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AMBIENTE BRASIL

26 / 09 / 2015 [ONU adota metas de desenvolvimento sustentável dos próximos 15 anos](#)

Nova agenda de desenvolvimento substitui os Objetivos do Milênio. Metas atacam problemas ligados à pobreza, saúde, educação e ambiente.

26 / 09 / 2015 [Sobe para 82 o número de cidades do RS afetadas pela chuva e granizo](#)

Quase 800 pessoas tiveram que sair de casa por conta das condições climáticas que atingem o Estado. Número de afetados beira 60 mil.

26 / 09 / 2015 [Dilma diz que Brasil terá 'boa meta' na redução da emissão de gases até 2030](#)

Presidente participará Cúpula sobre Desenvolvimento Sustentável em NY. Sem adiantar metas, Dilma afirmou que Brasil 'sempre dá sua contribuição'.

26 / 09 / 2015 [IBGE: Agricultura é maior responsável por desmatamento de florestas no país](#)

De acordo com o instituto, 236.600 km² de áreas desflorestadas, quase o tamanho do Estado de São Paulo, ocorreu para a implantação de lavouras. Isso representa 65% do total do desmate no período.

26 / 09 / 2015 [Por que eclipses como o deste domingo preocupam a Nasa](#)

Fim de semana será animado para entusiastas da observação espacial, com eclipse e superlua; mas, para a Nasa, fenômeno costuma ser precedido de várias precauções.

26 / 09 / 2015 [Brasil perde 1,8% de suas florestas em dois anos, diz IBGE](#)

Entre 2010 e 2012, houve a reposição de 204 km² de florestas, mas o desmatamento foi quase 300 vezes maior: 59,4 mil km².

26 / 09 / 2015 [Ibama vai investigar fraude em controle de poluentes pela Volkswagen no Brasil](#)

A Volkswagen anunciou, na terça-feira (22), que mais de 11 milhões de carros a diesel em todo o mundo foram equipados com o tipo de motor que poderia distorcer os dados de emissões.

26 / 09 / 2015 [Fernando Meirelles afirma que tema ambiental está "desgastado"](#)

"O tema ficou um pouco desgastado, lembro de quando começaram as primeiras campanhas pelo mico leão dourado, 'salve as baleias', mas o negócio foi crescendo tanto que só isso não atrai mais (o público)", declarou o diretor.

26 / 09 / 2015 [Sergipe confirma sete casos de febre chikungunya](#)

Segundo o Núcleo de Endemias da Vigilância Epidemiológica da Secretaria de Estado de Saúde, de janeiro a 24 de setembro, foram notificados 361 casos suspeitos de febre chikungunya.

26 / 09 / 2015 [China antecipa criação de mercado nacional de emissões de carbono](#)

Presidente Xi Jinping anuncia novo pacote para o clima em discurso nos EUA. Países terão padrões conjuntos de limite de emissões para veículos pesados.

26 / 09 / 2015 [Novas imagens mostram 'escamas de dragão' na superfície de Plutão](#)

Cordilheiras com textura estranha ficam perto da linha do pôr do sol em astro. Sonda New Horizons também enviou imagem mais

'colorida' do planeta-anão.

26 / 09 / 2015 [Morcego vampiro albino é encontrado em Pacajá, no sudoeste do Pará](#)

Animal raro foi capturado em uma ação de combate a raiva na região. Esta foi a segunda captura registrada no país de um exemplar albino.

26 / 09 / 2015 [Cantareira e demais sistemas caem com estiagem na região das represas](#)

Volume dos reservatórios vem caindo durante a semana. Cantareira não recebe chuva desde o dia 14.

26 / 09 / 2015 [Bombeiros combatem 4 incêndios florestais nesta sexta-feira no DF](#)

Corporação trabalha com 100 militares e 20 viaturas de combate ao fogo. Queimadas atingem regiões de Brazilândia, Fercal, Paranoá e Lago Norte.

26 / 09 / 2015 [Terremoto fere 60 na Indonésia](#)

Tremor danificou 200 casas no leste do país. Entre os feridos, 16 estão em estado grave.

25 / 09 / 2015 [Meta do Brasil para emissões de CO2 será ambiciosa, afirma diplomata](#)

Presidente Dilma anuncia domingo pontos da política do país para o clima. Até agora, promessa é restaurar florestas e eliminar desmate ilegal até 2030.

25 / 09 / 2015 [China lançará em 2017 sistema de comércio de direitos de emissão de CO2](#)

O sistema que implementará China em 2017 é conhecido em inglês como "cap and trade" e consiste na fixação de um limite para as emissões de carbono, e a permissão para que as empresas do país que não cheguem a esse limite possam vender créditos a outros que passem do nível máximo.

25 / 09 / 2015 [Tratamento alternativo para infecção mortal se mostra eficaz, diz estudo](#)

Remédio elimina infecção ao atacar toxinas e não a bactéria em si. Infecção por 'Clostridium difficile' pode ser contraída em hospital e matar.

25 / 09 / 2015 [Cada pessoa tem 'nuvem' particular de micróbios, diz pesquisa](#)

Ao entrar na nuvem de uma outra pessoa, você é atingido por 'chuva' de bactérias; cada indivíduo tem seu próprio 'microbioma', o que pode ter aplicação forense no futuro.

25 / 09 / 2015 [Vereadores de Curitiba aprovam proibição de carroças com animais](#)

Texto passou por primeira votação com unanimidade entre os parlamentares. Segundo a prefeitura, cerca de 100 famílias dependem dos animais para viver.

25 / 09 / 2015 [Esmalte dos dentes é herança dos peixes, diz estudo](#)

O esmalte é um tecido dentário presente exclusivamente nos vertebrados. Mas a ganoína, tecido que lembra o esmalte, está presente nas escamas de inúmeros peixes fósseis e alguns peixes primitivos que vivem até hoje.

25 / 09 / 2015 [Chuvas no Rio Grande do Sul já atingiram 35,8 mil pessoas](#)

De acordo com a Defesa Civil, 148 famílias (619 pessoas) tiveram de deixar suas casas em todo o estado. As chuvas começaram na quarta-feira (16) e já atingiram 74 municípios gaúchos.

25 / 09 / 2015 [Nova Zelândia expulsa 1º solicitante de asilo por motivos climáticos](#)

Morador de Kiribati tentou por quatro anos ser primeiro refugiado climático. Ele foi devolvido ao seu país depois de esgotar todos os recursos judiciais.

25 / 09 / 2015 [Há 11 dias sem chuvas, Cantareira tem segunda queda seguida](#)

Todos os mananciais da Grande SP caíram nesta quinta-feira (24). Inverno chuvoso não conseguiu impedir redução do volume no Cantareira.

25 / 09 / 2015 [Filhote de girafa nasce no zoológico de Milwaukee](#)

Ainda sem nome, filhote é macho, tem 1,75 m e pesa 70 quilos. Ele é a primeira girafa a nascer no zoológico desde 2003.

25 / 09 / 2015 [Estrela do mar está morrendo em decorrência do aquecimento global](#)

Nos últimos anos, milhões destes animais perderam os braços em um processo de deterioração que ocorre em questão de poucos dias.

25 / 09 / 2015 [Índia comemora um ano de sonda espacial ao redor de Marte](#)

Neste tempo, a MOM enviou fotografias, vídeos e dados que a Isro ia publicando na rede social Twitter, uma coleção que a agência indiana divulgou agora com um mesmo corpo.

25 / 09 / 2015 [Em 2014, ano com poucos desastres naturais, Ásia foi região mais afetada](#)

Região teve 85% do total de mortes em catástrofes, afirma a Cruz Vermelha. Letalidade de eventos climáticos cresce em relação à de terremotos e vulcões.

25 / 09 / 2015 [Com aquecimento global, geleiras de Spitzberg avançam para fiordes](#)

No verão do hemisfério norte, a baía de Ny-Ålesund ficou repleta de blocos de gelo que flutuavam após se separarem da frente azul da geleira banhada pelas águas do Ártico. Ao redor pode-se observar montanhas peladas, tundra e outras geleiras.

25 / 09 / 2015 [Donald Trump contesta papa sobre alterações climáticas](#)

Perguntado pela rede de televisão CNN se concordava com Francisco que o assunto do clima é urgente, o republicano disse que "não". "Não acredito no aquecimento global", afirmou o bilionário.

24 / 09 / 2015 [Florestas europeias já não antecipam a primavera, segundo um estudo](#)

O aumento de temperatura devido à mudança climática causou um avanço no broto das plantas, muito positivo para que estas fixassem mais carbono, no entanto, uma equipe de cientistas acaba de descobrir que esta tendência tem diminuído, segundo um artigo publicado nesta quarta-feira pela revista "Nature".

24 / 09 / 2015 [Dilma apresentará na ONU agenda ambiciosa para COP21](#)

O Brasil já havia divulgado seu compromisso para restaurar 12 milhões de hectares de parques e eliminar o desmate ilegal na Amazônia até 2030.

24 / 09 / 2015 [Eurodeputados pedem à UE ambição e fundos para cúpula climática de Paris](#)

Os eurodeputados aprovaram um relatório do socialista francês Gilles Pargneaux, que pede "objetivos climáticos juridicamente vinculativos, acompanhados de instrumentos financeiros sólidos".

24 / 09 / 2015 [Nos Estados Unidos, papa pede urgência para conter mudanças climáticas](#)

O presidente Barack Obama agradeceu o apoio do papa sobre as questões climáticas, e disse: "Santo Papa, você está aqui para nos lembrar que temos a sagrada obrigação de proteger o nosso planeta".

24 / 09 / 2015 [Inverno foi um dos mais quentes já registrados em AL, diz meteorologia](#)

Período que deveria ser o mais frio do ano teve pico 30,3°C no Agreste. Estação terminou na madrugada desta quarta, dando lugar à primavera.

24 / 09 / 2015 [Pequenos produtores mantêm cultivo tradicional de flores em Garanhuns/PE](#)

Produtores particulares cultivam e comercializam flores em Garanhuns. Município produz 80 espécies que são destinadas a praças e canteiros.

24 / 09 / 2015 [Justiça alemã vai investigar Volkswagen sobre emissão de gases poluentes](#)

Na terça-feira (22), a Volkswagen anunciou que mais de 11 milhões de carros a diesel em todo o mundo foram equipados com o tipo de motor que poderia distorcer os dados de emissões.

24 / 09 / 2015 [Cantareira tem inverno mais chuvoso desde 2009, mas perde volume](#)

Apesar de chuvas, sistema termina estação com nível menor do que entrou. Chuvas do começo de setembro pararam e estiagem já dura 9 dias.

24 / 09 / 2015 [Estudo elucida mistério da formação das galáxias superluminosas](#)

Estruturas têm taxa de criação de estrelas mil vezes superior à da Via Láctea. Elas se formam devagar agregando matéria, não por colisão como se achava.

24 / 09 / 2015 [Primavera começa no Rio como o inverno acabou: calor de mais de 35°C](#)

Máxima desta quarta-feira (23) foi de 35,6°C, registrada em Santa Cruz. Calor e tempo sem chuva devem continuar até domingo, segundo previsão.

24 / 09 / 2015 [Registrados 49 casos de antraz cutâneo são registrados no Peru](#)

Pessoas tiveram contato com carne de vaca infectada na região de Piura. Doença causa úlceras na pele e é diferente do antraz causado por inalação.

24 / 09 / 2015 [Crânio em Minas é registro mais antigo de decapitação nas Américas](#)

Ossos que incluíam mãos decepadas foram datados em cerca de 9.000 anos. Indivíduo provavelmente teve cabeça arrancada em ritual depois de sua morte.

24 / 09 / 2015 [Eclipse lunar total vai coincidir com a superlua no domingo](#)

Trata-se de uma coincidência o fato de a lua estar se aproximando da fase cheia, e também do seu ponto mais próximo da Terra.

24 / 09 / 2015 [China finaliza a retirada de 700 toneladas de água contaminada em Tianjin](#)

A região foi afetada por região duas explosões de produtos químicos que mataram 173 pessoas e feriram mais de 70 em 12 de agosto.

24 / 09 / 2015 [Ibama não libera operação de Belo Monte até cumprimento de exigências ambientais](#)

As pendências listadas pelo Ibama foram verificadas em campo nos últimos 45 dias por fiscais do órgão.

24 / 09 / 2015 [Transferência de água do Rio Grande para o Alto Tietê começa na quarta-feira](#)

Obra é considerada a mais importante contra a crise hídrica. 4 mil litros de água serão transferidos por segundo.

23 / 09 / 2015 [Situação das unidades de conservação marinhas é preocupante, diz navegador](#)

Segundo o navegador e conservacionista João Lara Mesquita, são raras as UCs da costa nacional com barco para fiscalizar as áreas. "Como você pode fiscalizar e conhecer sua área se não tem sequer um barco?" "Quando você encontra uma unidade federal da costa com barco é uma grande exceção."

23 / 09 / 2015 [Aquecimento global condiciona sexo de tartarugas marinhas](#)

O aquecimento global aumentou o número de tartarugas marinhas macho em detrimento das fêmeas, o que aumenta o perigo de extinção - alertou nesta terça-feira (22) um comunicado da Convenção para a Conservação das Espécies Migratórias.

23 / 09 / 2015 [Cantareira fica estável, mas outros mananciais caem com estiagem](#)

Cantareira ficou estável após queda, mas não recebe chuva desde o dia 14. Demais sistemas que abastecem a Grande SP voltaram a perder volume.

23 / 09 / 2015 [Cientistas japoneses criam rim para transplante em laboratório](#)

Testes em porcos e ratos teriam resultado em órgãos com funcionamento normal na passagem de urina; notícia é esperança para pacientes à espera de transplante.

23 / 09 / 2015 [PETA pede na Justiça que macaco seja reconhecido como autor de selfie](#)

Animal pegou câmera de fotógrafo e fez imagem em 2011 na Indonésia. Organização quer administrar receitas em benefício do macaco.

23 / 09 / 2015 [Corte de CO2 pode injetar até R\\$ 600 bilhões no PIB do Brasil, diz estudo](#)

Redução de emissões em 17% requer investimento de R\$ 372 bilhões. Mudança para economia verde criaria mais de 1 milhão de empregos.

23 / 09 / 2015 [Terremoto no Chile soma 550 réplicas, que se prolongarão por até um ano](#)

O terremoto e o tsunami de 16 de setembro, que afetaram principalmente a região de Coquimbo no norte do Chile, obrigou a evacuar cerca de um milhão de pessoas do litoral ao longo do Chile, com um balanço de 13 mortos, 9.065 afetados e mais de cinco mil casas destruídas ou com danos.

23 / 09 / 2015 [Poluição no rio Tietê preocupa moradores e ambientalistas](#)

Apesar da poluição já afetar rio, turismo ainda é explorado em Barra Bonita. Rio precisa de cuidados para ser preservado no interior paulista.

23 / 09 / 2015 [Aquecimento global faz ressurgir uvas esquecidas em Champagne](#)

Verões escaldantes e secos beneficiam as cepas arbane e petit meslier. Calor deixa uvas raras maiores e mais saudáveis, diz produtor de vinho.

23 / 09 / 2015 [Elefante-símbolo de parque indonésio é encontrado morto e sem as presas](#)

Yongki, de 35 anos, ajudava guardas a aplacar conflitos entre animais. Indivíduo era de subespécie da ilha de Sumatra, ameaçada de extinção.

23 / 09 / 2015 [Humala apoia Hollande sobre necessidade de acelerar detalhes sobre COP21](#)

O presidente do Peru, Ollanta Humala, expressou na segunda-feira seu apoio ao líder francês, François Hollande, sobre a necessidade de acelerar a negociação para se chegar a Paris, sede da Conferência do Clima, com os principais temas consolidados sobre o acordo global.

23 / 09 / 2015 [Pesca artesanal reúne especialistas no DF](#)

Iniciativa busca técnicas ou metodologias reaplicáveis e que representem soluções efetivas de transformação social.

23 / 09 / 2015 [Governo recupera áreas em crise hídrica](#)

MMA, MJ e Caixa destinam verbas para áreas de preservação nas imediações de rios e espelhos d'água.

23 / 09 / 2015 [Organizador da caça ao leão Cecil é julgado por tráfico de animais](#)

Caçador compareceu à justiça em caso de tráfico de antílope. Theo Bronkhorst organizou caça em que dentista matou leão Cecil.

22 / 09 / 2015 [Projetos para 'precificar' CO2 dobram em três anos, diz Banco Mundial](#)

Preço do carbono, porém, ainda é baixo demais para desincentivar emissões. Impostos e mercados já movimentam US\$ 50 bilhões, segundo estimativa.

22 / 09 / 2015 [Valinhos/SP confirma a terceira morte por febre maculosa neste ano](#)

Vítima, que era morador de Itu, estava temporariamente na casa de parente. Registros já superam os óbitos de 2014, quando duas pessoas morreram.

22 / 09 / 2015 [ONU premia indígenas brasileiros por proteção ao meio ambiente](#)

Os dois premiados do Brasil no Equator 2015 são o Instituto Raoni, uma organização fundada pelo povo indígena Kayapó que protegeu 2,5 milhões de hectares de floresta utilizando inovadoras campanhas.

22 / 09 / 2015 [Animal de 260 milhões de anos foi primeiro quadrúpede não-rastejante](#)

'Bunostegos akokanensis' tinha tamanho e postura de uma vaca. Maior parte dos animais terrestres da época se locomoviam como lagartos.

22 / 09 / 2015 [Material de preservação de línguas indígenas será distribuído para as aldeias](#)

O objetivo é formar pesquisadores indígenas e não indígenas, além de criar arquivos digitais e centros

de documentação nas aldeias e no museu.

22 / 09 / 2015 [Egiptólogo britânico diz saber onde está tumba de Nefertiti](#)

Localização do túmulo da rainha de beleza mítica permanece um mistério. Cientista vai procurá-la em câmara da tumba de Tutancâmon este mês.

22 / 09 / 2015 [Túmulo pré-romano é descoberto nas ruínas de Pompeia](#)

Ossos e objetos estavam em túmulo samnita do século IV antes de Cristo. Ruínas são segundo ponto turístico italiano mais visitado, depois do Coliseu.

22 / 09 / 2015 [Tempo seco baixa nível do Cantareira e dos demais reservatórios](#)

Cantareira não recebe chuva desde o dia 14, diz Sabesp. Demais mananciais também perderam volume com estiagem.

22 / 09 / 2015 [ONG adverte para aumento de investimento brasileiro em combustíveis fósseis](#)

O compromisso do Brasil em reduzir suas emissões de gases poluentes pode ser comprometido pelo investimento em combustíveis fósseis no período 2014-2023, com 71% do total, advertiu o relatório divulgado nesta segunda-feira pela ONG World Resources Institute e pela USP.

22 / 09 / 2015 [Incêndio atinge o Parque do Rola Moca, na Grande BH, desde domingo](#)

Quase 1,5 mil hectares já haviam sido queimados durante a tarde de segunda-feira (21).

22 / 09 / 2015 [Nível de rios começa a estabilizar, mas RS segue em alerta para chuvas](#)

Mais de 150 famílias tiveram de sair de casa, diz Defesa Civil. Previsão é de chuva intensa nas próximas 48 horas na Metade Sul.

22 / 09 / 2015 [Ministério Público entrega sangue repatriado a líder yanomami](#)

Material foi colhido nos anos 60 por cientistas americanos sem aval dos índios. Amostras retornarão a aldeia e serão enterradas em cerimônia religiosa.

22 / 09 / 2015 [Estudo de estrelas de formato exótico ajuda a entender a formação do Sistema Solar](#)

Devido à sua alta taxa de rotação, as estrelas Be tornam-se bojudas e ejetam matéria, compondo discos ao seu redor que são incapazes de gerar planetas. A física que os descreve pode ser usada para explicar também a gênes.

22 / 09 / 2015 [Metas para ingestão de potássio e sal estão fora de compasso, diz estudo](#)

Mais de 99% das pessoas descumprem uma das duas recomendações. Em quatro países analisados, problema é excesso de sódio e falta de potássio.

21 / 09 / 2015 [Grupo constrói barco ecológico com garrafas pet para tirar lixo do mar](#)

Ideia era chamar atenção para preservação do meio ambiente. Escoteiros e voluntários de Santos utilizaram 820 garrafas de plástico.

21 / 09 / 2015 [Fósseis, mortos, joias e até um avião: as surpresas encontradas com o derretimento das geleiras](#)

Aquecimento global tornou mais fácil localizar coisas em montanhas e deu origem à nova forma de arqueologia.

21 / 09 / 2015 [China lança novo modelo de foguete pondo 20 microssatélites em órbita](#)

Longa Marcha 6 tem 29,3 m e usa combustível de oxigênio e querosene. Veículo pode pôr em órbita carga de uma tonelada a 700 km de altitude.

21 / 09 / 2015 [Voluntários recolhem mais de 2 t de lixo em praias e rios de Peruíbe/SP](#)

Ação faz parte do Dia Mundial de Limpeza de Rios de Praias, realizado neste sábado (19). Guarujá e Santos também tiveram atividades.

21 / 09 / 2015 [Especialistas alertam para importância do diagnóstico precoce do Alzheimer](#)

A doença é progressiva e faz com que a pessoa perca gradualmente a memória, a capacidade de orientar-se no tempo e no espaço, além de trazer dificuldades de comunicação, raciocínio lógico e alterações comportamentais.

21 / 09 / 2015 [Animal de 260 milhões de anos foi primeiro quadrúpede não-rastejante](#)

'Bunostegos akokanensis' tinha tamanho e postura de uma vaca. Maior parte dos animais terrestres da época se locomoviam como

lagartos.

21 / 09 / 2015 [Projeto apoia 400 agroextrativistas de Minas](#)

Famílias que vivem da produção e comercialização de pequi, castanha de baru e jatobá recebem assistência.

21 / 09 / 2015 [Papa Francisco conversa sobre meio ambiente com Fidel Castro](#)

O papa Francisco, que está de visita a Cuba, encontrou-se no domingo (20) com o ex-presidente cubano Fidel Castro. Segundo o Vaticano, os dois conversaram sobre vários temas do mundo atual e trocaram presentes de cortesia.

21 / 09 / 2015 [Incêndio atinge e destrói área do Parque da Serra da Boa Esperança/MG](#)

Chamas começaram no sábado (19) e já atingiram cerca de 70% do parque. Polícia Militar do Meio Ambiente suspeita que o fogo possa ser criminoso.

21 / 09 / 2015 [Terra treme em cidades do RN; pessoas relatam momentos de medo](#)

Segundo a UFRN, tremor teve magnitude 3.6 e foi registrado às 8h49 deste domingo (20). Evento teve epicentro em João Câmara, Pureza e Poço Branco.

21 / 09 / 2015 [Ação de preservação resgata 1,2 mil animais da Mata Atlântica no litoral](#)

Trabalho acontece entre Caraguá e São Sebastião, no litoral norte. Trecho da mata no litoral norte paulista vai receber obras de rodovia.

21 / 09 / 2015 [Tela Verde abre chamada para a 7ª edição](#)

Produtores podem enviar vídeos com temática socioambiental até 22 de outubro.

21 / 09 / 2015 [Chuvas afetaram ao menos 4,4 mil pessoas em SC, afirma Defesa Civil](#)

Em Corupá, dois homens ficaram feridos durante enterro no sábado (19). Leoberto Leal decretou situação de emergência após queda de granizo.

21 / 09 / 2015 [Ferramenta vai medir os resultados da A3P](#)

MMA lançará ResSoA, sistema online que avaliará ações de sustentabilidade de órgãos públicos.

9 / 2015 [UE anuncia meta de 'carbono zero' até 2100 para Conferência de Paris](#)

es membros da União Europeia acordaram formalmente sua posição comum para a Conferência de Paris sobre o clima: a meta é uma redução de 40% das emissões de gases de efeito estufa até 2030, 50% até 2050 e uma "neutralidade de carbono" até 2100.

9 / 2015 [Ecossistemas únicos na Nicarágua correm risco de desaparecer](#)

Os ecossistemas da Nicarágua são os fluxos de lava de seus vulcões, as lagoas em crateras, os lagos Cocibolca e Xolotlán, e Ometepe e as florestas de bambu do litoral do Caribe com remanescentes no Pacífico.

9 / 2015 [Crise apresenta oportunidades para pesquisa e desenvolvimento no Brasil](#)

A crise econômica pode dar um novo impulso para o desenvolvimento de produtos e áreas nas quais o país apresenta vantagens competitivas, favorecendo investimentos em ciência e tecnologia, avalia presidente da FAPESP.

9 / 2015 [Guarani-kaiová criticam proposta de indenizar proprietários por demarcações](#)

Na constituição, quando um território é reconhecido como pertencente a povos tradicionais, os títulos de posse são considerados nulos. Os proprietários têm direito à indenização somente pelas benfeitorias. Na semana passada, o Senado aprovou um projeto de emenda constitucional que permite o pagamento pela terra nua para terras demarcadas a partir de 1988.

9 / 2015 [Remédio experimental contra ebola está mais perto de chegar ao mercado](#)

O medicamento ZMapp foi usado no tratamento de profissionais de saúde. Status de 'fast-track' deve acelerar sua produção e chegada ao mercado.

9 / 2015 [Sobe para 13 o número de mortos do terremoto no Chile](#)

Um terremoto, de magnitude 8,3 na escala de Richter, aconteceu quarta-feira (16) às 19h45. Um alerta de tsunami foi emitido, o que levou à retirada de cerca de 1 milhão de pessoas de cidades da região costeira.

9 / 2015 [Sem nenhuma chuva na semana, Cantareira completa 4 dias estável](#)

A seca atinge maior parte dos reservatórios nesta semana. Cantareira segue utilizando o volume morto.

9 / 2015 [Em projeto de 'repovoamento', bugios são introduzidos no Parque Nacional da Tijuca](#)

A introdução dos novos bugios é parte de um projeto maior, de reconstrução da fauna do Parque Nacional da Tijuca, para combater o declínio da "floresta vazia": a perda de animais de médio e grande porte por conta da caça tem efeitos muito prejudiciais à vivência da própria floresta.

9 / 2015 [Astronauta filma órbita completa da Terra](#)

A astronauta Scott Kelly deve bater recorde de permanência na Estação Espacial Internacional.

9 / 2015 [Madeira apreendida é transformada em cadeiras para hospital no Acre](#)

O projeto é desenvolvido há dois meses pela Fundação de Tecnologia do Acre. Cadeiras são destinadas a enfermarias do Hospital Regional do Acre na capital.

9 / 2015 [Ig Nobel premia 'frangossau' e teste com picadas de abelha no pênis](#)

A cerimônia do prêmio que satiriza o Nobel foi entregue ontem aos vencedores. Receita para 'descozinhar' ovo também está entre os vencedores.

9 / 2015 [Rio vai comemorar Dia Mundial sem Carro com passeio ciclístico no domingo](#)

O objetivo é alertar para dois grandes problemas dos centros urbanos: engarrafamentos e má qualidade do ar.

9 / 2015 [Unidades de conservação têm congresso](#)

Representantes de várias partes do mundo estarão presentes à reunião em Curitiba.

9 / 2015 [Sem chuva, Sistema Alto Tietê volta a registrar queda, diz Sabesp](#)

Nas últimas 24 horas, as chuvas de agosto foram 49% a menos do que o esperado. A pluviometria acumulada ficou em 18,6 mm, quando a média histórica para esta época do ano é de 36,7 mm.

14 / 09 / 2015 [Rio registra temperatura máxima mais baixa do ano neste domingo](#)

Termômetros marcaram 19,2°C, em São Cristóvão, diz Alerta Rio. Previsão é da chuva continuar até esta segunda e dias continuarem nublados.

14 / 09 / 2015 Incêndio atinge Parque Nacional da Chapada Diamantina

Por causa do tempo seco e dos ventos, o fogo se alastra rapidamente pela vegetação.

14 / 09 / 2015 Software vai monitorar banhistas para evitar ataques de tubarão, no Recife/PE

Programa percebe presença do banhista na área de risco e o acompanha. Trabalho funcionará como projeto piloto nos próximos 18 meses.

14 / 09 / 2015 Filhote de lobo-marinho é encontrado próximo ao Canal 6, em Santos

Animal está debilitado e recebe atendimento no Aquário Municipal. Biólogos não encontraram machucados no animal.

14 / 09 / 2015 Período de proibição da pesca em rios de MT começa dia 1º de novembro

Proibição é necessária devido à piracema, período de reprodução do peixe. Pesca só deverá ser liberada novamente no dia 29 de fevereiro de 2016.

14 / 09 / 2015 Inundações deixam ao menos 7 mortos no Japão

Outras 15 pessoas estão desaparecidas e 5 mil desabrigadas. Transbordamento de rio arrasou área residencial em Joso.

14 / 09 / 2015 Astronautas recém-chegados são recebidos como heróis no Cazaquistão

Os três astronautas, o russo Gennady Padalka, o cazaque Aidyn Aimbetov, e o dinamarquês Andreas Mogensen, retornaram no sábado (12) de uma viagem que partiu da ISS e lhes levou até o centro do Cazaquistão.

14 / 09 / 2015 Estado de emergência é declarado na Califórnia/EUA por incêndios florestais

Estado de emergência vale para condados de Lenzol e Lake. Dezenas de casas já foram destruídas pelo fogo, que segue avançando.

14 / 09 / 2015 Projeto transforma cigarros irregulares em adubos ecológicos

Cargas apreendidas são trituradas e viram fertilizantes, em Cristalina (GO). Material é usado no cultivo e ajuda a proteger as plantas e hortaliças.

14 / 09 / 2015 Ração com erva-mate para boi melhora qualidade da carne

Colaboração entre pesquisadores brasileiros e dinamarqueses desenvolveu estratégias inovadoras para a produção de proteína animal e de pão.

14 / 09 / 2015 Chuva melhora reservatório de usina de Marimbondo em Icém/SP

Em janeiro, quantidade de energia armazenada era de 16%. Com as chuvas, em maio saltou para 36%.

14 / 09 / 2015 Líquido de resto do pirarucu pode curar má digestão do leite

Cientistas brasileiros transformam restos do pirarucu em líquido proteico capaz de enriquecer alimentos para quem tem intolerância à lactose.

14 / 09 / 2015 Todos os sistemas que abastecem SP registram alta no domingo

Volume de água do Cantareira subiu pelo quinto dia seguido. Setembro já superou a previsão de chuvas para todo o mês.

14 / 09 / 2015 Destino de onça-parda capturada em MS será definido nos próximos dias

Onça foi encontrada neste domingo (13) em uma casa em Naviraí. Segundo PMA, CRAS da capital cuidará de destino do felino.

14 / 09 / 2015 Asfalto ecológico é usado em estrada que liga Plácido de Castro/AC à Bolívia

Produto dura mais e não afeta meio ambiente, diz responsável pela tecnologia. Trecho experimental foi aplicado há um mês em 300 metros de ramal.

15 / 09 / 2015 Dia da camada de ozônio terá comemoração

Empresas do setor de espumas de poliuretano que eliminaram completamente o uso dos hidroclorofluorcarbonos (serão homenageadas).

15 / 09 / 2015 Diferença genética explica por que europeus do norte são mais altos

Características necessárias à sobrevivência eram diferentes nas regiões. Holandeses são, em média, 7 cm mais altos que italianos, diz estudo.

15 / 09 / 2015 Incêndios atingem duas áreas na Chapada Diamantina

Por causa do tempo seco e dos ventos, o fogo se alastra rapidamente pela vegetação, informou a administração do parque.

15 / 09 / 2015 Saúde confirma febre amarela em 4 macacos achados mortos no DF

Bichos foram encontrados mortos em área rural de Ceilândia e no zoológico. Funcionários de zoo serão imunizados e primatas passarão por exames.

15 / 09 / 2015 Acelerador de partículas vê sinais de fenômenos que violam leis da física

Experimento observou primeira ruptura em modelo teórico dos anos 1970. Ele ocorreu no LHC, colisor gigante entre a Suíça e a França.

15 / 09 / 2015 Astronauta norte-americano está em plena forma após seis meses no espaço

Na metade do caminho da estadia de um ano na ISS, o astronauta norte-americano Scott Kelly disse nesta segunda-feira (14) estar em forma e se adaptar bem à micro-gravidade, embora sinta muita falta de sair para tomar um ar.

15 / 09 / 2015 Cobertura de neve na Califórnia atinge nível mais baixo em 500 anos

Em 1º de abril - quando a camada de neve está geralmente no seu máximo - o governador da Califórnia, Jerry Brown, declarou a primeira restrição obrigatória de água na história do estado.

15 / 09 / 2015 Fundo Amazônia: governo anuncia recursos até 2019

Governo calcula que poderá financiar 24 novos projetos e Ministério do Meio Ambiente diz que irá procurar novos doadores

15 / 09 / 2015 Pinguins são soltos após temporada de reabilitação no litoral do ES

Animais encalharam nas praias do litoral brasileiro durante a migração. Eles foram soltos a 20 quilômetros das praias de Anchieta.

15 / 09 / 2015 Volume de água furtado em SP este ano abastecerá Itaquera por um mês

Balanco contabiliza fraudes na Grande São Paulo e região de Bragança. 2015 teve 35,8% mais fraudes do que 2014, segundo dado obtido pelo G1.

15 / 09 / 2015 Cantareira e demais mananciais seguem aumentando volume

Chuva forte deu trégua, mas reservatórios seguem subindo. Cantareira segue operando no volume morto.

15 / 09 / 2015 Cerrado terá R\$ 60 milhões para pesquisa

Recursos permitirão a coleta informações sobre a importância do bioma para a população e para o combate às mudanças climáticas.

15 / 09 / 2015 Vírus ameaça extinguir espécie de ave na Austrália

Um vírus ameaça extinguir os periquitos-de-barriga-laranja, uma espécie da Austrália que está à beira de desaparecer do planeta.

15 / 09 / 2015 Balanco do Fundo Amazônia é positivo, diz Izabella Teixeira

O Fundo Amazônia foi criado em 2008 para promover projetos voltados para prevenção e combate ao desmatamento, e o uso sustentável das florestas no bioma.

15 / 09 / 2015 Ministra diz que Brasil está engajado em viabilizar acordo do clima em Paris

O principal objetivo é garantir um novo acordo entre os países para diminuir a emissão de gases de efeito estufa, reduzindo o aquecimento global e limitando o aumento da temperatura em 2°C até 2100.

GSW JOURNAL

A continental-weathering control on orbitally driven redox-nutrient cycling during Cretaceous Oceanic Anoxic Event 2

Simon W. Poulton, Susann Henkel, Christian Marz, Hannah Urquhart, Sascha Flogel, Sabine Kasten, Jaap S. Sinninghe Damste, and Thomas Wagner

Geology published 24 September 2015, 10.1130/G36837.1

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Matt Ikari

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Salvatore Alparone, Salvatore Gambino, and Vincenzo Milluzzo

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Ayla S. Pamukcu, Guilherme A.R. Gualda, Florence Begue, and Darren M. Gravley

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Ian J. Duncan

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Primary Surface Ruptures of the Ludian Mw 6.2 Earthquake, Southeastern Tibetan Plateau, China

Xiwei Xu, Chong Xu, Guihua Yu, Xiyan Wu, Xi Li, and Jianguo Zhang

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Geology, Mineralogy, and Lithogeochemistry of Metalliferous Mudstones Associated with the Lemarchant Volcanogenic Massive Sulfide Deposit, Tally Pond Belt, Central Newfoundland

Stefanie Lode, Stephen J. Piercey, and Christine A. Devine

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Sulfide Immiscibility Induced by Wall-Rock Assimilation in a Fault-Guided Basaltic Feeder System, Franklin Large Igneous Province, Victoria Island

(Arctic Canada)

Ben Hayes, Jean H. Bedard, Matthew Hryciuk, Boswell Wing, Peter Nabelek, William D. MacDonald, and C. Johan Lissenberg

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Volcanological and Structural Controls on Mineralization at the Mount Keith and Cliffs Komatiite-Associated Nickel Sulfide Deposits, Agnew-Wiluna Belt, Western Australia--Implications for Ore Genesis and Targeting

Caroline S. Perring

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Extended wave-equation imaging conditions for passive seismic data

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Economic Geology, November 2015, v. 110, p. 1655-1660,
doi:10.2113/econgeo.110.7.1655

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MAGMATIC Au MINERALIZATION AT THE BILIHE Au DEPOSIT, CHINA
Zhiming Yang, Zhaoshan Chang, Jeanne Paquette, Noel C. White, Zengqian Hou, and Liangsheng Ge
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Volcanological and Structural Controls on Mineralization at the Mount Keith and Cliffs Komatiite-Associated Nickel Sulfide Deposits, Agnew-Wiluna Belt, Western Australia—Implications for Ore Genesis and Targeting
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The Origin of Niobium and Tantalum Mineralization in the Nechalacho REE Deposit, NWT, Canada
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EARTH GAUGE

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National Public Lands Day

Link: www.earthgauge.net/2015/national-public-lands-day-2015

Tweet this tip: Get outside and help spruce up the public lands we all enjoy! National Public Lands Day is Sept. 26:

www.earthgauge.net/?p=39114 #NPLD

Tweet the NPLD video: On 9/26, celebrate something we all share...our public lands. #NPLD

www.youtube.com/watch?v=n9q2WX5uQ3k

National Public Lands Day is Saturday, September 26, 2015! The annual event grew from 700 volunteers in 1994 to 175,000 volunteers in 2014. Last year, volunteers worked at more than 2,100 sites across every state, the District of Columbia and Puerto Rico. They collected an estimated 23,000 pounds of invasive species, built and maintained over 1500 miles of trails, planted 100,000 trees, removed an estimated 500 tons of trash and so much more! National Public Lands Day is a great opportunity to get outside and help spruce up the parks, community gardens, schoolyards, refuges and other public lands we all enjoy.

Tip: Find out what's happening where you live. Visit the [National Public Lands Day map](#) to search for events by state or zip code. Most events take place rain or shine, so check the local forecast and prepare for all kinds of weather.

NPLD is a fee-free day on many federally managed lands and volunteers who participate are given coupons for a second free entry into their favorite federal public land areas that have entrance fees.

CLIMATE FACT

Your National Parks and Climate Change

Link: www.earthgauge.net/2015/your-national-parks-and-climate-change

Tweet this tip: #Climatechange will impact some of the most iconic and frequently visited National Parks.
www.earthgauge.net/?p=39124

The National Parks Service was established to preserve the scenic natural wonders of the United States and leave them unimpaired for the enjoyment of future generations. To ensure their longevity, it is important to understand how they will be impacted by rising temperatures, more extreme weather patterns and rising sea levels.

Here are just a few examples of how a changing climate will impact some of the most iconic and frequently visited National Parks.

Great Smoky Mountains National Park (Tennessee and North Carolina)

As the most visited National Park, Great Smoky Mountains is a popular tourist destination. A changing climate threatens the ecosystems there due earlier springs and changes in stream temperature and flow.

Bloom times for some species in the park are occurring earlier in the year due to warmer winters and are expected to occur even earlier in the future. Along with disrupting pollination timing, earlier blooms also make plants more susceptible to disease and insects.

Changes in stream temperature and flow can have a negative effect on survival of some species. For instance, Brook Trout that are native to cooler, high-elevation streams are facing competition from non-native fish species moving upstream due to warmer temperatures. As water temperatures rise and competition with other species increases, the trout may have few places left to reproduce.

Grand Canyon National Park (Arizona)

The Grand Canyon is known for its colorful stone monuments and unique habitats. The wildlife and vegetation found at Grand Canyon will be impacted by changing precipitation and temperature patterns. Temperatures in the area may rise as much as 6 degrees Fahrenheit by 2050 and annual precipitation may decrease by up to 10 percent by the end of this century.

As temperature and precipitation patterns shift, so will the vegetation and wildlife that depend upon certain habitats. For example, the Pinyon-Juniper Woodland ecosystem of the Grand Canyon is named for the pinyon pine and juniper trees that coexist there. As precipitation and temperature patterns change, scientists expect that the pinyon pine will migrate towards southern areas while the juniper will shift further to the southeast, separating the two species and disrupting other species in the ecosystem.

In an area that is already known for warm weather, rising temperatures will also directly affect visitors by increasing the likelihood of heat-related illnesses and wildland fires.

Everglades National Park (Florida)

Its low elevation, subtropical climate and iconic animals make the Everglades a unique national park. Located in Southern Florida and surrounded by seas on three sides, the Everglades is already experiencing changes due to a warming climate and sea level rise.

As the sea level of Southern Florida rises, it increases the salinity of groundwater and soils which many Everglade species rely on. As a result, freshwater habitats such as freshwater pine forests will shrink and be replaced by saltwater species such as mangroves. Warmer temperatures and increasing inland water salinity will also shift the range of Florida's wildlife. The habitat range for American Crocodiles may more than double by 2060 due to higher temperatures and sea level rise expanding the range of brackish waters in which they live.

(Sources: NPS. *Evolution of an Idea*. nps.gov/americasbestidea/templates/timeline.html. NPCA. *State of the Parks: Grand Canyon National Park*. npca.org/about-us/center-for-park-research/stateoftheparks/grand_canyon/GRCA-report.pdf. NPS. *Everglades: Climate Change*. nps.gov/ever/learn/nature/climatechange.htm. NPS. *Sea-Level Rise in Everglades National Park*. nps.gov/ever/learn/nature/cceffectsslirnpark.htm. NPS. *Climate Change, Shifting Ranges*. nps.gov/ever/learn/nature/upload/FINALShiftingRanges4Web.pdf. NPS. *Monitoring Climate Change in the Smokies*. nps.gov/media/video/view.htm?id=C28C7793-1DD8-B71C-071F154BB9B43A40. NPCA. *Ten Most Visited Parks*. npca.org/exploring-our-parks/visitation.html)

IN THE NEWS

"Giving Back on National Public Lands Day" – B. Ward, *Yale Climate Connections*, September 18, 2015 – www.yaleclimateconnections.org/2015/09/giving-back-on-public-lands-day/

National Parks and other public lands are more than just recreation areas – they also help to slow the effects of climate change.

CALIBRANDO LA TIERRA

El Día Nacional de Tierras Públicas

Dirección: www.earthgauge.net/2015/el-dia-nacional-de-tierras-publicas-2015

Comparte este hecho en Twitter: ¡Salga, ayude a mejorar las tierras públicas y disfrute! Día Nacional de Tierras Públicas: 26 de Sept www.earthgauge.net/?p=39119 #NPLD

¡El **Día Nacional de Tierras Públicas** es el Sábado 26 de Septiembre del 2014! Este evento anual ha crecido de 700 voluntarios en 1994 a 175,000 voluntarios en el 2014. El año pasado, los voluntarios trabajaron en más de 2,100 sitios en todos los estados, incluyendo al Distrito de Columbia y Puerto Rico. ¡Ellos colectaron alrededor de 23,000 libras de especies invasivas, construyeron y dieron mantenimiento a más de 1,500 millas de senderos, plantaron 100,000 árboles, removieron alrededor de 500 toneladas de basura y mucho más! El Día Nacional de Tierras Públicas (NPLD por sus siglas en inglés) es una buena oportunidad para salir y ayudar a mejorar los parques, jardines comunitarios, patios de escuelas, refugios y otras tierras públicas que todos disfrutamos.

Consejo: Averigüe qué está pasando en dónde Ud. vive. Visite el [mapa del Día Nacional de Tierras Públicas](#) para encontrar eventos por estado o código postal. La mayoría de eventos se llevan a cabo con buen o mal tiempo, así que revise el pronóstico del tiempo y prepárese para todo tipo de tiempo.

El NPLD es un día libre de tarifa o cobro de entrada en muchas tierras federales y los voluntarios que participan ese día reciben cupones de entrada gratuita para disfrutar de un segundo día sin tarifa en su tierra pública federal favorita.

Impactos del cambio climático en los parques nacionales

Dirección: www.earthgauge.net/2015/impactos-del-cambio-climatico-en-los-parques-nacionales

Comparte este hecho en Twitter: Muchos de nuestros parques nacionales emblemáticos están siendo impactados por el cambio climático. www.earthgauge.net/?p=37507

¿Sabías que los Estados Unidos fue el primer país en crear un parque nacional? El parque nacional de Yellowstone, creado en 1872 por el presidente Ulysses S. Grant, fue el primer parque nacional en el mundo. El sistema de parques nacionales de los EE.UU. tiene 401 áreas cubriendo más de 84 millones de acres en cada estado y territorio. Los parques nacionales sirven como refugios para la vida silvestre, proporcionan aéreas de recreación para los seres humanos, y preservan las áreas naturales para generaciones futuras. Por desgracia, muchos de nuestros parques nacionales emblemáticos están siendo impactados por el cambio climático y condiciones extremas del tiempo. Éstos son sólo algunos ejemplos:

Parque Nacional de Yellowstone: Las temperaturas más altas en Yellowstone han causado una reducción en las capas de nieve, derretimiento temprano de la nieve y niveles irregulares del agua en los ríos y arroyos. Los glaciares de las montañas se están reduciendo en tamaño y las condiciones más cálidas han resultado en un aumento de la frecuencia de los incendios forestales en el parque.

El cambio climático también puede ser un factor en la propagación del escarabajo del pino de montaña, que ataca los pinos de corteza blanca que dominan los bosques en las elevaciones más altas. Debido a la deforestación del escarabajo, el 46 por ciento de los pinos de corteza blanca en Yellowstone perecieron en el 2009. La pérdida de los pinos de corteza blanca tiene un efecto dominó: los osos pardos dependen de las semillas de los pinos de corteza blanca para prepararse para la hibernación. La disminución de esta fuente de alimentos ha dado lugar a un mayor número de interacciones y problemas entre los osos pardos y los seres humanos. El resto de la fauna también está sintiendo los impactos – la disminución de la capa de nieve y los veranos más cálidos son una amenaza para la trucha de agua fría nativa, afectando las temporadas de pesca en el parque.

Parque Nacional de Yosemite: Mientras las temperaturas se calientan, el derretimiento de la capa de nieve de la Sierra está ocurriendo más temprano. El glaciar Lyell y otros glaciares se están reduciendo. Las precipitaciones de invierno han estado cayendo en forma de lluvia en vez de nieve. Los animales que viven en las altas elevaciones, como las picas, están experimentando una reducción de su rango, mientras que las especies de latitud baja están ampliando sus rangos hacia arriba. La supresión de los incendios también ha cambiado la densidad de los bosques y la composición de las especies, remplazando árboles tolerantes a fuego con árboles sensibles al fuego. El aumento en la densidad de los bosques incrementa la mortalidad de los árboles debido a la sequía, ya que un mayor número de árboles conduce a la competencia por la humedad del suelo. Las altas temperaturas y la sequía aumentan el riesgo de incendios forestales, como el fuego RIM, que ha consumido más de 250.000 acres de bosque con un costo estimado de 113 millones de dólares.

Parque Nacional Acadia: Acadia tiene niveles de ozono del suelo que exceden los estándares de la calidad del aire. Temperaturas más altas promueven la formación de ozono en la zona. El ozono, un irritante respiratorio que puede afectar la salud de los turistas y de los animales en el parque, se sabe que reduce el crecimiento del pino blanco según lo sugieren los anillos tomados de los árboles. El parque también ha experimentado una temporada más corta de invierno que afecta la capa de nieve y la nieve derretida, lo cual tiene un efecto directo en los ecosistemas y las actividades turísticas. En el siglo pasado, la cantidad de lluvia y tormentas intensas han aumentado más

del 60 por ciento en el noreste, afectando las calles, senderos y caminos únicos de transporte. Los caminos de transporte fueron construidos bajo la supervisión de John D. Rockefeller y son importantes para la historia del parque. Acadia es también un punto caliente para la deposición atmosférica de mercurio y la acumulación. El mercurio puede ser encontrado en todos los niveles de la cadena alimenticia y puede conducir a tasas de crecimiento más lentas en especies como la golondrina bicolor.

Parque Nacional de las Montañas Rocosas: Inviernos más templados en el Parque Nacional de las Montañas Rocosas están poniendo presión sobre la fauna de tiempo frío. Los lagópodos coliblanco dependen de la nieve profunda para sobrevivir y debido a las primaveras tempranas y más cálidas, sus crías están naciendo antes. Crías prematuras son vulnerables a suministros bajos de alimentos y cambios en temperatura, que se ha traducido en una disminución de la población. Aumento en las temperaturas también presentan una amenaza para las flores silvestres en el parque por el impacto en la fecha de la temporada de floración. Al igual que otros parques, el Parque Nacional de las Montañas Rocosas ha visto cambios en la distribución de especies debido a temperaturas más altas. Por ejemplo, el abeto de Douglas de elevaciones bajas ha sido documentado en elevaciones más altas.

(Fuentes: Harris, T.B., N. Rajakaruna, S.J. Nelson, and P.D. Vaux. 2012. Stressors and Threats to the Flora of Acadia National Park, Maine: Current Knowledge, Information Gaps, and Future Directions. *The Journal of the Torrey Botanical Society* 139(3):323-344. Yosemite Association. 2006. Climate Change and Fire in Yosemite National Park. *Yosemite* 68(3):3-5 pp. and Moritz, C., J.L. Patton, C.J. Conroy, J.L. Parra, G.C. White, S.R. Beissinger. 2008. Impact of a Century of Climate Change on Small-Mammal Communities in Yosemite National Park, USA. *Science* 322(10):261-264. and Guarín, A. and A.H. Taylor. 2005. Drought Triggered Tree Mortality in Mixed Conifer Forest in Yosemite National Park, California, USA. *Forest and Ecology Management* 218:229-244. and Logan, J.A. and W.W. MacFarlane. Beetle Devastates Yellowstone Whitebark Pine Forests. Accessed 20 September 2013. actionbioscience.org/environment/loganmacfarlane.html and National Park Service. Air Pollution Impacts. Accessed online 20 September 2013. nature.nps.gov/air/Permits/aris/acad/impacts.cfm and National Park Service. Climate Change and the Red Cheek Salamander. Accessed online 18 September 2013, nps.gov/grsm/photosmultimedia/climate-video1.htm and Public Broadcasting Service. America's Best Idea. Accessed online 19 September 2013. pbs.org/nationalparks/history/ep1/ and Pederson, Gregory T., Julio L. Betancourt and Gregory J. McCabe, 2013, "Regional patterns and proximal causes on the recent snowpack decline in the Rocky Mountains, U.S.," *Geophysical Research Letters*, 40:1-6 and Wilms, C.C. and W.M. Getz. 2005. Gray Wolves as Climate Change Buffers in Yellowstone. *PLoS Biol* 3(4): e92 and B. Finley. Colorado Scientist Study Ptarmigans as Bellwethers of Climate Change. Accessed online 20 September 2013. denverpost.com/ci_15936268 and Greater Yellowstone Coalition. Climate Report: Restoring Watersheds. Accessed online 20 September 2013. greateryellowstone.org/issues/climate/Feature.php?id=315 and Schaming T. Importance of Whitebark Pines and Clark's Nutcrackers in Western Ecosystems. Accessed online 20 September 2013. americanforests.org/our-programs/endangered-western-forests/importance-of-whitebark-pines-and-clarks-nutcrackers-in-western-ecosystems/)

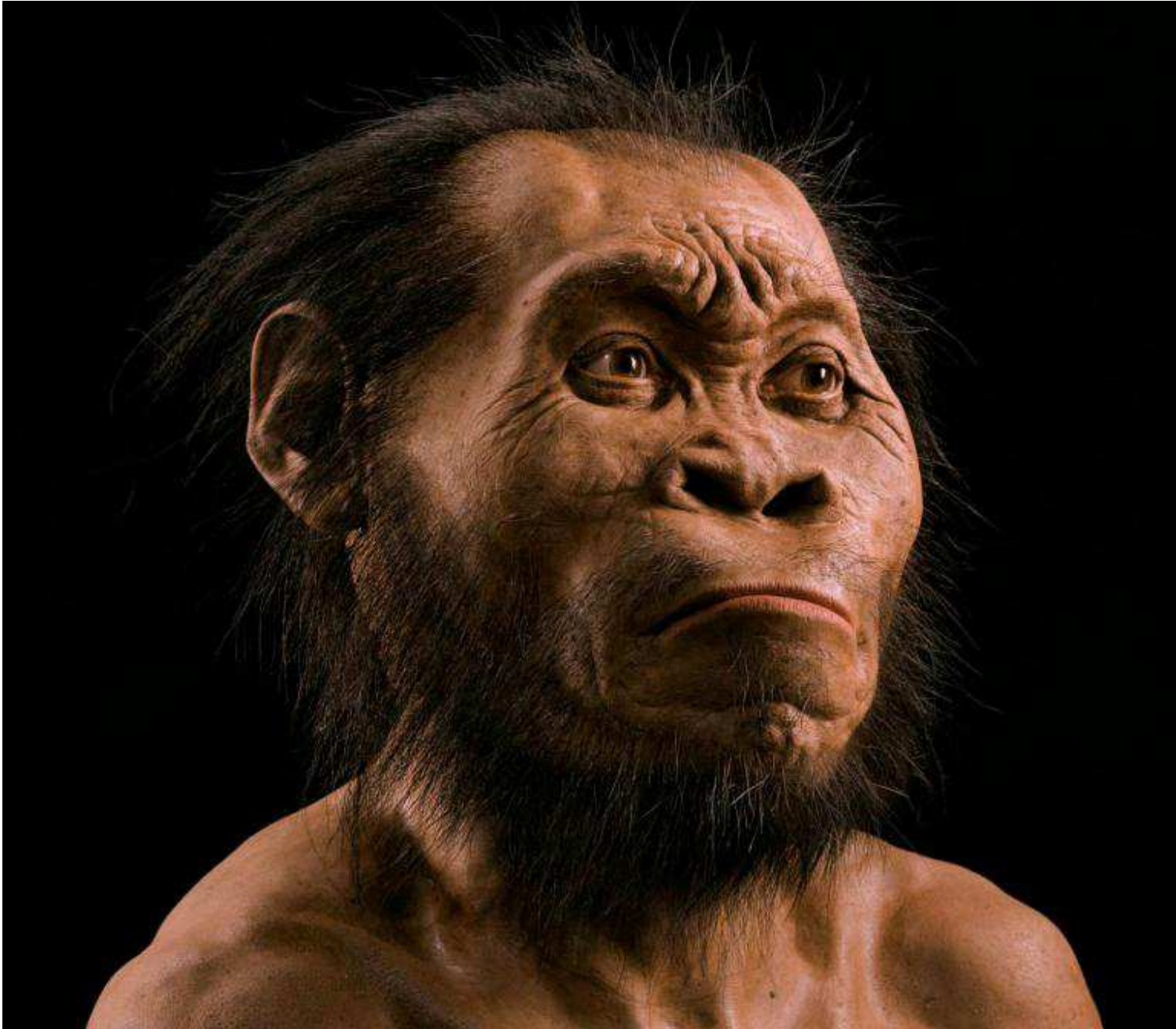
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EARTH PAGES

The 'star' hominin of South Africa

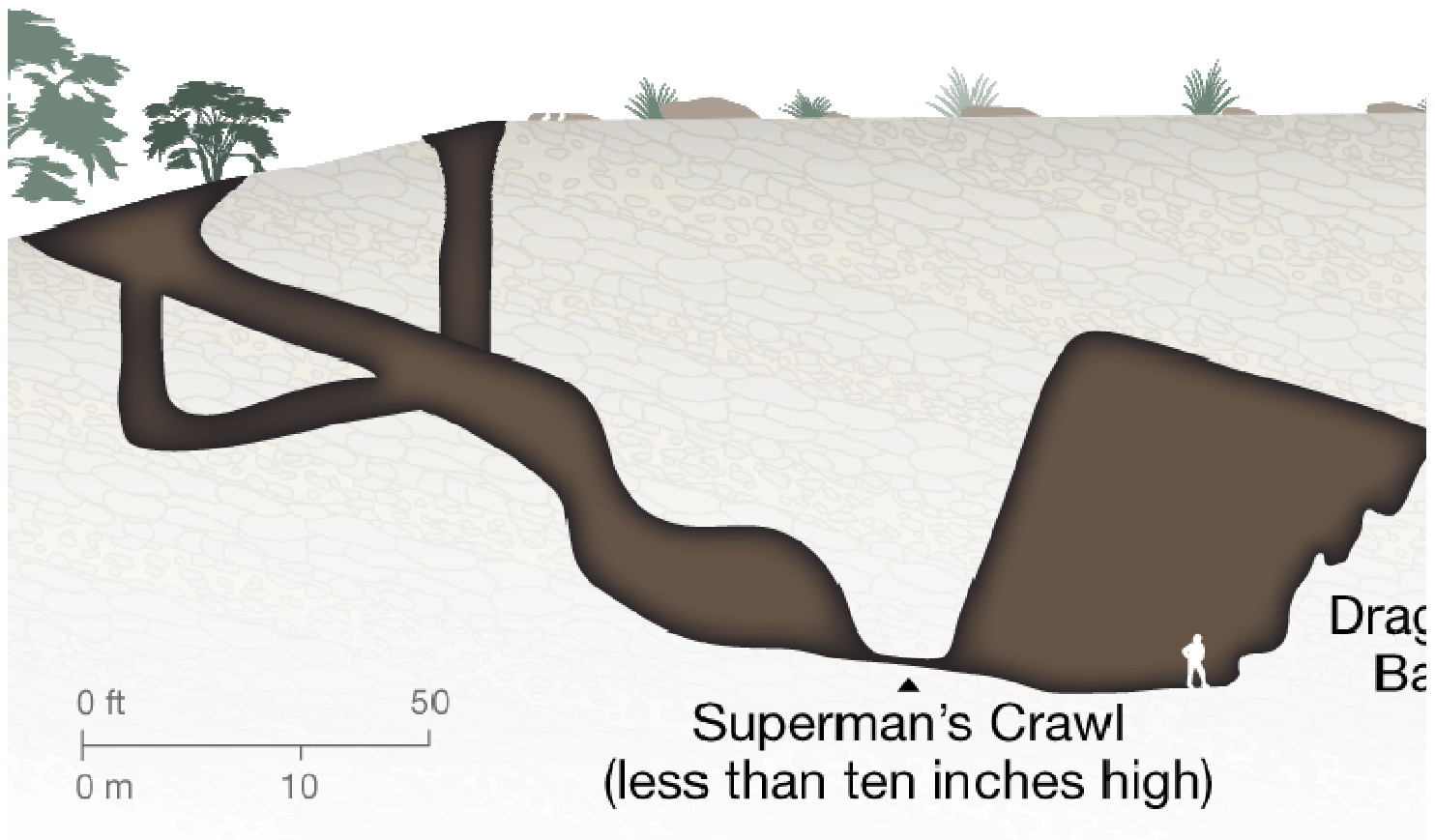
Posted on [September 11, 2015](#) by [Steve Drury](#) | [Leave a comment](#)

The week of 7 to 11 September 2015 was one of the most news-rich of the year. To name but two issues: the plight of tens of thousands of refugees fleeing Africa and the Middle East to Europe was made worse by total confusion, little action and downright obstruction by some of the most privileged governments on Earth ; in Britain one of the most exciting political dramas in decades – the leadership elections of the Labour Party – were reaching a climax of press and political skulduggery because of the unexpected direction both had taken. Something else burst onto the media scene that was, if anything, even more out-of-the-blue to the majority of people on Thursday 10 September: the remains of at least 15 individuals of a new hominin species found in a near-inaccessible cave were announced by a multinational team of geologists and anthropologists. The feature that ensured its wide publicity in competition with some pretty serious political and humanitarian developments was the suggestion that the corpses had been ritually laid to rest by beings that lived maybe 2 million years ago. This major scientific stir arose from the publication of two lengthy papers by the open-access, electronic journal *eLife* (Berger, L. R. and 46 others 2015. [Homo naledi, a new species of the genus Homo from the Dinaledi Chamber, South Africa](#). *eLife* DOI: 10.7554/eLife.09560. Dirks, P.H.G.M. and 23 others 2015. [Geological and taphonomic context for the new hominin species Homo naledi from the Dinaledi Chamber, South Africa](#). *eLife*, DOI: 10.7554/eLife.09560).



Artist's reconstruction of the face of *Homo naledi* (credit: John Gurche artist, Mark Thiessen photographer, National Geographic)

Homo naledi (*naledi* means 'star' in the Sotho language: the find was in the Rising Star cave system near Johannesburg) is known in more anatomical detail than any early hominin, and most closely resembles *H. habilis* and *H. rudolphensis* discovered 3 to 4 thousand miles away in Tanzania and Kenya. The Dinaledi deposit remains undated but likely to come out at around 2 Ma or older. The sheer wealth of anatomical detail, including complete foot- and hand-bone remains from individuals, evidence for a range of ages at death, and plenty of dental and cranial information, actually poses a taxonomic problem of comparison with remains of other early hominins. Most of them are fragmentary, and it seems likely that once a precise date is obtained *H. naledi* will assume greater importance in comparative anatomy. Comparison with australopithecines is easier because of their abundant remains, and *H. naledi* is clearly distinct from that clade as regards gait, chewing, overall physiognomy ([see reconstruction video](#)) and cranial dimensions, but does have [some australopithecine affinities](#). They were certainly different from their near geographic neighbour *Au. sediba*, also found in a cave deposit within the great swath of Palaeoproterozoic limestones near Johannesburg, where the [Cradle of Humankind](#) UNESCO World Heritage Site is situated. The brain of *Homo naledi* was on a par with those of australopithecines as regards volume, yet larger than that of *H. floresiensis*: it does seem that brain size is not necessarily related to the uses to which it is put.



The route into the Dinaledi Chamber where bones of at least 15 individual members of *Homo naledi* were found (credit: National Geographic magazine <http://news.nationalgeographic.com/2015/09/150910-human-evolution-change/>)

Interestingly, it is reported that only the most diminutive members of the research team were able to [enter the chamber](#) where the remains were found because of the narrowness of the connecting passage. Also, access from the main cave system involved an upward 'U-bend', so that although water could – and did from time to time – enter the chamber in the past, it is unlikely that coarse material such as large bones could simply have been washed in, the more so as the chamber is on a minor spur from the main system and its outlet is through small floor drains that could not sustain torrential flow. Nor is there any direct access from the ground surface to this part of the system. Some of the more fragile body parts, such as a hand, are still articulated, which suggests a non-violent movement to the chamber. There are no signs of physical trauma to any of the bones, ruling out action by carnivores or transport by violent floods, nor any indicative of de-fleshing as by cannibalism. However, before fossilisation, many of the bones had been gnawed by beetles and snails. This combination of features leads to the possibility that corpses may have been deliberately placed in the chamber. If they had been, then to get to deepest recess of the cave system and find the Denalidi Chamber required illumination: fire brands. That the chamber was actually a living space is highly unlikely because of its remoteness from the surface. One big question that cannot be answered is whether or not such possible disposal was by ritual or simply for sanitary arrangements. Another possibility, not considered by the authors is seeking refuge from predators and becoming trapped in the desperately constricted space.

The possibility of ritual burial is clearly what has seized headlines. Yet few palaeoanthropologists will accept that: only [Neanderthals](#) and anatomically modern humans are definitely considered to have adopted such a practice, in the last hundred thousand years. The association of a bifacial stone tool with 350 ka old *H. heidelbergensis* remains at Atapuerca in northern Spain has been suggested to be the earliest evidence for ritual burial, but is not widely accepted. There are no reports of artefacts in the Dinaledi Chamber.

Related articles

• [Scientists discover new human-like species in South Africa cave](#)



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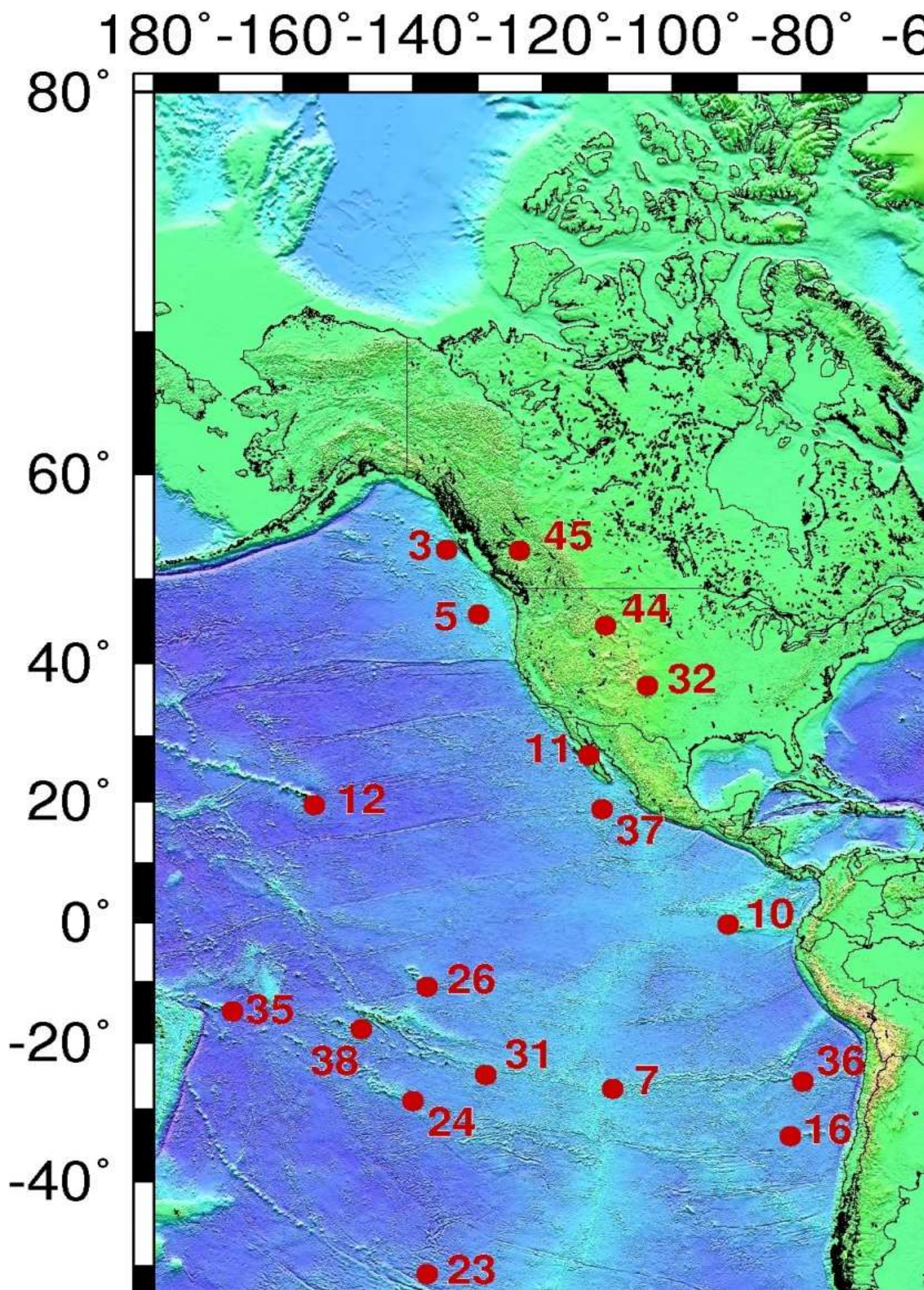
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[Hotspots and plumes](#)

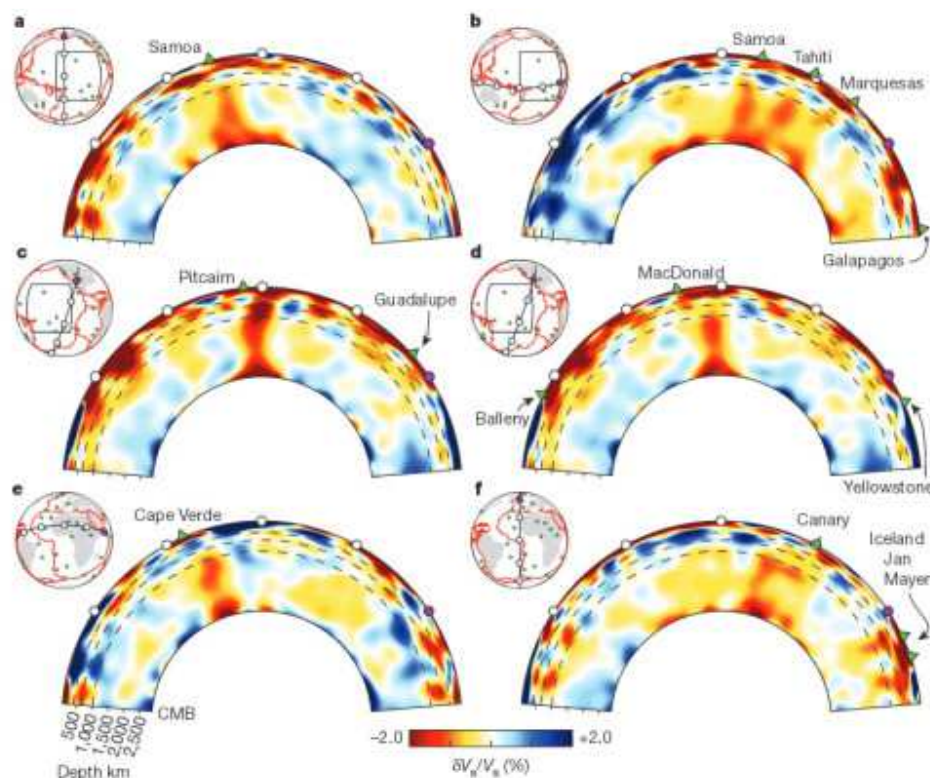
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One of the pioneers of plate tectonics, [W. Jason Morgan](#), recognised in the 1970s that chains of volcanic islands and seamounts that rise from the ocean floor may have formed as the movement of [lithospheric plates](#) passed over sources of magma that lay in the mantle beneath the plates. He suggested that such [hotspots](#) were fixed relative to plate movements at the surface and likened the formation of chains such as that to the west of the volcanically active of the Hawaiian 'Big Island' to linear scorching of a sheet of paper moved over a candle flame. If true, it should be possible to use hotspots as a framework for the [absolute motion of lithospheric plates](#) rather than the velocities of individual plates relative to the others. But Morgan's hypothesis has been debated ever since he formulated it. A test would be to see whether or not plumes of rising hot material in the deep part of the mantle can be detected. This became one of the first objectives of seismic tomography when it was devised in the last decade of the 20th century: a method that uses global earthquakes records to detect parts of the mantle where seismic waves traveled faster or slower than the norm: effectively patches of hot (probably rising) and cold rock. The first such evidence was equally [hotly debated](#), one view being that the magma sources beneath oceanic islands such as Hawaii and Iceland were actually related to plate tectonics and that the hotspot hypothesis had become a kind of belief system.



Global distribution of hotspots (credit: Wikipedia)

The problem was that [mantle plumes](#) supposedly linked to magmatic hotspots in the upper mantle would be so thin that they would be difficult to detect even with seismic tomography. Geophysicists have been trying to sharpen up seismic resolution partly by using supercomputers to analyse more and more seismic records and also by improving the theory about how seismic waves interact with 3-D mantle structure. This has culminated in more believable visualisation of mantle structure (French, S.W. & Romanowicz, B. 2015. Broad plumes rotted at the base of the [Earth's mantle](#) beneath major hotspots). The two researchers from the University of California at Berkeley in fact showed something different, but still robust support for Morgan's 40-year old ideas. Instead of thin plumes, they have been able to show much broader conduits beneath at least 5 and maybe more active ends of hotspot chains. The zones extend upwards from the [core-mantle boundary](#) to about 1000 km below the Earth's surface, where some bend sideways towards hotspots, perhaps as a result of another kind of upper mantle circulation.



Whole-Earth seismic tomography cross sections beneath a variety of volcanic islands, (Credit French and Romanowicz; <http://www.nature.com/doi/10.1038/nature14876>)

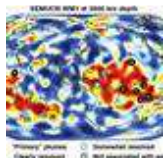
The sources of these hot columns at the core-mantle boundary appear to be zones of very low shear-wave velocities; i.e. almost, but not quite molten blobs. French and Romanowicz suggest that the columns are extremely long-lived and may even have a chemical dimension – as in the hypothesis of [mantle heterogeneity](#). Another interesting feature of their results is that the striking vertical linearity of the columns could indicate that the overall motion of the lower mantle is extremely sluggish and punctured by discrete convection.

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[Thin- or thick-skinned tectonics: a test](#)

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

How the continental lithosphere deforms at [convergent plate margins](#) has been a matter of opinion that depends on where observations have been made in ancient orogenic belts. One view is that arc and collisional orogens are dominated by deformation of the upper crust and especially the cover of sedimentary and volcanic rocks above deeper and older basement. This is a 'thin-skinned' model in which rocks of the upper crust are detached from those below and thicken more or less independently by [thrust faulting](#), the formation of ductile nappes or a combination of the two. Mountain ranges, in this view, are the product of piling up of thrust slices or nappes, as exemplified by the Alps, Canadian Rockies and the Caledonian thrust belt of NW Scotland. Thick-skinned processes, as the name suggests, see crustal shortening and thickening as being distributed through the crust from top to bottom and even involving the lithospheric mantle. The hinterlands of both the Alps and the Scottish Caledonides show plenty of evidence for entire-crust deformation, deep crustal rocks being found sheared together with deformed rocks of the cover. It stands to reason that orogenic processes on the grand scale must involve a bit of both.

Both hypotheses stem from field work in deeply eroded, structurally complex segments of the ancient crust, and it is rarely if ever possible to say whether both operated together or one followed the other during the often lengthy periods taken by orogeny to reach completion, and the sheer scale of the process. [Orogenesis](#) is going on today, to which major seismic activity obviously bears witness. But erosion has not progress from cover through basement so, up to now, only seismicity and geodetic GPS measurements have been available to show that continental crust in general is being shortened and thickened, as well as being moved about. Potentially, a means of assessing active deformation, even in the deep crust, is to see whether or not the speeds of seismic waves at different depths are biased depending on their direction of travel. Such anisotropy would develop if the mineral grains making up rocks were deformed and rotated to preferred directions; a feature typical of metamorphic rocks. But to make such measurements on the scale of active orogens requires a dense network of seismometers and software that can tease directionality and depth out of the earthquake motions detected by it.



Aligned minerals in a Brazilian metamorphic rock (credit: Eurico Zimbres in Wikipedia)

A joint Taiwanese-American consortium set up such a network in Taiwan, which is capable of this type of seismic tomography. Taiwan is currently taking up a strain rate of 8.2 cm per year due to motion of the Philippine Plate on whose western flank the island lies: it is part of an island arc currently colliding with the stationary [Eurasian Plate](#) and whose crust is shortening. Results of seismic anisotropy (Huang, T.-Y. *et al.* 2015. Layered deformation in the Taiwan orogen. *Science*, v. **349**, p. 720-723) show that the fast direction of shear (S) waves changes abruptly at about 10 to 15 km deep in the crust. In the upper crust this lines up with the roughly N-S structural 'grain' of the orogen. At between 13 to 17 km down there is no discernible anisotropy, below which it changes to parallel the direction of plate motion, ESE-WNW. It seems that thin skinned tectonics is indeed taking place, although probably not above a structural detachment. Simultaneously the deep crust is being deformed but the shearing is ascribed to the descent of lithospheric mantle of the Philippine Plate beneath the Eurasian Plate, while the deep crust remains attached to the upper crust. If it were possible to examine the mineral lineations now forming in both the Taiwanese upper and lower crust where metamorphism is active, then the two directions would be apparent. Although not mentioned by the authors, perhaps the detection of different directionality of aligned [metamorphic minerals](#) in low- and high-grade metamorphic rocks might indicate such tectonic processes in the past.

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[Roman concrete restrains magma](#)

Posted on [August 17, 2015](#) by [Steve Drury](#) | [Leave a comment](#)

Four million people in and around the Italian city of Naples on the shore of the Tyrrhenian Sea have always lived under a double threat of natural disaster. The one that immediately springs to most people's mind is the huge volcano [Vesuvius](#) that looms over its eastern suburbs, for this was the source of the incandescent pyroclastic flow that overwhelmed Pompeii and Herculaneum in 79 CE. Less familiar outside Italy is a cluster of elliptical volcanic features directly to the west of the city: Campi Flegrei or the [Phlegraean Fields](#). In fact the cluster is part of a vast, dormant caldera, half of which lies beneath the sea centred on the ancient Roman port of [Puteoli](#) (modern Pozzuoli). This volcanic collapse structure is about 10 km across; about as large as Vesuvius. Campi Flegrei is famous for its sulfur-rich

fumaroles including the mythical crater home of Vulcan the god of fire, Solfatara.



The [Bay of Naples](#) with Vesuvius to the east of the city and Campi Flegrei to the west. (credit: Google Earth)

Between 1970 and 1984 the ground around Pozzuoli rose more than 2 metres, which may be evidence that the deep seated magma chamber is inflating. Fears that this might presage an eruption in the near future stems from a curious feature affecting archaeological remains, such as upright pillars in the harbour area of Pozzuoli. At many different levels the stonework is pockmarked by curious holes that are the fossil borings of marine molluscs: at some stage the feet of the pillars descended below sea level. Together with historic records since the Roman era these borings help to establish the local ups and downs of the surface over the last two millennia in considerable detail. From a high of 4 m above sea level when the pillars were erected 194 BCE they slowly subsided to reach sea level around 300 CE when Puteoli ceased to be an important harbour and 4 metres below that around 900 CE. For the last millennium they have slowly risen until in 1538 more than 4 metres of inflation took place very rapidly. That was immediately followed by a small eruption of about 0.02 km³ of magma at Mount Nuovo, to the northeast of another recent crater now occupied by a lake: hence the fear surrounding the uplift in 1970-84. Campi Flegrei has a history of eruptions going back 40 thousand years, including two in the 'super volcano' category of 200 and 40 km³ that blanketed vast areas in pyroclastic ash.

One tantalising aspect of the ground inflation and deflation is that each cycle lasts of the order of a thousand years. Another seems to be that magma breaks to the surface very rapidly after a long period of inflation, as if whatever was keeping the magma chamber in a metastable state failed in a brittle fashion. Tiziana Vanorio and Waruntorn Kanitpanyacharoen of Stanford and Chulalongkorn universities in the US and Thailand have come up with a possible reason for such gradual crustal warping in volcanic areas and long-delayed eruption, for which Campi Flegrei is a model case (in fact the oscillations there are unsurpassed). Such long-term bending of the crust suggests abnormally strong rock near the surface. The co-workers analysed borehole cores that penetrated to the depth of small shallow earthquakes – in the metamorphic basement of the area – and found that the zone above the seismically active layer is not only stronger than the basement, but closely resembles a construction material to which Roman architecture owes its longevity (Vanorio, T. & Kanitpanyacharoen, W. 2015. Rock physics of fibrous rocks akin to [Roman concrete](#) explains uplifts at Campi Flegrei Caldera. *Science*, v. **349**, p. 617-621).



Mollusc-bored pillars in the Macellum (indoor market) of Pozzuoli (credit: Wikipedia)

Roman masons discovered that by mixing young, loose volcanic ash with lime mortar (calcium hydroxide) produced a strong concrete when cured. Specifically, the invention of concrete took place at Pozzuoli itself, using volcanic ash from Campi Flegrei and the product

was known as pozzolana. Young ash from an explosive volcano is mainly shards of anhydrous silicate glass, which quickly react with water and calcium hydroxide to produce fibres of hydrous calc-silicate minerals, almost as in conventional cement curing, but without the need for heating limestone and clay to very high temperatures. The strength of pozzolano enabled Roman architects to build the great dome of the [Pantheon](#) in Rome, still the world's largest unreinforced concrete dome. Moreover, the speed with which it sets by exothermic reactions enables its use below sea level. Vanorio and Kanitpanyacharoen found that the strong upper zone beneath Campi Flegrei is almost identical to pozzolano, and suggest that it formed as a result of calcium-rich hydrothermal fluids percolating through young pyroclastic rocks. The calcium derives from metamorphic basement rich in calc-silicate layers through which hot groundwater is driven as a result of heat from the underlying magma chamber. It seems the Campi Flegrei caldera has built its own containing dome. But that is perhaps a mixed blessing: the 1970-84 inflation seems now to be deflating and the flexible carapace may make using ground movements as means of predicting eruptions unreliable.



Interior view of the dome of the Pantheon in Rome (credit: Wikipedia)

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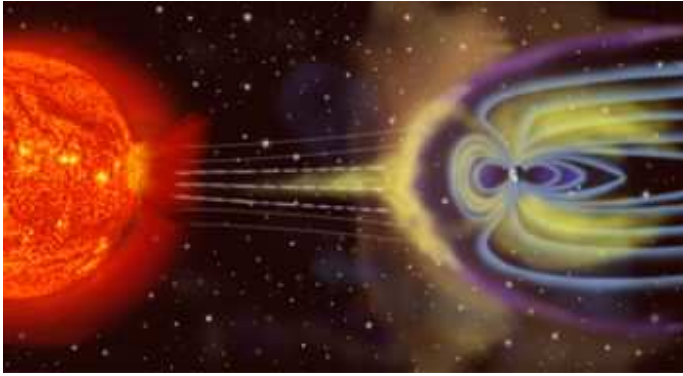
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[When Earth got its magnetic field](#)

Posted on [August 13, 2015](#) by [Steve Drury](#) | [1 comment](#)

For a planet to produce life it needs various attributes. Exoplanet hunters tend to focus on the 'Goldilocks' Zone' where solar heating is neither so extreme nor so little that liquid water is unstable on a planet's surface. It also needs an atmosphere that *retains* water. Ultraviolet radiation emitted by a planet's star dissociates water vapour to hydrogen and oxygen and the hydrogen escapes to space. The reason Earth has not lost water in this way is that little water vapour reaches the stratosphere because it is condensed or frozen out of the air as the lower atmosphere becomes cooler with altitude. Given moist conditions survivability to the extent that exists on Earth still needs another planetary parameter: the charged particles emitted as an interplanetary 'wind' by stars must not reach the surface. If they did, their potential to break complex molecules would hinder life's formation or wipe it out if it ventured onto land. A moving current of electrical charge, which is what a stellar 'wind' amounts to, can be deflected by a magnetic field. This is what happens on Earth, whose magnetic field is a good reason why our planet has supported life and its continual evolution since at least about 3.5 billion years ago.



Deflection of the solar 'wind' by Earth's magnetosphere. (credit: Wikipedia)

Direct proof of the existence of a [geomagnetic field](#) is the presence of aligned particles of magnetic minerals in rocks, for instance in a lava flow, caused by their acquiring magnetisation in a prevailing magnetic field once they cooled sufficiently. The earliest such *remanent* magnetism was found in igneous rocks from north-eastern South Africa dated at between 3.2 to 3.45 billion years. All older rocks do not show such a feature dating back to their formation because of thermal metamorphism that resets any remanent magnetism to match the geomagnetic field prevailing at the time of reheating. There are, however, materials that formed further back in time and are also known to resist thermal resetting of any alignments of magnetic inclusion. They are zircons (ZrSiO_4), originally crystallised from igneous magmas, which may have locked in minute magnetic inclusions. Zircons are among the most change-resistant materials and they can also be dated with great precision, with the advantage that the U-Pb method used can distinguish between age of formation and that of any later heating. Famously, individual grains of zircon that had accumulated in an early Archaean conglomerate outcropping in the [Jack Hills](#) of Western Australia yielded [ages going back from 3.2 to 4.4 billion](#) years; far beyond the age of any tangible rock and close to the formation age of the Earth. Quite a target for palaeomagnetic investigations once a suitable technique had been developed.



Western Australia's Jack Hills from Landsat (credit NASA Earth Observatory)

John Tarduno and colleagues from the Universities of Rochester and California USA and the Geological Survey of Canada report the magnetic properties of the Jack Hills zircons (Tarduno, J.A. *et al.* 2015. A Hadean to [Paleoarchean](#) geodynamo recorded by single zircon crystals. *Science*, v. **349**, p. 521-524). All of the grains analysed record magnetisation spanning the period 3.2 to 4.2 billion years that indicate geomagnetic field strengths ranging from that found today at the Equator to about an eighth of the modern value. So from 4.2 Ga onwards geomagnetism probably deflected the solar wind: the early Earth was set for living processes from its earliest days. The discovery also supports the likelihood of functioning plate tectonics during the Hadean.

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[Pleistocene megafaunal extinctions – were humans to blame?](#)

Posted on [August 4, 2015](#) by [Steve Drury](#) | [Leave a comment](#)

Australia and the Americas had an extremely diverse fauna of large beasts (giant wombats and kangaroos in Australia; elephants, bears, big cats, camelids, ground sloths etc in the Americas) until the last glaciation and the warming period that led into the Holocene interglacial. The majority of these megafauna species vanished suddenly during that recent period. To a lesser extent something similar happened in Eurasia, but nothing significant in Africa. Because the last glacial cycle also saw migration of efficient human hunter-gatherers to every other continent except Antarctica, many ecologists, palaeontologists and anthropologists saw a direct link between human predation and the mass extinction (see *Earth-Pages* of [April 2012](#)). Earlier humans had indeed spread far and wide in Eurasia before, and the crude hypothesis that the last arrivals in Australasia and the Americas devoured all the meatiest prey in three continents had some traction as a result: predation in Eurasia and Africa by earlier hominids would have made surviving prey congenitally wary of bipeds with spears. In Australia and the Americas the megafauna species would have been naive and confident in their sheer bulk, numbers, speed and, in some cases, ferocity. Other possibilities emerged, such as the [introduction of viruses](#) to which faunas had no immunity or as a result of climate change, but none of the three possibilities has gained incontrovertible proof. But the most popular, human connection has had severe knocks in the last couple of years. A fourth, that the extinctions stemmed from a [comet impact](#) proved to have little traction.



Megafauna in a late-Pleistocene landscape including woolly mammoths and rhinoceroses, horses, and cave lions with a carcass. (credit: Wikipedia)

Since the amazing success of analysing the bulk DNA debris in sea water – environmental DNA or eDNA – to look at the local diversity of marine animals, the analytical and computing techniques that made it possible have been turned to ancient terrestrial materials: soils, permafrost and glacial ice. One of the [first attempts](#) revealed [mammoth](#) and pre-Columbian horse DNA surviving in Alaskan permafrost, thanks to the herds' copious urination and dung spreading. Several articles in the 24 July 2015 issue of *Science* review [ancient DNA](#) advances, including eDNA from soils that chart changes in both fauna and flora over the last glacial cycle (Pennisi, E. 2015. Lost worlds found. *Science*, v. **349**, p. 367-369). Combined with a variety of means of dating the material that yield the ancient eDNA, an interesting picture is emerging. The soil and permafrost samples potentially express ancient ecosystems in far more detail than would fossil animals or pollens, many of which are too similar to look at the species level and in any case are dominated by the most abundant plants rather than showing those critical in the food chain.



Plants of the Arctic tundra in Nunavut, Canada (Photo credit: Wikipedia)

The first major success in palaeoecology of this kind came with a 50-author paper using eDNA 'bar-coding' of permafrost from 242 sites

in Siberia and Alaska I Willerslev, E. and 49 others 2014. Fifty thousand years of Arctic vegetation and megafaunal diet. *Nature*, v. **506**, p. 47-51. doi:10.1038/nature12921). Dividing the samples into 3 time spans – 50-25, 25-15 ([last glacial maximum](#)) and younger than 15 ka – the team found these major stages in the last glacial cycle mapped an ecological change from a dry tundra dominated by abundant herbaceous plants (forbs including abundant anemones and forget-me-not), to a markedly depleted Arctic steppe ecosystem then moist tundra with woody plants and grasses dominating. They also analysed the eDNA of dung and gut contents from ice-age megafauna, such as mammoths, bison and woolly rhinos, where these were found, which showed that forbs were the mainstay of their diet. Using bones of large mammals 6 member of the team also established the timing of extinctions in the last 56 ka (Cooper, A. *et al.* 2015. Abrupt warming events drove Late Pleistocene Holarctic megafaunal turnover. *Science*, DOI: 10.1126/science.aac4315), showing 31 regional extinction pulses linked to the rapid ups and downs of climate during [Dansgaard-Oeschger cycles](#) in the run-up to the last glacial maximum. By the end of the last glacial maximum, the megafauna were highly stressed by purely climatic and ecological factors. Human predation probably finished them off.

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[How far has geochemistry led geology?](#)

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Thin section of a typical granite: clear white and grey grains are quartz (silica); striped black and white is feldspar; coloured minerals are micas (credit: Wikipedia)

In the Solar System the Earth is unique in having a surface split into two distinct categories according to their relative elevation; one covered by water, the other not. More than 60% of its surface – the ocean basins – falls between 2 to 11 km below sea level with a mean around 4 to 5 km deep. A bit less than 40% – land and the continental shelves – stands higher than 1 km below sea level up to almost 9 km above, with a mean around 1 km high. Between 1 and 2 km below sea level is represented by only around 3 % of the surface area. This combined hypsography and wetness is reckoned to have had a massive bearing on the course of climate and biological evolution, as far as allowing our own emergence. The Earth's bimodal elevation stems from the near-surface rock beneath each division having different densities: [continental crust](#) is less dense than its oceanic counterpart, and there is very little crustal rock with an intermediate density. Gravitational equilibrium ensures that continents rise higher than oceans. That continents were underpinned mainly by rocks of granitic composition and density, roughly speaking, was well known by geologists at the close of the 19th century. What lay beneath the oceans didn't fully emerge until after the advent of plate tectonics and the notion of simple basaltic magmas pouring out as plates became detached.

In 1915 Canadian geologist [Norman Levi Bowen](#) resolved previously acquired knowledge of the field relations, mineralogy and, to a much lesser extent, the chemistry of igneous rocks, predominantly those on the continents in a theory to account for the origin of continents. This involved a process of distillation or fractionation in which the high-temperature crystallisation of mafic (magnesium- and iron-rich) minerals from basaltic magma left a residual melt with lower Mg and Fe, higher amounts of alkalis and alkaline earth elements and especially enriched in SiO₂ (silica). A basalt with ~50% silica could give rise to rocks of roughly granitic composition (~60% SiO₂) – the 'light' rocks that buoy-up the continental surface – through Bowen's hypothetical fractional crystallisation. Later authors in the 1930s, including Bowen's teacher [Reginald Aldworth Daly](#), came up with the idea that granites may form by basalt magma digesting older SiO₂-

rich rocks or by partially melting older crustal rocks as suggested by British geologist [Herbert Harold Read](#). But, of course, this merely shifted the formation of silica-rich crust further back in time

A great deal of field, microscope and, more recently, geochemical lab time has been spent since on to-ing and fro-ing between these hypotheses, as well as on the petrology of basaltic magmas since the arrival of plate theory and the discovery of the predominance of basalt beneath ocean floors. By the 1990s one of the main flaws seen in Bowen's hypothesis was removed, seemingly at a stroke. Surely, if a basalt magma split into a dense Fe- Mg-rich cumulate in the lower crust and a less dense, SiO₂-rich residual magma in the upper continental crust the bulk density of that crust ought to remain the same as the original basalt. But if the dense part somehow fell back into the mantle what remained would be more able to float proud. Although a neat idea, outside of proxy indications that such delamination had taken place, it could not be proved.

Since the 1960s geochemical analysis has become steadily easier, quicker and cheaper, using predominantly X-ray fluorescence and mass-spectrometric techniques. So geochemical data steadily caught up with traditional analysis of thin sections of rock using petrological microscopes. Beginning in the late 1960s igneous geochemistry became almost a cottage industry and millions of rocks have been analysed. Recently, about 850 thousand multi-element analyses of igneous rocks have been archived with US NSF funding in the [EarthChem](#) library. A group from the US universities of Princeton, California – Los Angeles and Wisconsin – Madison extracted 123 thousand plutonic and 172 thousand volcanic igneous rocks of continental affinities from EarthChem to 'sledgehammer' the issue of continent formation into a unified theory ([Keller, C.B. et al.](#) 2015. Volcanic-plutonic parity and the differentiation of the continental crust. *Nature*, v. **523**, p. 301-307).

In a nutshell, the authors compared the two divisions in this vast data bank; the superficial volcanic with the deep-crustal plutonic kinds of continental [igneous rock](#). The gist of their approach is a means of comparative igneous geochemistry with an even longer pedigree, which was devised in 1909 by British geologist [Alfred Harker](#). The Harker Diagram plots all other elements against the proportionally most variable major component of igneous rocks, SiO₂. If the dominant process involved mixing of basalt magma with or partial melting of older silica-rich rocks such simple plots should approximate straight lines. It turns out – and this is not news to most igneous geochemists with far smaller data sets – that the plots deviate considerably from straight lines. So it seems that old Bowen was right all along, the differing deviations from linearity stemming from subtleties in the process of initial melting of mantle to form basalt and then its fractionation at crustal depths. Keller and colleagues found an unexpected similarity between the plutonic rocks of subduction-related volcanic arcs and those in zones of continental rifting. Both record the influence of water in the process, which lowers the crystallisation temperature of granitic magma so that it freezes before the bulk can migrate to the surface and extrude as lava. Previously, rift-related magmas had been thought to be drier than those formed in arcs so that silica-rich magma should tend to be extruded.

But there is a snag, the EarthChem archive hosts only data from igneous rocks formed in the Phanerozoic, most being less than 100 Ma old. It has long been known that continental crust had formed as far back as 4 billion years ago, and many geologists believe that most of the continental crust was in place by the end of the Precambrian about half a billion years ago. Some even reckon that igneous process may have been fundamentally different before 3 billion years ago (see: Dhuime, B., Wuestefeld, A. & Hawkesworth, C. J. 2015. Emergence of modern continental crust about 3 billion years ago. *Nature Geoscience*, v. **8**, p.552–555). So big-science data mining may flatter to deceive and leave some novel questions unanswered .

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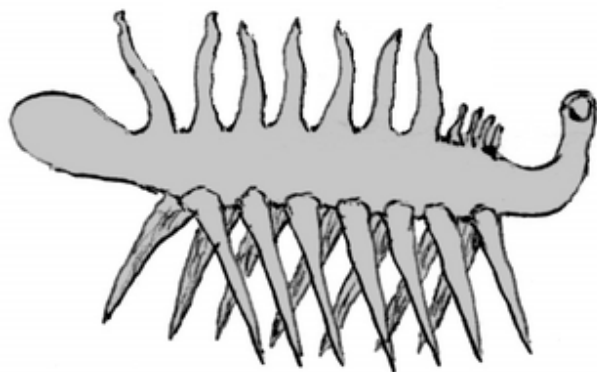
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[Hallucigenia gets a head](#)

Posted on [July 7, 2015](#) by [Steve Drury](#) | [Leave a comment](#)

The [Middle Cambrian](#) Burgess Shale of the Canadian Rockies is one of those celebrated sediments that show extraordinary preservation of soft-bodied and easily disarticulated organisms and rich assemblages of fossils. Being one of the earliest known of such lagerstätten, many of the denizens of the ecosystem in which the shale originated were at first regarded as members of hitherto undiscovered and now vanished phyla, the basal branches of the 'tree of life'. Some certainly looked pretty odd, such as *Opabina* with a feeding apparatus looking similar to the extension nozzle of a vacuum cleaner; but that is clearly some kind of arthropod. Others turned out to be

astonishingly large, once it was realised that parts of their broken bodies had previously been taken to be different organisms, an example being *Anomalocaris*. But perhaps the oddest, certainly to palaeontologists, was *Hallucigenia*. However, there are plenty of even more weird and wonderful living creatures, such as the [sea pig](#), although modern creatures are more easily pigeonholed, taxonomically speaking.



Hallucigenia as originally reconstructed; i.e. upside-down. (credit: Wikipedia)

The trouble with *Hallucigenia* was not so much its complexity – it was a fairly simple-looking beast – but that there were two choices as to which way up it lived; a feature that surprisingly led to a great deal of pondering that ended with the scientist who formally described it in 1977 making the wrong choice. That was eventually resolved fourteen years later, but the creature might also have inspired [the Pushmi Pullyu](#) in Hugh Lofting's Dr Doolittle stories for children. Not that it resembled a unicorn-gazelle cross: far from it, for no-one could decide which its front was and which its backside, and even if it may have lain on its side. But *Hallucigenia* does demonstrate bilateral symmetry beautifully – it must have a front and back, and a top and bottom, even though which was which remained veiled in mystery – and so belongs to the dominant group of animals, imaginatively known as bilaterians.

The Burgess Shale lagerstätte seemingly was heaving with *Hallucigenia* so would-be taxonomists have had no shortage of specimens to ponder over in the 38 years since [Simon Conway Morris](#) made his dreadful mistake: of course, that was not of such enormity as Einstein's 'biggest blunder' in the form of his cosmological constant, and Conway Morris quickly accepted his error when the beast was turned right-way-up in 1991. The problem is, exquisite as they are, [Burgess Shale fossils](#) are flattened and all that remains of mainly soft-bodied animals are delicate carbonaceous films, which need electron microscopy to unravel.



The latest reconstruction of *Hallucigenia*, by palaeontological illustrator [Danielle Dufault](#)

In 2015, *Hallucigenia*'s front end was definitely found and a great deal more besides by Canadian palaeontologists Martin Smith and Jean-Bernard Caron of the Royal Ontario Museum and the University of Toronto (Smith, M.R. & Caron J.-B. 2015. *Hallucigenia*'s head and the pharyngeal armature of early ecdysozoans. *Nature*, v. **523**, p. 75-78). It has eyes, albeit rudimentary, and a throat, deep within which it has pointy teeth. *Hallucigenia* was a lobopod, whose living relatives lie within that large and diverse group the [Ecdysozoa](#), which all have throat teeth and include the wondrous water bear (tardigrade) and the velvet- and penis worms (onychophores and priapulids, respectively) as well as lobsters, flies and woodlice. It may indeed have been close to the last common ancestor of all animals who moult their carapaces.

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Picture of the month, June 2015

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



Spheroidally weathered basalt from Turkey. (credit: Francisco Sousa)

[Spheroidal weathering](#) of lavas, easily confused with pillows, is also found in other homogeneous igneous rocks. It develops from rectilinear joint sets along which the groundwater responsible for breakdown of silicates initially moves. Hydration reactions begin along the joints but proceed most quickly at corners so that curved surfaces begin to develop. The concentric banding that sometimes culminates in almost spherical relics may involve more than just rotting of anhydrous silicates as the reactions involve volume increases that encourage further rock fracturing. Other factors, such as elastic strain release may also encourage the characteristic concentricity. Prolonged, intense [chemical weathering](#) leaves [isolated, rounded corestones](#) surrounded by [saprolite](#), that can form boulder fields when the softer weathered material has been eroded away.

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Are coral islands doomed by global warming?

Posted on [June 18, 2015](#) by [Steve Drury](#) | [Leave a comment](#)

Among the most vocal and persistent advocates of CO₂ emissions reduction are representatives of islands in the tropics that are built entirely of reef [coral](#). All the habitable land on them reaches only a few metres above high-tide level, so naturally they have more cause to worry about [global warming](#) and [sea-level rise](#) than most of us. Towns and villages on some [atolls](#) do seem to be more regularly inundated than they once were. So a group of scientists from New Zealand and Australia set out to check if there have been losses of

land on one Pacific atoll, [Funafuti](#), during the century since tidal observatories first recorded an average 1.7 mm annual rise in global sea level and a faster rate ($\sim 3 \text{ mm a}^{-1}$) since 1993 (Kench, P.S. *et al.* 2015. Coral islands defy sea-level rise over the past century: Records from a central Pacific atoll. *Geology*, v. **43**, p.515-518).



Funafuti atoll (Tuvalu) from space (credit: Wikipedia)

Funafuti atoll comprises 32 islands that make up its rim, with a range of sizes, elevations, sediment build-ups and human modifications. The atoll was first accurately surveyed at the end of the 19th century, has aerial photographic cover from 1943, 1971 and 1984 and high-resolution satellite image coverage from 2005 and 2014, so this is adequate to check whether or not sea-level rise has affected the available area and shape of the habitable zone. It appears that there has been no increase in erosion over the 20th century and rather than any loss of land there has been a net gain of over 7%. The team concludes that coral reefs and islands derived from their remains and debris are able to adjust their size, shape and position to keep pace with sea level and with the effects of storms.



Beach on Fongafale Islet part of Funafuti Atoll, Tuvalu. (credit: Wikipedia)

This is an observation of just one small community in the vastness of the Pacific Ocean, so is unlikely to reassure islanders elsewhere who live very close to sea level and are anxious. It is a finding that bears out longer-term evidence that atolls remained stable during the major sea-level changes of the post-glacial period until about 7 thousand years ago when land glaciers stabilised. Since coral grows at a surprisingly rapid rate, that growth and the local redistribution of debris released by wave action keep pace with sea-level change; at least that taking place at rates up to 3 mm per year. But the study leaves out another threat from global warming. Corals everywhere are starting to show signs of ill thrift, partly resulting from increasing acidity of seawater as more CO₂ dissolved in it and partly from increases in sea-surface temperature, as well a host of other implicated factors. This manifests itself in a phenomenon known as coral bleaching that may presage die-off. Should coral productivity decrease in the Pacific island states then the material balance shifts to land loss and sea level will begin an irresistible threat.