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AMBIENTE BRASIL

/ 08 / 2015 Julho de 2015 foi o mês mais quente da história no mundo todo, diz NOAA

Temperatura média de 16,61°C foi mais alta do que a média do século XX. NOAA também aponta temperaturas recordes nos oceanos.

21 / 08 / 2015 Dilma e Merkel assumem compromisso de reduzir emissão de gases de efeito estufa

O texto divulgado pela presidente Dilma Rousseff e a chanceler da Alemanha, Angela Merkel, inclui o compromisso com a descarbonização da economia até o fim deste século, o que significa reduções drásticas de emissões de gases de efeito estufa por meio de cortes significativos no uso de combustíveis fósseis.

21 / 08 / 2015 Nível de cianeto em área de explosão na China é 356 vezes superior ao limite

Fábrica de produtos químicos teve explosões na zona portuária de Tianjin. Chuva que cai na região reforça temor de grande contaminação.

21 / 08 / 2015 Desafio do balde de gelo impulsionou estudo da esclerose, dizem cientistas

Pesquisas financiadas por campanha viral começam a apresentar resultados; no Brasil, dinheiro ajuda a financiar participação em projeto internacional.

21 / 08 / 2015 Vulcão Colima entra em erupção duas vezes no mesmo dia no México

Cinzas e fumaça foram expelidas a mais de 3 quilômetros de altura. Vilas na região têm sido evacuadas desde início de atividades, em julho.

21 / 08 / 2015 Ave rara encontrada machucada no aeroporto de Cacoal/RO não resiste

Animal foi encontrado bastante debilitado após se chocar com um trator. Ave morreu quando recebia anestesia para passar por uma cirurgia.

21 / 08 / 2015 Moedas no valor de US$ 4,5 mi são achadas no litoral dos EUA

O carregamento pertencia a uma frota da 11 galeões espanhóis que afundaram durante um furacão enquanto faziam a viagem de Cuba à Espanha.

21 / 08 / 2015 Foguete é lançado da Guiana com satélite que cobrirá o Brasil

O Intelsat 34, construído pela SSL (Space Systems Loral) para a Intelsat, fornecerá soluções de conexão para meios de comunicação, para a banda larga e a telefonia móvel, bem como para aplicações empresariais, governamentais e militares.

21 / 08 / 2015 Tempestade Danny se torna primeiro furacão da temporada no Atlântico

Com ventos de 120 km, ele deve voltar em breve a ser tempestade tropical. Furacão de Categoria 1, a menor da escala, é considerado pequeno ciclone.

21 / 08 / 2015 Campanha arrecada US$ 720 mil para restauração de traje de Neil Armstrong

Doações de mais de 9 mil pessoas ajudaram a ultrapassar meta inicial. Traje deve ficar pronto para 50º aniversário de chegada à Lua, em 2019.

21 / 08 / 2015 **Panda de zoológico dos EUA pode dar à luz a qualquer momento**

Mei Xiang foi inseminada artificialmente em abril. Procedimento usou esperma congelado e esperma 'fresco'.

21 / 08 / 2015 **Empresa abre ao público software que ajuda Stephen Hawking a falar**

Programa, desenvolvido especialmente para o físico, foi disponibilizado online.

21 / 08 / 2015 **Nasa desmente que asteroide irá destruir a Terra em setembro**

Profecia teria sido alastrada por um reverendo que garante que 'devemos estar prontos' para a 'ruptura'.

21 / 08 / 2015 **"Aranha voadora" é descoberta na Floresta Amazônica**

Pesquisadores observaram que espécie conseguia pousar em troncos após ser jogada do topo das árvores.

20 / 08 / 2015 **Células do "coração" de abelhas podem mascarar efeitos de agrotóxicos nos insetos**

Sistema hepatonefrocítico do animal é capaz de combater substâncias tóxicas até uma determinada concentração e tempo de exposição, revela estudo da UFSCar de Sorocaba.

20 / 08 / 2015 **Jogos Mundiais Indígenas serão vitrine para atletas, diz secretário**

Os primeiros Jogos Mundiais dos Povos Indígenas serão "uma grande vitrine" para os atletas, disse na quarta-feira (19) o secretário Nacional de Esporte, Educação, Lazer e Inclusão Social do Ministério do Esporte, Evandro Garla Pereira da Silva.

20 / 08 / 2015 **Cientista diz que desenvolveu cérebro humano em laboratório nos EUA**

Modelo feito na Universidade de Ohio tem maturidade de feto de 5 semanas. Cérebro foi desenvolvido a partir de células da pele humana.

20 / 08 / 2015 **Brasil assina acordos ambientais de 54 milhões de euros com a Alemanha**

Acordos são para conservação de floresta e regularização de imóveis rurais. Presidente Dilma recebe chanceler alemã, Angela Merkel, nesta quinta-feira (20).

20 / 08 / 2015 **Greenpeace exige parada de reator nuclear próximo a vulcão no Japão**

Vulcão teve pequena erupção na madrugada desta quarta-feira (19). Sendai 1 é o único dos 48 reatores nucleares do país em funcionamento.

20 / 08 / 2015 **Emissões de CO2 da China estão superestimadas, afirma estudo**

Dados divulgados pela ONU foram contestados em pesquisa. Ainda assim, país continua líder mundial de emissões de dióxido de carbono.

20 / 08 / 2015 **Obama visitará Nova Orleans em 10º aniversário de furacão Katrina**

O furacão 'Katrina', em 29 de agosto de 2005, alagou quase totalmente a cidade e causou mais de 1.800 mortes.

20 / 08 / 2015 **Zoo de Tóquio voltará a tentar reprodução de panda gigante**

A inseminação artificial dos pandas é realizada no limitado período em que as fêmeas são férteis - vários dias dentro das aproximadamente duas semanas que dura o período de zelo -, e o zoológico de Tóquio realizou até nove tentativas sem sucesso entre 1994 e 2004.

20 / 08 / 2015 **Beber café diariamente pode evitar volta do câncer de cólon, diz estudo**

Estudo avaliou pacientes que foram tratados de câncer colo-retal de grau III. Outras pesquisas sugerem efeitos protetores do café contra o câncer.

20 / 08 / 2015 **Cingapura e Austrália dão lições para conviver com a escassez de água**

Crise hídrica em todo o mundo é o tema da série 'Água – Planeta em Crise'. Tonico Ferreira mostra como alguns países convivem com o racionamento.

20 / 08 / 2015 **São Paulo declara estado crítico do Alto Tietê**

Governador Geraldo Alckmin minimizou estado crítico na Bacia do Alto Tietê. Portaria publicada pelo DAAE classifica como crítica situação hídrica no local.

20 / 08 / 2015 **Foguete japonês decola com suprimentos rumo à Estação Espacial**

Foguete leva cerca de 4,5 toneladas de suprimentos. H-2B segue trajetória prevista, segundo porta-voz da agência japonesa.

20 / 08 / 2015 **Tempestade Danny mantém força e pode se transformar em furacão na 6ª feira**

A tempestade tropical Danny manteve sua intensidade nesta quarta-feira com ventos máximos sustentados a 85 km/h, e espera-se que se transforme em furacão na sexta-feira, rumo às Antilhas menores, informou o Centro Nacional de Furacões (NHC) dos EUA.

20 / 08 / 2015 **Egito convida britânico para testar teoria sobre tumba de Neferti**

O Ministério de Antiguidades do Egito anunciou nesta quarta-feira (19) que convidou o egiptólogo britânico Nicolas Reeves para visitar o Egito e testar sua própria teoria de que a sepultura da rainha Nefertiti está na tumba do faraó Tutancâmon.

20 / 08 / 2015 **Número de casos de dengue aumenta 500% no Rio**

Na capital fluminense, entre janeiro e julho, 13,5 mil pessoas foram diagnosticas com dengue.

19 / 08 / 2015 **Planeta Terra esgota recursos e 'opera no vermelho' em 2015**

Desde 13 de agosto de 2015, o nosso planeta já está "no vermelho".

19 / 08 / 2015 **Índios da Amazônia ganham cartilha para prevenção da Aids e outras doenças**

Cartilha orienta índios kanamari, do Amazonas, sobre doenças sexualmente transmissíveis, Aids e hepatites virais

19 / 08 / 2015 **Cachorros evoluíram por causa de mudanças climáticas, diz pesquisa**

Um estudo de fósseis de cães da América do Norte com 40 milhões de anos sugere que o caminho evolutivo de grupos inteiros de predadores são consequência direta das mudanças climáticas, segundo artigo publicado na Nature Communications.

19 / 08 / 2015 **EUA propõem reduzir emissões de metano na indústria de petróleo e gás**

Estas medidas visam a contribuir com os objetivos anunciados em janeiro pela Casa Branca, que consistem em reduzir estas emissões entre 40% e 45% até 2025 com relação aos níveis de 2012.

19 / 08 / 2015 **Estacionamento solar da UFRJ gera energia que pode abastecer 70 casas**

Com 414 painéis, será o maior em geração de energia, diz Fundo Verde. Energia vai alimentar rede da Light e será distribuída por todo o campus.

19 / 08 / 2015 **El Niño deve se estender além de 2015, diz instituto australiano**

Escritório Australiano de Meteorologia diz que El Niño se intensificou. Fenômeno climático se fortaleceu nas últimas semanas.

19 / 08 / 2015 **Google lança ferramenta que calcula custos da energia solar**

Empresa já investiu mais de US$ 1 bilhão em projetos de geração de energia limpa.

19 / 08 / 2015 **Tempestade Danny ameaça virar furacão e avança rumo ao Caribe**

Ela pode se transformar na quinta no primeiro furacão da temporada. Atividade no Atlântico deve ser menor este ano, dizem cientistas.

19 / 08 / 2015 **Formigas de zoo alemão carregam folhas com mensagem pró-Amazônia**

Em campanha, ONG WWF cortou slogans em folhas usando laser. Ação ocorre às vésperas de encontro entre Angela Merkel e Dilma Rousseff.

19 / 08 / 2015 **Empresa espanhola fabrica camiseta que repele mosquitos**

Tecido contém substância que repele mosquitos e outros insetos. Segundo empresa, efeito repelente aguenta até 100 lavagens.

19 / 08 / 2015 **Pesquisadores descobrem na África 'mão moderna' mais antiga do mundo**

Ossos descobertos na Tanzânia têm mais de 1,84 milhão de anos. Estudo revelou que 'mão moderna' é mais antiga do que se pensava.

19 / 08 / 2015 **Espécie ameaçada, gatos-do-deserto nascem em zoo de Israel**

Fêmea Rotem deu à luz três filhotes no Safari de Ramat Gan. Espécie que habita desertos é listada como 'quase ameaçada' por ONG.

19 / 08 / 2015 **Cigarro mata 2 mil pessoas todo ano no DF, diz Secretaria de Saúde**

Índice de fumantes caiu, mas ainda representa 10% da população. Entidades estiveram na Câmara para pedir ações contra tabagismo.

19 / 08 / 2015 **Cientistas recriam em laboratório o papel dos cometas na origem da vida**

Japoneses conseguiram criar peptídeos simulando impactos. Essas moléculas complexas são consideradas fundamentais à vida.

19 / 08 / 2015 **Coreanos e alemães testam novo exoesqueleto controlado pelo cérebro**

Em teste, voluntários saudáveis conseguiram controlar robô com cérebro. Usuário dá ordens à máquina ao olhar para luzes com frequências distintas.

19 / 08 / 2015 **Empresa planeja elevador que abre atalho para o espaço**

Empresa canadense Toth Technologies registrou a patente de torre de 20km que permitiria a decolagem de aviões espaciais da estratosfera.

18 / 08 / 2015 **Cinco maneiras pelas quais o El Niño pode alterar o clima do planeta**

Fenômeno em 2015 pode ser o mais forte já registrado, afetando todos os continentes.

18 / 08 / 2015 **Marinha alerta para ondas de mais de dois metros no litoral do RN**

Aviso começa a valer às 16h desta segunda-feira e é válido até as 12h da quinta-feira. Recomendação é que pequenas embarcações evitem navegar.

18 / 08 / 2015 **El Niño pode elevar nível dos reservatórios em 2016, diz ONS**

Segundo o diretor-geral do Operador Nacional do Sistema Elétrico, Hermes Chipp, a perspectiva dos reservatórios para geração de energia no próximo ano é mais tranquila do que foi na virada do ano passado para 2015.

18 / 08 / 2015 **China fechará 10 mil fábricas para reduzir poluição durante desfile militar**

As medidas divulgadas através da agência oficial "Xinhua", e que também incluem o fechamento temporário de centrais térmicas e a paralisação dos trabalhos em 9 mil obras, se somam às restrições ao tráfego anunciadas há alguns dias.

18 / 08 / 2015 **Fiscalização flagra despejo de óleo queimado em açude de Maceió/AL**

Retífica estava contaminando o solo com despejos inapropriados. Doze galpões industriais foram autuados por não ter licença ambiental.

18 / 08 / 2015 **Líbano está à beira de catástrofe por crise do lixo**

A crise dos resíduos começou após o fechamento do despejo de Naame, em 17 de julho, e o fim do contrato com a sociedade Sukleen, encarregada de recolher o lixo.

18 / 08 / 2015 **Projeto TerraMar protegerá a costa brasileira**

MMA, ICMBio e governo alemão lançam o projeto em Pernambuco. Investimento chega a R$ 42 milhões.

18 / 08 / 2015 **Seca prejudica obras de emergência do Sistema Alto Tietê**

Especialista diz que rio Guaió não tem vazão para socorrer represas. Agosto é o mês com maior redução no volume do sistema em 2015.

18 / 08 / 2015 **Baleias-francas são avistadas no Litoral Norte do RS**

Segundo Instituto Oceano Vivo, elas foram vistas no domingo em Cidreira. Fêmea e filhote se aproximaram da costa e pesquisadores gravaram a cena.

18 / 08 / 2015 **Estados da Amazônia fortalecem REDD+**

Reunião de representantes do MMA e dos governos locais destaca a importância de unificar ações capazes de reduzir emissões por desmatamento.

18 / 08 / 2015 **Projeto quer identificar vegetação em florestas do Amapá após exploração**

Especialistas do Amapá e Guiana Francesa desenvolverão a pesquisa. Monitoramento ocorrerá em dois anos, para mapear vegetação.

18 / 08 / 2015 **Projeto pretende avançar o conhecimento sobre explosões solares**

Pós-doutorando na University of Glasgow, da Escócia, ex-bolsista da FAPESP é o único representante brasileiro no consórcio de pesquisa integrado por sete instituições europeias.

18 / 08 / 2015 **Plantações de cacau 'invadem' a floresta tropical amazônica**

Alerta é de um estudo publicado pelo World Resources Institute (WRI). Produtores passaram a olhar a América do Sul como grande viveiro.

18 / 08 / 2015 **Saguis são vistos como ameaça ao meio ambiente em Santa Catarina**
Animal é uma espécie de macaquinho bem comum no Norte e Nordeste do Brasil, e foi levada de forma clandestina para o Sul do país.

17 / 08 / 2015 **Descoberta na Áustria geleira para treinar missão a Marte**

Uma geleira alpina de 2,7 mil metros de altura não é o entorno desértico que habitualmente é associado a Marte, mas é onde foram encontradas as "condições ideais" para treinar uma missão simulada ao planeta vermelho.

17 / 08 / 2015 **Cegonhas viram 'pais adotivos' de filhote em zoológico dos EUA**

Funcionários de zoológico encontraram ovo abandonado. Casal que já chocava um ovo próprio chocou também 'ovo adotivo'.

17 / 08 / 2015 **Japão adia lançamento da sonda Konotori 5 para Estação Espacial**

Decolagem estava prevista para este domingo (16). Mau tempo causou mudança; lançamento deve ser na segunda (17).

17 / 08 / 2015 **SP registra quedas nos índices de água dos reservatórios de 6 sistemas**

Sistema Cantareira caiu pela 14ª vez consecutiva no sábado (15). Segundo boletim da Sabesp, não choveu; SP vive crise hídrica.

17 / 08 / 2015 **Mauá/SP terá sensor para monitorar deslizamentos em tempo real**

O sistema pode detectar as movimentações do solo em um raio de 2,5 quilômetros a partir dos dispositivos instalados em 150 casas, no bairro do Jardim Zaíra.

17 / 08 / 2015 **China quer usar animais para prever terremotos**

Cientistas vão observar mudanças no comportamento de animais que poderiam estar relacionadas à iminência de tremores.

17 / 08 / 2015 **Povoado em Serra Leoa festeja fim de isolamento por ebola**

Aldeia Masesbe estava em isolamento havia 21 dias por causa de doença. Vírus do ebola reapareceu recentemente no local de 500 habitantes.

17 / 08 / 2015 **Luz síncrotron aprofunda conhecimento sobre solo brasileiro**

Processos químicos, físicos e biológicos que ocorrem em diversas regiões do solo são estudados em nível atômico.

17 / 08 / 2015 **Onda de calor faz egípcios sofrerem e causa mais de 90 mortos**

Em uma semana, pelo menos 93 egípcios, a maioria idosos, morreram por causa das altas temperaturas e quase 200 tiveram que ser hospitalizados ao sofrer com fadiga e desmaios, após ficarem expostos ao sol, que estes dias castiga mais do que nunca o país.

17 / 08 / 2015 **Incêndios atingem duas regiões de mata neste domingo no DF**

Focos estão perto de área urbana; combate começou às 14h, diz Bombeiros. Até as 18h deste domingo, não havia vítimas ou dano registrado a moradias.

17 / 08 / 2015 **Autoridades chinesas são alvo de críticas por resposta a explosões**

As explosões que mataram mais de 50 pessoas na cidade chinesa de Tianjin na quarta-feira levantaram diversos questionamentos de chineses a autoridades. As explosões ocorreram em um depósito de materiais químicos e foram tão intensas que puderam ser vistas do espaço. Mais de 720 pessoas ficaram feridas.

17 / 08 / 2015 **MMA apresenta Programa Arpa no Peru**

Encontro da RedParques permite a troca de experiências positivas, o que evitará a repetição de equívocos já cometidos por instituições parceiras.

17 / 08 / 2015 **Canadá é acusado de transformar Filipinas em lixão**

A chegada às Filipinas de cerca de 2,5 mil toneladas de resíduos enviados pelo Canadá nos dois últimos anos indignou grupos ambientalistas, que acusam o país de tratar o arquipélago asiático como um depósito de lixo.

17 / 08 / 2015 **Governo do Rio investe em saneamento para viabilizar Jogos Olímpicos**

Oito obras de saneamento estão sendo feitas pelo governo do estado do Rio de Janeiro para viabilizar os Jogos Olímpicos Rio 20216. O objetivo é tratar o esgoto lançado diariamente na Baía de Guanabara e favorecer, principalmente, as competições aquáticas.

10 / 08 / 2015 **Perigo em órbita: o avanço do problema do lixo espacial**

Em 2014, a Estação Espacial Internacional (ISS) teve de mudar de lugar três vezes para escapar de pedaços letais de detritos espaciais, que também ameaçam satélites cruciais - e caros - atualmente em órbita.

10 / 08 / 2015 **Umidade do ar atinge 12% em Cuiabá/MT no domingo e chega a nível de deserto**

Por conta da baixa umidade, a capital de MT entra em estado de alerta. Menor índice do ano foi registrado pelo Inpe na tarde deste domingo (9).

10 / 08 / 2015 **Escócia proíbe cultivo de produtos geneticamente modificados**

O governo escocês tomou como base as novas regras europeias que permitem que os países recusem individualmente "culturas geneticamente modificadas autorizadas pela União Europeia".

10 / 08 / 2015 **Parque ecológico de Nova Odessa/SP registra 1º nascimento de araras**

Reprodução é inédita no local e as aves ainda estão no ninho. Procriação em cativeiro é considerada rara, segundo Prefeitura.

10 / 08 / 2015 **Cerca de 4 mil árvores passaram por manutenção na capital paraense**

Serviço foi realizado no primeiro semestre de 2015. Semma prevê que 5.120 árvores recebam manutenção ao longo do ano.

10 / 08 / 2015 **Com volume 77% menor, Piracicaba vira 'rio de pedras' no interior de SP**

Manancial ficou com 12,3 mil litros de água por segundo neste domingo (9). Vazão média para agosto é de 54,8 mil litros por segundo, conforme Daee.

10 / 08 / 2015 **Nagasaki lembra 70 anos do ataque nuclear com defesa do pacifismo**

Tragédia foi lembrada no Parque da Paz, com um minuto de silêncio. Bomba atômica explodiu em 9 de agosto de 1945, matando 74 mil na hora.

10 / 08 / 2015 **Tufão Soudelor chega à China provocando mortes e inundações**

Cidade de Ningde, na província de Fujian, está alagada. Tormenta deixou mortos e feridos também em Taiwan.

10 / 08 / 2015 **Estudo mostra que países ricos enfrentam maior risco de inundações**

Os países ricos enfrentam riscos maiores com as alterações climáticas e as atividades humanas, que tornam as populações costeiras mais vulneráveis a inundações devastadoras.

10 / 08 / 2015 **Nível do Sistema Cantareira registra oitava queda consecutiva em agosto**

Manancial operava com 17,9% da sua capacidade neste domingo (9). Agosto é tradicionalmente o mês mais seco do ano, diz CGE.

10 / 08 / 2015 **Dendê é fonte de renda para pequenos produtores da Amazônia**

Entenda como é feito cultivo, a colheita e a produção do óleo. Planta dá frutos o ano inteiro.

10 / 08 / 2015 **Mesmo com chuva, volume do Sistema Alto Tietê cai 0,2 mm**

Essa é a 11ª queda consecutiva no volume de água das represas. Sistema opera em 17%, segundo a Sabesp.

10 / 08 / 2015 **Brasileiro clica marlim azul atacando corrida das sardinhas na África do Sul**

Fenômeno marinho ocorre quando corrente fria 'empurra' milhões de peixes. Fotógrafo precisou de 35 dias para ter boas condições para o mergulho.

10 / 08 / 2015 **Holandês de 21 anos embarca para missão de limpar Pacífico de plásticos**

O holandês Boyan Slat era um adolescente quando teve a ideia de livrar os oceanos de resíduos de plástico. Aos 21 anos, ele conseguiu reunir, via financiamento coletivo, os US$ 2,2 milhões para começar a tarefa, e agora dá o primeiro passo da missão: a elaboração de um mapa deste tipo de resíduos no Pacífico.

11 / 08 / 2015 **Cometa Tchouri e sonda Rosetta atingem ponto próximo do Sol**

Cientistas esperam recolher partículas orgânicas deixadas pela formação do Sistema Solar e presas durante 4,6 bilhões de anos nesse cometa.

11 / 08 / 2015 **Calor causa morte de 21 pessoas no Egito**

As vítimas, que morreram no domingo (9), não resistiram às altas temperaturas, que chegaram a atingir 47 graus Celsius e se tornaram piores por causa dos elevados níveis de umidade.

11 / 08 / 2015 **Zoneamento agrícola orienta plantio de dez culturas de verão**

O zoneamento agrícola é um instrumento auxiliar na gestão de riscos na agricultura, porque reduz os graus de dificuldade relacionados a fenômenos climáticos adversos, uma vez que permite ao produtor identificar o melhor período de semeadura das lavouras nos diferentes tipos de solo e ciclos de cultivares.

11 / 08 / 2015 **Inverno quente aumenta risco de dengue em Santa Bárbara/SP, diz Saúde**

Temperaturas acima de 30°C são propícias à proliferação do Aedes aegypti. Índice em 'armadilhas' que mapeiam larvas não caiu o previsto, cita CCZ.

11 / 08 / 2015 **Avanços no combate à dengue são discutidos em encontro em Cuba**

Especialistas de 15 países, incluindo Brasil e EUA, estão em Havana. Eles discutirão situação epidemiológica e desenvolvimento de vacinas.

11 / 08 / 2015 **Apenas 30% dos recifes de coral indonésios estão em boas condições**

Os recifes de coral sofreram danos principalmente devido a atividades humanas como a pesca com explosivos e potássio e os resíduos marítimos.

11 / 08 / 2015 **Cosmonautas russos concluem caminhada espacial na ISS**

A caminhada espacial teve uma duração de 5 horas e 31 minutos, uma a menos do que o previsto originalmente, e terminou às 19h51 GMT (16h51 de Brasília), explicou a agência espacial americana.

11 / 08 / 2015 **Panda-gigante mostra sinais de gravidez em zoológico dos EUA**

Mei Xiang foi inseminada artificialmente em abril. Procedimento usou esperma congelado e esperma 'fresco'.

11 / 08 / 2015 **Zimbábue suspende parcialmente restrições à caça de leões e outros animais**

Em comunicado divulgado à imprensa, a Associação de Guias e Caçadores Profissionais do Zimbábue especificou que a proibição à caça de animais de grande porte será mantida em alguns cerrados como no qual morreram recentemente dois leões, incluindo Cecil, e em duas zonas de caça ao sul do Parque Natural Hwange.

11 / 08 / 2015 **CAR já cadastrou 59% dos imóveis rurais**

Números indicam que, até o fim do prazo, 5 de maio de 20116, cobertura chegará próximo de 100%.

11 / 08 / 2015 **Campanha de vacinação contra pólio começa neste sábado em todo o país**

Além de vacina contra poliomielite, crianças poderão atualizar caderneta. Campanha do Ministério da Saúde vai de 15 a 31 de agosto.

11 / 08 / 2015 **Papa estabelece dia anual de cuidado com meio ambiente para os católicos**

Dia Mundial de Prece pelo Cuidado com a Criação será em 1º de setembro. Ortodoxos já dedicam a data à proteção do meio ambiente.

11 / 08 / 2015 **Rio fica laranja após contaminação por agência ambiental nos EUA**

Funcionários acidentalmente despejaram metais pesados no rio. Contaminação fez cidade declarar estado de emergência e afeta população.

11 / 08 / 2015 **Estudo diz que mudanças climáticas ameaçam borboletas britânicas**

Extinção de espécies sensíveis à seca poderia ocorrer antes de 2050. Borboletas podem indicar efeitos em outros insetos.

11 / 08 / 2015 **Baleia aparece na costa da Austrália e atrai centenas de espectadores**

Observadores chegaram mais perto de baleia-jubarte em barcos fretados. Milhares de baleias migram nesta época da Antártica para a Austrália.

12 / 08 / 2015 **Índios Tremembés recebem posse permanente de terras no Ceará**
A Terra Indígena Tremembé da Barra do Mundaú tem 3.580 hectares. O espaço é alvo de uma disputa judicial com um grupo estrangeiro que planeja construir um grande empreendimento turístico no local. Batizado de Nova Atlântida, o projeto inclui a construção de hotéis e campos de golfe na área.

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Editorial

Data, ideas, and the nature of scientific progress
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Three-component mixed-layer illite/smectite/kaolinite (I/S/K) minerals in hydromorphic soils, south China
Hanlie Hong, Feng Cheng, Ke Yin, Gordon Jock Churchman, and Chaowen Wang
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Decrease of hydrogen incorporation in forsterite from CO2-H2O-rich kimberlitic liquid
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Structural insights and elasticity of single-crystal antigorite from high-pressure Raman and Brillouin spectroscopy measured in the (010) plane
Hauke Marquardt, Sergio Speziale, Monika Koch-Müller, Katharina Marquardt, and Gian Carlo Capitani
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Joshua H.F.L. Davies, Richard A. Stern, Larry M. Heaman, Xavier Rojas, and Erin L. Walton
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Fluids in the Crust

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Letter

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Marco Merlini, Michael Hanfland, Ashkan Salamat, Sylvain Petitgirard, and Harald Müller
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New Mineral Names

New Mineral Names
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Book Review

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EARTH PAGES

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 km^3 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 km^3 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 Chulalonkorn 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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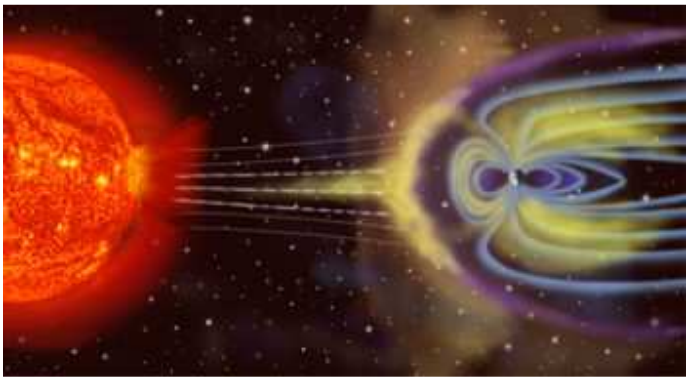
When Earth got its magnetic field

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 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 kangeroos 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 IWillerslev, 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?

Posted on July 16, 2015 by Steve Drury | 4 comments

Thin section of a typical granite: clear white and grey grains are quarts (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 SiO_2 (silica). A basalt with ~50% silica could give rise to rocks of roughly granitic composition (~60% SiO_2) – 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 SiO_2-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, SiO_2-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 became 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, SiO_2. 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 .

Related articles

Till, C. 2015. Big geochemistry. Nature, v. **523**, p. 293-294.

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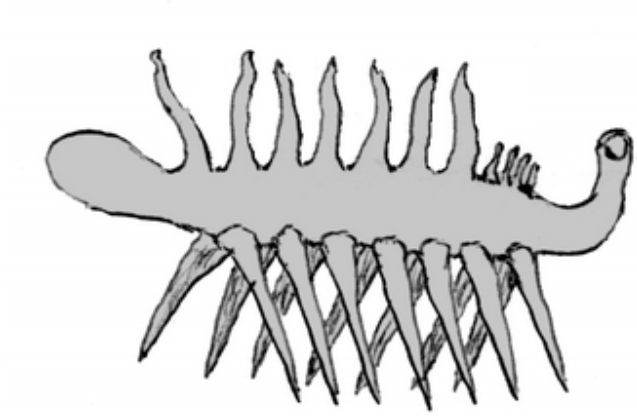
Hallucigenia gets a head

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.

1 Comment

Posted in Geomorphology

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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 voluble and persistent advocates of CO_2 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 (~3 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 CO_2 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.

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Flourishing life during a Snowball Earth period

Posted on June 18, 2015 by Steve Drury | Leave a comment

That glacial conditions were able to spread into tropical latitudes during the late Neoproterozoic, Cryogenian Period is now well established, as are the time spans of two such events. http://earth-pages.co.uk/2015/05/21/snowball-earth-events-pinned-down/ But what were the consequences for life that was evolving at the time? That something dramatic was occurring is signalled by a series of perturbations in the carbon-isotope composition of seawater. Its relative proportion of ^{13}C to ^{12}C ($\delta^{13}C$) fell sharply during the two main Snowball events and at other times between 850 to 550 Ma. Since ^{12}C is taken up preferentially by living organisms, falls in $\delta^{13}C$ are sometimes attributed to periods when life was unusually suppressed. It is certain that the 'excursions' indicate that some process(es) must have strongly affected the way that carbon was cycled in the natural world.

Artist's impression of a Snowball Earth as it would appear with today's continental configuration adjacent to the East Pacific Ocean. (Photo credit: Wikipedia)

The further sea ice extended beyond landmasses during Snowball events the more it would reduce the amount of sunlight reaching the liquid ocean and so photosynthesis would be severely challenged. Indeed, if ice covered the entire ocean surface – the extreme version of the hypothesis – each event must have come close to extinguishing life. An increasing amount of evidence, from climate- and oceanographic modelling and geological observation, suggests that a completely icebound Earth was unlikely. Nevertheless, such dramatic climate shifts would have distressed living processes to the extent that extinction rates were high and so was adaptive radiation of survivors to occupy whatever ecological niches remained or came into being: evolution was thereby speeded up. The roughly half-billion years of the Neoproterozoic hosted the emergence and development of multicellular organisms (metazoan eukaryotes) whose cells contained a nucleus and other bodies such as mitochondria and the chloroplasts of photosynthesisers. This hugely important stage of evolution burst forth shortly after – in a geological sense – the last Snowball event, during the Ediacaran and the Cambrian Explosion. But recent investigations by palaeontologists in glaciogenic rocks from China unearthed a rich diversity of fossil organisms that thrived during a Snowball event (Ye, Q. *et al*. 2015. The survival of benthic macroscopic phototrophs on a Neoproterozoic snowball Earth. *Geology*, v. **43**, p. 507-510).

The Nantuo Formation in southern China contains glaciogenic sedimentary rocks ascribed to the later Marinoan glaciation (640 to 635 Ma). Unusually, the pebbly Nantuo glaciogenic rocks contain thin layers of siltstones and black shales. The fact that these layers are free of coarse fragments that floating ice may have dropped supports the idea that open water did exist close to glaciated landmasses in what is now southern China. Palaeomagnetic measurements show that the area was at mid-latitudes during the Marinoan event. The really surprising feature is that they contain abundant, easily visible fossils in the form of carbonaceous ribbons , disks, branching masses and some that dramatically resemble complex multi-limbed animals, though they are more likely to be part of an assemblage of algal remains. Whatever their biological affinities, the fossils clearly signify that life happily flourished beneath open water where photosynthesis provided a potential base to a food chain, though no incontrovertible animals occur among them.

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See also: Corsetti, F.A. 2015. Live during Neoproterozoic Snowball Earth. *Geology*, v. **43**, p. 559-560.

-  Fossils Explain How Life Coped During Snowball Earth

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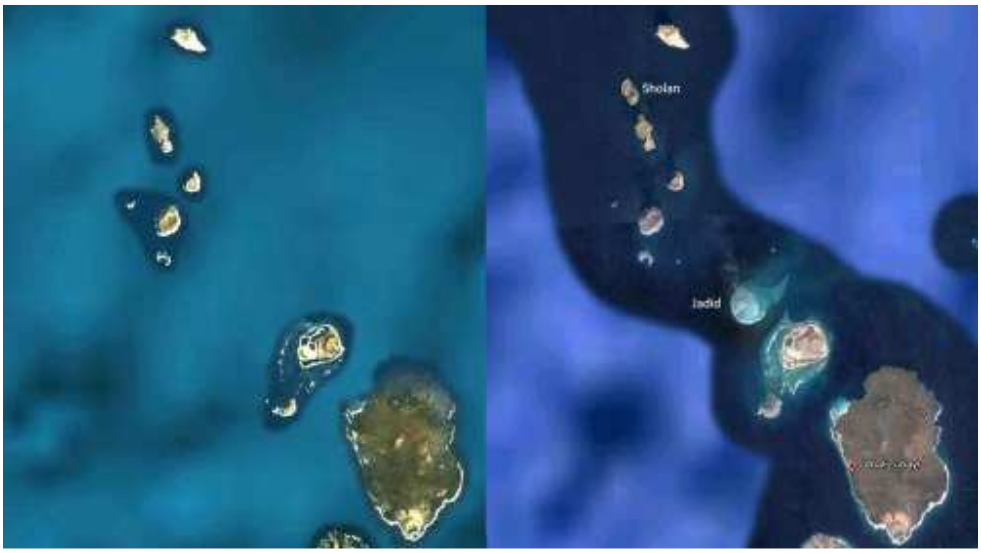
Two happy events for plate tectonics

Posted on June 4, 2015 by Steve Drury | 1 comment

In an era where fears of rising sea level and loss of land are growing it is a great pleasure to announce (albeit several years late) the birth of two new islands. They emerged close to the axis of the Red Sea in Yemeni territory as new members of the volcanic Zubair Islands during episodic eruptions that began on 18 December 2011. First to form was dubbed Sholan ('One who is Blessed' in Arabic – a girl's name), which ceased to be active a month later. Further submarine volcanism began on 28 September 2013, with another island,

Jadid ('New' in Arabic – a boy's name), breaking surface in October 2013. The double event has been described in great detail by geoscientists based at King Abdullah University of Science and Technology, Saudi Arabia (Xu, W. 2015. Birth of two volcanic islands in the southern Red Sea. *Nature Communications*, DOI: 10.1038/ncomms8104. After rapid growth during their initial eruptive phases both islands underwent significant marine erosion once quiescent, but seem set to remain as part of the Zubair archipelago.



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

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

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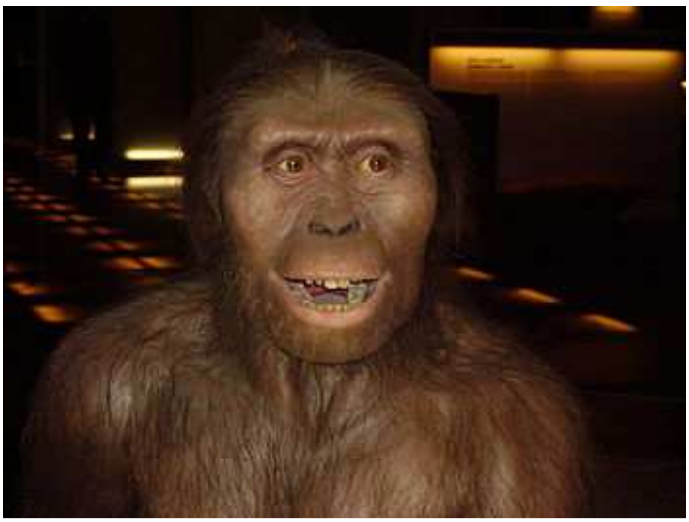
Stone tools go even further back

Posted on May 25, 2015 by Steve Drury | Leave a comment

Shortly after it seemed that the maker of the earliest stone tools (2.6 Ma) may have been *Australopithecus africanus*, thanks to a novel means of analyzing what hominin hands may have been capable of, some actual tools have turned up from even earlier times (Harmand, S. and 20 others 2015. 3.3-million-year-old stone tools from Lomekwi 3, West Turkana, Kenya. *Nature*, v. **521**, p. 310-315). Their age is comparable with that (3.4 Ma) of animal bones from Dikika, Ethiopia showing cut marks and signs of deliberate breaking, which had previously been controversial as they suggested that local *Australopithecus afarensis* of a similar age had made them. What the authors claim to be 'a new beginning to the known archaeological record' almost a million years earlier than the first appearance of Homo fossils in the Lake Turkana area seems to point in that direction. But *A. afarensis* has not been found in that area, although a hominin known as *Kenyanthropus platyops* with roughly the same age as the tools has.



Reconstruction of Australopithecus afarensis (Photo credit: Wikipedia)

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

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

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

Note added 28 May 2015: Within a week palaeoanthropologists' focus shifted to the Afar Depression in Ethiopia where a new species of hominin has emerged from Pliocene sediments dated to between 3.3 and 3.5 Ma (Haile-Selassie, Y *et al*. 2015. New species from Ethiopia expands Middle Pliocene hominin diversity. *Nature*, v. **521**, p. 483-488. doi:1038/nature14448). *Australopithecus deyiremeda* is represented by fragments of two lower- and one upper jaw plus several other lower facial specimens. So the species is differentiated from other hominins by dentition alone, but that is unmistakably distinct from extensive data on *Au. afarensis* which lived within a few kilometres over the same period. Until the last 15 to 20 years it was thought that *Au. afarensis* was the sole hominin around in the Middle Pliocene of East and Central Africa, but now it seems there may have been as many as five, the three mentioned above, plus *Au. bahrelghazali* from Chad and an as yet undesignated fossilised foot from Afar. For possibly three closely related species to coexist in Afar is difficult to understand: possibly they occupied different niches in the local food web or employed different strategies (Spoor, F. 2015.

The middle Pliocene gets crowded. *Nature*, v. **521**, p. 432-433). Another question is: did they all make and use tools? For the Lomekwi tools *K. platyops* is a candidate, but for the cut marks on bones at Dikika in Afar there are at least two: *Au. afarensis* and *Au. deyiremeda.* So multiple tool makers living at the same time suggests some earlier originator of the 'tradition'.

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