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‡ BOLSAS

Bolsas PQ e DT estão com inscrição aberta

O CNPq abriu o calendário para seleção das Bolsas de Produtividade em Pesquisa (PQ) e de Desenvolvimento Tecnológico e Extensão Inovadora (DT).

O prazo de inscrição vai até o dia 18 de agosto.

O pesquisador deve atender aos critérios de avaliação dos Comitês de Assessoramento, disponíveis em: <http://www.cnpq.br/cas/cas.htm>. Os bolsistas cujo prazo da bolsa termina em 28/2/2012 também devem obedecer ao calendário. Os resultados estão previstos para divulgação a partir de janeiro de 2012 e o início da vigência deve ocorrer entre março e maio do mesmo ano.

Produtividade em Pesquisa - As Bolsas PQ são concedidas para pesquisadores de todas as áreas do conhecimento com o objetivo de distinguir seu trabalho e valorizar sua produção. Entre os critérios para a concessão estão a produção científica, a participação na formação de recursos humanos e a efetiva contribuição para a área de pesquisa. O período de vigência da bolsa para pesquisador nível 1A é de 60 meses, níveis 1B, 1C e 1D de 48 meses, para a categoria 2 o período é de 36 meses.

Desenvolvimento Tecnológico - As bolsas DT tem como finalidade distinguir o pesquisador doutor, valorizando sua produção em desenvolvimento tecnológico e inovação, desde que seja titulado há pelo menos três anos, tenha um bom e crescente histórico de formação de recursos humanos, produção e transferência de tecnologia, e um projeto de pesquisa claramente inovador. O período de vigência da bolsa para pesquisador nível 1A é de 60 meses, níveis 1B, 1C e 1D de 48 meses, para a categoria 2 o período é de 36 meses.

Ascom do CNPq

‡ CONCURSOS

Vagas para professores na UFSCar

Os departamentos de Matemática e de Engenharia Civil da UFSCar, em São Carlos (SP), abriram concurso para seleção de duas vagas de professores - uma em cada departamento.

Para o departamento de Engenharia Civil, o profissional atuará em Geotecnia, sendo o cargo de professor adjunto e o regime de trabalho de dedicação exclusiva.

Para concorrer é necessário ter graduação em Engenharia Civil e também ter título de doutor em uma das seguintes áreas: Geotecnia, Engenharia Geotécnica, Engenharia com área de concentração em Geotecnia ou Engenharia de Solos.

O candidato aprovado para essa vaga recebe salário de R\$ 7.333,66 e lecionará as seguintes disciplinas: Geologia de Engenharia, Mecânica dos Solos, Fundações, Geotecnia Aplicada ao Uso e Ocupação do Solo, Mineralogia Aplicada e Geologia Ambiental.

A inscrição para o concurso de Professor Adjunto na área de Engenharia Civil se encerram em 3 de junho.

Já para o concurso de Professor Titular do departamento de Matemática o profissional deve ser formado em Ciências Exatas ou Engenharia e portar o título de doutor em Matemática ou áreas afins.

O candidato selecionado será nomeado no regime de Dedicação Exclusiva, sendo a remuneração de R\$ 11.755,05.

A inscrição para o concurso de professor titular terminam em 7 de outubro próximo e será aceita apenas pela internet. Mais informações e editais: www.concursos.ufscar.br.

Agência Fapesp

‡ ARTIGO DA SEMANA

‡ NEWS METEORITICA DA SEMANA

Why haven't we found evidence for life starting in asteroids?

<http://planetary.org/blog/article/00003027/>

May. 10, 2011 | 11:51 PDT | 18:51 UTC

Here's a theoretical paper that asks an interesting question: When the solar system was very young and still very hot, could medium-sized asteroids have been habitable abodes for life? It's not a crazy question, because there's abundant mineralogical evidence for what we consider the building blocks of life in asteroids, specifically carbonaceous asteroids. They contain lots of different organic molecules including amino acids; there's evidence for the presence of liquid water within asteroids in the past, and many carbonaceous asteroids still retain quite a lot of water bound within their minerals; and the residual heat from their formation and from the decay of radioactive isotopes give you the "food," water, and energy that are necessary for life. But despite searches there's been no convincing evidence that life ever arose on an asteroid. Given what we think are the right ingredients, why didn't life arise?



[Click to enlarge >](#)

Lutetia from Rosetta

An asteroid the size of Lutetia (132 by 101 by 76 kilometers) that started out with enough ice content could have had liquid water at life-friendly temperatures in its pore spaces for many millions of years, but it looks like life still couldn't get started there. Credit: ESA 2010 MPS for OSIRIS Team MPS / UPD / LAM / IAA / RSSD / INTA / UPM / DASP / IDA

Oleg Abramov and Stephen Mojzsis developed some computer models to try to figure out an answer to this question, exploring theoretical asteroids with diameters of 75 to 200 kilometers beginning at about 3 million years after the initiation of solar system formation. These asteroids retain initial heat from their formation, and then experience further heating due to the rapid decay of aluminum-26.

The paper tells an interesting story for what happened within young asteroids, which would have started out containing some rock (part of it in the form of the common minerals olivine and pyroxene), and some water ice, and some pore space. The asteroids' interiors heat rapidly at first and then more slowly as the aluminum-26 decays. At an age of about a million years, the inside of the asteroid gets warm enough -- above 273 Kelvins -- for the water ice to start melting. This part of the story is independent of the starting diameter of the asteroid.

Once the water starts to melt, the story gets more interesting. If there are minerals available that like to react chemically with water, those reactions get started. The common minerals olivine and pyroxene do react with water, very readily in fact, turning into a mineral called serpentine. This is an exothermic reaction, meaning that heat is released as the reaction proceeds, warming the asteroid a bit more, which melts more water, which reacts with more olivine and pyroxene, and so on; it's a positive feedback cycle.

The final outcome depends upon how much water Abramov and Mojzsis gave the starting asteroid. If it was 20% water, all of that water gets used up to make serpentine (or, to put it another way, water is the limiting reagent in the reaction), and the final asteroid winds up being dry and hot. With more than 20% water, there is water left over after the reactions have run their course, and because of water's capacity to absorb heat, the resulting asteroid is cooler.

What happens next depends upon the initial size of the asteroid. Larger asteroids take longer to heat, they get hotter, and they take longer to cool. This shouldn't be any surprise to anybody. With more initial water content, the maximum temperature inside the asteroid is cooler and is reached later. They found heat to be retained longest in a 200-kilometer asteroid that started out as 40% ice, a body that took 60 million years to cool. This body would have contained habitable conditions at its center (liquid water at temperatures between 273 and 373 Kelvins) for over 24 million years. Is this long enough for life to start? It would seem like enough time, right? So why didn't it happen, as far as we can tell?

Abramov and Mojzsis looked more closely at what happened within the interior of this asteroid over that 24 million years and may have found the reason why life couldn't get started. When an asteroid's interior gets hot enough to melt water and that runaway serpentine reaction gets going, the center of the asteroid actually gets too hot; the Goldilocks zone is fairly close to the surface. As the asteroid cools off, the habitable zone migrates inward: regions closer to the center become cool enough as regions closer to the surface become too cold, freezing the ice. The cooling happens pretty fast, so the habitable zone migrates inward at rates of around 1 to 10 millimeters per year. (It happens more slowly for larger asteroids with more initial water.)

This is an important number, because recent research has shown that although asteroids can be very porous, the pores are tiny (5 to 50 nanometers across) and not well-connected, so liquid water cannot migrate from pore to pore very fast, if at all. Water, and any nascent life floating in it, certainly couldn't have moved fast enough to keep up with the migration of the habitable zone. The smallest known non-virus life form from Earth is 400 nanometers across, much bigger than these pores. Even at the centers of the largest asteroids, where water would have hung around the longest, pre-biotic organic chemicals wouldn't move around readily. So opportunities for reactions between naturally occurring organic molecules would be very rare.

Big asteroids are a different story. Big, ice-rich bodies like Ceres, or the body whose destruction gave rise to the Themis family of asteroids, would have differentiated, separating into layers of liquid water above a rocky interior, solving the pore space problem. Their long-lasting internal heat would likely have kept those oceans liquid for millions or tens of millions of years; Ceres may even have retained an internal ocean right down to the present day. So the moral of the story is: despite the existence of habitable zones within medium-sized asteroids for many millions of years, it just doesn't seem like life had a chance to get started there. But we ought to check for ancient life on Ceres and Themis!

Edição 4256 - Notícias de C&T - Serviço da SBPC

1. Votação do Código Florestal é adiada devido ao racha na base do governo
2. Mudança no texto beneficia 90% dos proprietários rurais
3. Muita pesquisa, pouco resultado
4. Governo pretende alterar Lei de Informática
5. Os riscos da ideologia no debate nuclear
6. Nota da CAI sobre Belo Monte
7. Alunos do ensino fundamental ganham apoio técnico do Inpe para lançar satélite
8. Secretaria de C&T do CE apresenta plano para os próximos 10 anos
9. RNP entrega nova capacidade da Rede Ipê na Bahia
10. Programa de acesso ao ensino técnico requer ação coletiva
11. Brasileiro quer criar Cidade do Cérebro
12. Comissão altera cargos do Ministério da Ciência e Tecnologia
13. Artigo da UFMG descreve receptor do sistema imune responsável pela identificação de bactéria similar à da tuberculose
14. Bin Laden e o Direito Internacional
15. Evento aborda mapeamento e prevenção de doenças ligadas ao estilo de vida
16. Ciência Hoje On-line: Radiografia da saúde no Brasil
17. UFSCar sedia Seminário Brasileiro de Estudos em Ciência, Tecnologia e Sociedade
18. Três entidades lançam programa voltado a florestas tropicais e energias renováveis
19. Bolsas PQ e DT estão com inscrição aberta

Edição 4255 - Notícias de C&T - Serviço da SBPC

1. Código florestal com inteligência
2. SBPC estreita relações com sociedades científicas
3. SBPC homenageia Amélia Hamburger
4. Código Florestal em vigor regula o uso de 5,2 milhões de propriedades
5. Tática diversionista garante tempo para negociar Código
6. Código Florestal: sem acordo, votação fica para hoje
7. Fazenda veta abatimento de dívida agrícola e votação do Código é adiada
8. A emergência do Código Florestal
9. SP quer ampliar ensino técnico estadual
10. Ensino customizado para empresas desponta na AL
11. Eventos extremos mudam cenário da Amazônia
12. Evento internacional estimula inovação no Amazonas
13. Diagnóstico de infartos à distância
14. USP aprova novo plano de carreira para funcionários
15. Tecnologia brasileira terá impulso com exploração do Pré-sal
16. Governo tenta atrair Vale para terras-raras
17. Programa Pappe-Pipe 3 lança outra chamada
18. Amazonas implementa Programa Ciência na Escola
19. Vagas para professores na UFSCar

Edição 4254 - Notícias de C&T - Serviço da SBPC

1. Proposta de Trabalho para a gestão 2011-2013 da SBPC
2. Manifesto: Venha para a SBPC discutir C&T e educação para todo o Brasil
3. SBPC apresenta crescimento no quadro de sócios
4. Renováveis suprirão 80% da energia em 2050
5. Frente ambientalista debate estudo da FGV sobre biodiesel
6. Conselheiro do governo Britânico visita o Brasil para lançar parcerias em ciência e inovação
7. Instituições têm até o fim da semana para informar dados ao censo
8. Reflorestamento sofreria com novo código
9. A necessária reforma do Código Florestal
10. CNPq: A configuração e os desafios
11. Primeiro americano que fez transplante completo de rosto aparece em público
12. Super-repelente de insetos
13. Dívida rural fará parte de negociação do Código
14. Plano Nacional de Museus será tema de audiência pública
15. Chamada Biota-Microrganismos: propostas até dia 23
16. 3º Congresso Internacional Six Sigma e evento acoplado 7º Workshop Gesiti
17. Vagas para professores na Unesp
18. Ciência Hoje On-line: Poder cicatrizante
19. Aberta a inscrição para Pós-graduação em Imunologia e Parasitologia básicas e Aplicadas

Edição 4253 - Notícias de C&T - Serviço da SBPC

1. Mais de 2 mil pessoas participaram da Reunião Regional da SBPC em Catalão (GO)
2. Fapeg lança edital para estimular inovação em micro e pequenas empresas
3. Brasileiro leva prêmio de US\$ 100 mil por ensinar povos da Amazônia a usar GPS e fazer mapas
4. Uso do computador ainda assusta professores
5. Governo vai mudar programa 'sustentável' que não deslanchou

6. Norte de MG pode virar deserto em 20 anos
7. Código Florestal: pressa é inimiga do futuro
8. Portaria que institui Rede Clima é alterada
9. Câmara aprova dois acordos de cooperação com as Filipinas
10. Setor espacial precisa de 'Embraer', diz chefe da AEB
11. Um código contra o Brasil
12. Códigos de comunicação digital reproduzem e identificam mutações em sequência de DNA
13. Risco de um mundo sem banana é destaque na Unesp Ciência
14. Bichos robóticos ajudam indústria a estudar automação
15. Mais barata energia 'verde' deve crescer, diz relatório do IPCC
16. Cartilha sobre a vida de Carlos Chagas Filho está na web
17. Bolsas para rede estadual de ensino
18. Workshop em mudanças climáticas
19. UFRRJ inscreve para novo Mestrado Profissional em Práticas em Desenvolvimento Sustentável

‡ AMBIENTE BRASIL

Hillary Clinton defende desenvolvimento sustentável no Ártico

Para secretária americana de Estado, problemas na região são ambientais e econômicos.

Cientistas deixam floresta sem água para estudar efeitos da seca

Pesquisa acontece na reserva de Caxiuanã, no Pará. Longos períodos de estiagem podem ser devastadores para a Amazônia.

Ministério das Cidades diz que país precisa investir R\$ 420 bilhões em saneamento

O país terá que investir R\$ 420 bilhões para oferecer água tratada, recolhimento de lixo e sistema de drenagem urbana a todas as residências e levar redes de esgoto para 90% da população nos próximos 20 anos.

Vaccarezza diz que não há mais data para votar novo Código Florestal

Líder disse que governo vai 'impedir votação' enquanto não houver acordo. 'Governo nunca teve prazo para votar o Código Florestal', disse Vaccarezza.

Ambientalistas criticam novo texto do Código Florestal

O relatório feito pelo deputado Aldo Rebelo define margens de rios, topos de morros e encostas como APPs, mas permite a ocupação já existente em algumas dessas áreas.

Regiões Norte e Nordeste devem continuar com chuvas fortes

Nos últimos dias, o estado de Pernambuco foi um dos mais atingidos pelas chuvas. A Paraíba e o Piauí também foram atingidos.

Maior chacina de animais de Ribeirão Preto/SP já tem 45 bichos mortos

A suspeita é que os bichos tenham sido envenenados.

Coala roubado é devolvido na Austrália

Animal de 13 anos foi deixado intacto no estacionamento de parque de Sydney.

Embrapa é a responsável por banco de material genético de animais selvagens da América Latina

O armazenamento das células-tronco possibilita, por exemplo, tratamento de animais, pesquisa e, caso necessário, a clonagem de animais. O material genético fica guardado em botijões de nitrogênio a 196 graus Celsius abaixo de zero.

Focas usam seus bigodes para achar comida dentro da água

Mecanismo presente no bigode das focas permite que elas descubram tamanho do peixe sem o uso da visão.

Ministério Público Federal no Pará pede que Ibama negue licença de instalação para Belo Monte

Segundo o MPF, a restrição deve permanecer enquanto não forem cumpridas todas as condições que o órgão ambiental estabeleceu como essenciais à viabilidade social e ambiental do empreendimento.

Vacinação contra gripe é prorrogada em SP

Campanha terminaria nesta sexta-feira (13); 20 de maio é o novo prazo. Idosos, gestantes e crianças entre 6 e 23 meses devem se imunizar.

Astronautas retornam à base de lançamento do Endeavour

Esta será a segunda tentativa de lançamento, marcada para a próxima segunda-feira (16).

Pouco estudado, planeta-anão Haumea tem água cristalizada

O Haumea, que orbita o Sol, é um dos maiores objetos estelares do chamado cinturão Kuiper. Ele possui dois satélites naturais, que se acredita terem se formado a partir de uma colisão.

Novo modelo busca explicar formação de planetas extrassolares

Astros conhecidos como 'Jupíteres quentes' contradizem teoria atual. Planetas giram em direção contrária à sua estrela mãe.

Seca provoca problemas de navegação no maior rio da China

O Yangtze registrou o menor nível em meio século.

Japão: novos vazamentos de água contaminada na central de Fukushima

Amostras da água do mar recolhidas nos arredores da central continham césio-134 em um nível 18.000 vezes maior do que o normal.

Erupção inédita de luminosidade no espaço intriga astrônomos

Telescópio observou forte erupção de raios gama em estrutura conhecida como Nebulosa do Caranguejo.

Último refúgio dos neandertais teria sido na Rússia

Conjunto de ferramentas de 33.000 anos reacende debate sobre data da extinção do parente mais próximo do homem moderno.

Brasil pleiteia US\$ 34 milhões para eliminação de HCFCs

Os recursos para evitar a emissão dos gases nocivos à camada de ozônio serão pleiteados junto ao Comitê Executivo do Fundo Multilateral para Implementação do Protocolo de Montreal, em julho.

Ministra reúne Contag para tratar de assentamento de agricultores em UCs

Ministra do Meio Ambiente, Izabella Teixeira, ressaltou a necessidade da criação de uma agenda de trabalho comum entre o MMA e a Contag para os próximos quatro anos. "Os movimentos sociais são parte da política ambiental que queremos criar", disse.

Começa sessão para votar novo Código Florestal

Depois de um dia de negociações, líder do governo anunciou acordo. Governo cedeu sobre isenção para pequeno agricultor recompor reserva.

Aquecimento global deve ser superado em breve, diz físico

Michio Kaku enxerga fusão nuclear como alternativa daqui a 20 anos. Para cientista, projeto na França mostra que a tecnologia está próxima.

Inpe confirma previsão de Amazônia mais quente e seca

O cenário é de mais secas no sul da Amazônia nos próximos anos e chuvas mais intensas no norte da floresta. Além disso, a mata deve ficar mais rala e aberta, processo chamado de savanização. Tudo isso será agravado se o desmatamento não for contido.

Luiz Henrique, ex-governador de SC, será o relator do Código Florestal no Senado

O senador adiantou que no parecer insistirá na redução das áreas de proteção ambiental localizadas em beiras de rios para 5 metros de largura. Quando governador, Luiz Henrique, aprovou um código ambiental para Santa Catarina.

Justiça proíbe prefeitura de Petrolina/PE de conceder licenças ambientais para obras nas margens do Rio São Francisco

Convênio entre o município e a Agência Estadual de Meio Ambiente e Recursos Hídricos deu à prefeitura poder de conceder licenças para empreendimentos em áreas de preservação permanente. Com isso corria-se o risco de novas licenças serem dadas sem o cumprimento das normas do Código Florestal.

Chuvas no Maranhão prejudicam mais de 4 mil pessoas e deixam 13 municípios em estado de emergência

Para os próximos dias, a previsão do Inmet para o estado ainda é a de fortes chuvas e de céu parcialmente nublado.

EUA lançarão sistema de avisos de emergência aos cidadãos pelo celular

Objetivo é notificar a população em casos de desastres, tornados e mensagens presidenciais urgentes.

Norte Energia espera obter licença ambiental para Belo Monte ainda este mês

O ministro de Minas e Energia, Edison Lobão, disse na quarta-feira (11) que o governo aguarda o licenciamento ambiental "o mais rápido possível". Segundo ele, as medidas determinadas pelo Ibama estão sendo cumpridas a seu tempo, e todas serão atendidas.

Açúcar pode ajudar a tratar infecções persistentes, diz pesquisa

Estudo mostra que açúcar tira bactérias da 'hibernação'. Doenças persistentes podem levar meses até serem curadas.

Estudo comprova que campo eletromagnético afeta velocidade da luz

Resultados vão permitir aplicações inéditas em componentes cujo comportamento poderia diferir segundo a direção da luz.

EUA quer estabelecer regras espaciais com China

Estados Unidos querem evitar problemas como derrubada de satélites e criar normas de conduta para eventuais crises.

Um terço dos alimentos produzidos no mundo é desperdiçado

De acordo com estudo da ONU, 1,3 bilhão de toneladas de alimento não são aproveitadas todos os anos.

Recomeça a escavação de um fóssil de dinossauro em Minas Gerais

Titanossauro viveu há cerca de 70 milhões de anos. Escavação em Uberaba tinha sido interrompida pelo período de chuvas.

Espanha corrige para 8 número de mortos por terremoto

'São oito mortos e há dois feridos graves', disse porta-voz do governo. Tremor de magnitude 5,3 no fim da tarde provocou destruição em Lorca.

Alguns planetas giram no sentido contrário ao de suas estrelas

Estudo revelou que perturbação gravitacional entre planetas acarreta na mudança de órbita, chegando ao ponto de mudar de direção.

Rio tem 8 mil casos de dengue em apenas uma semana

O último boletim epidemiológico da Secretaria de Saúde do estado, divulgado nesta quarta-feira (11), mostra um total de 85.415 casos suspeitos.

BP autorizada a comprar blocos de exploração no Brasil

A autorização permitirá a BP explorar oito blocos nas bacias de Campos e Camamu-Almada, a profundidades compreendidas entre 100 e 2.780 metros.

Turquia teme desastre ecológico por vazamento de cianureto

Derramamento com resíduos tóxicos provenientes de mina de prata provocaria o maior desastre ambiental no país.

Cientistas americanos encontram células-tronco no pulmão

Descoberta pode gerar novos tratamentos contra doenças crônicas. Células conseguiram reparar tecidos danificados em camundongos.

Vacina experimental contra HIV elimina vírus em testes com macacos

Medicamento usa um vírus mais brando, o CMV, para preparar o organismo. Segundo pesquisadores, resultado é inédito para vacinas experimentais.

Câmara dos Deputados adia para esta quarta-feira votação do Código Florestal

O adiamento servirá para tentar acordo entre o governo e os parlamentares sobre o único ponto divergente que trata das reservas nas propriedades até quatro módulos fiscais.

Prejuízos econômicos de desastres estão em elevação, diz ONU

Desastres já causaram mais de 481,5 bilhões de reais em prejuízos neste ano, quase o mesmo do total gasto no ano passado.

Relatório do Inpe alerta para risco da diminuição de chuvas na Amazônia

Valor econômico dos serviços ambientais da floresta ainda é desconhecido. Trabalho em conjunto com Reino Unido visa projetar efeitos no Brasil.

Estudo do Vaticano alerta para perigos do aquecimento global

Relatório divulgado pela Santa Sé alerta para necessidade urgente de reduzir emissão de gases do efeito estufa.

Hillary pede ajuda da China para lidar com mudanças climáticas

Secretária de Estado dos EUA quer que os dois países dialoguem para garantir o sucesso da próxima conferência do clima.

Modelagem pode melhorar gerenciamento costeiro

MMA divulga sistema espanhol para antecipar impacto de mudanças climáticas no litoral. Objetivo é engajar pesquisadores brasileiros na

geração de conhecimentos que adaptem o programa ao Brasil para prevenir e combater a erosão e inundações na zona costeira.

Fundo Clima pode apoiar Copa de 2014

Segundo o secretário de Mudanças Climáticas e Qualidade Ambiental do Ministério do Meio Ambiente, Eduardo Assad, o Fundo Clima pode ser uma fonte de apoio às ações de neutralização de emissões da Copa do Mundo de Futebol de 2014.

Prefeitos defendem aprovação de texto de Aldo Rebelo para novo Código Florestal

O apoio foi anunciado após enquete sugerida pelo presidente da Confederação Nacional de Municípios, Paulo Ziulkoski, durante explanação sobre os pontos que serão defendidos pela entidade no Congresso Nacional.

Aneel marca para 10 de junho 1ª leilão de transmissão do ano

Leilão terá três diferentes lotes que juntos somam investimentos de R\$ 750 milhões em 430 quilômetros de extensão.

Mudança no Código Florestal é 'retrocesso', diz MPF

Parecer foi elaborado por peritos em engenharia florestal. Documento afirma que novo Código reduz proteção ao meio ambiente.

Mais 13 animais são mortos em chacina em Ribeirão Preto/SP

39 animais foram encontrados mortos até esta terça-feira (10). A suspeita é de envenenamento.

Lagarto sem olhos e sem patas é descoberto no Camboja

Apesar de parecer uma cobra, animal tem características de lagarto como dois pulmões e língua não bifurcada.

Arraia comercializada há anos é finalmente descrita pela ciência

Espécie amazônica com desenho que lembra tigre é vendida para a Ásia. 'Potamotrygon tigrina' vive no Alto Amazonas, em território peruano.

Tecnologia pode permitir uso da voz para carregar baterias

Tecnologia transforma energia sonora - seja de voz, ruídos ou música - em eletricidade.

Índios terenas detêm coordenador da Funai em MS

Indígenas querem a nomeação de um índio para um cargo no órgão.

Terremoto de 7,1 graus atinge Vanuatu, no Pacífico Sul

O tremor ocorreu às 5h55 de terça-feira (horário de Brasília), com epicentro a 26,5 quilômetros de profundidade e 276,5 quilômetros ao sul de Port-Vila, a capital do país.

Tamanho do dedo anelar pode ajudar a revelar doença motora, diz estudo

Pesquisa sugere que pessoas com dedo anelar maior do que o indicador teriam risco maior.

Novo presidente da Funasa toma posse

Gilson de Carvalho Queiroz Filho, tomou posse na tarde de terça-feira (10).

Rio de Janeiro quer usar área de 1,5 milhão de hectares para projetos florestais

A meta do plano é implantar um projeto de silvicultura sustentável no Norte e Noroeste fluminense para apoiar o desenvolvimento econômico e a inclusão social dessas regiões.

Um em cada sete derrames acontece enquanto a pessoa está dormindo

Percepção tardia dos sintomas atrapalha no tratamento. Números são de pesquisa da Universidade de Cincinnati, nos EUA.

Consórcio internacional quer criar consciência humana para robô

O programa, batizado de "Human Brain Project" (Projeto Cérebro Humano), está a cargo de instituições científicas da Espanha, Suíça, Alemanha, Suécia, Reino Unido, Bélgica, Israel, França e Áustria.

Energias renováveis cobrirão 80% da demanda global, diz IPCC

Relatório prevê que esse setor se desenvolva em meados deste século e que seu uso se multiplique de três a 20 vezes.

Ressaca que matou três pessoas no Rio mantém mar agitado até quinta-feira

A ressaca no litoral fluminense foi provocada por um ciclone extratropical, que se formou na Argentina na semana passada e chegou à Região Sudeste do Brasil no fim de semana.

Chuva já deixa mais de 15 mil pessoas fora de casa em Pernambuco

Nove cidades decretaram calamidade; outras 26 estão em emergência. No Recife, foram registrados nove deslizamentos de barreira.

Tempestade tropical mata 13 e deixa milhares de deslocados nas Filipinas

A catástrofe afetou 111.938 pessoas, das quais 5.000 famílias tiveram de deixar suas casas e outras 4.000 estão isoladas nas áreas afetadas.

Brasileiro ensina povos da Amazônia a usar GPS e fazer mapas

O projeto do grupo, batizado de "Nova Cartografia Social da Amazônia", ensina indígenas, quilombolas e outros grupos tradicionais a empregar o GPS e técnicas modernas de georreferenciamento para produzir mapas artesanais, mas bastante precisos, de suas próprias terras.

Descobertos tigres raros na Indonésia

WWF descobriu 12 animais, incluindo duas famílias, em região florestal ameaçada pela indústria de papel.

Cientistas vão testar comunicação com golfinhos por computador

A meta é criar um sistema de linguagem com os quais os golfinhos selvagens se comuniquem naturalmente que, por si só, já é uma grande desafio.

Epidemia da dengue pode ser a pior já enfrentada em Londrina/PR

Secretaria de Saúde confirmou nesta segunda-feira (9) a quarta morte pela doença. Número de casos já ultrapassam 6,2 mil.

Mariposa inspira nanotecnologia para estudar Mal de Alzheimer

Imitando a estrutura das antenas da mariposa da seda, os nanoporos vão ajudar a estudar uma classe de doenças neurodegenerativas que inclui o Mal de Alzheimer, Parkinson e Huntington.

Votação do novo Código Florestal 'talvez' seja adiada, diz líder

Depois de passar a segunda-feira (9) em reuniões em busca de um acordo que atenda 'a base aliada, os ambientalistas e a formulação do governo', Vaccarezza afirmou que ainda reunirá todos os líderes aliados, o relator da proposta, deputado Aldo Rebelo, e alguns ministros na terça-feira (10).

Choques planetários formaram atmosfera de lua de Saturno

A descoberta explicaria a peculiaridade da atmosfera da lua Titã, mais espessa que um corpo planetário de temperatura média.

Nova vacina da malária será testada em humanos em 2012

A Colômbian falciparum vaccine será testada em seres humanos em junho de 2012 depois de obter 90% de eficiência em macacos.

Dengue é um dos principais problemas de saúde pública no Brasil, segundo revista inglesa

Edição especial sobre a saúde dos brasileiros resultou em seis artigos sobre os progressos, fracassos e desafios do Brasil.

Dia de negociações na Câmara para votar nesta terça-feira novo Código Florestal

O relator do projeto, deputado Aldo Rebelo (PCdoB-SP), passou o dia em conversas na tentativa de um entendimento em torno da matéria.

Pesquisadores descobrem por acaso 'super repelente' de insetos

O repelente é eficaz não só contra os mosquitos mas contra todo tipo de insetos, desde moscas a traças e formigas.

Descoberto um dos primeiros minerais do Sistema Solar

Geólogos anunciaram a descoberta de um autêntico fósil mineral, um dos primeiros minerais formados em nosso Sistema Solar.

'Parente' do tiranossauro mudava de dieta com avanço da idade, diz estudo

Esqueleto de tarbossauro de 70 milhões de anos permitiu descoberta. Animais mais velhos da espécie não competiam com mais novos por comida.

França devolve à Nova Zelândia cabeça mumificada de guerreiro maori

Peça ficou exposta por décadas em um museu francês; decisão foi comemorada por nativos neozelandeses.

Norte de MG pode virar deserto dentro de 20 anos

O desmatamento, a monocultura e a pecuária intensiva, somados a condições climáticas adversas, empobreceram o solo de 142

municípios do Estado.

Endeavour deve partir somente depois do dia 16

Com o atraso, mais dois dias serão acrescentados à missão de 14 dias na ISS (Estação Espacial Internacional) prevista inicialmente.

Ecologistas temem desastre no Cáucaso russo após Jogos de Inverno

Obras em Sochi avançam enquanto entidades denunciam que custo ambiental do evento poderá ser muito alto.

Nove municípios de PE decretam estado de calamidade pública

Estado sofre consequências de enchentes que já mataram duas pessoas. Mais de 15 mil famílias deixaram suas casas em 55 municípios atingidos.

Nível do rio Mississippi atinge recorde de 1937 nos EUA

O nível do rio cresceu progressivamente nos últimos dias, resultado das abundantes chuvas da semana passada, que caíram num ritmo próximo aos 30 centímetros diários.

Cadela pintada de rosa encontrada no lixo recebe 100 pedidos de adoção

Cinco dias após ser recolhida por vendedora, Rosinha já ganhou 1,1 kg. Expectativa é de que animal esteja pronto para adoção em 40 dias.

Sucuri aparece no Bairro da Paz em Salvador/BA

Moradores atribuem o aparecimento da cobra ao desmatamento. A Sucuri foi levada para a mata, onde foi solta.

Chimpanzés falam, mentem e recitam poesia usando sinais

Pesquisadores estudaram animais por mais de 40 anos para combater a ideia de que linguagem diferencia humanos de outros primatas.

Estudo analisa as mortes caninas por raça

Animais maiores tendem a ter doenças crônicas, como câncer, enquanto pequenos, a causa mais comum foi trauma.

Apenas 8% dos municípios fazem a coleta seletiva de lixo

Diariamente o Brasil produz 150 mil toneladas de lixo, das quais 40% são despejadas em aterros a céu aberto.

Debate sobre Código Florestal não pode ser monopolizado por "atrasados", diz Marina Silva

A ex-ministra considerou uma vitória o adiamento da votação do novo código para a próxima terça-feira (10). De acordo com Marina, a sociedade civil vai apresentar as propostas de alteração do texto do código para a Casa Civil.

Estudo diz que terremoto no Leste dos Andes pode ser devastador

Sismos podem atingir magnitude 8,9; pensava-se que o limite era 7,5. Região abrange partes do Sul da Bolívia e do Norte da Argentina.

Japão abre as portas de reator 1 da Usina de Fukushima

A abertura do reator 1 ocorre quase dois meses depois do terremoto seguido de tsunami que atingiram o país e deixaram mais de 25 mil mortos.

Fórum de Mudanças Climáticas pede mais debate sobre Código Florestal

Secretário do fórum participou de debate com relator do texto, Aldo Rebelo. Câmara dos Deputados marcou votação para a próxima terça-feira (11).

Choques planetários formaram atmosfera de nitrogênio da lua Titã, em Saturno

Estudo japonês explicaria a peculiaridade da atmosfera da lua de Saturno, mais espessa que o normal.

Batalhão Florestal apreende 31 balões na Região Metropolitana do Rio de Janeiro

Segundo policiais, 24 balões seriam soltos só na Zona Oeste. Policiais estavam divididos em dez equipes, mas ninguém foi preso.

Supremo rejeita pedido do PV para barrar votação do Código Florestal

Ministro analisou pedido de liminar, mas ainda vai julgar mérito do pedido. Votação do tema está prevista para a próxima terça-feira (10) na Câmara.

Legislação ambiental brasileira é uma das mais modernas do mundo, diz especialista

De acordo com advogado José Gustavo de Oliveira Franco, especialista em direito ambiental, a estrutura da legislação ambiental

começou a ser implementada no país a partir de 1981 com a Política Nacional de Meio Ambiente, que tem uma série de instrumentos para o planejamento, a gestão ambiental e a fiscalização.

População será orientada para evitar as queimadas em Mato Grosso

Onze audiências serão realizadas como parte do programa de prevenção. Bombeiros reconhecem que falta estrutura para combater queimadas em MT.

Fósseis de 35 gambás primitivos são encontrados na Bolívia

Os esqueletos de 64 milhões de anos foram encontrados em uma área de um metro quadrado, uma clara evidência de que viviam em bando, existia uma manada na qual os machos competiam pelas fêmeas e praticavam a poligamia.

"Lixo não existe. Resíduos sólidos são matéria-prima a ser reaproveitada", diz especialista

O interesse pela reciclagem de pneus e eletroeletrônicos tem aumentado no país. O tempo médio de utilização de computadores e impressoras, por exemplo, é cinco anos. Para as geladeiras e os fogões, algumas empresas já se especializam na coleta, desmontagem e encaminhamento para as usinas de reciclagem.

EUA lançam 1º satélite de novo sistema de alerta antimísil

Lançamento foi atrasado em um dia por causa do mau tempo. Equipamento custou 2,1 bilhões de reais.

Milhares se reúnem em protesto contra energia nuclear no Japão

O protesto ocorreu no sábado, um dia após o primeiro-ministro Naoto Kan pedir a paralisação das operações de uma usina nuclear situada no sudoeste de Tóquio por ela estar próxima a uma falha geológica, temendo um desastre como o que ocorreu na unidade de Fukushima, em março.

‡ SCIENCE

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Geology of Ore Deposits

Vol. 53, No. 2, 2011

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‡ EARTH PAGES

The Sendai great earthquake in close retrospect

Posted on [May 9, 2011](#) by [sdrury777](#) | [Leave a comment](#)



Tsunami debris at Sendai airport

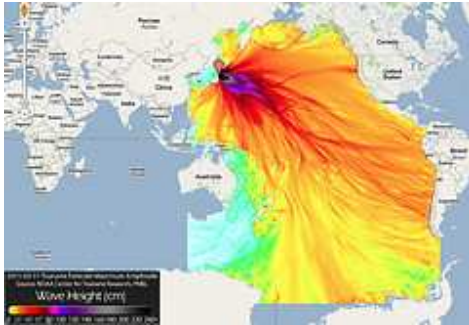
Media coverage of the disasters following the magnitude 9.0 earthquake of 11 March 2011 that devastated the north-eastern coast of Honshu, Japan around the city of Sendai is now (early May) fitful and dominated by the aftermath of the tsunamis' effect on the Fukushima Daiichi nuclear power station. For those who escaped the tsunamis the experience is irredeemably seared on their memory. Unlike the great waves that killed 10 times more people around the Indian Ocean on 26 December 2004, it will also be unforgettable for those of us far from the event who witnessed the lengthy, high-definition footage captured during the black-water torrents that swept all before them far inland. But that is no longer 'news'...

Only 6 to 7 weeks later lessons are being learned that probably should have been anticipated long before. Japan has the world's best disaster preparedness systems. They are centred on civil engineering that was proven to resist great earthquakes by that of 11 March; the terrifying tremors resulted in far fewer casualties than would have been the case anywhere else under such conditions. The tragedy lay with the magnitude of the tsunamis – as high as 30 m in some areas – that reached the coast within an hour of the seismic event. As well as the devastation and loss of life along the coast and up fertile low-lying valleys, waves of this size swept over defences of the coastal Fukushima Daiichi nuclear power plant cutting off emergency power supplies: the world's largest tsunami barriers proved inadequate to the task and near-meltdown ensued.

Despite the densest network of seismometers anywhere and in-place earthquake early-warning and risk-assessment systems, the events were not forecast and the only warning was that of the earthquake itself which alerted a well-versed population to the imminence of tsunamis to follow. Public education and preparedness proved to be the major life saver, except of course for those tragically killed or lost without trace. So what went wrong?

The risk assessment and warning systems produced results that bore little relation to the actual seismic shaking; the warning was for

the immediate vicinity of Sendai city to experience the highest intensities (5-6), most of the rest of Honshu, including Tokyo, having expected intensities in the 2-4 range. For Fukushima Daiichi a maximum magnitude of 7.2 in its vicinity was predicted to have less than 10% chance of occurring over the next 50 years. In reality seismometers across the whole eastern part of the Honshu north of Tokyo recorded intensities between 5-7, demonstrated graphically by numerous CCT recordings in shops and offices. The emerging opinion is that the theory and historic data used for risk and warning systems are flawed or inadequate. For instance the earthquake ripped along 400 km of the Japan Trench subduction zone rather than being a point source – a lesson also from the Sumatra earthquake of 26 December 2004, when ocean-floor thrusting extended 1200 km northwards to the Andaman Islands. Great earthquakes are far too infrequent for sufficient modern-style seismic data to have been collected for previous cases in the 20th century, but it seems clear since 2004 that: (1) stresses accumulate to unexpectedly high values where opposed plates are coupled or stuck together; (2) the 'point-source' model for earthquakes, which the use of seismic focuses and epicentres pinpointed by the world-wide seismic network encourages, is far from reality, the more so for the biggest stress accumulations; (3) existing approaches will fail for events with magnitudes greater than 8.0.



NOAA's Prediction of 11 March tsunami wave heights across Pacific Ocean. Image by cogito ergo imago via Flickr

Part of the problem is the sparse record of great earthquakes and the likelihood that, if they do have cyclicity, it may be of the order of hundreds to thousands of years. Historical sources record a large earthquake and tsunamis affecting Sendai district in 869 CE (Common Era), confirmed recently by geologists having located a typical tsunami deposit extending 3-4 km up the Sendai Plain, compared with more than 5 km in March 2011. The survey team claimed at the time that their discovery might indicate far higher risk now in the area than modelled 'officially'. Sadly, evaluating the prediction was incomplete when disaster did strike. Geoscientists can map faults, infer the length of their activity and work out the mechanisms whereby they fail, but apart from historical data – often sketchy – pinpointing and quantifying past events is beyond us. Looking at more widespread secondary effects, tsunami deposits in particular that often contain dateable organic debris, seems a fruitful way forward for coastal areas likely to bear the brunt of both shaking and huge inundations and the powerful ebbing of their flood waters. That is a topic in its infancy, but likely now to burgeon.

Ominously, because great earthquakes are so rare along any plate boundary, for seven greater than magnitude 8 to occur worldwide in a matter of 6 years (Sumatra, 2004, 9.1, 2005, 8.8, and three with magnitude >7 in 2010; Kuril Islands, 2006, 8.3, 2007, 8.1; Sichuan, 2008, 8.0; Chile, 2010, 8.8; Japan, 2011, 9.0) raises the questions, do they occur in time clusters, and if so, why? Although the numbers are small enough to strain statistics, comparing the last six years with the previous century or so of seismometer recordings shows that great earthquakes have never occurred so frequently. Is there a domino effect so that, say, energy from the Sumatran earthquake of late 2004 has somehow been transmitted throughout the interconnected subduction-zone system to destabilise other highly stressed areas? It is widely acknowledged that in one subduction system there is evidence of clustering, and this may extend to the two great earthquakes (2006 and 2007) in the Kuril Islands on the same boundary as the Sendai event, and two off Sumatra (2004 and 2005) with three more with magnitude >7 in 2010 on what previously had been regarded as a relatively quiescent subduction zone. Analysing all recorded seismic events greater than magnitude 5 to improve the statistics suggests that clustering does not extend to global scales, yet great earthquakes buck other trends shown by lesser ones. Their motions both vertical and lateral could conceivably cause widespread destabilisation, yet worryingly the only test of the idea is the occurrence of yet more in the next few years.

Sources: Normile, D. *et al.* 2011. Devastating earthquake defied expectations. *Science*, v. **331**, p. 1375-1376; Brahic, C. *et al.* 2011. Megaquake aftermath. *New Scientist*, v. **209** (19 March 2011), p. 6-8; Cyranoski, D. Japan faces up to failure of its earthquake preparations. *Nature*, v. **471**, p. 556-557; Normile, D. 2011. Scientific consensus on great quake came too late. *Science*, v. **332**, p. 22-23.

See also: Geller, R.J. 2011. Shake-up time for Japanese seismology. *Nature*, v. **472**, p. 407-409.

YouTube video: <http://www.youtube.com/watch?v=Ydvn2xo9Ndw>

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Clovis first hypothesis refuted

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Clovis blades. Image via Wikipedia

For decades palaeoanthropologists studying the Americas were dominated by a single idea; that nobody entered the continents before those people who used the elegant fluted spear blades first found near Clovis, New Mexico in the 1930s. These were eventually dated at a maximum age of around 13 ka before the present. One reason for accepting the Clovis people as the first Americans, apart from the lack of conclusive evidence for any earlier occupation, was the fact that glaciers blocked the route from the Bering land bridge of the last Ice age until about 13 ka. But migration may have been possible as far back as 30 ka along the Pacific coast after people crossed the Beringia flatlands exposed by fallen sea-level. There have been suggestions of pre-Clovis sites, but none have carried the weight of evidence to shift the majority from their position. This now has to change because of very high-quality evidence from a site in Texas (Waters, M.R. and 12 others 2011. The Buttermilk Creek complex and the origins of Clovis at the Debra L. Friedkin site, Texas. *Science*, v. **331**, p. 1599-1603). The site in question is in sediments that lie beneath those containing Clovis style tools. In fact it has yielded more than 15 thousand items that are well made, but bear little comparison with the iconic Clovis tools. Almost 50 optically stimulated luminescence (OSL, based on time of burial after exposure to sunlight) dates show a clear increase in age with depth in the excavations, some reaching back as far as 33 ka. The authors favour a conservative approach and restrict their estimated ages to those artefacts found in a well defined stratigraphic horizon, which span the range 13.2 to 15.5 ka. The Clovis-first case seems to be closed, but a new phase in North America aimed at pushing back the time of first human colonising will undoubtedly begin now.

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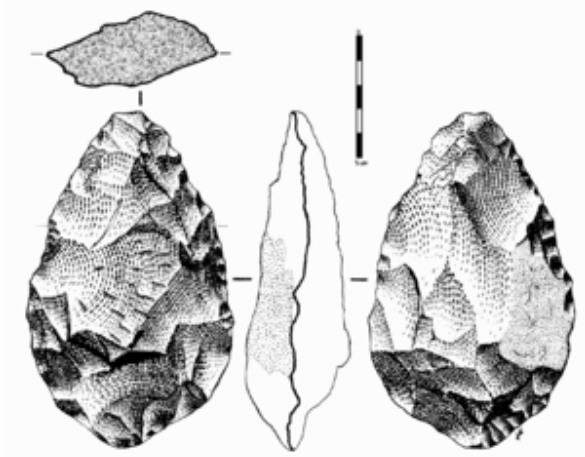
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Early bi-face tools from South India

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Typical bi-face 'hand axe' from Zamora, Spain. Image via Wikipedia

An icon of palaeoanthropology, the bi-face or Acheulean 'hand axe' was invented in Africa, presumably by *H. ergaster*, about 1.6 Ma ago and apart from in the Middle East, where it first occurs around 1.4 Ma, elsewhere it was a late arrival in the artefact record. Human colonisation of Asia began as early as 1.8 Ma ago, so those early arrivals would not have brought the Acheulean technology but used less elegant tools similar to the earliest Oldowan edged pebbles. Although occupied by *H. erectus* until as recently as ~20 ka, those Asians are believed not to have managed the bi-face breakthrough, indeed its absence has suggested to some that the erects evolved from the very earliest immigrants into Asia. It has been widely accepted that abundant bi-face tools in India date from about 500 ka ago, presumed to have been brought by *H. heidelbergensis* migrants. An object lesson in the way that new techniques rather than new

archaeological sites can dramatically change such long-held notions has emerged from excavations at Attirampakkam about 30 km NW of Chennai (Madras) in South India (Pappu, S. *et al.* 2011. Early Pleistocene presence of Acheulian hominins in South India. *Science*, v. **331**, p. 1596-1599). This was the site where Palaeolithic tools first came to light in the sub-continent in 1863. The Indo-French research team used the cosmogenic isotope and magnetostratigraphic methods to estimate the date at which the tools were buried and discovered a much earlier age than expected, between 1.0 to 1.5 Ma. That throws into question the assumption of younger ages in general for the technology in India, but more important, suggests that there was an eastward wave of migration from Africa shortly after the invention of bi-face tools. A wave of re-evaluation of the somewhat confusing Asian record of early humans seems on the cards.

See also: Dennell, R. 2011. Earlier Acheulian arrival in South Asia. *Science*, v. **331**, p. 1532-1533

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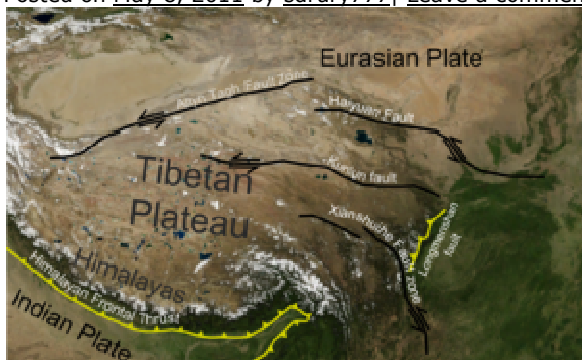
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Winds of Change

Posted on [May 8, 2011](#) by [sdrury777](#) | [Leave a comment](#)



Altyn Tagh range at top - click for detail. Image via Wikipedia

The transport of sediment by wind action is generally visualised as sand dunes of all kind of shapes. Yet shifting sand particles arm strong wind in the manner of a sand blaster so that it can act as an agent of erosion to form peculiar landforms known as yardangs, which often parallel the prevailing wind as linear ridges. Yardangs very rarely form from crystalline rocks, but poorly cemented sedimentary rocks are particularly prone to wind erosion. In a few areas that are very arid it is the dominant sculpting process. One such area is the Qaidam Basin (<50 mm of rain per year) at the northern edge of the Tibetan Plateau. The basin is flanked to the north by the Altyn Tagh mountains, and major passes in that range funnel powerful winds across the basin floor. The yardangs of Qaidam are enormous, reaching up to 50 m high and show clearly on satellite images and often camouflage the trend of bedding in the sedimentary rocks from which they are carved. Formerly thought to be a basin in which sediment was accumulating and being actively folded by tectonic forces related to the India-Asia collision zone, recent work reveals several very surprising aspects of local wind action (Kapp, P. *et al.* 2011. Wind erosion in the Qaidam basin, central Asia: implications for tectonics, palaeoclimate, and the source of the Loess Plateau. *GSA Today*, v. **21** (April/May 2011) p. 4-10). Since the Late Pliocene the rate of wind erosion has reached as much as 1 mm per year, so that it is a source of sediment not a repository, to the extent that at least a third of the basin is occupied by exposed folded sediments that wind erosion has exhumed. Yet this is not an area noted for large dust storms.



Yardangs in Qaidam. Image by Joe Zhou via Flickr

The folded sediments are early Pleistocene lacustrine silts and fine sands, which sand blasting has easily sculpted, but many of the yardangs are encrusted with a crust of salt. Indeed several generations of such crusts mark wind-eroded surfaces of different relative ages. It seems that the erosion has occurred in episodes, most likely during cold-dry glacial and stadial periods when the northern jet stream probably shifted south from its present local position around 48°N to the latitude of Qaidam (around 40°N) when the Altyn Tagh's funnelling effect would have been maximised by prevailing north westerly winds that parallels the yardangs. Such episodes can be shown to have eroded hundreds to thousands of metres of the slowly deforming sediments since about 2.8 Ma. It was at that time that folding began in earnest, and quite possibly the unloading effect of the wind erosion may have assisted the deformation. Where did such vast volumes of sediment end up? Downwind to the south east are the famous loess deposits in the headwaters of the Huang He

([Yellow River](#)), whose transport of eroded loess accounts for the great fertility of much of China's soils and thereby its great carrying capacity for human population. Interestingly, the loess deposits show intricate alternations that match the ups and downs of climate through the late Pleistocene. The link with the Qaidam [yardang](#) fields seems convincing

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Bulges that move

Posted on [May 8, 2011](#) by [sdrury777](#) | [Leave a comment](#)

In 2008 a team of geophysicists from Cambridge University, UK published an astonishingly detailed picture of about 500 km² of a land surface complete with drainage systems (Figure 3 in Rudge, J.F. *et al.* 2008. A plume model of transient diachronous uplift at the Earth's surface. *Earth and Planetary Science Letters*, v. **267**, p. 146-160). The surprise was not its Palaeogene age (~55 Ma), but that it is buried beneath the Atlantic continental shelf about 200 km west of the Shetland Isles and had been revealed by detailed, 3-D seismic reflection surveys during oil exploration. Technically it is buried landscape unconformity that resulted from uplift (by almost 500 m) and erosion (for ~1.3 Ma) that interrupted Palaeocene to Eocene marine sedimentation and was suddenly buried to preserve the details of river channels: uplift rapidly gave way to subsidence and conditions returned to marine about 0.6 Ma later. The timing and the location of such a transient crustal bulge, during the early part of opening of the North Atlantic, suggests that it stemmed from a thermal source, probably the Iceland hot spot straddled by the mid-Atlantic Ridge. The model favoured by the authors is radially horizontal spreading of a pulse of especially hot mantle outwards from the plume beneath the Iceland hot spot; a 'plume head'. Volumetric expansion of the lithosphere causes the uplift, and movement away from the plume of the hot mantle results in an annular, outward moving ripple. Cooling once the thermal source has passed produces subsidence.

The idea clearly has 'legs' for a whole number of reasons, not the least being the sheer number of long-lived hot spots above mantle plumes that affect the ocean basins and parts of the continents, Africa and North America especially. Now it has been publicised more widely than in a specialised journal (Williams, C. 2011. Pulsating planet. *New Scientist*, v. **209** (12 March 2011), p. 41-43). One of the original authors is reported to have suggested that the ~55 Ma thermal ripple beneath the nascent North Atlantic may have destabilised gas hydrates in the sediments causing methane to belch out in its wake. That is a possible mechanism for the [Palaeocene-Eocene thermal maximum](#) and its huge associated carbon isotope 'spike' likely stemming from boosted atmospheric methane.



The Grand Canyon from the South Rim. Image via Wikipedia

Probably the most famous extant bulge is the one through which the Colorado River has carved the USA's 1.8 km deep Grand Canyon: the Colorado Plateau. Long believed to have formed above hot, low-density lithosphere too, this uplift is the subject of completely new ideas that also have stemmed in part from seismic data, though not produced by artificial reflectance methods. Geophysicists in the US have developed a system that uses hundreds of transportable seismometers that are being 'marched' from west to east as an array that uses seismographs from natural earthquakes world-wide to perform seismic tomography – 3-D mapping of varying seismic velocities and thereby rigidity and density in the mantle – with improved resolution because of the close spacing of the recording stations. Publications from the Earthscope USarray are beginning to appear from the western USA, one of which concerns the Colorado Plateau (Levander, A. *et al.*, 2011. Continuing Colorado plateau uplift by delamination-style convective lithospheric downwelling. *Nature*, v. **472**, p. 461-465). The western part of the plateau is associated with a high-velocity anomaly that extends to around 900 km beneath, which the authors ascribe to a large blob of rigid mantle that has detached from the lithosphere and is slowly sinking. This 'drip' is an example of delamination where mantle that becomes detached from the lithosphere causes it to thin and reduces its overall density. The overlying crust rises in response. There is a thermal effect, as warmer, less rigid asthenosphere convects upwards to fill the gap left by the drip, but it is an effect rather than a cause of the uplift.

See also: Zandt, G. & Reiners, P. 2011. Lithosphere today... *Nature*, v. **472**, p. 420-421.

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Antarctic analogue for alien life?

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The full 'Snowball Earth' model for episodes in the Neoproterozoic that left glaciogenic sediments at near-equatorial palaeolatitudes implies that the oceans were frozen over globally. An objection to that is the likelihood that all photosynthetic activity would have been shut down leading to near catastrophe for all life forms of the time except those based on chemoautotrophic metabolism, as around hydrothermal vents. Antarctica has around 140 lakes that have been frozen over for at least hundreds of thousands if not millions of years, the best known being Lake Vostok, deep within the continent, that Russian scientists are on the verge of tapping after drilling through more than 3 km of glacial ice. Who knows what they might find? Far less extreme, but also having perennial ice cover, is Lake Untersee close to the coast in East Antarctica. Its summer ice cover is 3 m thick and it is presumed to have remained icebound through previous interglacials, although it is fed by meltwater from a nearby glacier in summer. It is not filled with fresh water, however, having a pH up to 12.1, around that of household bleach. It also has very high oxygen content, in fact supersaturated at 50% more than the solubility expected at 0°C. Lake Untersee would be expected to have little life, being an extremely hostile environment. Nonetheless, it does boast a biome and sufficient light gets through the ice cover to support microbial mats of photosynthesising blue-green bacteria (Andersen, D.T. *et al.* 2011. Discovery of large conical stromatolites in Lake Untersee, Antarctica. *Geobiology*, v. **9**, p. 280–293). As well as perhaps helping elevate the oxygen levels in the lake water, these organisms have secreted stromatolite-like cones, pinnacles and mounds, but not ones made of carbonate. Although the water contains plenty of calcium ions, there is insufficient carbon as CO₃ or HCO₃ ions for calcite to be precipitated. The carbon-poor nature of the water seems to confirm its long-term isolation from the atmosphere. Instead, the stromatolites are made of laminated clay, maybe derived by exceedingly slow breakdown of feldspars that would also yield calcium and hydroxyl ions to explain the water's peculiar chemistry. The different shapes of stromatolites are linked to different cyanobacterial communities, which may help explain morphological variations among fossil stromatolites.

The lead author is from the SETI Institute in California, and presumably visited Lake Untersee in the cause of exobiology, as reported in other commentaries on the paper. However, the peculiarities of the lake and its life seem to be just that, with little relevance to frigid sedimentation in the distant past apart from a possible explanation for varying shapes of fossil stromatolites. Nor is the lake sterilised by virtue of perennial ice cover. Being fed by glacial melting it has received rock flour that has broken down to clays, and that implies meltwater carries other materials from the ice cap. Even Antarctica is not isolated from wind-blown dust, so cyanobacteria may have been introduced by sturdy, wind-borne spores being incorporated in the ice cap, eventually to end up in Lake Untersee. It seems that the lead author actually dived in the lake, which puts the fears of contamination by careful drilling into Lake Vostok into perspective. How such an environment links to notions of life elsewhere in the universe is hard to see. The truly fascinating thing about home-grown cyanobacteria is that early variants may well have cuddled up with other simple cells for mutual wellbeing to become the chloroplasts of eucaryan photosynthesising autotrophs, on which most metazoan life on Earth now depends.

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Bouncing back from the deep

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Eclogite from Norway. Image by kevinzim via Flickr

Because the average density of the rocks making up the continental crust is about 2.7 t m⁻³ while that of the mantle is greater than 3.0 t m⁻³ it might seem as though continents cannot be subducted. Indeed, that was one of the first principles of plate tectonics, which would account for continental crust dating back to 4000 Ma, whereas there is no oceanic crust older than about 150 Ma. In the southern foothills of the Alps in Piemonte, Italy is a site which refutes the hypothesis in a stunning fashion. The minor ski resort of Monte Muirone is backed by cliffs in what to all appearances is a common-or-garden granite: it even seems to contain phenocrysts of plagioclase

feldspar. Microscopic examination of the megacrysts reveals them to be made up of a complex intergrowth between jadeite, a high-pressure sodic pyroxene, and quartz. This is exactly what should form if albite, the sodium-rich kind of plagioclase feldspar, if it descended to depths over 70 km below the surface, i.e. to mantle depths.

Monte Muçrone proves that continental materials can be subducted, but also reveals that these granites popped back up again when the forces of subduction were relieved at the end of the Alpine orogeny. Other examples have since turned up, but few so spectacular as continental rocks from Switzerland (Herwartz, D. *et al.* 2011. Tracing two orogenic cycles in one eclogite sample by Lu-Hf garnet chronometry. *Nature Geoscience*, v. 4, p. 178-183). The Adula nappe of the Swiss Lepontine Alps consists of granitoid gneisses and metasediments of continental affinities, associated with mafic and ultramafic metamorphic rocks. The mafic rocks include eclogites typical of high-pressure, low-temperature metamorphism characteristic of subduction. Their minerals record formation temperatures around 680°C at a depth of more than more than 80 km. Eclogites are beautiful green and red rocks containing high-pressure omphacite pyroxene and pyrope garnet. Garnets generally contain abundant rare-earth elements especially those with the highest atomic numbers. One of these is lutetium (Lu) that has a radioactive isotope ¹⁷⁶Lu with a half-life of 3.78×10^{10} years to yield a daughter isotope of hafnium ¹⁷⁶Hf; garnets can be dated using this method. Garnets are frequently zoned, and the Adula eclogites clearly show several generations of zonation. Zoning can form as metamorphic conditions change, so in itself is not unusual, but dating different generations is. The German team from the Universities of Bonn, Cologne and Münster found that the garnets defined two distinct isochrons, one of Variscan age of just over 330 Ma, the other Alpine around 38 Ma. Clearly the pre-Variscan crust (probably once part of the African continent) had been subducted twice but had wrested itself clear of the mantle's clutches on both occasions, each time remaining more or less intact. One idea that stems from this coincidence is that the Variscan mountain belt that formed at the earlier subduction zone subsequently split at its high P – low T core, so that the eclogites lay at a new continental margin and could suffer the same extreme compression when new subduction began there.

See also: Bruekner, H.K. 2011. Double-dunk tectonics. *Nature Geoscience*, v. 4, p. 136-138

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Continuing the quest of Mohorovičić

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Andrija Mohorovičić (Image via Wikipedia)

Most people are quite content with an annual holiday abroad, yet a number of geoscientists yearn for something more adventurous. The Croatian geophysicist Andrija Mohorovičić was among the first to study estimates of speeds at which seismic waves travelled through the Earth, discovering in 1909 that below a depth of about 30 km below the continental surface they moved faster than in the uppermost layer. He had discovered the boundary between the continental crust and the underlying mantle, a discontinuity that bears his name though often shortened to the 'Moho'. Having been traced beneath most of the Earth's surface, a group of American scientists discussed over a drink or three at a 'wine breakfast' in 1957 a project to drill through the Moho to find out what the mantle was made of. The brainchild of Harry Hess, one of the first to suggest plate tectonics as a driving mechanism for continental drift, was dubbed Project Mohole. With US government support, a drilling barge designed for offshore oil drilling and a system of thrusters and pre-GPS locational instrumentation to keep the barge on station the Mohole was spudded in 1961 on the seabed near Guadalupe Island off Baha California in Mexico; about the time that John F. Kennedy declared his belief that the USA could land a man on the Moon by the end of the 1960s. There was something of a thrill factor about Project Mohole, and its first attempts were reported in Life Magazine by John Steinbeck, author of *The Grapes of Wrath* and amateur oceanographer. It turned out that sending a drill bit to the mantle was more difficult than a manned lunar landing. Only a few metres of basaltic crust was recovered and Congress cancelled Mohole funding in 1966. Nevertheless, the project was the forerunner of the highly successful Ocean Drilling Program and its predecessors, probably the most prolific international collaboration of any kind.



The drilling barge CUSS1 used for the original Mohole Project. Image via Wikipedia

Since the 1960s research into the mantle has been continued with great success by looking at upthrust masses such as those in the Alps and in ophiolite complexes, nodules in alkaline basalts and kimberlites that form below 100 km into the mantle, samples dredged from oceanic fracture zones, and indirectly from the geochemistry of basalts that are derived by partial melting of mantle materials. Yet, there is still an air of frustration about some igneous petrologists and geophysicists; they want to touch the real thing! Now, at last, they may have their chance, for improved drilling and positioning technology developed by ODP and the petroleum industry make a hole through the Moho feasible. Indeed one is planned once drill-bits and lubricants suitable for the anticipated temperatures and pressures have been finalised. Three sites are under consideration: near the original Mohole; in the Cocos Plate off Costa Rica and the Pacific Plate near Hawaii, each combining the coolest crust, thinnest sediment cover and shallowest possible water – i.e. just off a mid-ocean ridge or hot-spot. The Costa Rica site (ODP site 1256) has the thinnest crust due to rapid sea-floor spreading by the East Pacific Rise there and is the most likely to be drilled. It already has a core that penetrates to 1.5 km in oceanic crust and a current project aimed at sampling the cumulate gabbro layer of the lower oceanic crust. That will still be 3.5 km above the local Moho.

There is an obvious question; will an ocean-floor site, however favourable, and a hole drilled through it help resolve fundamental issues regarding the mantle? Well, probably for oceanic lithospheric mantle, but that has had basaltic magma removed from it to form the crust above. Also mid-ocean ridge basalts have geochemical features that suggest that their source mantle had been a melt source previously, compared with the source mantle materials for alkaline and some other types of basalt that seem to have been less depleted in certain elements. The most important question posed by the mantle in general concerns how it originally formed during the Earth's earliest history, accretion of debris from the solar nebula, the moon-forming event and extraction of the metallic core. A Mohole can contribute little to those issues.

Source: Teagle, D.A.H. & Ildefonse B. 2011. Journey to the mantle of the Earth. *Nature*, v. **471**, p. 437-439.

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Some megafaunas of the recent past

Posted on [May 7, 2011](#) by [sdrury777](#) | [Leave a comment](#)

Harvey was an imaginary, 2 m tall rabbit which befriended Elwood P. Dowd in Mary Chase's 1944 comedy of errors named after the said rabbit, filmed in 1950 and starring James Stewart as the affable though deranged Dowd. Though not so tall, a giant fossil rabbit (relative to modern rabbits) weighing it at 12 kg has emerged from the prolific Late Neogene cave deposits of Minorca (Quintana, J. *Et al.* 2011. *Nuralagus rex*, gen. et sp. nov., an endemic insular giant rabbit from the Neogene of Minorca (Balearic Islands, Spain). *Journal of Vertebrate Paleontology*, v. **31**, p. 231-240). At about 3 times heavier than Barrington my lagomorphophagic (rabbit-eating to the uninitiated) cat, this would have been, to him, a beast best avoided, as the name *N. rex* might suggest. So unexpected was a gigantic rabbit that, interestingly, it was first mistaken for a fossil tortoise, albeit one lacking a carapace.

Island faunas have long been recognized as havens for peculiar trends in evolutionary successions, either towards dwarfism as in the case of the tiny elephants on which *H. floresiensis* preyed until quite recently on the Indonesian island of Flores or gigantism as in this remarkable case. As the authors infer, on account of the creature's '(short manus and pes with splayed phalanges, short and stiff vertebral column with reduced extension/flexion capabilities), and the relatively small size of sense-related areas of the skull (tympenic

bullae, orbits, braincase, and choanae)...’ this was a rabbit which sadly could not hop. This un-rabbit-like locomotion may well have been a result of it not having needed to hop, being so large as to challenge seriously the largest Neogene predators on the island – lizards – and thereby saving energy. For much the same evolutionary logic, neither did *N. rex* have long ears, having less need to detect a stealthy nemesis.

The demise of Late Neogene megafaunas in general has often been ascribed to human intervention. Though *N. rex* became extinct at around 3 Ma and avoided human predation, later giants did not fare so well. A case in point is the celebrated woolly mammoth, the last of the steppe mammoths, that first appeared in the fossil record of Siberia around 750 ka ago (Nicholls H. 2011. Last days of the mammoth. *New Scientist*, v. **209** (26 March 2011), p. 54-57). DNA evidence from hairs preserved in permafrost suggests that ancestors of the steppe mammoth line diverged with that of Asian elephants from African elephant ancestors around 5 Ma. Interestingly, ancestral steppe mammoths – without shaggy coats but having the archetypical curved tusks – roamed Africa until 3 Ma when they disappear to reappear in Europe and Asia, yet without adaptation to cold until the onset of northern glaciations around 2.5 Ma. At that point the true steppe mammoths evolved increased tooth enamel needed for a diet of mainly silica-rich grasses to resist wear. The family spread to North America when sea-level fell to expose the sea floor of the Bering Straits. The woolly mammoth is the star partly because specimens periodically turn up almost perfectly preserved in permafrost. This has allowed almost half of a full DNA sequence to be restored. Preserved haemoglobin from a woolly mammoth shares with that from modern musk oxen an ability to release oxygen at temperatures well below zero so that they could function even if their extremities became chilled.



Reconstructed woolly mammoth at the Royal BC Museum, Victoria, British Columbia (Image via Wikipedia)

Astonishingly, all elephants urinate so copiously that they soak their range lands in DNA, though it only lingers in ultra cold climes. This bizarre fact encouraged a large team of palaeobiologists to comb frozen soils in an alluvium section in Arctic Alaska for mammoth DNA (Haile, J and 17 others, 2009. Ancient DNA reveals late survival of mammoth and horse in interior Alaska. *Proceedings of the National Academy of Sciences of the USA*, v. **106**, p. 22352–22357). Mammoth DNA turned up in soils as young as 10.5 ka. Moreover mammoth overlapped with human occupation for several millennia, casting doubt on theories that mammoth extinction resulted either from human predation or the introduction of epidemic disease that might have felled mammoths quickly: they declined gradually. Yet the empirical fact that steppe mammoths in general and the woolly mammoth in particular survived through at least 8 major glacial-interglacial transitions only to become extinct at the start of the current Holocene interglacial period at the same time as humans recolonised the frigid desert of Arctic latitudes, where woolly mammoths could survive except at the last glacial maximum surely points to some influence that arose from human activity.

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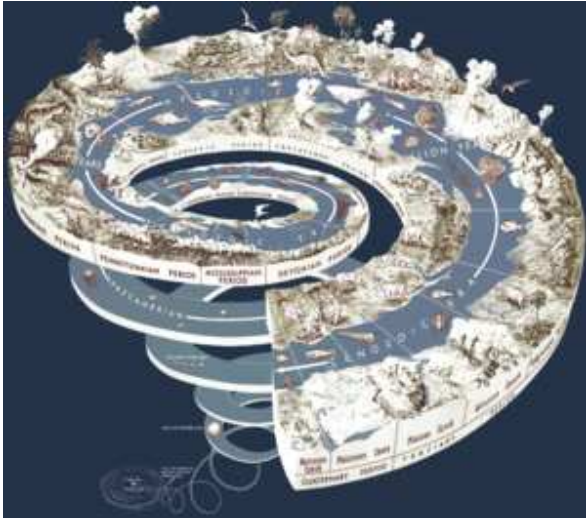
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Rationalising geological time

Posted on [May 7, 2011](#) by [sdrury777](#) | [Leave a comment](#)



The Geologic Time Spiral: A Path to the Past. Designed by Joseph Graham, William Newman, and John Stacy. Get it from <http://pubs.usgs.gov/gip/2008/58/>

The *Système International d'Unités (SI)* is the agreed arbiter that defines the units in which phenomena are measured. There are 7 SI base units (length, mass, time, electric current, temperature, intensity of radiation and amount of substance) from which others are derived as they become necessary. Geoscientists have striven to comply, though not always happily. For instance the doubly-derived SI unit for pressure, the pascal (Pa) is a newton (derived unit of force) per square metre (N m^{-2}), and in base units $1 \text{ kg m}^{-1} \text{ s}^{-2}$. The pascal replaced the long employed arbitrary unit, the kilobar ($1 \text{ kb} = 1000 \times$ surface atmospheric or barometric pressure) one of which represents about 3.5 km depth in the earth. The reluctance to shift units is probably innate conservatism, for $1 \text{ kb} = 100 \text{ MPa}$: simples!

Another problem has arisen as regards the SI base unit for time – the second. This is unwieldy for geological time, the Earth having formed approximately 1.435×10^{17} seconds ago. It's not so handy for history either, about 3×10^{10} seconds having elapsed since William of Normandy won the Battle of Hastings.

The year is what we remember, but even that in a historical sense has its problems, for instance the BC/AD division where some scholars even dare to suggest that Christ was born in 4 BC. The more politically correct Common Era (CE) and Before the Common Era (BCE) of course don't fool anyone. Interestingly, Wikipedia (en.wikipedia.org/wiki/Year) indicates, there are over ten current versions of a 'year' depending on context (for instance, astronomers favour the Julian year). Historical and thus geological time has the unnerving habit of continually getting longer, and it is a major problem to measure historical time precisely, either from increasingly vague records as one delves back in historical documents or because of the inherent imprecision in measuring radioactive isotopes and their daughter products that underpins archaeological and geological time. Archaeologists have a very hard time of it, for their workhorse is radiocarbon dating that depends on the production of radioactive ^{14}C in the atmosphere by cosmic ray's interaction with nitrogen. The rate of ^{14}C production varies over time with the cosmic ray flux from extra-solar sources, and even worse, a very large amount was produced by testing nuclear weapons in the atmosphere in the mid 20th century. Abandoning the BC/AD division that lurks still with historians and archaeologists, geoscientists speak of time 'before present' (bp), which doesn't matter a damn for geological Periods, Eras and Eons which are immensely long whatever the unit. But it does for the Holocene, mainly calibrated by radiocarbon methods: bomb-test production of ^{14}C , which will linger about 50 thousand years before near-complete decay, has forced the 'present' to be set at 1950 AD!

So the year is here to stay, even though it is arbitrary and changes all the time, along with kilo, mega and giga prefixes for thousands, millions and billions of years. Yet teeth are now being ground over what the unit's symbol should be (Biever, C. 2011. Push to define year sparks time war. *New Scientist*, v. **210** (30 April 2011), p. 10). A task group of geoscientists and chemists set up by the International Union of Pure and Applied Chemistry, IUPAC, and the International Union of Geological Sciences, IUGS in 2006 have now defined the year – why chemists, you might wonder; they measure the radioactive decay constants of isotopes used in radiometric dating. The link to the SI system through the base unit of one atomic-standard second is to be standardised by the solar year; the time in seconds between one solstice and the next at the equator for year 2000: i.e. $3.1556925445 \times 10^7 \text{ s}$ (Holden, N.E. *et al.* 2011. IUPAC-IUGS common definition and convention on the use of the year as a derived unit of time (IUPAC Recommendations 2011). *Pure and Applied Chemistry*, v. **83**, p. 1159-1162). It is to be called the *annus (a)*, applied in ka, Ma or Ga to two usages of time, the time difference between 'now' and an event in the past, and the time difference between two events in the past. This dual usage of the same symbol is the source of the gnashing. Whereas Ma, for instance, was quite acceptably used for the measured age of a rock relative to the present, there are at least three schools of thought for other uses of time. Some have been quite happy to use Ma for measured age, a fixed time datum in the past such as the Precambrian-Cambrian boundary, and a time duration such as that of a geological Period or some major event such as an orogeny (that has been used in Earth Pages News since its outset). Others would distinguish between the first and the other two, as for instance Ma for the first and Myr for the other two. But there are variants, the symbol mya having been used for 'million years ago', and the international science journal *Nature* currently uses Myr for the first but now takes the safe path of using 'million years' for the other two. Nicholas Christie-Blick of Columbia University in New York is reported as having opined that the rationalisation to one-symbol-fits-all is a huge step backwards, and he is not alone; *Science* editorial staff will continue to demand of their authors a distinction between age and time span, since a switch would 'confuse its readers', long accustomed to that usage.

Also it is so easy to write, 'the rock has an Ar-Ar age of 25 Ma', 'it took 25 Ma for this trilobite to disappear from the geological record', and 'about 25 Ma ago, there is a gap in the fossil record of primates'. I personally welcome the simplification, especially as it will encourage authors to write more nicely.