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ARTIGO DA SEMANA

<http://www.unicamp.br/unicamp/noticias/2014/09/09/aluno-do-ig-e-o-premiado-internacional-da-sociedade-geologica-da-america>

Aluno do IG é o premiado internacional

da Sociedade Geológica da América

09/09/2014 - 14:00

[Paulo Cavalheri](#)



Marcus Vinícius Theodoro Soares, aluno da graduação em geologia do Instituto de Geociências (IG), é o único estrangeiro entre os premiados pela Geological Society of America (GSA), que conta com recursos oferecidos pela Subaru of America. O prêmio é constituído por uma bolsa de 1.500 dólares e garante o registro do aluno ganhador no congresso anual da GSA (que será em Vancouver, Canadá), além de isenção por um ano da anuidade como membro da entidade. O propósito desta bolsa é encorajar estudantes de geologia em suas carreiras e incentivá-los a prosseguir com os estudos na área.

Segundo Marcus Vinícius, o prêmio é concedido a sete alunos – seis americanos e um internacional – dentre os concorrentes indicados por representantes da GSA em países das zonas delimitadas pela entidade: Cordilleran, North-Central, Northeastern, Rocky Mountain, South-Central, Southeastern. Indicado pelo professor Georgio Basilic, do IG, aluno brasileiro acabou escolhido para o prêmio internacional, basicamente por seu histórico acadêmico.

O estudante já está na Universidade de Bristol (Reino Unido) através do programa Ciência sem Fronteiras, mas explica que isso não está diretamente relacionado com a premiação pela GSA. "Este prêmio é destinado ao avanço dos estudos em geologia e, portanto, de ser utilizado com esse intuito. A princípio, penso em iniciar uma biblioteca geológica pessoal, mas também posso gastá-lo para participar de congressos e pesquisas de campo. Como estou prestes a me formar, talvez guarde o dinheiro para comprar livros durante o mestrado."

O curso de Marcus Vinicius pelo CsF começou em janeiro deste ano e vai até janeiro de 2015, experiência que ele considera extremamente enriquecedora tanto no aspecto acadêmico como pessoal. "Em Bristol procurei escolher disciplinas nas áreas de sedimentologia, estratigrafia e petróleo, que mais me fascinam. Meu projeto é focado na simulação 3D de reservatórios de petróleo utilizando métodos estatísticos e computacionais, atrelados à interpretação geológica dos dados gerados. Os estudantes da universidade vêm de toda a Europa, Ásia, Oceania e outras partes do globo. Participei trabalhos de campo ao longo da costa oeste britânica, do norte

do País de Gales e dos fiordes do oeste escocês."

<http://www.geologypage.com/2014/09/textbook-theory-behind-volcanoes-may-be.html#ixzz3CuYVxtUB>
Textbook theory behind volcanoes may be wrong



Tungurahua volcano eruption.
Credit: © Sunshine Pics / Fotolia

In the typical textbook picture, volcanoes, such as those that are forming the Hawaiian islands, erupt when magma gushes out as narrow jets from deep inside Earth. But that picture is wrong, according to a new study from researchers at Caltech and the University of Miami in Florida.

New seismology data are now confirming that such narrow jets don't actually exist, says Don Anderson, the Eleanor and John R. McMillian Professor of Geophysics, Emeritus, at Caltech. In fact, he adds, basic physics doesn't support the presence of these jets, called mantle plumes, and the new results corroborate those fundamental ideas.

"Mantle plumes have never had a sound physical or logical basis," Anderson says. "They are akin to Rudyard Kipling's 'Just So Stories' about how giraffes got their long necks."

Anderson and James Natland, a professor emeritus of marine geology and geophysics at the University of Miami, describe their analysis online in the September 8 issue of the Proceedings of the National Academy of Sciences.

According to current mantle-plume theory, Anderson explains, heat from Earth's core somehow generates narrow jets of hot magma that gush through the mantle and to the surface. The jets act as pipes that transfer heat from the core, and how exactly they're created isn't clear, he says. But they have been assumed to exist, originating near where Earth's core meets the mantle, almost 3,000 kilometers underground -- nearly halfway to the planet's center. The jets are theorized to be no more than about 300 kilometers wide, and when they reach the surface, they produce hot spots.

While the top of the mantle is a sort of fluid sludge, the uppermost layer is rigid rock, broken up into plates that float on the magma-bearing layers. Magma from the mantle beneath the plates bursts through the plate to create volcanoes. As the plates drift across the hot spots, a chain of volcanoes forms -- such as the island chains of Hawaii and Samoa.

"Much of solid-Earth science for the past 20 years -- and large amounts of money -- have been spent looking for elusive narrow mantle plumes that wind their way upward through the mantle," Anderson says.

To look for the hypothetical plumes, researchers analyze global seismic activity. Everything from big quakes to tiny tremors sends seismic waves echoing through Earth's interior. The type of material that the waves pass through influences the properties of those waves, such as their speeds. By measuring those waves using hundreds of seismic stations installed on the surface, near places such as Hawaii, Iceland, and Yellowstone National Park, researchers can deduce whether there are narrow mantle plumes or whether volcanoes are simply created from magma that's absorbed in the sponge-like shallower mantle.

No one has been able to detect the predicted narrow plumes, although the evidence has not been conclusive. The jets could have simply been too thin to be seen, Anderson says. Very broad features beneath the surface have been interpreted as plumes or super-plumes, but, still, they're far too wide to be considered narrow jets.

But now, thanks in part to more seismic stations spaced closer together and improved theory, analysis of the planet's seismology is good enough to confirm that there are no narrow mantle plumes, Anderson and Natland say. Instead, data reveal that there are large, slow, upward-moving chunks of mantle a thousand kilometers wide.

In the mantle-plume theory, Anderson explains, the heat that is transferred upward via jets is balanced by the slower downward motion of cooled, broad, uniform chunks of mantle. The behavior is similar to that of a lava lamp, in which blobs of wax are heated from below and then rise before cooling and falling. But a fundamental problem with this picture is that lava lamps require electricity, he says, and that is an outside energy source that an isolated planet like Earth does not have.

The new measurements suggest that what is really happening is just the opposite: Instead of narrow jets, there are broad upwellings, which are balanced by narrow channels of sinking material called slabs. What is driving this motion is not heat from the core, but cooling at Earth's surface. In fact, Anderson says, the behavior is the regular mantle convection first proposed more than a century ago by Lord Kelvin. When material in the planet's crust cools, it sinks, displacing material deeper in the mantle and forcing it upward.

"What's new is incredibly simple: upwellings in the mantle are thousands of kilometers across," Anderson says. The formation of volcanoes then follows from plate tectonics -- the theory of how Earth's plates move and behave. Magma, which is less dense than the surrounding mantle, rises until it reaches the bottom of the plates or fissures that run through them. Stresses in the plates, cracks, and other tectonic forces can squeeze the magma out, like how water is squeezed out of a sponge. That magma then erupts out of the surface as volcanoes. The magma comes from within the upper 200 kilometers of the mantle and not thousands of kilometers deep, as the mantle-plume theory suggests.

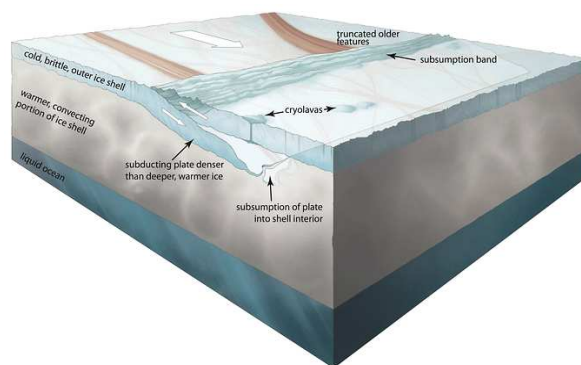
"This is a simple demonstration that volcanoes are the result of normal broad-scale convection and plate tectonics," Anderson says. He calls this theory "top-down tectonics," based on Kelvin's initial principles of mantle convection. In this picture, the engine behind Earth's interior processes is not heat from the core but cooling at the planet's surface. This cooling and plate tectonics drives mantle convection, the cooling of the core, and Earth's magnetic field. Volcanoes and cracks in the plate are simply side effects.

The results also have an important consequence for rock compositions -- notably the ratios of certain isotopes, Natland says. According to the mantle-plume idea, the measured compositions derive from the mixing of material from reservoirs separated by thousands of kilometers in the upper and lower mantle. But if there are no mantle plumes, then all of that mixing must have happened within the upwellings and nearby mantle in Earth's top 1,000 kilometers.

NEWS METEORITICA DA SEMANA

http://www.ccvalg.pt/astrologia/noticias/2014/09/9_placas_tectonicas_europa.htm

CIENTISTAS ENCONTRAM EVIDÊNCIAS DO "MERGULHO" DE PLACAS TECTÓNICAS EM EUROPA 9 de Setembro de 2014



Cientistas descobriram evidências de placas tectónicas na lua de Júpiter, Europa. Esta impressão de artista do processo de subducção (onde uma placa é forçada sob a outra) mostra como uma área exterior, fria e frágil com 20-30 km se move para o interior mais quente e, em última instância, é englobado. A banda de baixo relevo foi criada na superfície e na placa dominante, de onde podem ter surgido criolavas.

Crédito: Noah Kroese, I.NK

(clique na imagem para ver versão maior)

Cientistas encontraram evidências de placas tectónicas na lua de Júpiter, Europa. São o primeiro sinal deste tipo de actividade geológica actual num mundo que não a Terra.

Os investigadores têm evidências visuais claras da expansão da crosta gelada de Europa. No entanto, não conseguiam encontrar áreas onde a antiga crosta era destruída para dar espaço à nova. Enquanto examinavam imagens de Europa capturadas pela sonda Galileu da NASA no início da década de 2000, os geólogos planetários Simon Katternhorn, da Universidade de Idaho, e Louise Prockter, do Laboratório de Física Aplicada de Johns Hopkins em Laurel, no estado de Maryland, descobriram algumas fronteiras geológicas incomuns.

"A forma como este terreno novo se formou deixou-nos intrigados durante anos, e não conseguíamos descobrir como foi acomodado," afirma Prockter. "Nós pensamos que finalmente encontramos a resposta."

A tectónica de placas é a teoria científica que afirma que a camada exterior da Terra é composta por placas ou blocos que se movem, que explicam o porquê da formação de montanhas e vulcões e a existência de sismos.

A superfície de Europa - uma das quatro maiores luas de Júpiter e ligeiramente mais pequena que a Lua da Terra - está repleta de fendas e sulcos. Sabe-se que os blocos à superfície mudam do mesmo modo como os blocos da Terra. Muitas partes da superfície de Europa mostram evidências de extensão, onde se formaram grandes bandas com quilómetros de comprimento à medida que a superfície era rasgada e o material gelado e fresco da camada inferior movia-se para a abertura recém-criada - um processo semelhante à expansão dos fundos oceânicos na Terra.

Na Terra, à medida que o novo material de superfície se forma nas cristas oceânicas, o material antigo é destruído por subducção, regiões onde duas placas tectónicas convergem, sobrepõem e onde uma é forçada sob a outra. No entanto, apesar do grau de extensão evidente à superfície de Europa, os cientistas não tinham sido capazes de determinar como a superfície conseguia acomodar todo este material novo.

Os investigadores que estudam Europa muitas vezes reconstróem os blocos superficiais da lua na sua configuração original - como um puzzle - para ter uma ideia do aspecto anterior da superfície antes da ruptura. Quando Katternhorn e Prockter reorganizaram o terreno gelado nas imagens, descobriram que quase 20.000 quilómetros quadrados da superfície estavam em falta nas latitudes altas do norte da lua.

Outra evidência sugeriu que o terreno em falta havia-se movido para baixo de uma segunda placa à superfície - um cenário visto com frequência nos limites das placas tectónicas. Katternhorn e Prockter viram criovulcões na placa dominante, possivelmente formados por meio de fusão e absorção da placa à medida que mergulhava para baixo da superfície, e uma ausência de montanhas na zona de subducção, implicando que o material era empurrado para o interior em vez de se "amarrotar" à medida que as duas placas chocavam uma com a outra.

Os cientistas acreditam que a área subductada foi absorvida pela concha gelada de Europa, que pode ter até 30 km de espessura, em vez de romper para o oceano subterrâneo por baixo. Na superfície relativamente jovem de Europa - com cerca de 40-90 milhões de anos, em média - os cientistas viram evidências de material que se move do interior para a superfície mas, até agora, não tinha sido encontrado nenhum mecanismo para mover o

material novamente para baixo da superfície e, possivelmente, para o grande oceano abaixo do gelo.

"Europa pode ser mais parecida com a Terra do que imaginávamos, caso tenha um sistema global de placas tectônicas," afirma Kattenhorn. "Não só esta descoberta a torna num dos corpos mais geologicamente interessantes do Sistema Solar, também implica uma comunicação bidireccional entre o exterior e o interior - uma maneira de mover o material da superfície para o oceano - um processo que tem implicações significativas para o potencial de Europa como mundo habitável."

Os resultados da equipa aparecem na edição online de Domingo da revista Nature Geoscience.

Em Julho, a NASA anunciou que pretendia recolher propostas para instrumentos científicos a serem incorporados numa missão futura a Europa.

"Europa continua a revelar-se como um mundo dinâmico com semelhanças convincentes com o nosso próprio planeta Terra," afirma Curt Niebur, cientista do programa Outer Planets na sede da NASA em Washington. "O estudo de Europa aborda questões fundamentais acerca da lua gelada potencialmente habitável e da busca de vida para lá da Terra."

Descobertas científicas anteriores apontam para a existência de um oceano de água líquida por baixo da crosta gelada de Europa. Este oceano abrange totalmente Europa e contém mais água líquida que todos os oceanos da Terra juntos.

A sonda Galileu da NASA, lançada em 1989, foi a única missão espacial a fazer várias visitas a Europa, passando perto da lua cerca de uma dúzia de vezes.

A Galileu descobriu evidências de um oceano de água salgada por baixo da crosta gelada de Europa. A missão terminou oficialmente em Setembro de 2003, quando a Galileu mergulhou na atmosfera de Júpiter para prevenir um impacto com Europa.

ÍNDICE DE NOTÍCIAS AMBIENTE BRASIL

Alterações climáticas podem mudar profundamente as florestas dos EUA

Incêndios florestais, insetos e secas já afetam áreas das Montanhas Rochosas. No oeste do país, a temperatura subiu 1°C desde 1895, dizem cientistas.

Explosão dupla de tempestade solar rumo para a Terra e levanta preocupações

Individualmente, as tempestades, conhecidas como ejeções de massa coronal, ou CMEs, não justificariam advertências especiais, mas o curto intervalo atípico e sua rota direta para a Terra levou o Centro de Previsão Climática, da Administração Nacional Oceânica e Atmosférica dos Estados Unidos (NOAA) a emitir o alerta.

Morte de ursa provoca polémica na Itália

Após ferir homem, animal foi morto por autoridades de Trento.

Amapá apresentou menor índice de desmatamento da Amazônia em 2013

Inpe apontou que 23 quilômetros quadrados de florestas foram desmatados. Amapá tem 73% de florestas preservadas, diz Secretaria de Meio Ambiente.

Pesquisa revela capacidade aquática dos Espinossauros

O Espinossauro, de maior tamanho que o Tiranossauro, é o primeiro dinossauro semi-aquático conhecido, segundo a pesquisa publicada nesta quinta-feira (11) na revista "Science".

Brasileiros descobrem pterossauro que lembra 'dragão' do filme Avatar

Fósseis do réptil voador 'Ikran draco avatar' foram encontrados na China. Descrição foi publicada nesta quinta-feira em revista do grupo 'Nature'.

WWF Brasil alerta sobre desmatamento no Dia Nacional do Cerrado

Para comemorar a data, A ONG promoveu na quinta-feira (11) um plantio de mudas de árvores típicas da região no Parque Ecológico da Asa Sul, em Brasília.

Descoberta mostra que mamíferos surgiram muito antes na natureza

As três novas espécies foram descritas a partir de seis fósseis quase completos de 160 milhões de anos encontrados na China. Os animais se assemelham a pequenos esquilos.

Carimbó é reconhecido como patrimônio cultural imaterial do Brasil

O carimbó, com seus instrumentos, dança e música, é resultado da fusão de influências das culturas indígena e negra. Além da parte cultural, uma característica importante do carimbó é a forma de organização e reprodução social que reúne carimbozeiros nas atividades do dia a dia e celebrações religiosas.

Filhote de peixe-boi é resgatada em rede de pesca em comunidade no AM

Animal foi batizada de Cassí por moradores que fizeram resgate. Centro de Reabilitação passa a ter oito peixes-boi em reabilitação.

Panda gigante 'vai ao dentista' para tratar dente quebrado nos EUA

Panda Bai Yun, de 23 anos, quebrou um dos caninos inferiores. Esses animais usam os dentes para quebrar e mastigar o bambu.

ANA tem R\$ 5,6 mi para projetos de conservação da água

Propostas devem ser entregues até o dia 20 de outubro.

Astronautas russos e americano retornam à Terra após 6 meses na ISS

Cápsula Soyuz pousou no Cazaquistão. Nave trouxe o americano Swanson e os russos Skvortsov e Artemiev.

Lábios de Jagger inspiram nome de criatura do pântano descoberta no Egito

Os cientistas desenterraram os fósseis do Jaggermeryx naida no deserto Wadi Moghra, no Egito, onde, segundo registros geológicos, havia um delta tropical cheio de pântanos há milhões de anos.

Cruz Vermelha quer formar 2 mil voluntários para combater ebola

Entidade já formou 3.500 pessoas e quer treinar mais de 5 mil no total. Voluntários devem atuar no oeste africano, região com maioria dos casos.

Emissão de gás carbônico no mundo tem maior salto desde 1984

Recorde não se deve apenas a mais emissões, mas a uma redução na capacidade de absorção de carbono pela biosfera.

Compensado de bambu pode ser usado em construções no Acre

Produto já foi testado e pode ser aplicado como forro e divisórias. Pesquisa é desenvolvida pelo estudante da Ufac, Daniel Nascimento.

Agência Espacial Europeia prepara 'avião espacial'

A Agência Espacial Europeia conclui nesta terça-feira (9) seu "avião do espaço" IXV, um protótipo que pode abrir caminho para o primeiro ônibus espacial europeu capaz de retornar do espaço.

Brasil pode começar vacinação contra meningite B em 2015

A doença meningocócica é a causa mais comum de meningite bacteriana no Brasil, que "tradicionalmente é um campeão neste tipo de enfermidade na América Latina", e os estados do Rio de Janeiro e de São Paulo são os que registram as maiores incidências.

Fóssil encontrado na Tanzânia revela nova espécie de dinossauro gigante

Batizado de 'Rukwatitan biseulptus', fóssil era de um titanossauro. Espécie deveria pesar cerca de 60 toneladas.

Plano vai proteger espécies ameaçadas de extinção

Lançado pelo ICMBio, o PAN Aves da Caatinga vai diminuir a captura e o tráfico, além de conhecer o tamanho populacional.

Água extraída de minerais faz plantas sobreviverem a períodos de seca

Para os cientistas, alguns minerais, como a pedra de gesso, conseguem reter a água em sua estrutura cristalina. O uso dessa água por plantas indica uma nova fonte de sobrevivência em locais muito secos.

Metade das aves da América do Norte correm risco por mudanças climáticas

Trezentos e catorze espécies, mais da metade das que existem na América do Norte e que não eram consideradas em perigo até o momento, estão a partir de agora ameaçadas de extinção se as temperaturas continuarem aumentando, segundo o estudo.

Tratamentos contra câncer de mama e mal de Parkinson ganham prêmio

Considerado 'Nobel americano' foi entregue nesta segunda-feira. Cientistas franceses e uma americana foram os ganhadores este ano.

Arqueólogos encontram armadura feita de ossos com 3.900 anos na Rússia

Arqueólogos russos afirmam que o artefato pode ter sido um troféu de guerra, uma vez que não foi enterrado no túmulo juntamente com o guerreiro para quem foi criado.

Netos de Hemingway velem pela preservação da fauna marinha cubana

John e Patrick Hemingway visitaram vila que inspirou 'O velho e o mar'. Viagem celebra 60º aniversário de prêmio Nobel e 80 anos de ida a Cuba.

Ebola já provocou 2.296 mortes na África Ocidental, segundo OMS

Ao todo, 4.293 pessoas foram infectadas este ano na África Ocidental. Foram 1.224 mortes na Libéria, 555 na Guiné e 509 em Serra Leoa.

Acordos de lâmpadas e embalagens passam por consulta pública

O Comitê Orientador para a Implementação da Logística Reversa aprovou, em julho, as duas propostas que receberão contribuições da sociedade pela internet por 30 dias.

Canadenses encontram navio lendário desaparecido no século 19

Embarcação ficou presa no gelo do Ártico em 1845; mais de cem morreram. Esquimós dizem que tripulação teve que recorrer ao canibalismo.

Biólogo pede devolução de metade da Terra para os animais

Biólogo de Harvard e vencedor de dois prêmios Pulitzer, Dr. Edward O. Wilson sugere plano radical de conservação para enfrentar "holocausto biológico" iminente.

Novo mapeamento do ebola mostra mais regiões da África sob risco

Locais com animais que abrigam vírus são mais abrangentes, diz estudo. Saldo de mortes no oeste africano chega a quase 2.100.

Falta de chuvas deixa clima seco e piora qualidade do ar na capital paulista

Para os próximos dias, a previsão é que os dias continuem ensolarados e o tempo seco. As mínimas devem ficar em 16 °C e as máximas podem chegar a 30 °C. Sem chuvas, a umidade deve continuar baixa, piorando a qualidade do ar.

Cientistas identificam 'camarão gigante' encontrado nos EUA

Embora seja parecido com um camarão, esse animal pertence à classe Stomatopoda e, na realidade, se alimenta de camarões.

Brasil sedia congresso internacional de resíduos sólidos

É a primeira vez que o evento, organizado pela Internacional Solid Waste Association, ocorre no Brasil. O Congresso Mundial de Resíduos Sólidos, que acontece até a próxima quarta-feira (10), reúne mais de mil participantes de 68 países.

Pedras afiadas sugerem povoamento de mais de 20 mil anos no Piauí

Dois conjuntos simples de ferramentas de pedras escavadas na base de uma encosta rochosa no Piauí foram feitas por pequenos grupos de colonos, que viveram há cerca de 24 mil anos, e outro de cerca de 15 mil anos, dizem os pesquisadores.

Rio de Janeiro recupera 17 encostas na região serrana desde o início do ano

Com a recuperação das encostas, as prefeituras pretendem evitar tragédias parecidas com a de 2011, quando deslizamentos de terra devido às fortes chuvas, devastaram a região.

Rio avançou na gestão de resíduos sólidos, mas não conseguiu acabar com lixões

Nos 91 municípios do estado do Rio de Janeiro, sem contar a capital, 94% dos resíduos sólidos urbanos têm destinação correta em aterros sanitários.

Fóssil achado na Tanzânia revela nova espécie de dinossauro gigante

O herbívoro, com o peso de vários elefantes, tinha patas dianteiras de cerca de dois metros de altura.

Grupo francês confirma segundo implante de coração artificial

Paciente era da cidade de Nantes. Primeira operação deste tipo ocorreu no dia 18 de dezembro de 2013.

Desassoreamento de lagoa em Belo Horizonte revela população de jacarés

Os animais serão monitorados e, nos próximos meses, um levantamento mais detalhado será feito em parceria com o Ibama.

Diminui a probabilidade do fenômeno 'El Niño' ocorrer em 2014

Esta probabilidade é de 55-60% entre setembro e novembro e de 70% para o período entre novembro e fevereiro, segundo a OMM.

Toalhinhas umedecidas desafiam sistemas de esgoto dos EUA

Com aumento das vendas de toalhinhas umedecidas, toneladas do produto entopem os equipamentos das redes de esgoto.

Seminário discute a importância das Reservas Particulares de Araucárias

Representantes do Ministério do Meio Ambiente falaram sobre compromisso dos proprietários de terras na conservação da natureza.

Inglêses descobrem joias de 2.000 anos abaixo de loja de departamento

A coleção inclui três braceletes de ouro, duas pulseiras e um colar de prata, um pequeno saco com moedas, um bracelete de prata e um pequena caixa de joias com quatro anéis de ouro e dois pares de brinco também de ouro.

Degradação florestal no Brasil preocupa especialistas

País precisa monitorar o problema e identificar as causas da diminuição de cobertura vegetal em outros biomas, além da Amazônia, avaliam pesquisadores em workshop internacional em Brasília.

Meteorito abre cratera de 12 metros de diâmetro na Nicarágua

O meteorito era "relativamente pequeno", que pode ter vindo de um asteroide que estava passando perto da Terra.

São Félix do Xingu a caminho da redução do desmatamento

Projeto incentiva diversificação produtiva e capacitação técnica em agroecologia.

Paranaense projeta sua própria casa-contêiner e ideia vira negócio

A ideia de usar o contêiner como matéria-prima surgiu a partir da necessidade. O terreno que abrigaria a residência estava em uma área afastada, o que elevaria muito os gastos, os problemas com a compra e transporte de material e também com a mão-de-obra. Assim sendo, a solução foi planejar uma casa móvel, que fosse construída em um local e apenas transportada para a sua destinação final.

Vacina experimental de Ebola protege macacos por dez meses

Estudo publicado neste domingo (7) foi bem-sucedido em laboratório. Pior epidemia do vírus atinge a África e já matou mais de 2 mil pessoas.

Bombeiros combatem incêndio no Parque da Serra Dourada, em Goiás

Tenente-coronel suspeita que raio após chuva tenha causado as chamas. Receio é que fogo atinja reserva biológica de unidade da UFG.

Rússia envia força naval para reabrir base militar no Ártico

A Rússia se une assim a outros países como o Canadá e a Noruega que reclamam seus direitos em uma região com grandes recursos energéticos.

Descoberta na Grécia 'importante' tumba da época helênica

Tumba foi descoberta no antigo sítio de Anfípolis. Arqueólogos estimam que a tumba tenha 3 metros de altura.

Fóssil de animal pré-histórico encontrado no Rio vai ser estudado na UFRJ

De formato e tamanho similares aos de uma anta, o xenungulado não é, entretanto, ancestral da anta. Esses mamíferos viveram na época de formação da Bacia de Itaboraí, há cerca de 55 milhões de anos.

USP estuda infestação de carrapatos em campus por meio dos pássaros

Grupo quer apontar como espécies levam transmissor da febre maculosa. Previsão é de que análise em Ribeirão Preto (SP) seja concluída em 2016.

Raras lagostas albinas e amarela são apanhadas nos EUA

Incidência de uma lagosta albina é de uma em 100 milhões. No caso da lagosta amarela, probabilidade é de uma em 30 milhões.

Primata encontrado só no AM pode desaparecer, alertam pesquisadores

Descumprimento de leis e urbanização causam mortes, dizem ambientalistas. Espécie é encontrada em três municípios; pelo menos 10 morrem por ano.

Vacinas e transfusões de sangue são possíveis soluções ao ebola

Em entrevista coletiva, a diretora geral adjunta da Organização Mundial da Saúde (OMS), Marie-Paule Kieny, disse que está sendo feito todo o possível para acabar com a doença da forma mais rápida e segura quanto for possível.

Cientistas não sabem como classificar misterioso 'coquelo' marinho

O organismo, que tem forma de cogumelo, foi encontrado na costa australiana.

PF vai apurar ataque de índios a madeireiros no Maranhão, diz ministro

Imagens mostram indígenas perseguindo e agredindo homens em reserva. Ministro José Eduardo Cardozo (Justiça) pediu relatório urgente à Funai.

Festival sobre meio ambiente atrai crianças e adultos no Rio

Com diversas tendas, onde o público pode ter contato com inúmeras iniciativas em defesa do meio ambiente, o Green Nation Fest prossegue até o próximo dia 17, com entrada franca.

Papiro citando a Santa Ceia pode ser o mais antigo amuleto do cristianismo

Um fragmento de papiro com referência à Santa Ceia pode ser o mais antigo amuleto do Cristianismo. O pedaço de papel foi descoberto por uma pesquisadora entre milhares de papiros mantidos na biblioteca da Universidade de Manchester, no Reino Unido

Cães distinguem latidos familiares e estranhos

Os pesquisadores testaram a reação de cães de estimação ao reproduzir latidos gravados previamente. As gravações foram feitas em duas linhas: uma quando o animal estava sozinho; e outra quando latia para um cão estranho, no portão da sua casa.

Sapato ecológico é confeccionado com borracha de seringueiros do AC

Marca francesa produz 120 mil pares de sapatos sustentáveis por ano. Cooperativa de seringueiros do AC vende borracha a R\$ 8,50 o quilo.

Entidades Ambientistas reúnem-se em novembro no DF

Objetivo é fortalecer as organizações não governamentais para formulação e controle social das políticas públicas ambientais.

Por estimativa populacional de botos na Amazônia, Instituto Mamirauá e WWF navegam rio no estado do Pará

A ausência de dados populacionais dos botos amazônicos pode dificultar a criação de estratégias de conservação.

Mortes por ebola sobem para 2.097 na África Ocidental, segundo OMS

Números incluem pacientes da Libéria, Guiné e Serra Leoa. Secretário-geral da ONU diz que levará de 6 a 9 meses para deter ebola.

Nível do Cantareira volta a cair depois de estabilidade

O nível registrado contabiliza a reserva técnica de 182,5 bilhões de litros, e vem sendo usada pela Sabesp desde março.

Poluição afasta turistas de Pequim

Entre janeiro e julho, a capital chinesa recebeu 2,36 milhões de turistas, menos 5,9% do que no mesmo período do ano passado, acrescentou o China Daily, citando estatísticas da Administração Nacional do Turismo.

Estudo contraria OMS e 'banca' uso de cigarros eletrônicos

Para cada um milhão de fumantes que passem a usar produtos eletrônicos, 6 mil vidas podem ser salvas por ano, dizem universidades britânicas.

Pesquisadores descobrem peixe transparente de 15 mm no Amazonas

Prionochanna nanus foi descoberto no município de Santa Isabel do Rio Negro. Animal tem faixas verticais escuras pelo corpo.

Califórnia será o primeiro estado americano a proibir sacolas plásticas

Nova lei deve passar a vigorar até o fim deste mês. Objetivo é substituir material por bolsas de papel ou sacolas retornáveis.

Baleias azuis da Califórnia se recuperam após anos de caçadas

Segundo os cientistas, essa é a única população de baleias azuis que está se recuperando da temporada de caça às baleias.

Japão quer retomar caça de baleias na Antártica, mas com limite de volume

País foi proibido de exercer atividade após decisão de Corte internacional. Segundo governo, finalidade da caça é científica e não comercial.

Americano pesca camarão gigante de 45 centímetros na Flórida

Espécie do crustáceo ainda não foi determinada por especialistas.

Dados da Rosetta mostram que cometa não possui gelo e frustram cientistas

O instrumento, um espectrômetro chamado Alice, registrou espectro de luz ultravioleta da superfície do cometa. Com os dados, a equipe

responsável pelo aparelho descobriu que o astro é escuro e que possui hidrogênio e oxigênio em sua pequena atmosfera.

Sistemas agroflorestais contribuem para a conservação dos recursos naturais em biomas diversos

Pesquisa científica está sendo realizada para a irradiação das agroflorestas em outros biomas, além da Mata Atlântica.

01 / 09 / 2014 Microplásticos em xampus estão sufocando o oceano

Tim Silverwood, co-fundador do grupo ambiental Take 3, afirmou que um único produto pode conter centenas de milhares de partículas.

01 / 09 / 2014 Lixo jogado em nascente de água afeta meio ambiente em Itapetininga/SP

Pneus, garrafas entre outros deixam o cenário lamentável. Moradores reclamam da falta de conscientização de alguns.

01 / 09 / 2014 Água-viva imortal pode guardar segredo da vida eterna

Ainda não se sabe se, um dia, o ser humano poderá aprender o "segredo" da juventude eterna com esses cnidários.

01 / 09 / 2014 25 municípios do Ceará têm alta incidência de dengue, diz secretaria

Secretaria considera alto índice cidades com 300 casos por 100 mil pessoas. Número de casos de dengue no Ceará 36% em relação ao ano passado.

01 / 09 / 2014 Pesquisa mostra que 65% dos pacientes com câncer continuam fumando

A situação se agrava pelo fato de o cigarro ser uma válvula de escape de grande parte dessas pessoas ao lidar com situações difíceis.

01 / 09 / 2014 Novo remédio eleva expectativa de pacientes com insuficiência cardíaca

Testes apontam que nova droga reduz o índice de mortalidade em 20%.

01 / 09 / 2014 Consumo de chá e café não prejudica o coração, aponta estudo

Estudo da Sociedade Europeia de Cardiologia desmistifica relação entre consumo destas bebidas e doenças cardiovasculares.

01 / 09 / 2014 Veneno de vespa age contra perda de neurônios por Parkinson, diz estudo

Pesquisa foi feita em ratos com lesão cerebral semelhante ao Parkinson. Ação neuroprotetora é de um fragmento de proteína do veneno.

01 / 09 / 2014 Segunda turma do curso online A3P abre inscrições nesta segunda-feira

Serão oferecidas 1.500 vagas para gestores de órgãos públicos que desejam instituir o programa. As inscrições podem ser feitas pelo site da plataforma Ambiente Virtual de Aprendizagem.

01 / 09 / 2014 Cientistas tentam provar que leão-do-atlas não desapareceu

Durante anos os pesquisadores sustentaram que o leão desapareceu em 1920 por causa da progressiva deterioração de seu habitat, o que o obrigou a descer das montanhas na busca de presas e começar a se alimentar do gado dos criadores.

01 / 09 / 2014 Butantan estuda molécula para combater dor inflamatória

O estudo pode resultar no desenvolvimento de medicamentos melhores que os usados atualmente, como a morfina, pois poderá ter menos efeitos colaterais nos pacientes.

01 / 09 / 2014 Técnico de informática transforma lixo eletrônico em objetos de escritório

O técnico de informática Ricardo Augusto realiza oficinas de reciclagem de lixo eletrônico, em Rio Branco. 'A tecnologia pode ir muito mais além do que a gente imagina', diz.

01 / 09 / 2014 Simpósio em MS vai discutir manejo de plantas daninhas

Evento será realizado em Naviraí, no dia 9 de setembro. Agricultores enfrentam problemas com seis espécies de plantas.

01 / 09 / 2014 Argentina lançará primeiro satélite de fabricação própria

Satélite é voltado a serviços de telecomunicações e será lançado da Guiana Francesa.

01 / 09 / 2014 Acidentes com animais peçonhentos no país dobram em 10 anos

Crescimento é preocupante, diz pesquisadora do Instituto Butantan. Ação do homem no meio ambiente tem provocado fenômeno, afirma.

02 / 09 / 2014 Colômbia recupera da Espanha tesouro de 700 peças pré-colombianas

No catálogo, há vasos decorados com rostos humanos, potes de cerâmica com desenhos geométricos em tom ocre, instrumentos

musicais, colares, ou pequenas figuras humanas. São peças que datam de 1.400 a.C. até o século XVI.

02 / 09 / 2014 Última semana para inscrições no curso online do PEAAP

O objetivo é capacitar online agentes públicos e representantes da sociedade civil para o desenvolvimento de políticas públicas, programas e projetos de educação ambiental no contexto da agricultura familiar.

02 / 09 / 2014 Japão detecta ao menos 22 casos de dengue transmitidos dentro do país

País não registrava nenhum caso de dengue havia 70 anos. Pacientes têm em comum o fato de terem passado por parque de Tóquio.

02 / 09 / 2014 Macacos imunizados com vacina anti-HIV brasileira passam por testes

Primeiro teste com primatas, feito em fevereiro, teve resultados positivos. Agora, eles receberam nova vacina com proteína do envelope do HIV.

02 / 09 / 2014 Espanha é líder mundial em transplantes em 2013, com 4.279 procedimentos

A Espanha realiza 14% de todos os transplantes da Europa e 4% do mundo.

02 / 09 / 2014 Traje espacial para cães do período soviético vai a leilão em Berlim

Um traje espacial de 1950 para cães será leiloado em Berlim (Alemanha) no dia 13 de setembro. O lance inicial é de cerca de R\$ 12 mil e espera-se que o traje possa ser arrematado por até R\$ 23,5 mil.

02 / 09 / 2014 Crocodilo que mordeu 2 pessoas é capturado em Miami/EUA

Réptil de 3,7 metros e 140 quilos morreu logo após ser capturado. Animal era conhecido com 'Pancho' em bairro no sudoeste de Miami.

02 / 09 / 2014 Fukushima: municípios aceitam construção de depósitos temporários

Os municípios japoneses de Fukushima, Futaba e Okuma comunicaram ao governo que aceitam a construção de depósitos temporários para armazenagem dos detritos provenientes da descontaminação da central nuclear da região, atingida por um terremoto, seguido de tsunami, em março de 2011.

02 / 09 / 2014 Problema genético deixa gata constantemente com fisionomia triste

Tucker acabou apelidada de a 'gata mais triste do mundo'. Com 1 ano de idade, ela está em abrigo em Arlington, em Washington.

02 / 09 / 2014 MMA debate uso da biodiversidade na alimentação

Consumo de plantas nativas contribui com a saúde e com a natureza.

02 / 09 / 2014 Nasa registra erupções intensas no Sol

Sequência de pelo menos meia dúzia de tempestades foi registrada nos últimos dias pelo Laboratório de Dinâmica Solar da agência espacial.

02 / 09 / 2014 Pesquisadores japoneses desenvolvem teste que detecta ebola em 30 minutos

O novo exame, que utiliza uma substância desenvolvida para detectar, amplificando ou aumentando, apenas os genes específicos do vírus, pode ser feito em um tubo de ensaio que é preciso aquecer até 60 ou 65 graus.

02 / 09 / 2014 Islândia rebaixa nível de alerta por vulcão

Autoridades rebaixaram de "vermelho" a "laranja" o nível de alerta para a aviação sobre o vulcão Bardarbunga.

02 / 09 / 2014 Marcha pelos Elefantes: mobilização mundial para salvar animais da extinção

Pelos cálculos, uma vida se perde a cada 15 minutos. E a cada 10 horas, um rinoceronte também é assassinado para que seu chifre seja extraído.

02 / 09 / 2014 "Mudança climática já é irreversível", diz relatório da ONU

Relatório de 127 páginas será publicado oficialmente em novembro, mas vazou para a imprensa nesta semana.

SCIENCE

Potential submerged Aboriginal archaeological sites in South West Arm, Port Hacking, New South Wales, Australia

David M. Nutley, Cosmos Coroneos, and James Wheeler
Geological Society, London, Special Publications. published 11
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<http://sp.lyellcollection.org/cgi/content/abstract/SP411.3v1?ct=ct>

Timing of the emergence of the Europe-Sicily bridge (40-17 cal ka BP) and its implications for the spread of modern humans

Fabrizio Antoniolli, Valeria Lo Presti, Maurizio Gasparo Morticelli, Laura Bonfiglio, Marcello A. Mannino, Maria Rita Palombo, Gianmaria Sannino, Luigi Ferranti, Stefano Furlani, Kurt Lambeck, Simonepietro Canese, Raimondo Catalano, Francesco Latino Chiocci, Gabriella Mangano, Giovanni Scicchitano, and Renato Tonielli
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Holocene shifts in riverine fine-grained sediment supply to the East China Sea Distal Mud in response to climate change

Bangqi Hu, Zuosheng Yang, Shuqing Qiao, Meixun Zhao, Dejiang Fan, Houjie Wang, Naishuang Bi, and Jun Li
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<http://hol.sagepub.com/cgi/content/abstract/24/10/1253?ct=ct>

Reconstructions of deltaic environments from Holocene palynological records in the Volga delta, northern Caspian Sea

Keith Richards, Nataliya S Boikhovskaya, Robert M Hoogendoorn, Salomon B Kroonenberg, Suzanne AG Leroy, and John Athersuch
The Holocene. 2014; 24(10): p. 1226-1252 Open Access

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Sedimentary record of V, U, Mo and Mn in the Pierre-Blanche lagoon (Southern France) - Evidence for a major anoxia event during the Roman period

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<http://hol.sagepub.com/cgi/content/abstract/24/10/1206?ct=ct>

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Aaron C Noell, William J Abbey, Robert C Anderson, and Adrian Ponce
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<http://hol.sagepub.com/cgi/content/abstract/24/10/1398?ct=ct>

Climate, palaeohydrology and land use change in the Central Iberian Range over the last 1.6 kyr: The La Parra Lake record

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Sedimentology, Stratigraphic Architecture, and Depositional Context of Submarine Frontal-Lobe Complexes

Emma A. Morris, David M. Hodgson, Stephen S. Flint, Rufus L. Brunt, Peter J Butterworth, and Jona Verhaeghe

Journal of Sedimentary Research. 2014; 84(9): p. 763-780

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Kathryn Yusoff

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GSW JOURNAL

Sedimentology, Stratigraphic Architecture, and Depositional Context of Submarine Frontal-Lobe Complexes

Emma A. Morris, David M. Hodgson, Stephen S. Flint, Rufus L. Brunt, Peter J Butterworth, and Jona Verhaeghe

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Rare Earth Elements As Biogeochemical Indicators In Mangrove Ecosystems (Pichavaram, Tamilnadu, India)

Swati M. Sappal, Al. Ramanathan, Rajesh K. Ranjan, Gurmeet Singh, and Alok Kumar

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Koksharovite, $\text{CaMg}_2\text{Fe}_3^{+4}(\text{VO}_4)_6$, and grigorievite, $\text{Cu}_3\text{Fe}_3^{+2}\text{Al}_2(\text{VO}_4)_6$, two new howardevansite-group minerals from volcanic exhalations

Igor V. Pekov, Natalia V. Zubkova, Vasilii O. Yapaskurt, Pavel M.

Kartashov, Yury S. Polekhovskiy, Mikhail N. Murashko, and Dmitry Y.

Pushcharovskiy

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Nafertisite, $\text{Na}_3\text{Fe}_2^{+10}\text{Ti}_2(\text{Si}_6\text{O}_{17})_2\text{O}_2(\text{OH})_6\text{F}(\text{H}_2\text{O})_2$, from Mt. Kukisvumchorr, Khibiny alkaline massif, Kola peninsula, Russia: Refinement of the crystal structure and revision of the chemical formula

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Shanqi Liu, Yongbing Li, Huiquan Tian, Junli Yang, Jianming Liu, and Yaolin Shi

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Reply to "Comment on 'Estimation of Ground Motion in Mexico City from a Repeat of the $M \sim 7.0$ Acambay Earthquake of 1912' by S. K. Singh, A.

- Iglesias, M. Ordaz, X. Perez-Campos, and L. Quintanar" by M. Suter
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EARTH PAGES

New Feature: Picture of the month

Posted on [August 31, 2014](#) by [Steve Drury](#) | [1 comment](#)

Having belatedly discovered [The Earth Science Picture of the Day](#) website (it has been going since September 2000; as long as *Earth Pages*!) I thought readers of *EPN* might like the aesthetic boost that it provides. So, on the last day of the month I intend to insert a link to what I think is the best of those contributed to EPOD over the previous 4 weeks or so.



The [Great Unconformity](#) of the Grand Canyon (credit: [Stan Celestian](#))

EPOD has a vast archive of contributions and each one has a brief description and links to other visual resources.

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Improved dating sheds light on Neanderthals' demise

Posted on [August 26, 2014](#) by [Steve Drury](#) | [Leave a comment](#)

As *Earth Pages* reported in [December 2011](#) a refined method of radiocarbon dating that removes contamination by younger carbon has pushed back the oldest accessible ^{14}C dates. Indeed, materials previously dated using less sophisticated methods are found to be significantly older. This has led archaeologists to [rethink several hypotheses](#), none more so than those concerned with the relationship in Europe between anatomically modern humans (AMH) and [Neanderthals](#), especially the extinction of the latter.

The team of geochronologists at Oxford University who pioneered accelerator mass spectrometry (AMS) of carbon isotopes, together with the many European archaeologists whose research has benefitted from it, have now published results from 40 sites across Europe that have yielded either Neanderthal remains or the tools they are thought to have fashioned (Higham, T. and 47 others. The timing and spatiotemporal patterning of Neanderthal disappearance. *Nature*, v. **512**, p. 306-309) . One such site is [Gorham's Cave](#) in the Rock of Gibraltar where earlier dating suggested that Neanderthals clung on in southern Iberia until about 25 ka. Another hypothesis concerns the so called [Châtelperronian](#) tool industry which previous dating at the upper age limit of earlier radiocarbon methodology could not resolve whether or not it preceded AMH colonisation of Europe; i.e. it could either have been a Neanderthal invention or copied from the new entrants. Most important is establishing when AMH first did set foot in previously Neanderthal's exclusive territory and for how long the two kinds of human cohabited Europe before the elder group met its end.

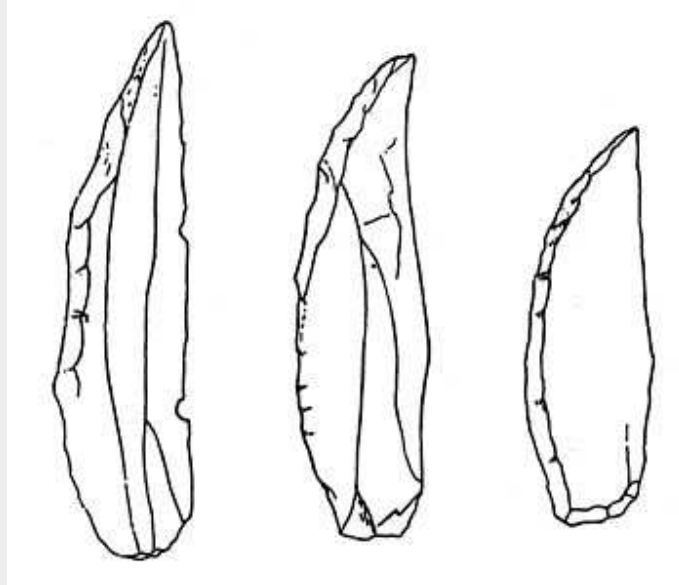


Reconstruction of Neanderthal life from the Neandertahl Museum(credit: Wikipedia)

The new data do not quash the idea of Neanderthals eking out survival almost until the last glacial maximum in the southernmost Iberian Peninsula, since material from Gorham's Cave could not be dated. However, occupation levels at another site in southern Spain in which Neanderthal fossils occur and that had been dated at 33 ka turned out to be much older (46 ka). So it is now less likely that Neanderthals survived here any longer than they did elsewhere.

Neanderthal remains are generally associated with a tool kit known as the Mousterian that is not as sophisticated as that carried by AMH at the same time. Of the Mousterian sites that yielded AMS ages, the oldest (the [Hvaena Cave](#) in Devon, Britain) dates to almost 50 ka. The youngest has a 95% probability of being about 41 ka old. Of course, Neanderthals may have survived until later, but there is no age

data to support that conjecture. The earliest known AMH remains in Europe are those associated with the so-called Uluzzian tool industry of the Italian peninsula. In southern Italy Mousterian tools are replaced by Uluzzian between about 44.8 and 44.0 ka, while Mousterian culture was sustained in northern Italy until between 41.7 to 40.5 ka.



Châtelperronian stone tools (credit: Wikipedia)







Mousterian blade tool from France (credit: Wikipedia)

Châtelperronian tools associated with Neanderthal remains occur in south-western France and the Pyrenees. The new AMS dating shows that the culture arose at about the same time (~45 ka) as the Uluzzian tool industry began in Italy and ended in those areas where it was used at about the same time (~41 ka) as did the more widespread Mousterian culture. So the question of whether Neanderthals copied stone shaping techniques from the earliest Uluzzian-making AMH more than 500 km to the east, or invented the methods themselves remains an open question. But does it matter as regards the cognitive abilities of Neanderthals? Copying methodology is part and parcel of the success and survival of succeeding AMH, but o too is the capacity to invent useful novelties from scratch. So, yes it does matter, for Neanderthals had sustained the Mousterian culture for tens to hundreds of thousand years with little change.

The upshot of these better data on timing is that AMH and Neanderthals co-existed in Europe for between 2.6 to 5.4 ka; as long as the time back from now to the Neolithic and early Bronze Age. Even allowing for low population density to make contacts only occasional, this is surely too long for systematic slaughter of Neanderthals by AMH. Yet it gives plenty of time for two-way transmission of cultural and symbolic activities, and even for genetic exchanges: assimilation as well as out-competition.

Incidentally, *Scientific American's* September 2014 issue is partly devoted to broader issues of human evolution (Wong, K. (editor) *The Human Saga. Scientific American*, v. **311**(No 3), p. 20-75) with a focus on new developments. These cover: a revised time line; the emerging complexity of hominin evolution by veteran palaeoanthropologist Bernard Wood.; the influence of climate change; by Peter de Menocal; cultural evolution in the broad hominin context by Ian Tattersall; a discussion of hominin mating arrangements by Blake Edgar; two contributions on cooperation versus competition among hominins by Frans de Wall and GGry Stix; two articles on recent biological and future cultural evolution by John Hawks and Sherry Turkle (interview).

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Did Out of Africa begin earlier?

Posted on [August 15, 2014](#) by [Steve Drury](#) | [Leave a comment](#)

It is widely thought that [anatomically modern humans](#) (AMH) began to diffuse out of Africa during the climatic cooling that followed the last interglacial episode. Periods of build-up of ice sheets, or stadials, also saw falls in sea level, which would have left shallow seas dry and easily crossed. The weight of evidence seems to point towards the narrowing of the Red Sea at the Straits of [Bab el Mandab](#) between modern Eritrea and the Yemen. Because the Red Sea spreading axis goes onshore through the Afar region of Ethiopia further north, the Straits today are shallow. Between about 70 and 60 ka, during a major stadial, much of the Bab el Mandab would have been dry. Dating of the earliest AMH remains in Asia and Australasia seems to suggest that the move out of Africa probably began around that time. But, of course, that presupposes the AMH fossils being the oldest in existence, although some would claim that genetic evidence also supports a 70-60 ka migration. Yet, AMH human remains dated at around 100 ka have been found in the Middle East on a route that would also lead out of Africa, but for the major problem of crossing deserts of modern Syria and Iraq. The supposed desert barrier has led many to suggest that the earlier venture into the Levant met a dead end. Should AMH fossils older than 70 ka turn up in Eurasia or Australasia then a single migration becomes open to doubt.

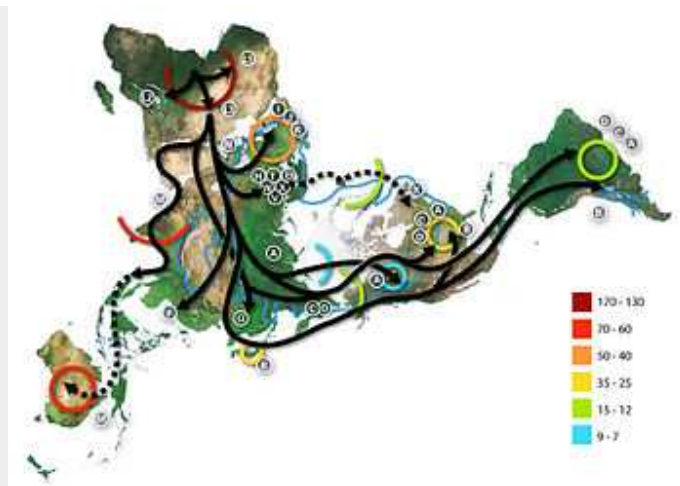


Chart of large human migrations based on variations in mitochondrial DNA in living humans (Numbers are millennia before present.) (credit: Wikipedia)

It appears that challenge to what has become palaeoanthropological orthodoxy has emerged (Bae, C.J. *et al.* 2014. Modern human teeth from Late Pleistocene Luna Cave (Guangxi, China). *Quaternary International*, In Press). Scientists from the US, China and Australia found two molar teeth within calcite flowstone in Lunadong ('dong' means 'cave'). That speleothem is amenable to uranium-series dating, and has yielded ages between 70 and 127 ka. That antiquity does open up the possibility of earlier migration, perhaps during the interglacial that ended at about 115 ka when sea levels would have stood about as high as it does nowadays (in fact it was only after about 80 ka that it stood low enough to make a move across the Bab el Mandab plausible). If that were the case, the migration route would have more likely been through the Middle East, perhaps along the Jordan valley and thence to the east. Had there been greater rainfall over what is now desert then there would have been no insurmountable barrier to colonisation of Asia.

These teeth are not the only evidence for earlier entry of AMH into east Asia; a date of 66 ka for a modern human toe bone was recently reported from the Philippines. Yet many experts remain unconvinced by teeth alone, especially from east Asia where earlier humans had evolved since first colonisation as early as 1.8 Ma ago. There are other pre-70 ka east Asian bones with more convincing AMH provenance, however.

There is another approach to the issue of earlier Out of Africa migration; one resting on theoretical modelling of the observed genetic and morphological variation among living Eurasians, especially the decreasing diversity proceeding eastwards (Reyes-Centeno, H. *et al.* 2014. Genomic and cranial phenotype data support multiple modern human dispersals from Africa and a southern route into Asia. *Proceedings of the National Academy of Sciences*, v. **111**, p. 7248-7253. doi: 10.1073/pnas.1323666111). The authors, from Germany, Italy and France, challenge the single-exit hypothesis based on genetic data, suggesting that those data are also commensurate with several Out of Africa dispersals beginning as early as 130 ka. They favour the Bab el Mandab exit point and migration around Eurasia at that time when sea-level was extremely low during a glacial maximum. They hint at the ancestors of living native Australians and Melanesians being among those first to leave Africa, other Asian and European populations having dispersed from a later wave.

Related articles

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Serious groundwater depletion in western US

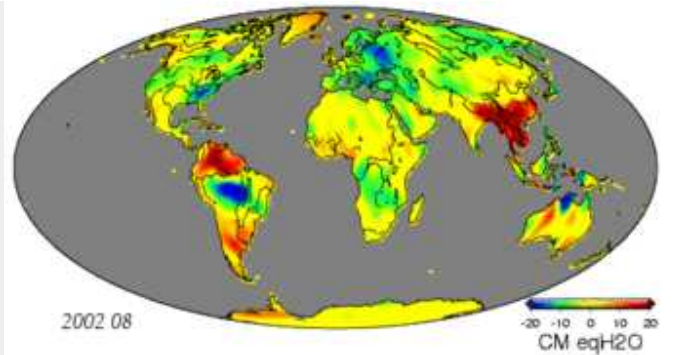
Posted on [August 15, 2014](#) by [Steve Drury](#) | [Leave a comment](#)

The 2300 km long Colorado River whose catchment covers most of Arizona and parts of the states of Colorado, California, Nevada, Utah, New Mexico and Wyoming is one of the world's most harvested surface water resources. So much so that barely a trickle now ends up in Baja California where the huge river once flowed into the sea. The lower reaches of the river system cross arid lands and it is the water source for several major cities and areas of intensive agriculture, serving as many as 40 million people and 16 thousand km² of irrigated fields. It has been nicknamed the US Nile because of its economic importance, but Egypt's Nile has far less pressure put on it, although its exit flow to the Mediterranean is also hugely reduced from its former peak volume. The water crisis affecting the Colorado River and the areas that it serves has peaked during the 14-year drought over its lower reaches. To ease conditions in the former wet lands of Mexico near the river's outlet 2014 saw deliberate major releases from giant reservoirs higher in the Colorado's course.



The Colorado River Basin (credit: Wikipedia)



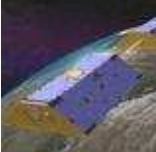
Surface abstraction is not the only drain on water resources of the Colorado River basin: groundwater pumping from the sediments beneath has grown enormously for both irrigation and urban use. That it is possible to play golf at many courses in the desert and to see monstrous musical fountains in Las Vegas is down largely to groundwater exploitation. There have been concerns about depletion of underground reserves once abstraction outpaced natural recharge by infiltration of rainfall and snow melt, but highlighting the magnitude of the problem required a rather dramatic discovery: so much water has been lost from aquifers that the missing mass has reduced the Earth's gravitational field over the south-west US (Castle, S.L. *et al.* 2014. Groundwater depletion during drought threatens future water security of the [Colorado River Basin](#). *Geophysical Research Letters*, doi: 10.1002/2014GL061055).



Global Gravity Anomaly Animation over land from GRACE (credit: Wikipedia)

The evidence comes from the [Gravity Recovery and Climate Experiment](#)(GRACE), jointly funded by NASA and Germany's DLR and launched in March 2002. GRACE uses two satellites that follow the same orbit with a spacing of 220 km between them. Range finders on each measure their separation distance, and so their ups and downs as gravity varies, with far greater accuracy than any other method. Measuring the Earth's entire gravitational field at their orbital height takes about a month. [Groundwater depletion beneath the Gangetic Plains](#)of northern India, to the tune of 109 km³, was detected in 2009 and the same approach has been applied to the Colorado Basin for nine years between 2004 and 2013. It shows that during this part of one of the longest droughts in the history of the south-west US 50 km³ have been lost from beneath, as a rate of about 5.5 km³ per year. Though the total is half the loss from beneath northern India, it should be remembered that more than ten times as many people depend on the Ganges Basin. Moreover, there is no monsoon recharge in the south-western states.

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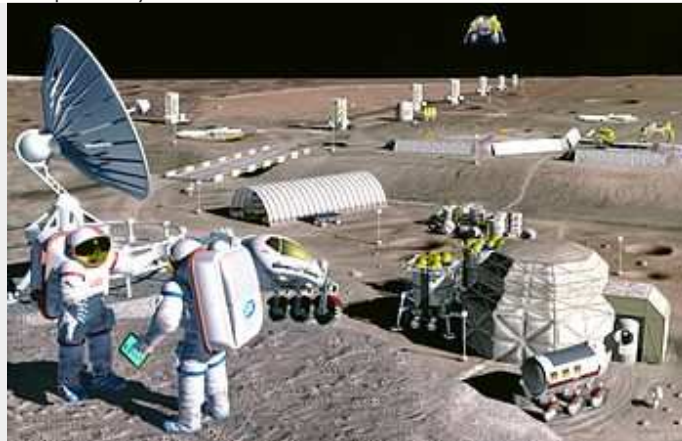
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Any excuse to return to the Moon

Posted on [August 8, 2014](#) by [Steve Drury](#) | [Leave a comment](#)

Humans first set foot on the Moon 45 years ago, yet by 42 years ago the last lunar astronaut left: by human standards staffed lunar exploration has been ephemeral. Yet for several reasons – romantic and political – once again getting living beings onto other worlds has become an obsession to some, in much the same manner that increasing numbers of countries seem hell-bent in increasing the redundancy of equipment in orbit; redundant because many of the satellites being launched all do much the same thing, especially in the remote sensing field. It's all a bit like the choice between buying a Ferrari or hiring a perfectly serviceable vehicle when needed – prestige is high on the list of motivators. A new obsession is [extraterrestrial mining](#) and some very rich kids on the block are dabbling in that possibility: James Cameron of Aliens and Avatar fame (both films with space mining in the plot); a bunch of Google top dogs;

billionaire entrepreneurs and oligarchs with cash to burn. Resource exploitation has also motivated Indian, Russian and Chinese interest in a return to the Moon, at least at an exploratory level.



NASA's proposed Moon colony concept from early 2001 (image: NASA)

The main prospective targets have been water, as a source of hydrogen and oxygen through electrolysis to make portable rocket fuel, and helium, especially its rare isotope He-3, for use in fusion reactors. Helium is more abundant on the Moon than it is on Earth: only 300 grams of He-3 per year leaks out of the Earth's depths. On the Moon there may be as much as 50 parts per billion in its dusty regolith cover where it remains supercooled in areas of permanent shadow. But to get a ton of it would require shifting 150 million tons of regolith. A decade ago geologists suggesting that metals might be mined on the Moon – noble metals and rare-earth elements have been mooted (the latter's export being embargoed by Earth's main producer China) – would have been laughing stocks, but now they get air time. Yet none of these materials occur on the Moon in the type of ore deposit found on Earth; if they did the anomalous nature of such enrichments on a body devoid of vegetation would have ensured their detection already. Even if there were lunar ore bodies, anyone with a passing familiarity with resource extraction knows just how much waste has to be shifted to make even a super-rich deposit economic on Earth, and that vast amounts of water are deployed in enriching the 'paying' metal to levels fit for smelting. For instance, while the rise in gold price since it was detached from a fixed link with paper money in 1971 has enabled very low concentrations to be mined, the methods involve grinding ore in water and then dissolving the gold in sodium cyanide solution, re-precipitating it on carbon made from coconut husks, redissolving and then precipitating the gold again by mixing the 'liquor' with zinc dust. Dry ore processing methods – based on density, magnetic and electrical properties – are hardly used in major mining operations nowadays.

The other, and perhaps most important issue with lunar or asteroid mining is that the undoubtedly high costs of whatever beneficiation process is deemed possible must be offset against income from the product; i.e. determined by market price on the home world which would have to be far higher than now. Such a rise in price would work to make currently uneconomic resources here worth mining, and anyone who believes that mining on the Moon would ever be competitive in that capitalist scenario risks being en route to the chuckle farm. Unless, of course, their motive is an exclusivist hobby par excellence and the bragging rights that accompany it – a bit like big game hunting, but the buzz coming from risking their billions rather than their lives.

But it turns out that a refocus on bringing stuff back from the Moon is not confined to floating stock on the financial markets. There are academic efforts to rationalise the Dan Dare spirit. There aren't many scientific journals with a level of kudos to match the Philosophical Transactions of the Royal Society, the first journal in the world exclusively devoted to science and probably the longest running since it was established in 1665 at the same time as the Royal Society itself. Recently one of its thematic issues dubbed "Shock and blast: celebrating the centenary of Bertram Hopkinson's seminal paper of 1914' (Hopkinson, B. 1914. A method of measuring the pressure produced in the detonation of high explosives or by the impact of bullets. *Philosophical Transactions of the Royal Society A* v. **213**, p.

437-456) a paper appeared that examines the likelihood of fossils surviving the shocks of a major impact (Burchell, M.J. *et al.* 2014. Survival of fossils under extreme shocks induced by hypervelocity impacts. *Philosophical Transactions of the Royal Society A* v. **372**, 20130190 [Open Access](#)).

The authors, based at the University of Kent, UK, used a high-velocity air gun to fire quite fragile fossils of diatoms frozen in ice into water at speeds up to 5.34 km s^{-1} . They then looked at solids left in the target to see if any recognisable sign of the fossils remained. Even at the highest energies of impact some diatomaceous material did indeed remain. Their conclusion was that meteorites derived by large impacts into planetary bodies, such as those supposedly from Mars or the Moon, could reasonably be expected to carry remnants of fossils from the bodies, had the impact been into sedimentary rock and that the bodies had supported living organisms that secreted hard parts. My first thought was that the paper was going to resurrect the aged notion of panspermia and a re-examination of the ALH84001 meteorite found in Antarctica claimed in 1996 to contain a Martian fossil (and believed by then US President Bill Clinton). Likewise it might be cited in support of the similar claim, made by panspermia buff [Chandra Wickramasinghe](#), regarding fossils reputedly in a [meteorite that fell in Sri Lanka](#) on 29 December 2012: widely regarded as [being mistaken](#). Yet Wickramasinghe's team reported diatoms in the meteorite!



The Martian meteorite ALH84001 shows microscopic features once suggested to have been created by life. (credit: Wikipedia)

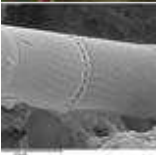
However, Burchell has suggested that their results open up the possibility of meteorites on the Moon that had been blasted there from Earth might preserve terrestrial fossils. Moreover, such meteorites might preserve fossils from early stages in the evolution of life on Earth, since when both rocks and whatever they once contained have been removed by erosion or obliterated by deformation and metamorphism on our active planet. 'Another reason we should hurry back to the Moon' says Kieren Torres Howard of New York's City University...

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Breathing spaces or toxic traps in the Archaean ocean

Posted on [July 31, 2014](#) by [Steve Drury](#) | [Leave a comment](#)

The relationship between Earth's complement of free oxygen and life seems to have begun in the [Archaean](#), but it presented a series of paradoxes: produced by photosynthetic organisms oxygen would have been toxic to most other Archaean life forms; its presence drew an important micronutrient, dissolved iron-2, from sea water by precipitation of iron-3 oxides; though produced in seawater there is no evidence until about 2.4 Ga for its presence in the air. It has long been thought that the paradoxes may have been resolved by oxygen being produced in isolated patches, or 'oases' on the Archaean sea floor, where early [blue-green bacteria](#) evolved and thrived.

A stratigraphic clue to the former presence of such oxygen factories is itself quite convoluted. The precipitation of calcium carbonates and therefore the presence of limestones in sedimentary sequences are suppressed by dissolved iron-2: the presence of Fe^{2+} ions would favour the removal of bicarbonate ions from seawater by formation of ferrous carbonate that is less soluble than calcium carbonate. Canadian and US geochemists studied one of the thickest Archaean limestone sequences, dated at around 2.8 Ga, in the wonderfully named Wabigoon Subprovince of the [Canadian Shield](#) which is full of stromatolites, bulbous laminated masses probably formed from bacterial biofilms in shallow water (Riding, R. *et al.* 2014. Identification of an Archean marine oxygen oasis. *Precambrian Research*, v. **251**, p. 232-237).



Limestone formed from blue-green bacteria biofilms or stromatolites (credit: Wikipedia)

Limestones from the sequence that stable isotope analyses show to remain unaltered all have abnormally low cerium concentrations relative to the other rare-earth elements. Unaltered limestones from [stromatolite-free](#), deep water limestones show no such negative Ce anomaly. Cerium is the only [rare-earth element](#) that has a possible 4+ valence state as well one with lower positive charge. So in the presence of oxygen cerium can form an insoluble oxide and thus be removed from solution. So cerium independently shows that the shallow water limestones formed in seawater that contained free oxygen. Nor was it an ephemeral condition, for the anomalies persist through half a kilometer of limestone.

The study shows that anomalous oxygenated patches existed on the Archaean sea floor, probably shallow-water basins or shelves isolated by the build up of stromatolite reef barriers. For most prokaryote cells they would have harboured toxic conditions, presenting

them with severe chemical stress. Possibly these were the first places where oxygen defence measures evolved, that eventually led to more complex eukaryote cells that not only survive oxygen stress but thrive on its presence. That conjecture is unlikely to be fully proved, since the first undoubted fossils of eukaryote cells, known as acritarchs, occur in rocks that are more than 800 Ma years younger.

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Planet Mercury and giant collisions

Posted on [July 30, 2014](#) by [Steve Drury](#) | [Leave a comment](#)



Mercury's sun-lit side from first MESSENGER flyby (credit: Wikipedia)

Mercury is quite different from the other three [Terrestrial Planets](#), having a significantly higher density. So it must have a considerably larger metallic core than the others – estimated to make up about 70% of [Mercury's](#) mass – and therefore has a far thinner silicate mantle. The other large body in the [Inner Solar System](#), our Moon, is the opposite, having the greatest proportion of silicate mantle and a small core.

The presently favoured explanation for the Moon's anomalous mass distribution is that it resulted from a giant collision between the proto-Earth and a Mars-sized planetary body. Moreover, planetary theorists have been postulating around 20 planetary 'embryos' in the most of which accreted to form Venus and Earth, the final terrestrial event being the Moon-forming collision, with smaller Mars and Mercury having been derived from the two remaining such bodies. For Mercury to have such an anomalously large metallic core has invited mega-collision as a possible cause, but with such a high energy that much of its original complement of silicate mantle failed to fall back after the event. Two planetary scientists from the Universities of Arizona, USA, and Berne, Switzerland, have modelled various scenarios for such an origin of the Sun's closest companion (Asphaug, E. & Reuffer, A. 2014. Mercury and other iron-rich planetary bodies as relics of inefficient accretion. *Nature Geoscience*, published online, doi: 10.1038/NGEO2189).

Their favoured mechanism is what they term 'hit-and-run' collisions in the early Inner Solar System. In the case of Mercury, that may have been with a larger target planet that survived intact while proto-Mercury was blasted apart to lose much of its mantle on re-accretion. To survive eventual accretion into a larger planet the left-overs had to have ended up in an orbit that avoided further collisions. Maybe Mars had the same kind of lucky escape but one that left it with a greater proportion of silicates.

One possible scenario is that proto-Mercury was indeed the body that started the clock of the Earth-Moon system through a giant impact. Yet no-one will be satisfied with a simulation and some statistics. Only detailed geochemistry of returned samples can take us any further. The supposed Martian meteorites seem not to be compatible with such a model; at least one would expect there to have been a considerable stir in planetary-science circles if they were. For Mercury, it will be a long wait for a resolution by geochemists, probably yet to be conceived.

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Mercury Was Formed By Planetary Hit And Runs



Planet Mercury result of early hit-and-run collisions



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Trapping Martian life forms

Posted on [July 21, 2014](#) by [Steve Drury](#) | [Leave a comment](#)

No matter how optimistic exobiologists might be, the current approaches to discovering whether or not Mars once hosted life or, the longest shot of all, still does are almost literally hit or miss. First the various teams involved try to select a target area using remotely sensed data to see if rocks or regolith have interacted with water; generally from the presence or absence of clay minerals and /or sulfates that hydrous alteration produces on Earth. Since funding is limited the sites with such ingredients are narrowed down to the 'best' – in the case of [NASA's Curiosity rover to Gale Crater](#) where a thick sequence of sediments shows occasional signs of clays and sulfates. But a potential site must also be logistically feasible with the least risk of loss to the lander. Even then, all that can be achieved in existing and planned mission is geochemical analysis of drilled and powdered samples. Curiosity's ambition is limited to assessing whether the conditions for life were present. Isotopic analysis of any carbon content to check for mass fractionation that may have arisen from living processes is something for a future ESA mission.

Neither approach is likely to prove the existence now or in far-off times of [Martian life](#), though scientists hope to whet the appetite of

those holding the purse strings. Only return of rock samples stands any realistic chance of giving substance to the dreams of exobiologists. But what to collect? A random soil grab or drill core is highly unlikely to provide satisfaction one way or the other. Indeed only incontrovertible remains of some kind of cellular material can slake the yearning. Terrestrial materials might provide a guide to (probably) robotic collectors. Kathleen Benison and Francis Karmanocky of West Virginia University have followed this up by examining sulfates from one of the least hospitable places on Earth; the salt flats of the high Andes of Chile (Benison, K.C. & Karmanocky, F.J. 2014. Could microorganisms be preserved in Mars gypsum? Insights from terrestrial examples. *Geology*, v. **42**, p. 615-618). Evaporite minerals from Andean salars precipitated from extremely acidic and highly saline lake water originating from weathering of surrounding volcanoes. Oddly few researchers have sought [cellular life](#) trapped in crystals of salt or gypsum, the two most common minerals in the high-elevation salt pans. Fluid inclusions in sedimentary halite (NaCl) crystals from as far back as the Triassic are known to contain single-celled extremophile prokaryotes and eukaryotes, but gypsum is more likely to be found on Mars. Benison and Karmanocky document a variety of cellular material from Chilean gypsum that has been trapped in the solid mineral itself or in fluid inclusions. This is the most likely means of fossilisation of Martian life forms, if they ever existed. The salar gypsum contain cells that can be cultured and thereby revived since several species can remain dormant for long periods. The authors suggest that transparent cleavage fragments of Martian gypsum could be examined at up to 2000x magnification on future Mars landers. Finding convincing cells would see dancing in exobiology labs, and what if they should move...

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Fieldwork and geological education

Posted on [July 16, 2014](#) by [Steve Drury](#) | [5 comments](#)

In March 2013 *EPN* carried an item connected with the [abandonment of field training at week-long summer schools by the UK's Open University](#). After 40 years of geoscientific summer schools connected with courses at Levels-1, -2 and -3 anonymous performance statistics were available for thousands of students who had studied those OU Earth Science courses that offered summer-school experiences in the field, first as compulsory modules (1971-2001) then as an optional element (2002-2011) and finally with no such provision. The March 2013 item compared statistics for the three kinds of provision. It should be noted that the OU once had possibly the world's largest throughput of degree-level geoscience students for a single higher educational institution.

After 2001, pass rates fell abruptly and significantly; in the *Science Foundation Course* the rate fell from an annual average of 69 to 54%, and in level-2 *Geology* from 65 to 55%. This was accompanied by a significant decrease in enrolment in equally and more popular geoscience courses that had never had a summer school element. The second statistical drop was of the order of 30 to 40%. It seemed that residential schools played a vital role in boosting confidence and reinforcing home studies, as well as transferring practical field skills. After further falls in enrolment since summer schools were removed from the curriculum in 2012, the OU is in the process of completely revising its geoscientific courses and attempting to substitute virtual, on-line field and lab 'experiences'. Time will tell if it ever manages to reach its former level of success and acceptance

So, discovering that The Geological Society of America had surveyed attendees at its Annual Meetings (Petcovic, H.L. *et al.* 2014. Geoscientists' perceptions of the value of undergraduate field education. *GSA Today*, v. **24** (July 2014), p. 4-10) piqued my interest. Almost 90% of those polled agreed that field studies should be a fundamental requirement of undergraduate programmes; very few

agreed that becoming an expert geoscientist is possible without field experience. Field courses develop the skills and knowledge specific to 'doing' geoscience; teach integration of fundamental concepts and broaden general understanding of them; inculcate cooperation, time management and independent thinking that have broader applications. Fieldwork also has personal and emotional impacts: reinforcing positive attitudes to the subject; creating a geoscientific *esprit de corps*; helping students recognise their personal strengths and limitations. Then there is the aspect of enhanced employability, highlighted by all categories of respondents.

Set against these somewhat predictable sentiments among geoscientists are the increasing strains posed by cost, time commitment, and liability, as well as the fact that some potential students do not relish outdoor pursuits. Yet overall the broad opinion was that degree programmes should involve at least one field methods course as a requirement, with other non-compulsory opportunities for more advanced field training

5 Comments

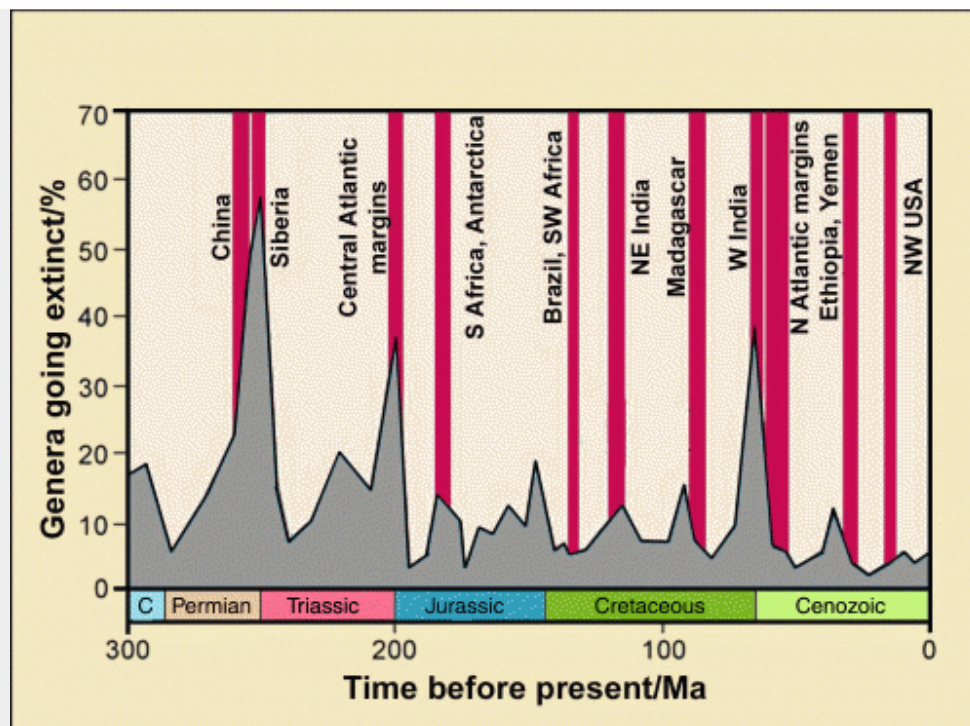
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Mass extinctions' connections with volcanism: more support

Posted on [July 4, 2014](#) by [Steve Drury](#) | [2 comments](#)

Plot the times of peaks in the rates of extinction during the Mesozoic against those of flood basalt outpourings closest in time to the die-offs and a straight line can be plotted through the data. There is sufficiently low deviation between it and the points that any statistician would agree that the degree of fit is very good. Many geoscientists have used this empirical relationship to claim that all Mesozoic mass extinctions, including the three largest (end-Permian, end-Triassic and end-Cretaceous) were caused in some way by massive basaltic volcanism. The fact that the points are almost evenly spaced – roughly every 30 Ma, except for a few gaps – has suggested to some that there is some kind of rhythm connecting the two very different kinds of event.



Major Mesozoic extinctions and flood basalt events (credit: S Drury)

Leaving aside that beguiling periodicity, the hypothesis of a flood-basalt – extinction link has a major weakness. The only likely intermediary is atmospheric, through its composition and/or climate; flood volcanism was probably not violent. Both probably settle

down quickly in geological terms. Moreover, [flood basalt volcanism](#) is generally short-lived (a few Ma at most) and seems not to be continuous, unlike that at plate margins which is always going on at one or other place. The great basalt piles of Siberia, around the Central Atlantic margins and in Western India are made up of individual thick and extensive flows separated by fossil soils or boles. This suggests that magma blurted out only occasionally, and was separated by long periods of normality; say between 10 and 100 thousand years. Evidence for the duration of major accelerations, either from stratigraphy and palaeontology or from proxies such as peaks and troughs in the isotopic composition of carbon (e.g. [EPN Ni life and mass extinction](#)) is that they too occurred swiftly; in a matter of tens of thousand years. Most of the points on the flood-basalt – extinction plot are too imprecise in the time dimension to satisfy a definite relationship. Opinion has swung behind an instantaneous impact hypothesis for the K-P boundary event rather than one involving the [Deccan Traps](#) in India, simply because the best dating of the Deccan suggests extinction seems to have occurred when no flows were being erupted, while the thin impact-related layer in sediments the world over is exactly at the point dividing Cretaceous flora and fauna from those of the succeeding Palaeogene.

Yet no such link to an extraterrestrial factor is known to exist for any other major extinctions, so volcanism seems to be 'the only game in town' for the rest. Until basalt dating is universally more precise than it has been up to the present the case is 'not proven'; but, in the manner of the Scottish criminal law, each is a 'cold case' which can be reopened. The [previous article](#) hardens the evidence for a volcanic driver behind the greatest known extinction at the end of the Permian Period. And in short-order, another of the [Big Five](#) seems to have been resolved in the same way. A flood basalt province covering a large area of west and north-west Australia (known as the Kalkarindji large igneous province) has long been known to be of roughly [Cambrian](#) age but does it tie in with the earliest Phanerozoic mass extinction at the Lower to Middle Cambrian boundary? New age data suggests that it does at the level of a few hundred thousand years (Jourdan, F. *et al.* 2014. High-precision dating of the Kalkarindji large igneous province, Australia, and synchrony with the Early-Middle Cambrian (Stage 4-5) extinction. *Geology*, v. **42**, p. 543-546). The Kalkarindji basalts have high sulfur contents and are also associated with widespread breccias that suggest that some of the volcanism was sufficiently explosive to have blasted sulfur-oxygen gases into the stratosphere; a known means of causing rapid and massive climatic cooling as well as increasing oceanic acidity. The magma also passed through late Precambrian sedimentary basins which contain abundant organic-rich shales that later sourced extensive petroleum fields. Their thermal metamorphism could have vented massive amounts of CO₂ and methane to result in climatic warming. It may have been volcanically-driven climatic chaos that resulted in the demise of much of the earliest tangible marine fauna on Earth to create also a sudden fall in the oxygen content of the Cambrian ocean basins.