decorrência das chuvas em Pernambuco

Por causa das chuvas, a Defesa Civil da Paraíba decretou situação de emergência em 26 municípios e 28 estão em estado de alerta.

ONG encontra no Vietnã maior grupo de primatas com risco de extinção

Mais de 400 macacos gibões-de-bochecha-branca foram contabilizados. Total corresponderia a dois terços da população da espécie no mundo.

Filhotes de urso-polar morrem mais ao migrar, diz estudo

Entre famílias de ursos-polares que migraram, a taxa de mortalidade dos filhotes é de 45%, segundo estudo da organização ambientalista World Wildlife Fund.

Com câmera e GPS, cientistas pesquisam comportamento de gatos

Sistema, apelidado de cat-nav, registra passeios de gatos pela vizinhança.

Cientistas descobrem seis novas espécies de mariposas

Novos insetos foram encontrados nos EUA e na Costa Rica. No estudo, pesquisadores alertam para o desaparecimento de espécies.

Aneel aprova edital para contratação de geração de energia

Empreendimentos devem gerar energia a partir de março de 2014. Leilão acontece no dia 17 de agosto.

Estudo diz que remédios contra Aids são mais eficazes do que se pensava

Antirretrovirais controlam sintomas e transmissão. Dados complementam pesquisa divulgada dois meses atrás.

Algas invadem praias francesas da Bretanha

Problema está pior neste ano; seres emitem gases tóxicos e prejudicam o turismo.

Crianças e idosos são vítimas frequentes da dengue

Segundo o secretário de Vigilância em Saúde do ministério, Jarbas Barbosa, essa tendência é resultado da recirculação de alguns tipos de vírus da dengue, como o sorotipo 2.

Assentados são multados em R\$ 20,4 mil por extração de aroeira em MS

PMA encontrou aroeira cortada em assentamento de Sidrolândia, MS. Assentados foram multados e podem responder por crime ambiental.

Rússia vai enviar nave espacial para Marte em novembro

Projeto vai estudar como radiação afeta superfície do planeta vermelho.

Primeiro americano a orbitar sobre a Terra completa 90 anos

John Glenn pilotou a cápsula Friendship 7 da missão Mercury-Atlas 6, em 1962.

Câmara de descompressão entre ISS e Atlantis é fechada

Operação foi realizada um dia antes de ônibus espacial iniciar retorno à Terra.

Governo quer aumentar produção de grãos em MT sem derrubar árvores

Ao mesmo tempo em que é contra o desmate, governo incentiva produção. Medida alternativa é utilizar áreas ocupadas pela pecuária.

Supernova pode ter originado a maior parte da poeira cósmica

A descoberta leva a supor que as supernovas - estrelas que explodem - são fontes da enorme quantidade de poeira cósmica existente no Universo. Não havia nenhum indício de sua origem e as observações feitas pelo Herschel são as melhores evidências obtidas até agora.

Não-africanos são parte neandertais, diz estudo

Estudo encontrou DNA neandertal em humanos modernos. Descoberta reforça teoria de cruzamento entre as espécies.

Estudo mostra que floresta absorve 1/3 do CO2 emitido no ar

As florestas do planeta absorvem 2,4 bilhões de toneladas de carbono por ano.

Amazônia pode perder cinco cidades de SP em um ano, prevê Imazon

Desmate entre agosto de 2011 e julho de 2012 pode alcançar 7.134 km². Modelo de previsão se baseia no atual ritmo de devastação do bioma.

Florestas protegidas garantem qualidade vida

Brasil possui a segunda maior área florestal do mundo o que representa 60,7% do território nacional. O número motiva lembrar a importância do recurso para sustentabilidade do planeta.

Baleia encalhada em praia do Rio Grande do Sul é sacrificada

Exames revelaram que o animal estava doente e não resistiria por muito tempo, mesmo que fosse devolvida ao mar.

Com ferimentos, filhote de peixe-boi vai ficar isolado por 40 dias no AM

Exemplar com três meses de vida foi encontrado no interior do estado. Saúde debilitada exige tratamento intensivo para recuperar peso.

ONG encontra leopardo-das-neves em área pacífica do Afeganistão

Felinos estavam em região do país que não foi afetada por guerra. Número de animais visto por organização ambiental não foi informado.

PRF aborda acidente e descobre aves silvestres escondidas em porta malas

Apreensão aconteceu na madrugada desta sexta (15), em Ponta Grossa (PR). Dos 961 aves que estavam no porta malas, 141 estavam mortas.

Energia no Brasil é limpa, cara e desperdicada, diz físico da UFRJ

Luiz Pinguelli Rosa falou na SBPC nesta sexta (15) sobre hidrelétricas. Construção da usina de Belo Monte no rio Xingu (PA) foi tema de debate.

Crocodilo "monstro" de 5,5 m assusta turistas australianos

O réptil, apelidado de Brutus, gosta de saltar no ar para pegar comida.

Próximo Congresso Mundial de Neurociência vai ser no Brasil

País derrotou Canadá e África do Sul em eleição em Florença, Itália. Rio de Janeiro deve sediar próxima edição do encontro, em 2015.

Sonda da Nasa deve orbitar asteroide do cinturão principal pela primeira vez

Cinturão de asteroides fica entre Marte e Júpiter. Informações vão ajudar cientistas a compreender origens do Sistema Solar.

Terremoto atinge costa de Valparaíso, no Chile

Tremor de 6,0 ocorreu na costa, a uma profundidade de 22 km. Não há relatos imediatos de danos ou alerta de tsunami na região.

Rio Grande do Sul registra oitava morte por gripe A

Quatro novos casos da doença foram confirmados nesta sexta-feira (15), destes, três são de Porto Alegre.

Terremoto de magnitude 5,5 abala leste do Japão, diz NHK

Não houve registro imediato de danos e nenhum alerta de tsunami foi emitido após o tremor.

Belo Monte: índios sairão de suas terras "por bem ou por Direito"

Em debate na 63ª reunião da SBPC, diretor da Companhia Hidro Elétrica do São Francisco defendeu a construção de usina.

Angra 3 tem alto custo e material obsoleto, diz professor da UFRJ

Físico Luiz Pinguelli Rosa criticou energia nuclear durante a SBPC. Segundo ele, ainda faltam US\$ 10 bilhões para completar a obra.

Astrônomo critica participação do Brasil na construção de observatório

João Steiner disse na SBPC que projeto subsidia apenas ciência europeia. Parceria entre Brasil e Europa terá custo de 256 milhões de euros.

Sonda espacial Dawn se encontrará com asteroide Vesta após 4 anos

Nave não tripulada da Nasa será a primeira a entrar na órbita de um asteroide.

Lei que desestimula uso de sacolas plásticas faz um ano e tem bom resultado no Rio

A população fluminense deixou de consumir 600 milhões de sacolas. O número representa redução de cerca de 25% das 2,4 bilhões de sacolas que eram distribuídas anualmente no estado.

‡ SCIENCE

B Switek

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<http://geology.gsapubs.org/cgi/content/abstract/39/8/763?ct=ct>
- Preservation of an extreme transient geotherm in the Raft River detachment shear zone
R. Gottardi, C. Teyssier, A. Mulch, T.W. Vennemann, and M.L. Wells
Geology. 2011; 39(8): p. 759-762
<http://geology.gsapubs.org/cgi/content/abstract/39/8/759?ct=ct>

Origin of the supergiant Olympic Dam Cu-U-Au-Ag deposit, South Australia:
Was a sedimentary basin involved?

Jocelyn McPhie, Vadim S. Kamenetsky, Isabelle Chambefort, Kathy Ehrig,
and Nicholas Green

Geology. 2011; 39(8): p. 795-798

<http://geology.gsapubs.org/cgi/content/abstract/39/8/795?ct=ct>

Spatial and Temporal Evolution of an Avulsion on the Taquari River
Distributive Fluvial System from Satellite Image Analysis

Holly A. Buehler, Gary S. Weissmann, Louis A. Scuderi, and Adrian J.
Hartley

Journal of Sedimentary Research. 2011; 81(8): p. 630-640

<http://jisedres.sepmonline.org/cgi/content/abstract/81/8/630?ct=ct>

Using vertical axis rotations to characterize off-fault deformation across
the San Andreas fault system, central California

Sarah J. Titus, Sarah Crump, Zachary McGuire, Eric Horsman, and Bernard
Housen

Geology. 2011; 39(8): p. 711-714

<http://geology.gsapubs.org/cgi/content/abstract/39/8/711?ct=ct>

The not-so-simple effects of boundary conditions on models of simple shear

Marcel Frehner, Ulrike Exner, Neil S. Mancktelow, and Djordje Grujic

Geology. 2011; 39(8): p. 719-722

<http://geology.gsapubs.org/cgi/content/abstract/39/8/719?ct=ct>

Rheology and microstructure of experimentally deformed plagioclase
suspensions

D. Picard, L. Arbaret, M. Pichavant, R. Champallier, and P. Launeau

Geology. 2011; 39(8): p. 747-750

<http://geology.gsapubs.org/cgi/content/abstract/39/8/747?ct=ct>

Nonglacial origin for low- $\delta^{18}\text{O}$ Neoproterozoic magmas in the South
China Block: Evidence from new in-situ oxygen isotope analyses using SIMS

Xuan-Ce Wang, Zheng-Xiang Li, Xian-Hua Li, Qiu-Li Li, Guo-Qiang Tang,
Qi-Rui Zhang, and Yu Liu

Geology. 2011; 39(8): p. 735-738

<http://geology.gsapubs.org/cgi/content/abstract/39/8/735?ct=ct>

Northeastern Atlantic cold-water coral reefs and climate

Norbert Frank, Andre Freiwald, Matthias Lopez Correa, Claudia Wienberg,
Markus Eisele, Dierk Hebbeln, David Van Rooij, Jean-Pierre Henriot,
Christophe Colin, Tjeerd van Weering, Henk de Haas, Pal Buhl-Mortensen,
J. Murray Roberts, Ben De Mol, Eric Douville, Dominique Blamart, and
Christine Hatte

Geology. 2011; 39(8): p. 743-746

<http://geology.gsapubs.org/cgi/content/abstract/39/8/743?ct=ct>

Warm, not super-hot, temperatures in the early Eocene subtropics

Caitlin R. Keating-Bitonti, Linda C. Ivany, Hagit P. Affek, Peter
Douglas, and Scott D. Samson

Geology. 2011; 39(8): p. 771-774

<http://geology.gsapubs.org/cgi/content/abstract/39/8/771?ct=ct>

Baltica in the Cordillera?

E.L. Miller, N. Kuznetsov, A. Soboleva, O. Udoratina, M.J. Grove, and
G. Gehrels

Geology. 2011; 39(8): p. 791-794

<http://geology.gsapubs.org/cgi/content/abstract/39/8/791?ct=ct>

Porosity redistribution enhanced by strain localization in crystal-rich
magmas

Mickael Laumonier, L. Arbaret, A. Burgisser, and R. Champallier

Geology. 2011; 39(8): p. 715-718

<http://geology.gsapubs.org/cgi/content/abstract/39/8/715?ct=ct>

Molybdenum isotopic records across the Precambrian-Cambrian boundary

Hanjie Wen, Jean Carignan, Yuxu Zhang, Haifeng Fan, Christophe Cloquet,
and Shirong Liu

Geology. 2011; 39(8): p. 775-778

<http://geology.gsapubs.org/cgi/content/abstract/39/8/775?ct=ct>

Characterization of Controls on High-Resolution Stratigraphic Architecture
in Wave-Dominated Shoreface-Shelf Parasequences Using Inverse Numerical

Modeling

Karl Charvin, Gary J. Hampson, Kerry L. Gallagher, Joep E. A. Storms, and Richard Labourdette
Journal of Sedimentary Research. 2011; 81(8): p. 562-578
<http://jsedres.sepmonline.org/cgi/content/abstract/81/8/562?ct=ct>

Particle Size Measurement of Diatoms with Inference of Their Properties: Comparison of Three Techniques

Robert S. Pugh and I. Nick McCave
Journal of Sedimentary Research. 2011; 81(8): p. 600-610
<http://jsedres.sepmonline.org/cgi/content/abstract/81/8/600?ct=ct>

The Fate of the Submarine Ikaite Tufa Columns in Southwest Greenland Under Changing Climate Conditions

Marc O. Hansen, Bjorn Buchardt, Michael Kuhl, and Bo Elberling
Journal of Sedimentary Research. 2011; 81(8): p. 553-561
<http://jsedres.sepmonline.org/cgi/content/abstract/81/8/553?ct=ct>

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Haijun Song, Paul B. Wignall, Zhong-Qiang Chen, Jinnan Tong, David P.G. Bond, Xulong Lai, Xiaoming Zhao, Haishui Jiang, Chunbo Yan, Zhijun Niu, Jing Chen, Hao Yang, and Yongbiao Wang
Geology. 2011; 39(8): p. 739-742
<http://geology.gsapubs.org/cgi/content/abstract/39/8/739?ct=ct>

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A plume drive for tectonics?

Posted on July 15, 2011 by sdrury777| [Leave a comment](#)

India's tectonic travels. Image via Wikipedia

The theory of plate tectonics resolved Alfred Wegener's search for a driving force for continental drift around half a century after his discovery faced near-universal rejection for not having one that was large enough or plausible. Plate theory recognises many forces, both driving and in opposition to tectonic movement. By far the largest is the gravitational pull exerted by subducting slabs of dense oceanic lithosphere, followed in distant second place by ridge-push, another gravity-driven force that arises from the slope on the ocean floors away from sea-floor spreading centres as the oceanic lithosphere cools and shrinks as it ages. Until very recently, no place was assigned in the theory to forces associated with the apparently non-tectonic plumes that rise through the mantle from well beneath the lithosphere from which plates are made, quite possibly because it seems logical to expect a vertically upwards force, if any, from hot plumes whereas plate tectonics is mainly concerned with horizontal movements. Looking around the present state of sea-floor spreading, the maximum pace at which plates move is just over 100 mm a-1 (100 km Ma-1) in the case of the Pacific Plate. Yet, during the Late Cretaceous and Early Palaeogene Periods after India had been wrenched away from the Gondwana supercontinent to move towards eventual collision with Eurasia the subcontinent experienced an extraordinary episode beginning around 68 Ma when its pace increased to as high as 180 km Ma-1. This accelerated motion continued over some 15 Ma and then equally abruptly slowed to less than 40 km Ma-1 around the start of the Eocene (Cande, S.C. & Stegman, D.R. 2011. Indian and African plate motions driven by the push force of the Réunion plume head. *Nature*, v. 475, p. 47-52; see also: Müller, R.D. 2011. Plate motion and mantle plumes. *Nature*, v. 475, p. 40-41). The acceleration coincided with the start of continental flood-basalt volcanism that blanketed much of western India with the Deccan Traps across the K-P boundary when the subcontinent lay over the site of the Réunion hot spot. Coincidentally, the Réunion plume head formed at that time; i.e. the Indian continental lithosphere did not drift over an active plume, but was hit from below by one that happened to be rising to the surface. Curiously, while the Indian plate was accelerated, nearby Africa was slowed, explained by a push in the same direction of India's travel towards a subduction zone beneath Asia and one applied to Africa that opposed its motion. Africa too resumed its usual tectonic progress at the start of the Eocene. But how did a mantle plume exert such a force: was it because it caused a local bulge from which the plates slid, or did mantle motion associated with the mushroom-like structure of the horizontally growing plume head exert viscous drag on the overlying plates? Such shifts in motion of major plates inevitably have an effect on the whole plate tectonic carapace, and the authors list a number of contemporary, distant consequences, speculating that the famous bend in the Hawaii-Emperor island and sea-mount chain in the Early Eocene resulted from the final waning of the Réunion plume head's influence and major readjustment of tectonics.

The result of India's final collision with Eurasia - the Himalaya. Image via Wikipedia

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From [small beginnings](#)

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Some really cool sauropods. Image via Wikipedia

The great vegetarian sauropod dinosaurs, such as Brachiosaurus, were the biggest animals to walk the Earth, weighing up to 100 tonnes, as long as 60 m from snout to the end of their tails and more than 10 m tall. So big, indeed, that even the largest contemporary predators would have been unable to get sufficient purchase with their jaws to do them much damage. This vast bulk, unlike even bigger modern whales, was unsupported by water and would have posed major problems had the sauropods not evolved very porous, low-density neck and tail bones and kept their heads small relative to the rest of their bodies. Such small heads needed to take in up to a tonne of vegetation each day to keep the monsters alive and ambling. Their teeth are not those of a chewer, being peg- or spoon-like and pointed forwards; specialised for raking in leaves and twigs, swallowed unchewed in great gulps. Once that style of eating developed in their precursors, with no need for massive chewing muscles it became possible to evolve necks up to 15 m long with increasingly diminutive heads. Studies of large numbers of some species of sauropod precursors indicate that juveniles grew astonishingly quickly, essential if their initial vulnerability was to be outpaced; newly hatched they would have weighed little more than 10 kg. At the growth rates of modern reptiles, the largest sauropods would only have reached full size in about a century. The estimated growth rates suggest warm bloodedness, research suggesting that they maintained body temperatures up to 12°C higher than do alligators. Clearly, sauropod dinosaurs were highly specialised, and their evolution is now known to have been lengthy.

A major news feature in Nature (Heeren, F. 2011. Rise of the titans. Nature, v. 475, p. 159-161) traces that evolution through several surprising stages. The earliest likely ancestors, which appear in the Late Triassic (~230 Ma), were about the size of a turkey and had teeth adapted for shredding fibrous plant material; other early dinosaurs show clear signs of a predatory lifestyle. There is a limit to the size of predators bound up with the energy balance between flesh consumption and the energy expended in casing down prey and killing them. The limits on the size of plant eaters are mechanical: how much they can stuff in and the strength of their bodies, especially legs. In a world dominated in numbers by predatory dinosaurs, the selection pressure for herbivores to outgrow them and become too big to bite would have been substantial.

Little Triassic Panphagia ('eater of everything') was also bipedal, but the fossil record of sauropod precursors clearly shows their growth to the order of 10 m by the Early Jurassic, but not yet a four-legged gait though they had evolved relatively short but sturdy legs, signs of mass-saving porous neck and tail bones, and jaws with a large gape suited to gulping rather than chewing. By the mid-Jurassic Period sauropods were big, strong and four-legged, and by the Cretaceous they reached unmatched dimensions with the titanosaurs. This evolutionary path was not the only one adopted for dinosaurian herbivory. The famous Iguanodon discovered in 1822 by Gideon Mantell in the Early Cretaceous of Sussex was a member of a bipedal group of herbivores, including the duck-billed dinosaurs, that spanned more or less the same time range as sauropods. Fredric Heeren's article is accompanied by an on-line 'tour' of sauropod evolution (go.nature.com/c7zlct), while the American Museum of Natural History has a website for a major exhibition of sauropods (www.amnh.org/exhibitions/wld/ and www.youtube.com/AMNHorg) that includes footage of a full-scale animatronic Mamenchisaurus from China which breathes and moves, (Switek, B. 2011. Living it large: review of The World's Largest Dinosaurs exhibition. Nature, v. 475, p. 172).

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Core's comfort blanket and stable magnetic fields

Posted on July 5, 2011 by [sdrury777](#) | Leave a comment

Pangaea and its break-up. Image via Wikipedia

The record of the Earth's magnetic field for the most part bears more than a passing resemblance to a bar-code mark, by convention black representing normal polarity, i.e. like that at the present, and white signifies reversed polarity. The bar-code resemblance stems from long periods when the geomagnetic poles flipped on a regular, short-term basis, by geological standards. The black and white divisions subdivide time as represented by geomagnetic into chrons of the order of a million-years and subchrons that are somewhat shorter intervals. Stemming from changes in the Earth's core, magnetostratigraphic divisions potentially occur in any sequence of sedimentary or volcanic igneous rocks anywhere on the planet and so can be used as reliable time markers; that is, if they can be defined by measurements of the remanent magnetism preserved in rock, which is not universally achievable. Yet this method of chronometry is extremely useful, for most of the Phanerozoic. However, there were periods when the geomagnetic field became unusually stable for tens of million years so the method is not so good. These have become known as superchrons, of which three occur during Phanerozoic times: the Cretaceous Normal Superchron when the field remained as it is nowadays from 120 to 83 Ma; a 50 Ma long period of stable reversed polarity (Kiaman Reverse Superchron) from 312 to 262 Ma in the Late Carboniferous and Early Permian; the Ordovician Moyero Reverse Superchron from 485 to 463 Ma.

Because the geomagnetic field is almost certainly generated by a self-exciting dynamo in the convecting liquid metallic outer core, polarity flips mark sudden changes in how heat is transferred through the outer core to pass into the lower mantle. It follows that if there are no magnetic reversals then the outer core continued in a stable form of convection; the likely condition during superchrons. But why the shifts from repeated instability to long periods of quiescence? That is one of geoscience's 'hard' questions, since no-one really knows how the core works at any one time, let alone over hundreds of million years. There is however a crude correlation with events much closer to the surface. The Kiaman superchron spans a time when Alfred Wegener's supercontinent Pangaea had finished assembling so that all continental material was in one vast chunk. The Cretaceous superchron was at a time when sea-floor spreading and the break-up of Pangaea reached a maximum. The Ordovician, Moyero superchron coincides with the unification of what are now the northern continents into Laurasia and the continued existence of the southern continents lumped in Gondwana, so that the Earth had two supercontinents. Those empirical observations may have been due to chance, but at least they provide a possible clue to linkage between lithosphere and core, despite their separation by 2800 km of convecting mantle that transfers the core heat as well as that produced by the mantle itself to dissipate at the surface. Enter the modellers.

How part of the Earth transfers heat is, not unexpectedly, very complex, depending not only on what is happening at that point but on heat-transfer processes and heat inputs both above and below it. The surface heat flow is complex in its own right ranging from less

than 20 to as much as 350 mW m⁻², the largest amount being through zones of sea-floor spreading and the least through continental lithosphere. Wherever heat is released in the core and mantle, willy-nilly the bulk of it leaves the solid Earth along what is today a complex series of lines; active oceanic ridge and rift systems such as the mid-Atlantic Ridge. These lines weave between six drifting continental masses and many more sites of additional heat loss – hot spots and mantle plumes. The many heat escape routes today complicate the deeper convective processes and there are many possibilities for the core to shed heat, yet they continually change pace and position. When, inevitably, all continental lithosphere unites in a supercontinent, almost by definition, the sites of heat loss simplify too, the supercontinent acting like an efficient insulating blanket. In a qualitative sense, this kind of evolving scenario is what modellers try to mimic by putting in reasonable parameters for all the dynamic aspects involved. Two physicists at the University of Colorado in Boulder, USA, Nan Zhang and Shije Zhong, have formulated 3-D spherical models of mantle convection with plate tectonics as a basis for whole Earth thermal evolution over that last 350 Ma (Zhang, N & Zhong, S. 2011. Heat fluxes at the Earth's surface and core-mantle boundary since Pangea formation. *Earth and Planetary Science Letters*, v. 306, p. 205-216). The acid test is whether the model can end with a close approximation to modern variations in heat flow and distribution of ages on the sea floor; it does. A probable key to stability in the means of transfer of heat from core to lower mantle – itself a key to a constant outer-core dynamo and geomagnetic polarity – is reduced heat flow at equatorial latitudes; a sort of equatorial downflow of convection with upflows in both northern and southern hemispheres. Zhang and Zhong's model produced minimal core-to-mantle heat flow at the Equator at 270 and 100 Ma, both within geomagnetic-field superchrons. Well, that is a good start. Superchrons seem also to have occurred from time to time during the Precambrian, one being documented at the Mesoproterozoic-Neoproterozoic boundary about 1000 Ma ago. At that time, all continental lithosphere was assembled in a supercontinent dubbed Rodinia ('homeland' or 'birthplace' in Russian).

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Search on for past tsunamis

Posted on July 5, 2011 by sdrury777| Leave a comment

Relics of the 2004 tsunami on the coast of South Andaman Island. Image via Wikipedia

Spurred by the horrific scenes and death toll wrought by tsunamis following the 26 December 2004 Sumatran and 11 March 2011 Sendai giant earthquakes, environmental geologists are beginning to look for signs that can reveal past tsunamis in order to evaluate risk from region to region. Before the 11 March disaster Japanese scientists had in fact traced signs of a tsunami in 869 CE and showed that it had reached almost as far inland as that following the Sendai earthquake. There are a number of geological features that mark the wake of a tsunami: dislodgement of huge boulders on rocky shores; signs of powerful scouring of shallow marine sediments as water recedes from the land; chaotic sediments made up of a jumble of clasts; sediments associated with high-energy flow interleaved with those that mark long periods of low energy deposition; marine faunas unexpectedly found in otherwise terrestrial sediments.

Shortly after the 2004 Indian Ocean tsunamis Indian and Japanese scientists visited the Andaman Islands, which were at the northern end of the megathrust deformation, to seek onshore signs of previous catastrophes (Malik, J.N. et al. 2011. Geologic evidence for two pre-2004 earthquakes during recent centuries near Port Blair, South Andaman Island, India. *Geology*, v. 39, p. 559-562). They discovered a layer of ripped-up lumps of mud set in a sandy matrix dumped on a low-energy black mud, the sandy unit showing inclined stratification that dips inland. All the evidence pointed to deposition by a tsunami. An earlier event reveals swamping of older non-marine sediments by the black mud unit that contains brackish-marine diatoms; a probable result of sudden subsidence linked to an earthquake affecting the Andamans in much the same way as did that of December 2004. The mud had also been intruded by a body of structureless sand, probably resulting from liquefaction as a result of the seismicity. Dating the events using radiocarbon methods proved difficult. Although dating of the earlier event suggested an event around 1670 CE, carbon from the later one gave much older ages, suggesting that the tsunami had ripped up older sediments and redeposited them. However it may be correlated with the major Arakan earthquake of 2 April 1762 close to the coast of Myanmar.

Evidence of this kind can easily be overlooked, and rather less research centres on recent coastal-zone sediments than on sedimentary rocks of the distant past. Areas where such signs of neotectonics have been sought assiduously are those surrounding coastal nuclear installations, but largely to check for evidence of recent faulting that may indicate potential seismic threat but not tsunamis. Clearly it was that kind of threat that decisively put the Japanese Fukushima Daiichi nuclear power station out of action and almost resulted in complete melt-down in March 2011, and severely set back construction of an advanced fast-breeder reactor on the eastern coast of India at Kalpakkam, near Chennai in 2004.

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The Sendai great earthquake in close retrospect (earth-pages.co.uk)

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Earliest animals from continental environments

Posted on July 5, 2011 by sdrury777| Leave a comment

Skolithus burrows. Image via Wikipedia

Following closely on discovery in 1 Ga old sediments of the earliest evidence for eukaryote life in continental environments (see Eukaryote conquest of the continents posted June 11, 2011) it seems that metazoan animals colonised non-marine environments earlier than had previously been thought. Up to now most palaeontologists believed that there was a lag of at least 80 Ma between the emergence of marine bilaterian metazoans and their expansion into freshwater, due to a number of physiological hurdles that had to be overcome, such as regulation of trace element chemistry within their cells and bodily fluids. It has been known for more than a century that the first signs of sturdy animals in the marine realm are burrows in tidal sediments that formed more or less at the Cambrian-Precambrian boundary; the earlier sac-like Ediacaran fauna seemed ill-suited to a burrowing or infaunal habitat. A considerable thickness of clastic sediments occur in the Cambrian of eastern California, USA. The earliest are clearly shallow-marine and contain abundant evidence of burrowing. Succeeding them are intensively studied fluvial sands and silts that have been used a model for sedimentation in the absence of the stabilising influence of land plants. What has been overlooked until recently is evidence for colonisation of the river-laid deposits by burrowing animals (Kennedy, M.J. & Droser, M.L. 2011. Early Cambrian metazoans in fluvial environments, evidence of the non-marine Cambrian radiation. *Geology*, v. 39, p. 583-586).

The burrows include the vertical U-shaped forms given the name *Arenicolites*, which is the most common trace fossil, simple vertical tubes (*Skolithus*) and horizontal, meandering tubes with furrowed sides (*Psammichnites*). Anyone who has seen the Early Cambrian Pipe Rock of NW Scotland will also have seen these trace fossils, yet the Pipe Rock shows evidence of tidal deposition and is shallow marine. Their non-marine equivalents in California are coeval with the earliest known trilobites in the Cambrian marine sequence. It seems that whatever the burrowing animals were, they easily overcame any physiological or environmental barriers to adopting a life in freshwater, encouraged by the ready sustenance that terrestrially adapted acritarchs and cyanobacteria had provided for half a billion years previously.

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Coast-to-coast seismic section of Canada

Posted on July 4, 2011 by [sdrury777](#) | Leave a comment

Geological map of Canada. Image via Wikipedia

In the last few decades there have been several massive programmes aimed at imaging the lithospheric structure beneath continents, often linked with a re-assessment of the various tectonic provinces thought to be present. One of the first was a joint Indian-Soviet project managed by the National Geophysical research Institute in Hyderabad to investigate the crust of South India in the 1970s, which still graces my office wall as a memento of my own contribution to unravelling the underpinnings of this ravishing area. This was followed-up by one from the Himalaya southwards, and others have focused on Britain, the Baltic Shield and the USA by the Consortium for Continental Reflection Profiling (COCORP); the last revealing in detail large-scale, low-angle thrust faulting in the Appalachians and crustal-scale detachment faults in the eastern Basin and Range. These experiments must have been great fun, as they involved detonating large amounts of high explosive to produce sufficient energy to get returns from 100 or more km below, with all the planning needed to avoid fear and loathing among the populace, let alone frightening the horses. Nowadays, most seismic profiling onshore is done using Vibroseis, best imagined as large trucks jacked up on pads on which they bounce up and down, in manner of an LA 'lowrider'. By comparison, marine surveys are far easier, although marine mammals have seemingly had major setbacks as a result of endless closely spaced seismic lines needed for 3-D subsurface analysis. Onshore, you only get one chance and need to pick your route with great care. Now a Canadian consortium has gone one better by using state-of-the-art seismic refraction and reflection techniques (Hammer, P.T.C. et al. 2011. The big picture: A lithospheric cross section of the North American continent. *GSA Today*, v. 21 (June 2011 issue), p. 4-9). Uniquely, the Canadian Lithoprobe project coordinated a full spectrum of geological, geochemical, and geophysical research, covering 20 years of deep-crustal research by hundreds of contributors.

A large-format profile in a supplement to the paper shows the deep relationships in the Mesozoic Cordilleran Orogen in the west, through the plexus of Precambrian Provinces of the Canadian Shield to the Palaeozoic Orogen in the east: a tract some 6000 km from west to east. The general picture is repeated stacking of orogens, with a remarkable repetition of very similar gross tectonic styles. Clearly, large-scale compressional processes have remained largely unchanged since the middle of the Archaean, and several upper parts of long-dead subduction zones and accretionary duplexes spring from the profile. The surface picture of much of the crust crossed by the stitched-together traverses gives the impression of both complex tectonics and many plutons of different ages, yet on the grand scale of the crust and lithosphere it is the tectonics that dominates: the passage of voluminous melts towards the surface has left the plethora of gently dipping deep shear zones and faults largely unmodified. Indeed, the seismic data reveal astonishingly well-preserved subducted or delaminated crust associated with collisions that occurred 2-3 billion years ago. Despite repeated accretionary tectonics spanning 3 Ga, and the Phanerozoic erosion of the Shield to reveal its innermost and deepest secrets, the crust-mantle boundary, the Moho, is astonishingly flat, ranging from 33-43 km deep. Nor is there much sign of 'roots' beneath orogens in the underlying lithospheric mantle; a long standing concept that appears not to be generally supportable over this stretch of the North American continent. The synthesis raises questions as to whether the Moho has always been that shallow or whether it can, in some situations, be a dynamic 'boundary'. For that to be the case requires that the geologic crust-mantle boundary may not always correspond to the seismic discontinuity with which the Moho has previously been correlated.

PDFs of the profile can be downloaded from <ftp://rock.geosociety.org/pub/GSAToday/1106insert-hammer/>

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Snowball Earth melting hypothesis weakened

Posted on July 4, 2011 by [sdrury777](#) | Leave a comment

Artist's impression of the Neoproterozoic Earth during a Snowball episode. Image by guano via Flickr

The combination of glaciogenic sediments with palaeomagnetic evidence for their formation at low-latitudes, together with dates that show glacial events were coeval in just two or three Neoproterozoic episodes are the linchpins for the Snowball Earth hypothesis. There is little doubt that the latest Precambrian Era did witness such extraordinary climatic events. Evidence is also accumulating that, in some way, they were instrumental in that stage of biological evolution from which metazoan eukaryotes emerged: the spectacular Ediacaran fossil assemblages follow on the heels of the last such event (see Bigging-up the Ediacaran in *Earth Pages* for March 2011). One of the difficulties with the 'hard' Snowball Earth hypothesis is how the middle-aged planet was able to emerge from a condition of pole-to-pole ice cover; hugely increased reflectivity of that surface should have driven mean global temperature down and down. Clearly the Earth did warm up on each occasion, and the leading model for how that was possible is massive release of greenhouse gases from sea-floor sediments or deep-ocean waters to increase the heat-retaining powers of the atmosphere; sufficiently voluminous release from volcanic action seems less likely as there is little evidence of upsurges in magmatism coinciding with the events. Almost all glaciogenic units from the Neoproterozoic have an overlying cap of carbonate rocks, indicating that hydrogen carbonate (formerly bicarbonate) ions together with those of calcium and magnesium suddenly exceeded their solubilities in the oceans.

Modern sea-floor hydrothermal vent. Image via Wikipedia

To seek out a possible source for sufficient carbon release in gaseous form geochemists have turned to C-isotopes in the cap carbonates. Early studies revealed large deficits in the heavier stable isotope of carbon (^{13}C) that seemed to suggest that the releases were from large reservoirs of carbon formed by burial of dead organisms: photosynthesis and other kinds of autotrophy at the base of the trophic pyramid selectively take up lighter ^{12}C in forming organic tissues compared with inorganic chemical processes). As in the case of the sharp warming event at the Palaeocene-Eocene boundary around 55.8 Ma ago (See The gas-hydrate 'gun' in June 2003 Earth Pages), these negative $\delta^{13}\text{C}$ spikes have been interpreted as due to destabilisation of gas hydrates in sea-floor sediments to release organically formed methane gas. This powerful greenhouse gas would have quickly oxidised to CO_2 thus acidifying the oceans by jacking up hydrogen carbonate ion concentrations. Detailed carbon-, oxygen- and strontium-isotope work in conjunction with petrographic textures in a Chinese cap carbonate (Bristow, T.F. et al. 2011. A hydrothermal origin for isotopically anomalous cap dolostone cements from south China. *Nature*, v. 274, p. 68-71) suggests an alternative mechanism to produce the isotopically light carbon signature at the end of Snowball events. The greatest ^{13}C depletion occurs in carbonate veins that cut through the cap rock and formed at temperatures up to 378°C and even the early-formed fine grained carbonate sediment records anomalously high temperatures. So, it seems as if the cap-rock was thoroughly permeated by hydrothermal fluids, more than 1.6 Ma after it formed on the sea floor. This triggered oxidation of methane within the sediments themselves, with little if any need for an atmospheric origin through massive methane release from destabilised gas hydrates elsewhere.

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Hominin round-up

Posted on July 2, 2011 by sdrury777 | Leave a comment

Australopithecus africanus from Sterkfontein cave, South Africa. Image via Wikipedia

Strontium isotopes and australopithecine habits

Viewers of Channel 4's Time Team will be used to seeing eating habits and places of habitation being derived from strontium isotopic analyses of the teeth of modern humans found by archaeologists. The methods enabled scientists to work out where 'Ötzi the Iceman', whose mummified remains were found on the alpine border of Austria and Italy, hailed from: it was most likely to have been the South Tyrol province of Italy. Other isotopes (nitrogen and carbon) shows that he was predominantly vegetarian; i.e. he was neither a hunter, nor an especially privileged member of Tyrolean Chalcolithic society.

The same methods offer insights into the life styles of far earlier hominins and has recently been used on teeth of australopithecines (*Australopithecus africanus* and *Paranthropus robustus*) found in the famous Sterkfontein and Swartkrans caves South Africa (Copeland, S.R. et al. 2011. Strontium isotope evidence for landscape use by early hominins. *Nature*, v. 474, p. 76-78). The caves formed in Precambrian dolomites and it was expected that all the teeth would show signs that the individuals from whose jaws they were collected lived their entire lives in a small tract of dolomites ($\sim 30\text{ km}^2$) surrounding the caves. For large individuals that was indeed the case, but teeth from smaller fossils show $^{87}\text{Sr}/^{86}\text{Sr}$ ratios that are significantly different from those characteristic of local rocks and soils. That suggests the smaller individuals came from further afield than the restricted tract of carbonate strata. Although pelvic remains are normally the best guide to the sex of primate fossils, they are less frequently found than those of crania and dentition. Size variations of adults in a primate species, however, may indicate sexual dimorphism – larger males than females – and this is well-accepted for australopithecines. The implication is that for both species males had small home ranges on the dolomites, or that they preferred that tract. Yet females had dispersed from their parental groups and moved into the area.

Most living primates do not show this kind of sexual dispersion pattern, termed male philopatry, it being common among modern humans, chimpanzees and bonobos. In the case of the australopithecines that were being studied, both were diminutive creatures living in open savannah with risks of predation from a range of large carnivores. Perhaps the bands living in the dolomite area had better refuges in caves than those elsewhere, and therefore able to attract females.

Arctic Neanderthals

A Mousterian stone point, possibly for a spear. Image via Wikipedia

The last Neanderthals known to have been alive were close to the southernmost limit of Europe, in caves on the Rock of Gibraltar at about 24 ka, shortly before the last glacial maximum. Their remains have been found in a $>6000\text{ km}$ west-east zone at temperate latitudes, south of 50°N , which extended from western Europe to the Denisova cave in the Altai republic of Russia (50°N , 87°E). This suggests that they subsisted in deciduous woodland and temperate steppe, diffusing southwards as conditions cooled during 2 or 3 past glacial periods. Consequently, sites at higher northern latitudes that preserve only cultural remains – Palaeolithic tools – have hitherto been regarded as signs of fully modern human occupation; it takes considerable skill to distinguish Neanderthal from early modern human artefacts, which are very similar during the time of overlapping occupation ($\sim 40\text{-}30\text{ ka}$). A site in northern Siberia at Byzovaya in the Polar Urals, close to the Arctic circle, is a case in point. A French, Norwegian and Russian team of archaeologists re-examined the site (Slimak, L. et al. 2011. Late Mousterian persistence near the Arctic Circle. *Science*, v. 332, p. 841-845) and dated it to between 31-34 ka. They also analysed a suite of stone tools, finding that they are directly comparable with Mousterian (Middle Palaeolithic) implements from western Europe rather than products of modern human's industry of similar antiquity. At that time high-latitude climate was well on its way to frigid, dry conditions (there were no substantial continental ice sheets in northern Russia). The animal remains found at the site were dominated by those of mammoth, with minor proportions of other cold-steppe large mammals, such as woolly rhino, musk ox, horse and bear.

A notable feature of the results is that they suggest that Neanderthals, or others people with a Mousterian culture, were occupying this bleak terrain at roughly the same time as modern humans, who left considerably richer suites of artefacts, including tools, ornaments

and figurines carved from bone and ivory, but were after more or less the same prey species. Both groups clearly were able to cope with and thrive on the harsh conditions, until recently only within the scope of highly specialised cultures such as the Inuit and original Siberian peoples. The dating shows that whoever produced and used the Mousterian tools not only shared the terrain with modern humans, but lingered until well after the previously accepted time (~37 ka) of the Neanderthals' demise except for a few refuges in the Iberian Peninsula and Balkans. Despite the occupation of northern Siberia by different cultural groups, until their bones are found who they were is not certain. Denisova Cave showed that Neanderthals and the genetically different Denisovans co-occupied temperate central Siberia (see Other rich hominin pickings in the May 2010 issue of EPN) so there are currently two options.

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Ancient Female Ancestors Roamed Far and Wide for Mates (news.sciencemag.org)

Schoeninger, M.J. 2011. In search of the Australopithecines. *Nature*, v. 474, p. 43-44.

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Eukaryote conquest of the continents

Posted on June 11, 2011 by [sdrury777](#) | Leave a comment

Suilven, a spectacular outlier of Torridonian terrestrial sandstones resting on a buried landscape of Archaean gneisses near Lochinver, Sutherland. Image via Wikipedia

Geologists often assume that the continents were first colonised by plants, insects then vertebrates beginning in the Ordovician Period with preservation of spores very like those of the liverworts, which incidentally can only be removed from gravel driveways by the use of acetic acid, glyphosate, pycloram and flamethrowers having no lasting effect. The most intractable of all organisms found on the land surface today are prokaryotic (nucleus-free cells) cyanobacteria whose biofilms cement desert varnish (see Desert varnish, May 2008 in Subjects: GIS and Remote Sensing). Cyanobacteria have long been suspected to have been the first life forms to adopt a terrestrial habit, and their cells have been discovered in the now-famous Neoproterozoic lagerstätten in the Doushantuo Formation of China (see The earliest lichens, May 2005 in Subjects: Geobiology, palaeontology, and evolution) The oldest un-metamorphosed sediments in Britain, the Torridonian redbeds that form the magnificent scenery of north-western Scotland, now push back the date of the earliest eukaryotic (cells with nuclei) terrestrial life, of which we are one form, half a billion years before the Doushantuo cyanobacteria (Strother, P.K. et al. 2011. Earth's earliest non-marine eukaryotes. *Nature*, v. 473, p. 505-509). The Torridonian is one of the thickest (~12 km) terrestrial sequences on the planet, and spans a time range of around 200 Ma (1.2 to 1 Ga). It is a repository of almost the entire range of humid continental sedimentary environments: colluvial fan; bajada; alluvial; deltaic and lacustrine build-ups. Grey lake-bed mudstones and phosphate nodules in the Torridonian yield small organic fossils lumped in the sack-term acritarchs. Similar bodies, whose affinities are diverse and generally obscure, have been reported from marine sediments as old as 3.2 Ga. The fascination of those from the Torridonian, other than their terrestrial association, is that some include aggregates of spherical cells with tantalising suggestions of central nuclei and, as a whole assemblage, exhibit a range of morphologies far beyond that of nucleus-free prokaryotes and the signature of cytoskeletal filaments that form a 'scaffold' for eukaryote cells. Worth noting is that one of the authors is Martin Brasier of Oxford University, whose meticulous bio-morphological skills in microscopy has made him one of the foremost critics of speculation on Precambrian microfossils (see Doubt cast on earliest bacterial fossils April 2003 in Subjects: Geobiology, palaeontology, and evolution). The authors opine that the ecological diversity of freshwater and land systems, and the physico-chemical stress associated with repeated wetting and desiccation compared with the marine domain may have been instrumental in origination of the Eucarya, which should give the Torridonian a scientific reputation that extends beyond these shores.

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Wide-eyed dinosaurs

Posted on June 11, 2011 by [sdrury777](#) | Leave a comment

Image by Ivan Walsh via Flickr

One of the surprises concerning the dinosaurs was that some species were able to live at near-polar latitudes. The surprise is not about their ability to survive a cold climate for the Cretaceous world was one characterised by greenhouse conditions and ice-free polar regions swathed in forests. On top of that, evidence is accumulating that some dinosaurs at least were able to regulate their body temperature; they may have been warm-blooded. The oddity is that they were able to survive the winter darkness of latitudes above those of the Arctic and Antarctic Circles. It now seems that some groups of dinosaurs evolved excellent night-time vision (Schmitz, L. & Motani, R. 2011. Nocturnality in dinosaurs inferred from scleral ring and orbit morphology. *Science*, v. 332, p. 705-708). Not only did some have large eyes, but preservation of the fibrous outer ring of the eye or sclera – the 'whites' in our case – in some large-eyed dinosaurs shows a reduction in width that is characteristic of good scotopic or night vision. Since much of the polar 'night' is more like twilight than perpetually full darkness, enhanced night vision would have allowed high-latitude dinosaurs to survive winter by crepuscular feeding habits. This more or less extinguishes the notional day-night duality of terrestrial vertebrate life during the Mesozoic; dinosaurs by day and early mammals by night that allowed mammalian ancestors to escape the clutches of dinosaur predators. Indeed many Mesozoic mammals show signs of diurnality.

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