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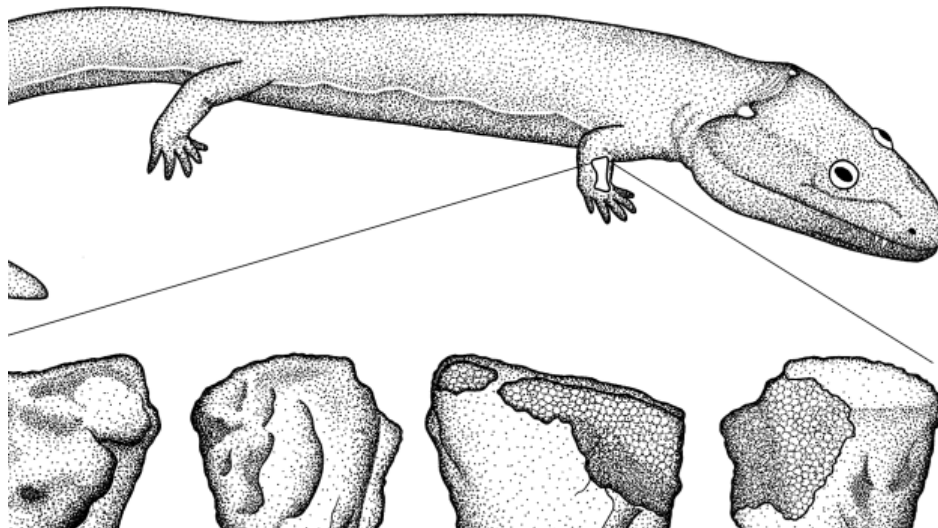


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ARTIGO DA SEMANA

<http://seuhistory.com/noticias/teoria-da-evolucao-em-risco-sao-descobertos-animais-terrestres-com-333-milhoes-de-anos>
[Teoria da Evolução em risco: são descobertos animais terrestres com 333 milhões de anos](#)



Uma equipe de pesquisadores do Museu de Queensland, na Austrália, chegou a uma conclusão surpreendente e de consequências científicas inesperadas. Ao analisar os restos fósseis da fêmea de um tetrápoide *Ossinodus pueri*, eles constataram que o animal havia sofrido uma fratura que só poderia ser causada por uma forte queda no solo. O fato não seria inusitado se a datação dos restos não indicasse que eles possuem 333 milhões de anos de idade. Ou seja, o animal teria vivido antes dos primeiros tetrápoides saírem da água para habitar na terra, segundo afirmam todas as teorias sobre a evolução dos vertebrados.

O diretor da pesquisa publicada pela revista Plos One, Peter Bishop, explica que, além do que se pode deduzir da fratura e da queda, características ósseas e dos vasos sanguíneos sugerem que o espécime teria passado bastante tempo na terra. Essa descoberta pode ter implicações muito importantes para o estudo dos contextos temporais, biogeográficos e fisiológicos na evolução dos vertebrados, cuja história oficial – agora ameaçada – indica que eles migraram da água para a Terra.

Fontes: [PlosOne](#) , [La Gran Época](#)

Crédito da imagem: P.J. Bishop et al., PLoS ONE 2015

NEWS METEORITICA DA SEMANA

<http://www.geologypage.com/2015/05/did-ocean-acidification-from-asteroid.html#ixzz3dQQ25gVN>

Severity of ocean acidification following the end-Cretaceous asteroid impact

1. [Toby Tyrrell^{a,1}](#),
2. [Agostino Merico^{b, c}](#), and
3. [David Ian Armstrong McKay^a](#)

[Author Affiliations](#)

1. Edited by Henry J. Melosh, Purdue University, West Lafayette, IN, and approved April 16, 2015 (received for review October 1, 2014)

Significance

Ammonites went extinct at the time of the end-Cretaceous asteroid impact, as did more than 90% of species of calcium carbonate-shelled plankton (coccolithophores and foraminifera). Comparable groups not possessing calcium carbonate shells were less severely affected, raising the possibility that ocean acidification, as a side effect of the collision, might have been responsible for the apparent selectivity of the extinctions. We investigated whether ocean acidification could have caused the disappearance of the calcifying organisms. In a first detailed modelling study we simulated several possible mechanisms from impact to seawater acidification. Our results suggest that acidification was most probably not the cause of the extinctions.

Abstract

Most paleo-episodes of ocean acidification (OA) were either too slow or too small to be instructive in predicting near-future impacts. The end-Cretaceous event (66 Mya) is intriguing in this regard, both because of its rapid onset and also because many pelagic calcifying species (including 100% of ammonites and more than 90% of calcareous nannoplankton and foraminifera) went extinct at this time. Here we evaluate whether extinction-level OA could feasibly have been produced by the asteroid impact. Carbon cycle box models were used to estimate OA consequences of (i) vaporization of up to 60×10^{15} mol of sulfur from gypsum rocks at the point of impact; (ii) generation of up to 5×10^{15} mol of NO_x by the impact pressure wave and other sources; (iii) release of up to 6,500 Pg C as CO_2 from vaporization of carbonate rocks, wildfires, and soil carbon decay; and (iv) ocean overturn bringing high- CO_2 water to the surface. We find that the acidification produced by most processes is too weak to explain calcifier extinctions. Sulfuric acid additions could have made the surface ocean extremely undersaturated ($\Omega_{\text{calcite}} < 0.5$), but only if they reached the ocean very rapidly (over a few days) and if the quantity added was at the top end of literature estimates. We therefore conclude that severe ocean acidification might have been, but most likely was not, responsible for the great extinctions of planktonic calcifiers and ammonites at the end of the Cretaceous.

AMBIENTE BRASIL

19 / 06 / 2015 [Maio passado foi o mais quente da história moderna](#)

Relatório mostra que em maio as temperaturas médias foram 0,87 grau Celsius mais quentes que a média desse mês no século XX.

19 / 06 / 2015 [Em encíclica, Papa diz temer guerra pela água ainda neste século](#)

Vaticano divulgou encíclica sobre o meio ambiente nesta quinta-feira. Francisco pediu mudanças em estilo de vida e acusou potências.

19 / 06 / 2015 [Grande operação internacional contra tráfico de animais em 62 países](#)

A agência policial europeia Europol anunciou nesta quinta-feira uma ampla operação internacional contra o tráfico de animais em 62 países, na qual foram apreendidas grandes quantidades de marfim, chifres de rinocerontes e ossos de baleias.

19 / 06 / 2015 [Califórnia usa drones para monitorar tubarões contra ataques nas praias](#)

Uso do veículo aéreo permite que confirmação de presença de tubarões ocorra em poucos minutos.

19 / 06 / 2015 [Espécie rara de anta albina aparece nadando em reserva ambiental](#)

Imagem foi flagrada em maio e divulgada nesta quinta-feira (18). Animal foi visto no Legado das Águas, uma reserva particular em Juquiá (SP).

19 / 06 / 2015 [Metano em meteoritos de Marte reforça tese de existência de vida no planeta](#)

A descoberta de um grupo internacional de cientistas levanta a possibilidade de o metano ser usado como fonte de alimento por formas rudimentares de vida que poderiam existir abaixo da superfície do planeta.

19 / 06 / 2015 [Tartaruga centenária pode virar mãe por inseminação e salvar sua espécie](#)

Ela é a última fêmea da espécie 'Rafetus swinhoei' e vive na China. Macho não conseguiu fertilizá-la por causa de lesão no órgão sexual.

19 / 06 / 2015 [Nova substância pode combater malária com dose avaliada em US\\$ 1](#)

Descoberta é importante devido à resistência da doença a tratamentos. Doença mata cerca de 600 mil pessoas por ano, a maioria na África.

19 / 06 / 2015 [Cientistas sequenciam genoma de primeiro ancestral americano](#)

Nesta quinta-feira (18), a revista Nature publicou o resultado das pesquisas feitas com o Homem de Kennewick. Cientistas mapearam o genoma do primeiro ancestral americano e concluíram que ele está mais ligado aos índios americanos nativos que a qualquer outra população.

19 / 06 / 2015 [ONU agradece ao Papa por apelo contra a mudança climática](#)

Diretor do Pnuma falou sobre apelo 'inequívoco' do Papa. Francisco divulgou nesta quinta encíclica sobre proteção ao meio ambiente.

19 / 06 / 2015 [DF descarta ebola e diz que paciente mentiu ao alegar ter saído do país](#)

Homem deu entrada na UPA de Sobradinho com sintomas da doença. Paciente já foi liberado; ele havia dito que tinha viajado para a Libéria.

19 / 06 / 2015 [Casos de dengue crescem 3,6% em Mogi Guaçu/SP e chegam a 13,3 mil](#)

Saúde investiga 17 mortes que podem ter sido causadas pela doença. Segundo a prefeitura, 45 pacientes aguardam resultados de exames.

19 / 06 / 2015 [Americano pesca fêmea de tubarão grávida de 34 filhotes](#)

A fêmea de quase 4 metros e todos os seus filhotes foram mortos.

19 / 06 / 2015 [Energia solar produz água no sertão do RN](#)

Seis sistemas de dessalinização foram entregues no Rio Grande do Norte, um deles com painéis fotovoltaicos. Beneficiarão 1.500 moradores do semiárido.

18 / 06 / 2015 [Pesquisadores percorrem a Mata Atlântica e analisam danos ao bioma](#)

Franceses e brasileiros refazem percurso que botânico fez no século 19. Danos à vegetação são grandes e antigos, analisam os estudiosos.

18 / 06 / 2015 [Estudo revela que menor poluição do ar salvaria 3 milhões de vidas](#)

Dados apontam que regiões mais afetadas são Índia e China. Poluição causa mais mortes que a Aids e a malária juntas.

18 / 06 / 2015 [Baixa umidade leva capital federal a decretar emergência ambiental](#)

O decreto foi publicado na edição de terça-feira (16) do Diário Oficial do Distrito Federal e autoriza participantes do Plano de Prevenção e Combate a Incêndios Florestais a desenvolver ações para minimizar as ocorrências de queimadas.

18 / 06 / 2015 [Sonda Rosetta pode fazer 'manobra radical' para se aproximar de cometa](#)

Rosetta precisa chegar mais perto para receber dados do robô Philae. Cientistas esperam obter dados para desvendar segredos do universo.

18 / 06 / 2015 [Inmetro assume gestão do Centro de Biotecnologia da Amazônia, diz MDIC](#)

Até então, CBA era administrado pela Suframa. Intenção do Ministério é fazer com que centro vire referência internacional.

18 / 06 / 2015 [Californianos pintam gramados de verde para esconder efeito da seca](#)

Em seu quarto ano seguido de seca, Estado americano impôs duras restrições para coibir consumo de água e impôs multas para quem regar jardins.

18 / 06 / 2015 [OMS descarta declarar emergência sanitária global por coronavírus](#)

Condições não são suficientes por não haver transmissão sustentada do vírus. Mers infectou mais de 1.200 pessoas no mundo e matou ao menos 450.

18 / 06 / 2015 [Principais reservas subterrâneas de água estão se esgotando, aponta estudo](#)

Dessas 21 reservas, há 13 que experimentaram no período de análise fortes declives em seus níveis de água.

18 / 06 / 2015 [Astrônomos descobrem galáxia com primeiras estrelas formadas após o Big Bang](#)

Chamada de Cosmos Redshift 7, ou simplesmente CR7, ela é três vezes mais brilhante do que a atual detentora desse recorde até o momento, a galáxia Himiko, a 13 bilhões de anos luz da terra.

18 / 06 / 2015 [Novo presidente da Funai promete acelerar demarcação de terras indígenas](#)

"A questão da definição dos processos e das terras indígenas é urgente. Vou fazer com que eles ganhem celeridade e que possamos cumprir essa agenda", disse João Pedro Gonçalves da Costa.

18 / 06 / 2015 [Brasil pode avançar no combate à seca e à pobreza, diz especialista](#)

Pesquisa divulgada na quarta-feira (17) – Dia Mundial de Combate à Seca e à Desertificação – pelo Centro de Gestão e Estudos Estratégicos, mostra que 16% do território nacional estão suscetíveis à desertificação.

18 / 06 / 2015 [Coreia do Sul testa tratamento experimental contra coronavírus Mers](#)

Teste consiste em injetar plasma sanguíneo de pacientes recuperados. Coronavírus Mers já matou 20 pessoas no país asiático.

18 / 06 / 2015 [Japão inaugura monumento em homenagem a insetos mortos por humanos](#)

Escultura retrata uma criatura de grandes proporções em formato de besouro escalando uma pedra, cercada por malhas de arame.

18 / 06 / 2015 [Nível do Cantareira fica estável pelo terceiro dia seguido](#)

O armazenamento está com um déficit de 9,3% e, para repor toda a água da reserva técnica, precisaria receber mais 91,8 bilhões de litros. Atualmente, esse manancial abastece 5,2 milhões de pessoas.

17 / 06 / 2015 [Obama coordena esforço de US\\$ 4 bilhões contra mudança climática](#)

Para encorajar o setor privado a realizar mudanças tecnológicas e reduzir a poluição, Obama promulgará também uma série de ações executivas dentro de seu plano para impulsionar um novo modelo energético limpo que também seja rentável.

17 / 06 / 2015 [Macãs produzidas na Europa têm alto nível de pesticidas, aponta relatório](#)

Greenpeace analisou frutas provenientes de 12 países europeus. Pesticidas mais encontrados foram o fungicida boscalida e o DDT.

17 / 06 / 2015 [Governo americano ordena retirada de gordura trans dos alimentos](#)

Vários testes científicos mostraram que o consumo de gorduras trans eleva o nível do chamado colesterol "ruim", destaca a FDA.

17 / 06 / 2015 [Terremoto do Nepal deslocou o monte Everest, afirma estudo chinês](#)

O terremoto de 7,8 graus que abalou o Nepal no dia 25 de abril deslocou o monte Everest, a maior montanha do planeta, em três centímetros para o sudoeste, afirma a Administração Nacional de Topografia, Cartografia e Informação Geológica.

17 / 06 / 2015 [Encíclica papal sobre meio ambiente terá grande impacto, diz ONU](#)

Vaticano vai divulgar documento nesta quinta-feira (18). Chefe da convenção do Clima na ONU diz que Papa está animado.

17 / 06 / 2015 [Asteroide Ícaro passará "perto" da Terra nesta quarta-feira](#)

O cálculo é que ele passe a cerca de oito milhões de quilômetros de distância do nosso planeta.

17 / 06 / 2015 [Cientistas criam motor que funciona a partir da água](#)

Pesquisadores norte-americanos anunciaram que usaram a energia da evaporação da água para operar motores, uma solução barata e que respeita o planeta.

17 / 06 / 2015 [Rússia e Estados Unidos competem por parceria espacial com Brasil](#)

Países disputam lançar satélites comerciais da base de Alcântara (MA). Governo decidirá nos próximos meses parceiro para fornecer tecnologia.

17 / 06 / 2015 [Prato tradicional tailandês entra na mira de médicos por elevar incidência de câncer](#)

Koi plaá é feito de peixe cru, o que está por trás de uma inflamação parasitária responsável por tumores de fígado em uma população do interior da Tailândia.

17 / 06 / 2015 [Finlândia quer usar esterco de cavalos para aquecer casas](#)

Segundo a TV estatal Yle, a nova coalizão governamental planeja o uso em larga escala dos equinos como fonte renovável de energia.

17 / 06 / 2015 [Governo quer parcerias científicas para estimular atuação da Embrapa](#)

O anúncio foi feito na terça-feira (16) pela ministra da Agricultura, Pecuária e Abastecimento, Kátia Abreu, em palestra na abertura do 14º seminário Perspectiva para o Agrobusiness em 2015 e 2016, promovido pela BMF& Bovespa, em parceria com o ministério.

17 / 06 / 2015 [MMA promove curso de manejo e conservação](#)

Realizado em Campina Grande (PB), evento abre programação do Dia Mundial de Combate à Desertificação, celebrado em 17 de junho.

17 / 06 / 2015 [Erupção provoca retirada de mais de 10 mil pessoas do oeste da Indonésia](#)

Todas as pessoas foram alojadas em prédios públicos ou templos. Nesta terça-feira (16), o Sinabung registrava importante atividade vulcânica.

17 / 06 / 2015 [Estudo vê menor risco cardíaco em pessoas que comem mais chocolate](#)

saiu na revista britânica 'Heart'. Pesquisa não explica o modo como o chocolate poderia ajudar o coração.

17 / 06 / 2015 Coreia do Norte relata pior seca dos últimos 100 anos

Arrozais de todo o país estão secando devido à falta de chuvas. 2014 já havia registrado a menor quantidade de chuvas em 30 anos.

16 / 06 / 2015 AIE avisa que temperaturas podem aumentar 4,3º por mudanças climáticas

Tomando como referência os compromissos atuais dos países e as políticas dos que não adotaram compromissos, como a Índia, a AIE estima que a temperatura média mundial terá aumentado 2,6º em 2100.

16 / 06 / 2015 Cientistas descobrem ferramenta de 3,3 milhões de anos

A grande questão em torno do achado é que o instrumento é cerca de 700 mil anos mais antigo que outras encontradas por arqueólogos – ou, seja, talvez a descoberta traga uma “reviravolta” na ideia defendida até agora sobre a evolução dos humanos e da tecnologia.

16 / 06 / 2015 Surto de doença bacteriana devasta colmeias da África do Sul

Especialistas temem que doença se espalhe pelo resto da África. Doença americana ataca larvas colocadas pela abelha rainha.

16 / 06 / 2015 Jardim da Serra/SC registra temperatura de -2°C, diz Inmet

Em Urupema também foi registrada temperatura negativa: -0,4°C, segundo a Epagr/Ciram.

16 / 06 / 2015 São Paulo amplia vacinação contra a gripe

Segundo balanço divulgado na segunda-feira (15), desde o início da campanha foram imunizadas 8.497.502 pessoas dos grupos prioritários (crianças entre seis meses e menos de cinco anos de idade, gestantes, idosos com 60 anos ou mais; puérperas – mulheres até 45 dias após o parto -, indígenas e trabalhadores da saúde; pacientes diagnosticados com doença crônica e pessoas do sistema prisional).

16 / 06 / 2015 Brasil marca 1º voo de foguete lançador de microssatélites para 2018

O veículo vai transportar ainda uma carga útil para teste. Devem ser levados ao espaço para teste três experimentos selecionados no 5º Anúncio de Oportunidade, lançado em fevereiro último.

16 / 06 / 2015 Repelente de pernilongos criado em São Carlos/SP pode ser usado em bebês

Produto feito com ajuda da nanotecnologia deve estar à venda em 1 mês. Creme tem ação prolongada e, segundo cientistas, não há contraindicação.

16 / 06 / 2015 Navegação no Xingu provoca migração de lontras e ariranhas

Norte Energia identificou menos vestígios de animais nos últimos 3 anos. Ariranhas são consideradas espécie vulnerável.

16 / 06 / 2015 Papagaios-do-mar podem desaparecer na Europa

Mudança climática, perda do habitat e pesca em excesso são os principais motivos.

16 / 06 / 2015 Incêndio destrói oito hectares em reserva florestal no Rio

Segundo a Secretaria Municipal de Meio Ambiente, responsável pela administração do parque desde 2007, embora ainda não haja confirmação, há a suspeita de que a causa seja a queda de um balão no terreno.

16 / 06 / 2015 Brasil pode importar mais eletricidade de países vizinhos

Entre os países que podem fornecer energia ao Brasil em caso de crise, o secretário citou a Argentina e o Uruguai.

16 / 06 / 2015 Sequenciamento de genomas de abelhas do gênero Bombus favorece a preservação

Duas espécies estudadas, ameaçadas de extinção, desempenham papel fundamental na polinização de vegetais como castanha, tomate, berinjela, jiló, pimentão, abóbora e kiwi.

16 / 06 / 2015 Agência pede fim de subsídio a combustível fóssil contra aquecimento

Relatório da Agência Internacional de Energia pede descarbonização global. Setor de energia é responsável por 2/3 das emissões de gases atuais.

16 / 06 / 2015 Ausência de dinossauros nos trópicos foi causada por tempo quente e seco

Durante anos, os paleontólogos avançaram em diferentes teorias para saber por que os dinossauros com pescoço longo, o Sauropodomorpha, evitaram por muito tempo os trópicos e eram numerosos em latitudes ao norte ou ao sul do Equador.

16 / 06 / 2015 Sonda Rosetta estabelece novo contato com módulo Philae

Robô retomou contato neste domingo, depois de ficar quase 7 meses inativo. Philae observa dados de cometa e pode ajudar a descobrir origem da vida.

08 / 06 / 2015 Apitaco pede despolição da Baía de Guanabara

Vários apitos soaram neste sábado (6) vindos de caiaques e canoas nas águas da enseada de Botafogo, zona sul do Rio. O motivo do alerta é a poluição da Baía de Guanabara, que será utilizada como local das provas de vela nos Jogos Olímpicos de 2016.

08 / 06 / 2015 Quelônios e cobra são resgatados de áreas residenciais em Manaus/AM

Cobra encontrada possui cerca de 1,70 m de comprimento. Tracajás foram recuperados em bairro da Zona Sul de Manaus.

08 / 06 / 2015 José Graziano é reeleito diretor-geral da FAO

Graziano está no comando da FAO desde 2012 e ficará por mais quatro anos no posto máximo da entidade, até julho de 2019.

08 / 06 / 2015 Metade dos golfinhos capturados no Japão são exportados

Caçadores de Taiji venderam de 2009 a 2014 um total de 760 golfinhos. Deste total, 354 foram exportados a uma dezena de países.

08 / 06 / 2015 Arqueólogos descobrem 6 tumbas com múmias de 2.500 anos no Egito

As sepulturas foram achadas em escavações realizadas nos arredores do mausoléu de Agha Khan III - líder espiritual dos muçulmanos ismailis -, na margem oeste do rio Nilo, na cidade de Assuão, explicou o ministro em comunicado.

08 / 06 / 2015 Coreia do Sul confirma 23 novos casos da doença Mers

Número de contaminados subiu para 87, segundo último levantamento. Governo vai rastrear celulares de vítimas para evitar alastramento.

08 / 06 / 2015 Semana do Meio Ambiente faz coleta de lixo eletrônico em Rancharia/SP

Atividades diversas serão realizadas entre os dias 8 e 12 de junho. Também constam doação de cães e feiras de agricultura na programação.

08 / 06 / 2015 Parceria em Cantagalo/RJ auxilia no Cadastro Ambiental Rural

Quem tem imóvel rural deve efetuar o cadastro até 5 de maio de 2016. Se não for feito, entre outras coisas, pode perder acesso a crédito agrícola.

08 / 06 / 2015 Prefeitura de Curitiba/PR quer proibir carroças e charretes com animais

Proposta começou a tramitar na Câmara Municipal e pode virar lei. Intenção é evitar maus-tratos aos animais e evitar acidentes de trânsito.

08 / 06 / 2015 Chega a 18 o número de mortos após terremoto na Malásia

O terremoto de magnitude 6 na escala Richter, atingiu na sexta-feira (5) a região norte da Ilha de Bornéu.

08 / 06 / 2015 Prorrogado o prazo de vacinação contra a febre aftosa no Maranhão

Criadores agora têm até o dia 15 de junho para imunizar os rebanhos.

08 / 06 / 2015 Aranha 'brasileira' causa pânico no norte da Inglaterra

Suspeita de que ovos em cacho de bananas eram da temível armadeira faz família abandonar casa e provoca fechamento temporário de supermercado.

08 / 06 / 2015 Projeto Tamar abre ninhos de tartaruga-de-pente em Natal/RN

Evento acontece nesta terça em celebração à Semana do Meio Ambiente. Objetivo é conscientizar crianças e adultos para a preservação da espécie.

08 / 06 / 2015 Nível do Sistema Cantareira fica estável no domingo

Manancial opera com 20,2% de sua capacidade, informa a Sabesp. Situação ainda é crítica e represas continuam usando 1º volume morto.

08 / 06 / 2015 Mudança climática preocupa maioria, diz pesquisa

A maioria (79%) da população do planeta está "muito preocupada" com os efeitos da mudança climática, mas menos da metade apoia um imposto sobre o carbono para diminuir as emissões - revela uma pesquisa realizada em quase 80 países.

09 / 06 / 2015 MS fica em alerta após confirmação de casos de febre amarela em Goiás

Infectologista diz que quem não se vacinou deve procurar posto de saúde. Prevenção contra possível criação de larvas do mosquito é importante.

09 / 06 / 2015 Sistema Alto Tietê tem sétima queda consecutiva no volume

Volume armazenado é de 21,6%, de acordo com a Sabesp. Desde o fim de maio índice tem sofrido várias reduções.

09 / 06 / 2015 Bacias dos rios PCJ registram 23% de mortes de peixes no estado de SP

Segundo Cetesb, mananciais da região tiveram 50 casos de mortandade. Especialistas apontam falta de oxigênio e baixa vazão como causas.

09 / 06 / 2015 Projeto Tamar comemora aumento da população de tartarugas marinhas

Nos últimos cinco anos, cinco espécies de tartarugas marinhas aumentaram em 86,7% seu contingente populacional. O grande destaque foi a tartaruga-oliva, encontrada no estado de Sergipe e no extremo norte da Bahia.

09 / 06 / 2015 Carcaça de baleia é encontrada em Jaguaruna na tarde de segunda-feira

Animal foi avistado por um pescador na praia de Campo Bom, perto das 17h. Polícia Ambiental afirma que o animal morreu antes de encalhar no local.

09 / 06 / 2015 Veículo da Nasa detecta vidro em crateras de Marte

Os resíduos teriam se formado por causa de um violento impacto, provavelmente de algum asteroide, e podem dar pistas que podem levar à descoberta de vida no planeta.

09 / 06 / 2015 Manter os oceanos "em forma", um dos desafios da conferência sobre o clima

O papel dos oceanos e sua "boa forma" devem ser mais considerados nas negociações do clima em dezembro, em Paris - é o que estima a Plataforma do Oceano e Clima da Unesco, que lançou um apelo nesse sentido na última semana.

09 / 06 / 2015 Estudo: maior longevidade leva ao aumento de casos de câncer

Em função do envelhecimento populacional, a maior incidência de tumores ocorre nas pessoas mais idosas.

09 / 06 / 2015 Nasa fracassa em lançar completamente paraquedas supersônico

Agência espacial já tinha adiado lançamento por três vezes. Balão de hélio subiu por duas horas antes de liberar paraquedas.

09 / 06 / 2015 Secretaria da Saúde de AL confirma três casos do Zika vírus no interior

Pacientes que apresentaram a doença são do município de Mata Grande. Vírus é transmitido pelo Aedes aegypti, mosquito que transmite dengue.

09 / 06 / 2015 Novos exames de sangue podem revelar infecções virais do passado

Exame exige apenas uma gota de sangue e custa US\$ 25 por amostra. Ele ajuda a identificar múltiplos fatores que podem afetar a saúde.

09 / 06 / 2015 Pesca desenfreada nos oceanos pode causar impacto maior que poluição, diz ONG

A pesca desenfreada pode ser mais prejudicial a ecossistemas marinhos que a poluição, alertou a diretora-geral da organização não governamental (ONG) Oceana no Brasil, Monica Peres.

09 / 06 / 2015 Litoral norte de SP recebe mais de 40 pinguins em menos de uma semana

Vídeo feito por turista mostra a chegada de um deles em praia de Ubatuba. Aves foram recolhidas e vão passar por processo de reabilitação.

09 / 06 / 2015 América Latina dividida entre comprometimento e desunião nas negociações sobre alterações climáticas

No último meio século, a América Latina contribuiu com menos de 5% das emissões de dióxido de carbono responsáveis pelo aquecimento global, mas é uma das regiões que mais pode sofrer caso a temperatura média aumente em mais de 2°C de hoje a 2050.

09 / 06 / 2015 G7 encerra reunião com compromisso sobre mudanças climáticas

Países mais ricos do mundo concordaram que é necessário reduzir carbono. Eles se comprometeram a reestruturar setor energético.

13 / 06 / 2015 Jardim Botânico do Rio festeja 207 anos

Órgão federal vinculado ao MMA é um importante centro de pesquisa mundial em botânica e conservação da biodiversidade. Para celebrar data de aniversário, neste sábado (13/06), instituição faz intensa programação.

13 / 06 / 2015 Cientistas podem ter achado sonda Philae 'perdida' em cometa

A Agência de Espaço Europeia pode ter encontrado a sonda Philae, enviada no cometa 67P/Churyumov-Gerasimenko para fazer o primeiro pouso controlado no núcleo de um cometa do Sistema Solar, em novembro de 2014.

13 / 06 / 2015 Raias gigantes são encontradas em região do litoral sul de São Paulo

Além dos registros fotográficos realizados nas últimas duas semanas, os mergulhadores coletaram o muco que envolve o animal. A substância contém material genético (DNA) e serve para que os cientistas façam uma análise biológica de cada espécime.

13 / 06 / 2015 Europa luta contra extinção de bisões, os 'reis da floresta'

Doados por zoológicos, 14 animais foram libertados nos Cárpatos romenos. Europa tem apenas 5 mil exemplares de seu maior mamífero terrestre.

13 / 06 / 2015 Japão aprova desativação da Central de Fukushima no prazo de 30 a 40 anos

O governo japonês aprovou nesta sexta-feira (12) a revisão do plano para as operações de desmontagem da Central Nuclear de Fukushima, que devem durar de 30 a 40 anos.

13 / 06 / 2015 Nível do Cantareira fica estável em 20,1% da capacidade

No cálculo que contabiliza a reserva técnica, volume de água que fica abaixo das comportas e que só pode ser retirado por meio de bombeamento, o nível está em 9,2% do total da capacidade de operação.

13 / 06 / 2015 Mudança climática leva urso polar a se alimentar de golfinhos, diz estudo

Pesquisador flagrou morte de cetáceos no Ártico ao longo de 2014. Com degelo, golfinhos nadam em áreas onde os ursos são encontrados.

13 / 06 / 2015 OMS estima que 400 milhões não têm acesso a serviços básicos de saúde

O documento analisou a cobertura médica universal (CMU) no mundo e constatou que mais pessoas do que nunca - 80% - têm acesso a serviços essenciais de saúde.

13 / 06 / 2015 Cães rejeitam pessoas que são hostis com seus donos, diz estudo

Os animais seriam capazes de julgar alguém com base no comportamento. Estudo será publicado até o fim do mês na revista 'Animal Behaviour'.

13 / 06 / 2015 Califórnia determina grandes cortes de água para agricultores

Medida afeta os mais antigos detentores de direitos sobre as águas. Estado americano já anunciou restrições em áreas urbanas.

13 / 06 / 2015 OMS vai convocar reunião de emergência sobre o coronavírus mers

No total, 126 pessoas contraíram o mers no país asiático e 11 morreram desde o primeiro diagnóstico, realizado em 20 de maio, em um homem que voltava da Arábia Saudita e de outros países do Golfo.

13 / 06 / 2015 Pesquisa sugere que classe de inseticidas afeta intelecto de crianças

Componentes piretróides são usados na agricultura e em casas. Desempenhos baixos se traduzem em falta de concentração e baixo aprendizado.

13 / 06 / 2015 Zoo do DF envia tigre-de-bengala Diego para santuário ecológico em SP

Animal foi apreendido em circo, em 2006 após evidência de maus-tratos. Santuário em Cotia deve receber leão que foi resgatado do mesmo local.

13 / 06 / 2015 Filhotes de orangotangos têm aulas de hábitos selvagens na Indonésia

Animais foram resgatados de cativeiro e passam por treinamento. Aprendizado é necessário para sobrevivência no ambiente natural.

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Tapiaite, Ca₅Al₂(AsO₄)₄(OH)₄·12H₂O, a new mineral from the Jote mine, Tierra Amarilla, Chile

Anthony R. Kampf, Stuart J. Mills, Barbara P. Nash, Maurizio Dini, Arturo A. Molina Donoso, and I. Graham

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REVISITING THE INFRARED SPECTRUM OF THE WATER-SMECTITE INTERFACE
Artur Kuligiewicz, Arkadiusz derkowski, Marek Szczerba, Vassilis Gionis, and Georgios D. Chryssikos

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MODIFICATION OF MONTMORILLONITE WITH ALKYL SILANES AND FLUOROSURFACTANT FOR CLAY/FLUOROELASTOMER (FKM) NANOCOMPOSITES

Maryam Khajehpour, Genaro A. Gelves, and Uttandaraman Sundararaj

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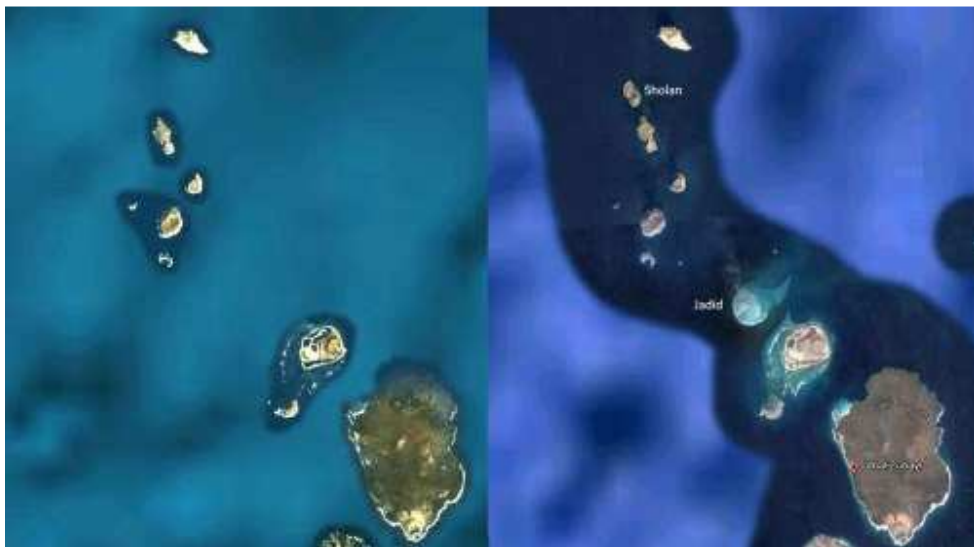
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EARTH PAGES

[Two happy events for plate tectonics](#)

Posted on [June 4, 2015](#) by [Steve Drury](#) | [1 comment](#)

In an era where fears of rising sea level and loss of land are growing it is a great pleasure to announce (albeit several years late) the birth of two [new islands](#). They emerged close to the axis of the Red Sea in Yemeni territory as new members of the volcanic Zubair Islands during episodic eruptions that began on 18 December 2011. First to form was dubbed Sholan ('One who is Blessed' in Arabic – a girl's name), which ceased to be active a month later. Further submarine volcanism began on 28 September 2013, with another island, Jadid ('New' in Arabic – a boy's name), breaking surface in October 2013. The double event has been described in great detail by geoscientists based at King Abdullah University of Science and Technology, Saudi Arabia (Xu, W. 2015. Birth of two volcanic islands in the southern Red Sea. *Nature Communications*, DOI: [10.1038/ncomms8104](#). After rapid growth during their initial eruptive phases both islands underwent significant marine erosion once quiescent, but seem set to remain as part of the [Zubair archipelago](#).



'Before and after' images of the Zubair archipelago in the southern Red Sea. (Left from Bing maps, right (February 2014) from Google Earth)

Analysis of small earthquakes that happened during the islands' growth together with Interferometric radar surveys that showed coincident ground movements among the islands suggest that both eruptions took place along an active north-south fracture system, probably part of axial rifting system of the Red Sea. In more detail, magma seems to have moved upwards along N-S fissures similar to those that now show up as dykes cutting lavas on the older islands in the area. The local fracture patterns are oblique to the main [Red Sea Rift](#) that trends NNW-SSE, possibly as a result of non-linear stress trajectories in the Arabia-Africa rifting. In almost all respects the volcanism and mechanism of intrusion and effusion closely resemble that reported recently from a terrestrial setting in the nearby [Afar Depression](#). The slow spreading Red Sea Rift rarely manifests itself by volcanism, so these events reveal a previous unsuspected zone of active melting in the mantle beneath the Zubair archipelago.

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[Stone tools go even further back](#)

Posted on [May 25, 2015](#) by [Steve Drury](#) | [Leave a comment](#)

Shortly after it seemed that the maker of the earliest [stone tools](#) (2.6 Ma) may have been [Australopithecus africanus](#), thanks to a novel means of analyzing what [hominin hands](#) may have been capable of, some actual tools have turned up from even earlier times (Harmand, S. and 20 others 2015. 3.3-million-year-old stone tools from Lomekwi 3, West Turkana, Kenya. *Nature*, v. **521**, p. 310-315). Their age is comparable with that (3.4 Ma) of animal bones from Dikika, Ethiopia showing cut marks and signs of deliberate breaking, which had previously been controversial as they suggested that local [Australopithecus afarensis](#) of a similar age had made them. What the authors

claim to be 'a new beginning to the known archaeological record' almost a million years earlier than the first appearance of Homo fossils in the Lake Turkana area seems to point in that direction. But *A. afarensis* has not been found in that area, although a hominin known as [Kenyanthropus platyops](#) with roughly the same age as the tools has.



Reconstruction of *Australopithecus afarensis* (Photo credit: Wikipedia)

Almost 150 fine-grained basaltic artefacts turned up at the Lomekwi site, which may have been where knappers habitually worked as many of them were fragments or debitage. The cores from which flakes had been struck are large, weighing on average 3.1 kg. It seems that the tool makers may have been forcefully pounding out edged tools for a variety of uses, unlike the single-use hammer stones used by chimpanzees today. Compared with the well known [Oldowan](#) tools, however, these are cruder and made by a different knapping technique that seems not to have focused on exploiting the conchoidal fracturing that produces the sharpest tools and is a feature of the later Oldowan tools.



Oldowan 'chopper' from Melka Kunture, Ethiopia. (credit: Wikipedia)

Frederick Engels, whose 1876 essay [The Part played by Labour in the Transition from Ape to Man](#) was among the first works to take Darwin's ideas on human origins forward, would have had a field day with the new evidence. For him the vital step was freeing of the hands by a habitual bipedal gait and their manipulation of objects – together with changes to the hands that would arise by such a habit. What the first tool maker looked like, doesn't really matter: the potential that act conferred was paramount. Nevertheless, there is a big step between early hominins and humans, from relatively small brains to those of *H. erectus* that were on the way to modern human capacity. The Lomekwi tools and the improved Oldwan artefacts spanned 1.7 Ma at least before *H. erectus* revolutionised manufacture to produce the bi-facial Acheulian hand 'axe', and going beyond that took almost a million years of little change in both tools and anatomy until the emergence of archaic modern humans.

Note added 28 May 2015: Within a week palaeoanthropologists' focus shifted to the [Afar Depression](#) in Ethiopia where a new species of hominin has emerged from [Pliocene](#) sediments dated to between 3.3 and 3.5 Ma (Haile-Selassie, Y *et al.* 2015. New species from Ethiopia expands Middle Pliocene hominin diversity. *Nature*, v. **521**, p. 483-488. doi:1038/nature14448). *Australopithecus deyiremeda* is represented by fragments of two lower- and one upper jaw plus several other lower facial specimens. So the species is differentiated from other hominins by dentition alone, but that is unmistakably distinct from extensive data on *Au. afarensis* which lived within a few

kilometres over the same period. Until the last 15 to 20 years it was thought that *Au. afarensis* was the sole hominin around in the Middle Pliocene of East and Central Africa, but now it seems there may have been as many as five, the three mentioned above, plus [Au. bahrelghazali](#) from Chad and an as yet undesigned fossilised foot from Afar. For possibly three closely related species to coexist in Afar is difficult to understand: possibly they occupied different niches in the local food web or employed different strategies (Spoor, F. 2015. The middle Pliocene gets crowded. *Nature*, v. **521**, p. 432-433). Another question is: did they all make and use tools? For the Lomekwi tools *K. platyops* is a candidate, but for the cut marks on bones at Dikika in Afar there are at least two: *Au. afarensis* and *Au. deyiremeda*. So multiple tool makers living at the same time suggests some earlier originator of the 'tradition'.

Note added 4 June 2015: Add southern Africa into the equation and there is yet more breaking news about coeval hominin diversity. US, Canadian, South African and French collaborators have finally started to resolve the achingly complex stratigraphy of the fossil-rich Sterkfontein cave deposits in South Africa by using a novel approach to estimating ages of materials' last exposure to cosmic rays (Granger, D.E. *et al.* 2015. New Cosmogenic burial ages for Sterkfontein member 2 *Australopithecus* and Member 5 Oldowan. *Nature*, v. **522**, p. 85-88). Specifically, they managed to date the tumbling into a deep sinkhole of a recently found, almost complete skeleton of an australopithecine. It still resembles no other some 70 years after a less complete specimen was found by Raymond Dart in the mid 1940s. It was first informally dubbed 'Little Foot' and then *Au. prometheus* and up to now has been regarded as an odd contemporary of 2.2 Ma old *Au. africanus*. The new dating gives an age of about 3.7 Ma: so at least 6 hominids occupied Africa in the Middle Pliocene. It is beginning to look like a previously unsuspected time of sudden diversification.

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[A certain shyness about research misconduct in the UK](#)

Posted on [May 21, 2015](#) by [Steve Drury](#) | [Leave a comment](#)

Since Earth Pages was launched at the start of the 21st century there have been highly publicised cases of gross misconduct by researchers, including plagiarism, 'massaging' data and even sabotaging the work of others, as well as lesser cases where publications were withdrawn or removed from journals. The most notorious have been from the USA, Japan, the Netherlands and a number of other advanced countries. But sharp practices in science are not well known in the UK; indeed I can't recollect more than one case that reached the same degree of coverage as the most notorious instances. Yet, in 2009, [Daniele Fanelli](#) of the University of Edinburgh reported the results of her analysis of accessible information from the UK about this matter. She found that about 2% of British scientists, who had been interviewed or answered questionnaires, answered 'Yes' when asked if they ever fabricated or falsified research data, or if they altered or modified results to improve the outcome. Up to one third admitted other questionable practices or knew of them having been committed by colleagues. Fanelli doesn't refer to more grievous matters such as sabotage or exploitation of students' work.

The silence from British Universities on [research misconduct](#) has become such an embarrassment that it was a subject of an [Editorial](#) and a [News In Focus Report](#) in the 21 May issue of *Nature*. While there are guidelines that urge British universities to publish annual reports of their investigations into misconduct, for 2013-14 only 12 such reports have been published: of the 88 universities contacted by the informal [UK Research Integrity Office](#), 30 institutions responded to UKRIO's survey. These reports covered 21 investigations, mostly unspecified, with 5 cases of plagiarism, 2 of falsification, 2 concerning authorship, 1 of fabrication and 1 breach of confidentiality. Three were upheld and 3 are pending.

These figures speak loudly for themselves: misconduct by researchers (and academics in general) is something that the halls of British academe 'dinnae care to speak about'. As the author of UKRIO's survey observed, 'It's just not credible', although many of the universities that she contacted claim that such reports were in progress. A likely story... We all know that the 'filthy snout' (Tom Wolfe *The Bonfire of the Vanities*) does 'come popping to the surface', but is buried in confidentiality by university Research Committees, leaving any victims dangling in a sorry psychological state and allowing journals' peer review system to catch any perpetrators before they reach the press, which it is rarely able to do. It takes a case as severe as that of Andrew Wakefield's fraudulent 1998 paper in the

Lancet associating the MMR vaccine with autism to see justice done.

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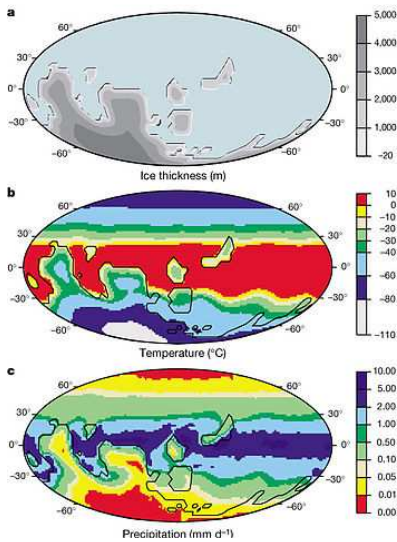
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[Snowball Earth events pinned down](#)

Posted on [May 21, 2015](#) by [Steve Drury](#) | [Leave a comment](#)

The Period that lasted from 850 to 635 million years ago, the [Cryogenian](#), takes its name from evidence for two and perhaps three episodes of glaciation at low latitudes. It has been suggested that, in some way, they were instrumental in the decisive stage of biological evolution from which metazoan eukaryotes emerged: the spectacular [Ediacaran fossil assemblages](#) follow on the heels of the last such event. Although controversies about the reality of tropical latitudes experiencing ice caps have died away, there remains the issue of synchronicity of such frigid events on all continents, which is the central feature of so-called 'Snowball Earth' events. While each continent does reveal evidence for two low latitude glaciations – the Sturtian (~710 Ma) and the later [Marinoan](#) (~635 Ma) – in the form of diamictites (sediments probably dropped from floating ice and ice caps) it has proved difficult to date their start and duration. That is, the cold episodes may have been diachronous – similar conditions occurring at different localities at different times. Geochronology has, however, moved on since the early disputes over Snowball Earths and more reliable and precise dates for beginnings and ends are possible and have been achieved in several places (Rooney, A.D. *et al.* 2015. A Cryogenian chronology: Two long-lasting synchronous Neoproterozoic glaciations. *Geology*, v. **43**, p. 459-462).



Computer simulation of conditions during a Snowball Earth period. (credit: Macmillan Publishers Ltd: Hyde *et al.*, *Nature* 405:425-429, 2000)

Rooney and colleagues from Harvard and the University of Houston in the USA used rhenium-osmium radiometric dating in Canada, Zambia and Mongolia. The Re-Os method is especially useful for sulfide minerals as in the pyritic black shales that occur extensively in the Cryogenian, generally preceding and following the glacial diamictites and their distinctive carbonate caps. Combined with a few ages obtained by other workers using the Re-Os method and U-Pb dating of volcanic units that fortuitously occur immediately beneath or within diamictites, Rooney *et al.* establish coincident start and stop dates and thus durations of both the Sturtian and Marinoan glacial events: 717 to 660 Ma and 640 to 635 Ma respectively on all three continents. Their data is also said to refute the global extent and even the very existence of an earlier, [Kaigas](#) glacial event (~740 Ma) previously recorded from diamictites in Namibia, the Congo, Canada and central Asia. This assertion is based on the absence of diamictites with that age in the area that they studied in Canada and their own dating of a diamictite in Zambia, which is one that others assigned to the Kaigas event.

The dating is convincing evidence for global glaciation on land and continental margins in the Cryogenian, as all the dates are from areas based on older continental crust. But the concept of Snowball Earth, in its extreme form, is that the oceans were ice-capped too as the name suggests, which remains to be convincingly demonstrated. That would only be achieved by suitably dated diamictites located on obducted oceanic crust in an ophiolite complex. Moreover, there are plenty more Cryogenian diamictites on other palaeo-continentals and formed at different palaeolatitudes that remain to be dated ([see here](#))

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[Earthquake hazard news](#)

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Assessments of [seismic risk](#) have relied until recently on records of destructive earthquakes going back centuries and their relationship to tectonic features, mainly [active faults](#). They usually predict up to 50 years ahead. The [US Geological Survey](#) has now shifted focus to very recent records mainly of small to medium tremors, some of which have appeared in what are tectonically stable areas as well as the background seismicity in tectonically restless regions. This enables the short-term risk (around one year) to be examined. To the scientists' surprise, the new modelling completely changes regional maps of seismic risk. The probabilities in the short-term of potentially dangerous ground movements in 17 oil- and gas-rich areas rival those in areas threatened by continual, tectonic jostling, such as California. The [new 'hot spots' relate to industrial activity](#), primarily the disposal of wastewater from petroleum operations by pumping it into deep aquifers.



USGS map highlighting short-term earthquake risk zones. Blue boxes indicate areas with induced earthquakes (source: [US Geological Survey](#))

Fluid injection increases hydrostatic pressure in aquifers and also in the spaces associated with once inactive fault and fracture systems. All parts of the crust are stressed to some extent but the presence of fluids and over-pressuring increases the tendency for rock failure. While anti-fracking campaigners have focussed partly on seismic risk – fracking has caused tremors around magnitudes 2 to 3 – the process is a rapid one-off injection involving small fluid volumes compared with petroleum waste-water disposal. All petroleum production carries water as well as oil and gas to wellheads. Coming from great depth it is formation water held in pores since sedimentary deposition, which is environmentally damaging because of its high content of dissolved salts and elevated temperature. Environmental protection demands that disposal must return it to depth.

The main worry is that waste water disposal might trigger movements with magnitudes up to 7.0: in 2011 a magnitude 5.6 earthquake hit a town in oil-producing Oklahoma and damaged many buildings. Currently, US building regulations rely on earthquake risk maps that consider a 50-year timescale, but they take little account of industrially induced seismicity. So the new data is likely to cause quite a stir. These are changing times, however, as the oil price fluctuates wildly. So production may well shift from field to field seeking sustainable rates of profit, and induced seismicity may well change as a result.

None of these areas are likely to experience the horrors of the [25 April 2015](#) magnitude 7.8 earthquake in Nepal. However, it also occurred in an area expected to be relatively stable compared with the rest of the Himalayan region. The only previous major tremor there was recorded in the 14th century. This supposedly 'low-risk' area overlies a zone in which small tremors or microearthquakes occur all the time. Such zones – and this one extends along much of the length of the Himalaya – seem to mark where fault depths are large enough for displacements to take place continually by plastic flow, thereby relieving stresses. Most of the large earthquakes have taken place south of the microseismic zone where the shallow parts of the [Indian plate](#) are brittle and have become locked. The recent event is raising concerns that it is a precursor of further large earthquakes in Nepal. Its capital [Kathmandu](#) is especially susceptible as it is partly founded on lake sediments that easily liquefy.

Note added: 13 May 2015. Nepal suffered another major shock (magnitude 7.3) on 12 May in the vicinity of Mount Everest. It too seems to have occurred in the zone of microearthquakes formerly thought to mark a zone where the crust fails continually by plastic deformation thereby relieving stresses. Kathmandu was this time at the edge of the shake zone

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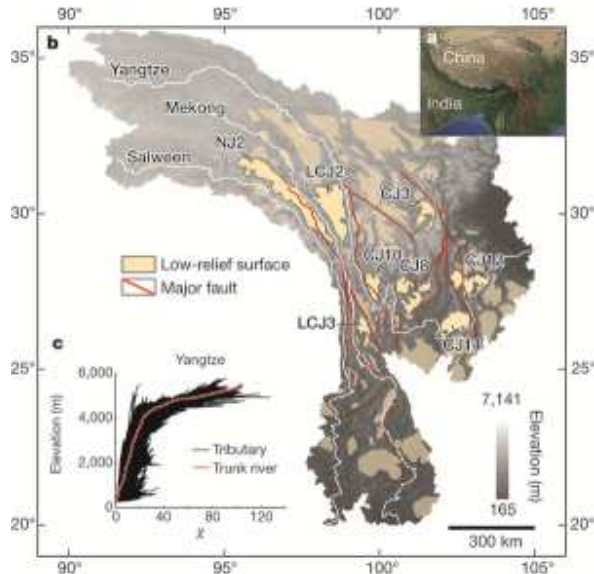
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[Two large, reorganised landscapes](#)

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Where tectonic processes proceed quickly it is only to be expected that the land surface undergoes dramatic changes and that big features form. Exactly which processes lay behind very striking landforms may have been worked out long ago; or old ideas from the heyday of geomorphology have perhaps lingered longer than they should. Two tectonically active regions that have a long history of study are the Himalaya and Iceland: one a model of long-lived and rapid uplift driven by collisional tectonics; the other likewise, as a product of extension and rapid build-up of flood basalt flows. Major features of both have been shown to be not quite what they seem. Substantial parts of the India-Asia collision zone contain broad patches of high, low-relief plateaus separated by deeply incised river gorges. In its eastern parts rise 3 of the largest rivers in SE Asia: the Yangtze; the Mekong and the Salween, which flow roughly parallel to the east and south-east for about 1000 km from their sources in the [Tibetan Plateau](#). Their trajectories partly follow some enormous [strike-slip fault](#) that accommodated the relative motion of two continent-bearing plates over the last 50 million years. As well as the crustal thickening that attended the collision, vast amounts of uplifted material have been eroded from the three major gorges. Thickening and unloading have been the key to producing the largest tracts of high land on the planet. Yet between the gorges and their many tributaries in the eastern part of the collision zone are many tracts of high land with only moderate relief rather than sharp ridges. Because the Eurasian plate prior to India's impact might reasonably be expected to have been only moderately high, if not low lying, and with a mature and muted landscape, a long-lived theory has been that these elevated plateaus are uplifted relics of this former landscape that were dissected by progressively deepening river incision. Much the same idea has been applied to similar mega features, and even coincident peaks in more completely eroded highlands.



Drainage basins of the Yangtze, Mekong and Salween rivers, with low-relief surfaces in buff and cream. Figure 1 in Yang et al. 2015 (credit: Nature)

In the India-Asian collision zone the supposedly 'relic' plateaus have been used to reconstruct the pre-collision land surface and the degree of bulging it has undergone since. However, the advent of accurate digital terrain elevation data has enabled the modelling of not only the large rivers but also of the tributary streams that make up major drainage. As well as the directional aspects of drainages their along-channel slopes can be analysed (Yong, R. et al. 2015. In situ low-relief landscape formation as a result of river network disruption. *Nature*, v. 520, p. 526-529). Rong Yang of the Swiss Federal Institute of Technology and colleagues from the same department and [Ben-Gurion University of the Negev](#), Israel have been able to show that matters are far more complex than once believed. The tributary drainages of the Yangtze, Mekong and Salween gorges appear to have been repeatedly been disrupted by the complexities of deformation. One important factor has been drainage capture or piracy, in which drainages with greater energy erode towards the heads of their catchments until they intercept a major drainage in another sub-basin, thereby 'stealing' the energy of the water that it carries. The 'pirate' stream then erodes more powerfully in its lower reaches, whereas the basin burgled of much of its energy becomes more sluggishly evolving thereafter and increasingly left anomalous high in the regional terrain: it evolves to liken what previously it had been supposed to be – a relic of the pre-collision landscape.

Many of the rivers in Iceland occupy gorges that contain a succession of large waterfalls. Upstream of each is a wide rock terrace, and downstream the gorge is eroded into such a terrace. Much of Iceland is composed of lava flows piled one above another, as befits the only substantial land that straddles a constructive plate margin – the [mid-Atlantic Ridge](#). Being famous also for its substantial ice caps that are relics of one far larger during the last glacial maximum, it has proved irresistible for geomorphologists to assign the gorge-fall-terrace repetition to gradual uplift due to isostatic rebound as the former ice cap melted and unloaded the underlying lithosphere. As relative sea-level fell each river gained more gravitational potential energy to cut back up its channel, which resulted in a succession of upstream migrating waterfalls and gorges below them. Individual lava flows, being highly resistant to abrasion cease to be affected once cut by a gorge; hence the terraces. But it is now possible to establish the date when each terrace first became exposed to cosmic-ray bombardment, using the amount of cosmogenic ^3He that has accumulated in the basalts that form the terrace surfaces (Baynes, E.R. et al. 2015. Erosion during extreme flood events dominates Holocene canyon evolution in northeast Iceland. *Proceedings of the National Academy of Science*, doi:10.1073/pnas.1415443112).



Gorge incised in basalt flows, Jökulsárgljúfur National Park, Iceland (credit: Wikipedia)

The British-German team from the University of Edinburgh and Deutsches GeoForschungsZentrum, Potsdam worked on terraces of the [Jökulsárgljúfur](#) canyon, discovering that three terraces formed abruptly in the Holocene, at 9, 5 and 2 ka ago, with no evidence for any gradual erosion by abrasion. Each terrace was cut suddenly, probably aided by the highly jointed nature of the overlying lava flow that would encourage toppling of blocks given sufficient energy. The team suggests that each represents not stages in uplift, but individual megafloods, perhaps caused by catastrophic glacial melting during subglacial eruptions or failures of dams formed by moraines or ice lobes.

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[What followed the Giant Impact \(read Lord Mayor's Show\)?](#)

Posted on [April 24, 2015](#) by [Steve Drury](#) | [Leave a comment](#)

The dominance of the [Lunar Highlands](#) by feldspar-rich anorthosites, which form when feldspars that crystallise from magmas float because of their lower density, gave rise to the idea that the Moon initially formed as a totally molten mass. That this probably resulted

because the early Earth collided with a Mars-sized protoplanet stems from the almost identical chemical composition of the lunar and terrestrial mantles, as worked out from the composition of younger basalts derived from both, together with the vast energy needed to support a large molten planetary body condensing from a plasma cloud orbiting the Earth. Such a giant impact is also implicated in the final stages of core formation within the Earth.



Artist's depiction (after William K. Hartmann) of the giant impact that is hypothesized to have formed the Moon. (credit: Wikipedia)

A core formed from molten iron alloyed with nickel would have acted as a chemical attractor for all other elements that have an affinity for metallic iron: the siderophile elements, such as gold and platinum. Yet the chemistry of post-moon formation basaltic melts derived from the Earth's mantle contain considerably more of these elements than expected, a feature that has led geochemists to wonder whether a large proportion of the mantle arrived – or was accreted – after the giant impact.

A tool that has proved useful in geochemistry on the scale of entire planets – well, just the [Earth and Moon](#) so far – is measuring the isotopic composition of [tungsten](#), a lithophile metal that has great affinity for silicates. One isotope is ^{182}W that forms when a radioactive isotope of hafnium (^{182}Hf) decays. The proportion of ^{182}W relative to other tungsten [isotopes](#) has been shown to be about the same in Lunar Highland anorthosites as it is in the Earth's mantle. This feature is believed to reflect [Moon formation](#) and its solidification after the parent ^{182}Hf had all decayed away: the decay has a half-life of about 9 Ma and after 60 Ma since the [formation of the Solar System](#) (and a nearby supernova that both triggered it and flung unstable isotopes such as ^{182}Hf into what became the Solar nebula) vanishingly small amounts would remain.

Oddly, two papers on tungsten and Earth-Moon evolution, having much the same aims, using similar, newly refined methods and with similar results appeared in the same recent issue of *Nature* (Touboul, M. *et al.* 2015. Tungsten isotopic evidence for disproportional late accretion to the Earth and Moon. *Nature*, v. **520**, p. 530-533. Kruijer, T.S. *et al.* 2015. Lunar tungsten isotopic evidence for the late veneer. *Nature*, v. **520**, p. 534-537). The two of them present analyses of glasses produced by large impacts into the lunar surface and probably the mantle, which flung them all over the place, maintaining the commonality of the ventures that might be explained by there being a limited number of suitable Apollo samples. Both report an excess of ^{182}W in the lunar materials: indeed, almost the same excess given the methodological precisions. And, both conclude that Moon and Earth were identical just after formation, with a disproportional degree of later accretion of Solar nebula material to the Earth and Moon.

So, there we have it: it does look as if Earth continued to grow after it was whacked, and there is confirmation. Both papers conclude, perhaps predictably, that the early Solar System was a violent place about which there is much yet to be learned...

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[St Paul and the meteorite?](#)

Posted on [April 24, 2015](#) by [Steve Drury](#) | [1 comment](#)

Dateline: Chelyabinsk, Russia 09.20 15 February 2013. As in many parts of Russia drivers in this Oblast in the Urals Economic District use an in-car camera during rush hour, hopefully to have proof of innocence in the event of a traffic accident. On this day, such cameras recorded a massive fireball streaking low across a clear, frosty sky. Some people on foot were temporarily blinded by its light, about 4

times that sunlight, and others were thrown off their feet by a large shock wave. Travelling at about 20 km s⁻¹ the fireball exploded, the blast shattering windows where people were gazing at the remarkable sight, about 1500 needing medical treatment. This event is the first in modern times to record the atmospheric entry of a superbolide and air blast, probably similar to what happened in the deserted area of Tunguska in Siberia on 30 June 1908.



Meteor trail and fireball seen over industrial estate in Chelyabinsk, Russia (credit: Russia Today)

Cut to the Levant in the 1st century of the Common Era: on the road to Damascus a Jewish fundamentalist with Roman citizenship, sworn to destroy the early Christian movement, is on a mission to arrest Christians and take them in chains to Jerusalem. Saul witnesses a great light in the sky and a deafening sound that he believes is the voice of Jesus, saying 'Saul, Saul, why persecutest thou me?' (Acts 9:4). He is flung off his feet, struck blind and convinced of the error of his calling. Three days later, in Damascus '...there fell from his eyes as it had been scales: and he received sight forthwith, and arose, and was baptized' (Acts 9:18), taking the name Paul.



The conversion of Saul by Michaelangelo

[William Hartmann](#) of the Planetary Science Institute at the University of Arizona, among the first planetary scientists to propose the giant impact origin for the Moon (see next item) and in his case to visualise it in a famous painting, has drawn a somewhat obvious hypothesis linking the two events (Hartmann, W.K. 2015. Chelyabinsk, Zond IV, and a possible first-century fireball of historical importance. *Meteoritics and Planetary Science*, v. 50, p. 368-381: doi: 10.1111/maps.12428). These days such a scary observation is easily rationalised as a natural phenomenon, but in earlier times Hartmann believes such a shock would have convinced witness of the almighty power of the supernatural 'in terms of current cultural conceptions'. He suggests that [Saul of Tarsus](#) may, at the time, have been struggling with his conscience about his attacks on his countrymen: hence his conversion. The phrase 'scales fell from his eyes' has entered common parlance for sudden changes in mental state and attitude: in fact it matches an outcome of severe photokeratitis of the eye's epithelial coating, the dead tissue eventually becoming detached, when clear sight is restored to some sufferers. While claiming to have no intention of undermining anyone's spiritual beliefs, Hartmann suggests that such rare and spectacular events are capable of having emotionally changed influential figures of the past and thereby re-routing the course of history. Hartmann cites modern cases of lesser bolide-entry phenomena, such as destruction of satellites over the US and Russia, which some witnesses misreported as rockets with lighted windows; i.e. UFOs. There are plenty of medieval cases where spiritual connotations were widely attached to strange natural phenomena. I have heard accounts from people living in Asmara, capital of Eritrea, who ascribed saintly intervention to a full solar halo with sun dogs connected by cruciform arcs on a misty morning in 1991. This occurred a few days before the occupying Ethiopian forces surrendered to Eritrean nationalist forces whose struggle for self determination had lasted for the previous three decades.

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[The dinosaur they could not kill: Brontosaurus is back](#)

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It would be pretty safe to say that everyone has heard of *Brontosaurus*, but in the 1970s the genus vanished from the palaeobiology lexicon. The '[Bone Wars](#)' of post-Civil War US palaeontology stemmed from the astonishing prices that dinosaur skeletons fetched. The frenzy of competition to fill museums unearthed hundreds of specimens, but the financial enthusiasm did not extend to painstaking anatomy. Finding a new genus meant further profit so a slapdash approach to taxonomy might pay well. So it did with the dinosaur family [Diplodocidae](#) for [Othniel Marsh](#), one of the fossil marauders. He along with his main competitor, Edward Cope, was a wizard fossicker, but lacked incentive to properly describe what he unearthed. In 1877 Marsh published a brief note about a new genus that he called *Apatosaurus*, then hurried off to for more booty. Two years later he returned from the field with another monster reptile, and casually made a brief case for the 'Thunder Lizard', *Brontosaurus*. Unlike his usage of 'Deceptive Lizard' for *Apatosaurus*, the English translation of *Brontosaurus* caught the public imagination and lingers to this day as the archetype for a mighty yet gentle, extinct beast. Yet, professional palaeontologists were soon onto the lax ways of Marsh and Cope, and by 1903 deemed *Brontosaurus* to be taxonomically indistinguishable from *Apatosaurus*, and as far as science was concerned the 'Thunder Lizard' was no more.



Artist's impression of a Brontosaurus . The idea that it was wholly or mostly aquatic is now considered outdated. (credit: Wikipedia)

But, the legacy of frenzied fossil collecting of a century or more ago is huge collections that never made it to display, which form rich pickings for latter-day palaeontologists with all kinds of anatomical tools now at their disposal: the stuff of almost endless graduate studies. Emanuel Tschopp of the New University of Lisbon with colleagues took up the challenge of the Diplodocidae by examining 49 named specimens and 32 from closely related specimens as controls, measuring up to 477 skeletal features (Tschopp, E. *et al.* 2015. A

specimen-level phylogenetic analysis and taxonomic revision of Diplodocidae ([Dinosauria](#), [Sauropoda](#)). *PeerJ*, v. **3**, doi10.7717/peerj.857). An unintended consequence was their discovery that 6 specimens of what had become *Apatosaurus excelsus* (formerly Marsh's *Brontosaurus*) differed from all other members of its genus in 12 or more key characteristics. It seems to taxonomists a little unfair that *Brontosaurus* should not be resurrected, and that looks likely.

Had this been about almost any other group of fossils, with the exception perhaps of the ever-popular tyrannosaurs, the lengthy paper would have passed unnoticed except by specialist palaeontologists. In a little over a week the open-access publication had more than 17 thousand views and 3300 copies were downloaded.

See also: Balter, M. 2015. Bully for Brontosaurus. *Science*, v. **348**, p. 168

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[Magma rushed into largest layered intrusion](#)

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Chances are that the platinum in the catalytic converter that helps prevent your car emitting toxic gases in its exhaust fumes came from a vast igneous intrusion in South Africa known as the Bushveldt complex. The world's most important source of noble metals formed by repeated differentiation of huge volumes of mafic magma to form thin, dense layers rich in sulfides, [platinum group metals](#) and chromium ore set in very thick layers of barren gabbro and other mafic to ultramafic rock. The intrusion is exposed over an area the size of Ireland and formed about 2 billion years ago. Its 370 000 to 600 000 km³ volume suggests that it was the magma chamber that fed flood basalts that erosion has since eroded away. Successive pulses of basaltic magma built up a total thickness of about 8 kilometres of layered rock.



Layered igneous rocks in the Bushveldt Complex (credit: Wikipedia)

The final product of the Bushveldt differentiation process was minute pockets of material of more felsic composition trapped within overwhelmingly larger amounts of gabbro. One of the elements that ended up in these roughly granitic inclusions was zirconium that mafic minerals are unable to accommodate while basaltic magma is crystallising. That formed minute crystals of the mineral zircon (ZrSiO₄) in the residual pockets, which in turn locked up a variety of other elements, including uranium. Zircon can be dated using uranium's radioactive decay to form lead isotopes, its refusal to enter chemical reactions after its crystallisation makes U/Pb dates of zircon among the most reliable available for geochronology and the precision of such dates has become increasingly exquisite as mass spectrometry has improved. So, the Bushveldt complex now has among the best records of magma chamber evolution (Zeh, A. *et al.* 2015. The [Bushveld Complex](#) was emplaced and cooled in less than one million years – results of zirconology, and geotectonic implications. *Earth and Planetary Science Letters*, v. **418**, p. 103-114).

Like a number of younger [large igneous provinces](#), the Bushveldt complex took a very short time to form, about 950 thousand years at 2055 Ma ago. That is from magma emplacement to final crystallization when the zircon ages were set, so the accumulation of magma probably took only 100 thousand years. This suggests that magma blurted into the lower crust at an average rate of around 5 cubic kilometers per year, and quite probably even faster if the magmatism was episodic. It requires a major stretch of the imagination to suggest that this could have occurred by some passive process. Instead, the authors have suggested that while a plume of mantle

material rose from well below the lithosphere a large slab of lower lithosphere, formed from dense eclogite, broke off and literally fell into the deeper mantle. The resulting changes in stress in the lower lithosphere would have acted as a pump to drive the plume upwards, causing it to melt as pressure dropped, and to squirt magma into the overlying continental crust. Although the authors do not mention it, this is reminiscent of the idea of large igneous provinces having sufficient power to eject large masses from the Earth's surface: the [Verneshot theory](#), recently [exhumed in late 2014](#). The main difference is that the originators of the Verneshot theory appealed to explosive gas release.