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5. Indústria da Europa quer acesso mais confiável à biodiversidade mundial
6. Pesquisas com células-tronco entre a ousadia e a cautela
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13. Agência europeia desqualifica estudo que liga transgênicos a câncer
14. Impa comemora 60 anos
15. Brasil vence a Olimpíada Ibero-americana de Matemática na Bolívia
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17. Instituto Mamirauá exhibe programação variada para a SNCT
18. Tome Ciência: A física 100 anos depois da revolução de Einstein
19. Concurso da UFRN abre 76 vagas para novos professores do quadro

#### **AMBIENTE BRASIL**

Pelos ajudam elefantes a resfriar corpo e eliminar calor, diz estudo

Pelos esparsos ajudam a melhorar controle de calor em 5%, diz pesquisa. Descoberta sugere que pelo em elefantes pode ser característica evolutiva.

Sistema de prevenção de desastres naturais deverá ser criado nas Américas  
Inicialmente, a ideia é reunir países que queiram integrar o projeto.

Catástrofes naturais já custaram ao mundo US\$ 3,5 trilhões em 30 anos  
Banco Mundial pede que países fiquem menos vulneráveis a desastres. Somente em 2011, as perdas foram estimadas em US\$ 380 bilhões.

Astrônomos da UFRGS descobrem novo satélite na Via Láctea  
Segundo pesquisadores, descoberta é inédita entre astrônomos brasileiros. Objeto está ligado ao processo de formação da nossa galáxia.

Três tucanos são apreendidos em fazenda no Norte de Minas  
As aves eram mantidas em viveiro na zona rural de São João da Lagoa. O criador foi preso em flagrante e encaminhado à delegacia.

Sem controle, pior incêndio em 20 anos atinge parque de Minas Gerais há uma semana  
Ao todo, já teriam sido consumidos 5.000 hectares da vegetação da unidade, que tem 31 mil hectares no total.

Morre o biólogo Keith Campbell, um dos 'pais' da ovelha Dolly  
Britânico morreu na sexta passada, mas anúncio foi feito nesta quinta (11). Campbell fez mais de 60% da pesquisa que levou à clonagem do mamífero.

Ibama apreende uma tonelada de pirarucu em porto de Manaus/AM  
Pescado veio de Fonte Boa e seria comercializado na capital. Proprietário de barco foi autuado e terá que pagar uma multa de R\$ 80 mil.

Novo presidente da Embrapa diz que orientação é ampliar atuação no exterior  
A Embrapa tem 47 unidades no país, quase dez mil empregados, sendo 2.410 pesquisadores - e ainda desenvolve pesquisas no exterior com laboratórios dos Estados Unidos, da França, Alemanha, Coreia do Sul e do Japão.

Robô submarino mapeia em 3D 'montanhas' submersas da Antártica  
Projeto que integra oito países vai conhecer melhor profundezas da região. Objetivo é saber mais detalhes do impacto da mudança climática.

Restos de antigo galeão espanhol são descobertos no mar na Itália  
Policiafz fazia mergulho na costa da Sicília e percebeu canhão na areia. Para comandante, peças de navio poderiam ser expostas em museus.

País que come mais chocolate ganha mais prêmios Nobel, diz estudo  
Pesquisa sugere que o cacau pode aumentar a capacidade mental. Cruzamento de dados foi feito com consumidores de 23 países.

Pântano acolhe 90 espécies de aves no centro de Bucareste  
Em seus quase 200 hectares de vegetação diversa e em seus pântanos alimentados por águas subterrâneas vivem, em um ecossistema estável, diferentes tipos de peixes, patos selvagens, cisnes, salamandras, cobras d'água, gaivotas e raposas, entre outras espécies.

Estudo sobre o aquecimento global analisa comportamento de aves  
Parceria entre universidades do Brasil e Canadá é feita no Vale do Paraíba. Objetivo é saber se beija-flores sobrevivem a altas temperaturas da Terra.

Brasil rejeitará prazos para preservação da biodiversidade  
Os negociadores mostrarão que o país tem condições e disposição para cumprir as recomendações internacionais.

Custo das catástrofes naturais triplicou em 30 anos  
Os gastos com desastres alcançaram um total de 3,5 trilhões de dólares.

A vez da pecuária sustentável  
Poder público, setor privado e sociedade querem que a atividade utilize práticas socialmente justas, ambientalmente corretas e economicamente viáveis.

Pesquisadores vestidos de panda capturam ursos para exame na China  
Mãe e filhote passariam por análises antes de serem devolvidos à natureza. Panda-gigante está ameaçado de extinção, de acordo com organização.

Funai terá que mediar desocupação de Belo Monte, determina Justiça Federal  
Além da intermediação da Funai, a negociação entre a empresa responsável pelas obras, a Norte Energia, e os manifestantes deverá ser acompanhada por um procurador federal e por outros especialistas em assuntos indígenas.

Laboratórios vão testar remédios para prevenir Alzheimer  
O teste deve começar no começo do ano que vem, envolvendo 160 pacientes no mundo todo. Todos eles têm mutações genéticas que costumam levar ao aparecimento de sintomas do Alzheimer antes dos 40 anos.

Turismo sustentável na Copa  
Passaporte Verde é um guia com orientações sobre o turismo sustentável, respeito ao meio ambiente e apoio ao desenvolvimento social

e econômico das comunidades.

ONU premia estudante brasileiro em concurso de pintura sobre meio ambiente

A pintura de Waldir Tokuda representa as "comunidades verdes", tema do concurso. Nela, as pessoas, animais, carros e ciclistas convivem em perfeita harmonia em um mundo de cores e alegria.

Estudo: células-tronco podem ajudar em terapia para doenças cerebrais

Os resultados, publicados na revista Science, sugerem que células-tronco neurais, que podem se diferenciar na produção de mielina nas células do cérebro (chamadas oligodendrócitos), podem servir como tratamento para a deficiência, também chamada de leucodistrofia.

Novos fósseis sugerem antigas origens de espécies do fundo do mar

Anteriormente, os pesquisadores acreditavam que estes animais evoluíram em passado relativamente recente, depois de pelo menos dois períodos de extinção em massa causada por mudanças em seu ambiente oceânico.

Maurício Antônio Lopes é o novo presidente da Embrapa

Engenheiro agrônomo assume no lugar de Pedro Antônio Arraes Pereira. Pesquisador especializado em genética está na empresa desde 1989.

Polícia Ambiental apreende 250 quilos de pirarucu em Porto Velho/RO

Pescado não tinha nota fiscal nem origem declarada. Carga veio do Amazonas, escondida embaixo de outros peixes, diz polícia.

Fóssil de animal de 520 milhões de anos tem cérebro bem preservado

Artrópode fossilizado tem estrutura neural similar a insetos, dizem cientistas. Estudo publicado na 'Nature' indica que cérebro evoluiu antes do imaginado.

Justiça manda Incra cessar desmate da Amazônia em propriedades no PA

Liminar diz que órgão deve conter devastação em assentamentos rurais. Entre janeiro e setembro de 2012, estado desmatou 482,52 km<sup>2</sup> de floresta.

Americanos levam Nobel de Química por estudos de receptores celulares

Anúncio de dupla vencedora aconteceu nesta quarta (10), em Estocolmo. Estruturas permitem às células 'perceber' moléculas no exterior.

Tropa especial do governo vai atuar contra desmatamento na Amazônia

Governo anuncia criação de grupo da Força Nacional para atuar no bioma. Em setembro, Deter registrou desmatamento de 282 km<sup>2</sup> na Amazônia.

Órgão recomenda que Fifa compense emissão de gases poluentes na Copa de 2014

Apesar da falta de dados, o Pnuma calcula que durante a competição foi emitida 1,65 milhão de toneladas de dióxido de carbono, número 60% menor do que o previsto, que girava em torno de 2,64 milhões de toneladas.

Curiosity encontra objeto brilhante no solo de Marte

Objeto chamou a atenção dos cientistas da missão, pois poderia ser um pedaço do jipe-robô.

Horário de verão diminuirá demanda de energia entre 5% e 5,5%, estima especialista da PUC-Rio

No verão, a ponta do sistema elétrico tende a ficar muito carregada no horário que se estende das 18 horas às 21 horas, principalmente no horário de pico, quando a iluminação pública é ativada e as pessoas vão para suas casas, ligam a televisão e aparelhos de ar condicionado.

Nobel de Medicina alerta sobre falsas terapias com células-tronco

A internet está repleta de propagandas que prometam curas com células-tronco para qualquer doença - incluindo diabetes, esclerose múltipla, artrite, problemas de vista, Alzheimer, Parkinson e até lesões na coluna vertebral - em países como China, México, Índia, Turquia e Rússia.

Francês e americano ganham Nobel de Física de 2012

Eles desenvolveram 'métodos de manipulação de sistemas quânticos'. Anúncio aconteceu nesta terça-feira (9), na Suécia.

Conservação remunerada

Para o MMA, é necessário avaliar os custos e benefícios decorrentes dos diferentes usos do solo, além de se combinar conservação de florestas com o pagamento pelo serviço.

Com condição rara, cachorro nasce com coloração verde na Inglaterra

A coloração diferenciada ocorre quando a mãe, durante a gravidez, fica exposta a uma substância chamada bilverdina, que pode ser encontrada na placenta.

Eletrônicos não reciclados são fonte de ouro no lixo, diz Greenpeace

Segundo o Greenpeace, o material está presente em dez milhões de celulares que são jogados fora por ano no país, e que - para piorar - poluem a terra, o ar e a água.

Cientistas descobrem fóssil raro de ataque de aranha contra presa

Trata-se do primeiro registro de ataque de aranha do mundo, diz pesquisa. Fóssil em peça de âmbar tem cerca de 100 milhões de anos.

Mau tempo impede missão de austríaco que tenta quebrar velocidade do som

Ainda não há data prevista para a próxima tentativa de salto do paraquedista Felix Baumgartner.

Exame a laser mostra importância do solstício em Stonehenge

Pesquisa mostrou que pedras foram posicionadas de uma maneira que sobressaíssem no alvorecer do dia mais longo do ano e ao entardecer do dia mais curto.

Oceano Ártico se divide entre a exploração econômica e a ecologia

O futuro do Ártico e a pesca predatória, além dos recursos genéticos e de mineração de suas profundezas, representam os novos desafios econômicos dos oceanos, que pedem uma regulamentação para que os ecossistemas sejam preservados.

Observatório Magnético da Amazônia será inaugurado em 2013, no AM

Obras estão sendo construídas em Tefé, no interior do Amazonas. Local vai gerar dados sobre a intensidade do campo magnético da Terra.

Manifestantes ocupam canteiro de obras de Belo Monte, no Pará

Cerca de 200 indígenas, agricultores e pescadores ocupam sítio Pimental. Consórcio Construtor de Belo Monte ainda não se manifestou.

Conferência da biodiversidade inicia com apelo a financiamento

Especialistas ambientais da ONU alertaram que o mundo tem apenas uma década para evitar uma extinção das espécies, que também representa uma ameaça à Humanidade.

Degelo acelerado na Groenlândia cria indústria de mineração no Ártico

Derretimento de calotas polares faz surgir depósitos de pedras preciosas. Cidade que sobrevivia da pesca do camarão já sente impacto econômico.

Protesto contra política ambiental da Índia marca início de cúpula da ONU

Conferência sobre biodiversidade reunirá governos em Hyderabad. Greenpeace pendurou faixa em mesquita da cidade indiana.

Morre girafa que perdeu companheiras após ataque de vândalos em zoológico

De acordo com os tratadores do zoológico da Polônia, Tofik apresentava sinais de depressão e vinha recusando alimento.

Estudo relaciona substância do tomate com menor incidência de AVC

Homens com mais licopeno no sangue tiveram menos derrames, diz artigo. Antioxidante é responsável pela coloração vermelha do tomate.

Dia das Crianças sustentável

Campanha que estimular o sentido do desapego, o não acúmulo e o não consumismo, pilares da sustentabilidade.

Nobel de Medicina premia cientistas por trabalhos com células-tronco

Britânico John B. Gurdon e japonês Shinya Yamanaka são reconhecidos. Descoberta revolucionou a medicina regenerativa ao 'reprogramar' células.

Carcaça de baleia aparece em praia da África do Sul e atrai tubarões

Remoção do corpo deu trabalho para equipes da Cidade do Cabo. Alerta sobre a presença de tubarões foi emitido para moradores.

Nasa lança 'serviço de entrega' para Estação Espacial Internacional

A nave da empresa Space-X não é tripulada, e tem a bordo quatrocentos quilos de comida, roupas e material de trabalho que chegarão aos seis astronautas da EEI.

Bactéria pode acabar com estrelas-do-mar devoradoras de corais

A descoberta pode ser importante na luta contra a perda de arrecifes corálicos devido a tempestades, ao avanço das estrelas-do-mar e ao aquecimento global.

Horário de verão começa dia 21; relógio deverá ser adiantado

O principal objetivo do horário de verão é aliviar as redes de transmissão de energia nos períodos do dia em que o consumo é mais intenso, principalmente das 18h às 21h.

Brasileiros e suecos descobrem neurônios que controlam memória

Segundo os cientistas, as OLM-alpha2, apelidadas de "células portadoras", ajudam a explicar como ocorre o fluxo de informação no hipocampo, uma região do cérebro importante na consolidação de dados em memória e aprendizado.

Expansão das cidades pode elevar temperaturas locais

Uma das razões que explicam o aquecimento é que as áreas urbanas são "ilhas de calor", com suas ruas e avenidas pavimentadas e paredes de concreto, aponta pesquisa.

Anvisa proíbe o comércio e o uso de medicamentos injetáveis que contenham chá verde

A medida foi tomada após a identificação de propagandas na internet de tratamentos estéticos para emagrecimento e combate à gorduras localizadas sugerindo o uso de formulações injetáveis contendo chá verde isolado ou associado a outras substâncias.

### **Gases do efeito estufa demoram para diminuir mesmo em recessão**

As emissões de dióxido de carbono, o principal gás do efeito estufa, aumentaram em média 0,73% para cada 1% de crescimento no PIB per capita, mas caíram apenas 0,43% para cada por cento de declínio no PIB per capita.

## **Índia faz encontro para concretizar promessas sobre biodiversidade**

Exploração predatória dos recursos, desmatamento, poluição, mudanças climáticas: a taxa de extinção das espécies é hoje até mil vezes mais elevada do que se sabia até agora, lembram os cientistas.

## **Pesquisa sobre incêndios florestais coloca queimadas em xeque**

Cientistas divergem sobre vantagem ecológica de limpar florestas para evitar incêndios posteriores.

## **Praia mais suja da Europa ganha "faxina" de ONGs**

Durante o dia 29 de setembro, El Pozuelo recebeu 250 voluntários para a retirada de 15 mil l de resíduos em 2 km de praia.

## **Sem ter 'céu próprio', primeiro observatório do país se reinventa**

Sem os gigantescos telescópios de observatórios europeus e americanos e ladeado por forte poluição luminosa, o Observatório Nacional teve de "terceirizar" suas observações ou buscar outras saídas.

## **Nova espécie de ave é encontrada na região central de Minas Gerais**

Pedreiro-do-Espinhaço foi descrito por pesquisadores da UFMG. Apesar de recém-descoberto, pássaro já estaria ameaçado de extinção.

## **Espécie de vespa paralisa aranha venenosa na Austrália**

Cientistas acreditam que animal esteja contribuindo para reduzir o número da população do aracnídeo.

## **Desmatamento: novo cálculo**

A partir e agora, as áreas que apresentarem aumento das taxas em pelo menos dois dos últimos três anos passarão a integrar a lista de prioridades.

## **Ações simples e domésticas**

Preservação do meio ambiente começa em casa. População precisa fazer a sua parte.

## **Anúncio do Nobel de Medicina abre premiação nesta segunda**

O anúncio dos vencedores dos prêmios Nobel de Medicina, Física e de Química acontecem, respectivamente, na segunda, terça e quarta-feira, e geram expectativa na área.

Preservação da biodiversidade volta a ser debatida por governos na Índia  
Conferência da ONU sobre diversidade biológica começa na segunda-feira. Foco será concretizar compromissos assumidos na última cúpula, em 2010.

Vietnã devolve ao Camboja exemplar de tartaruga ameaçada de extinção  
Batagur, réptil aquático, vivia há mais de 30 anos em Hanói. Governo do Camboja recebeu espécime oficialmente nesta sexta-feira.

Tecnologia militar ajuda cientistas a achar baleia ameaçada na Austrália  
Sistema que localiza submarinos contribui para conservação da baleia-azul. Espécie está ameaçada de extinção, segundo organização.

Pesquisadores 'instalam' GPS em tubarões em programa de preservação  
Dispositivo em barbatanas de animais em área turística ajudou cientistas em estudo.

Experiência portuguesa com segurança de barragens pode ser aproveitada no Brasil  
A legislação portuguesa que regulamenta esse mecanismo foi criada há quase 20 anos e ajustada recentemente, enquanto no Brasil as regras ainda estão em fase inicial.

Produção de mel colorido intriga apicultores na França  
Abelhas estão produzindo mel azul, verde e marrom. Sindicato acredita que restos de corantes usados em doces sejam a causa.

Austrália inaugura maior telescópio do planeta  
Sistema também usará antenas na África do Sul e na Nova Zelândia. Projeto de 1,5 bilhão de euros opera com sinais de rádio.

Exposição A Terra Vista do Céu mostra o mundo por meio de fotografias aéreas  
A exposição reúne 130 imagens feitas a partir de balões, helicópteros e aviões em diversas partes do mundo.

Fundação Bill e Melinda Gates seleciona projetos no Brasil  
Os temas da chamada de propostas são: malária, doenças tropicais negligenciadas, comunicação de projetos sociais e inovações para mulheres agricultoras. Os candidatos têm até 7 de novembro para envio de propostas.

Pesquisadores e militares voltam à Antártica depois de oito meses do incêndio na Estação Comandante Ferraz  
Segundo a Marinha, o "Tio Max", como é chamado o navio, apoiará projetos de ciência e tecnologia, realizando sondagens e levantamentos oceanográficos que se iniciam no Continente Sul-Americano e vão até a Antártica.

Estudo sugere que neandertais tiveram filhos com humanos

De acordo com o jornal britânico Daily Mail, os resultados sugerem que quando humanos modernos chegaram ao continente, eles se depararam com os neandertais, com quem se reproduziram e tiveram filhos.

Bahia e Mato Grosso alertam para aumento de casos de dengue no verão

No ano de 2012, até o dia 29 de setembro, foram notificados 66.684 casos de dengue na Bahia, o que corresponde a aumento de 30,81% em relação ao mesmo período de 2011. Em Mato Grosso, até o dia 4 de outubro, foram notificados 37.900 casos de dengue, acréscimo acima de 300% na comparação a igual período de 2011.

Ambientalistas com máscaras de animais protestam na Grã-Bretanha

Ativistas são contra obras de rodovia na região sudeste da Inglaterra. Obra vai atingir espécies protegidas de animais, dizem manifestantes.

Cientistas afirmam ter encontrado 160 novas espécies em Bornéu

Expedição ao monte mais alto da Malásia recolheu ainda amostras de DNA. Entre os achados estão espécie de aranha, mariposa e cogumelos.

### **03 / 10 / 2012 [Quarenta e uma baleias-piloto encalham e morrem na Indonésia](#)**

Incidente ocorreu nas Ilhas Savu, na província de Sonda Oriental. Outros três animais também encalharam, mas conseguiram sobreviver.

### **03 / 10 / 2012 [Expedição descobre um milhão de novas espécies de plâncton](#)**

Cientistas passaram quase três anos filmando plânctons submarinos em diferentes oceanos.

### **03 / 10 / 2012 [ONU pede mais ambição de países em negociação climática de Doha](#)**

Secretária de convenção da ONU disse não haver recuo em planos. Próxima conferência do clima ocorre em novembro no Qatar.

### **03 / 10 / 2012 [Estudo diz que fraude em pesquisas científicas aumentou dez vezes](#)**

A pesquisa, publicada na revista americana PNAS, analisou documentos de ciências biomédicas na base PubMed e observou que aproximadamente metade dos mais de 2 mil artigos sofreram "retratação" por envolver fraude.

### **03 / 10 / 2012 [Conhecimento da relação entre oceano e continente facilitará previsão de desastres, diz cientista](#)**

O ministro da Ciência, Tecnologia e Inovação, Marco Antonio Raupp anunciou, nesta terça-feira (2), a criação do Instituto Nacional de Pesquisas Oceanográficas.

### **03 / 10 / 2012 [Três biomas discutem CAR](#)**

Objetivo do encontro é discutir a regularização de imóveis rurais nas áreas de Mata Atlântica, Caatinga e Pampa.

### **03 / 10 / 2012 [Camundongo perde pele para distrair predador, diz estudo](#)**

Essa capacidade de "autoamputação" era considerada exclusiva de répteis e anfíbios e outros animais, como crustáceos, com exceção dos mamíferos; mas agora uma equipe de pesquisadores demonstrou um fenômeno parecido em um camundongo africano.

### **03 / 10 / 2012 [Índios tiram título de eleitor no Rio para lutar por um emprego](#)**

Dos cerca de 600 indígenas que moram no Rio de Janeiro, aproximadamente 300 fizeram questão de tirar o título de eleitor.

### **03 / 10 / 2012 [Vaca transgênica produz leite que causa menos reações alérgicas](#)**

Método bloqueia 96% de proteína que causa reação. Entre 2% e 3% das pessoas têm alergia a leite e derivados.

### **03 / 10 / 2012 [Grupo de macacos é visto em subúrbio de capital da Malásia](#)**

Kuala Lumpur é conhecida por ser metrópole asiática "verde", diz revista. Capital possui 1,6 milhão de habitantes e é a mais populosa do país.

### **03 / 10 / 2012 [Após mortes, Índia mobiliza Força Aérea para proteger rinocerontes](#)**

Governo quer mais segurança para espécie ameaçada em reserva natural. Caçadores retiraram chifre de animais ainda com vida; já são sete vítimas.

### **03 / 10 / 2012 [Apesar do crescimento, população de baleias jubarte segue ameaçada no Brasil](#)**

População de 11 mil baleias ainda é muito inferior ao patamar de 30 mil animais que existiam antes da espécie ser quase extinta por baleeiros.

### **03 / 10 / 2012 [Ambientalista usa máscara de sapo para cobrar lei anticapa na Costa Rica](#)**

Manifestação pede aprovação de projeto que proíbe caça esportiva no país. Nova lei prevê multas de até US\$ 500 mil para quem praticar

caça ilegal.

### **03 / 10 / 2012 Gorilas africanos perdem até 59% do seu habitat em 15 anos, diz estudo**

Pesquisa analisou presença de oito espécies de primatas em 22 países. Mais de 40 cientistas de 31 instituições participaram de levantamento.

### **03 / 10 / 2012 Desmatamento é o principal causador da extinção de primatas no Amazonas**

Pelo menos, 15 espécies podem ser extintas na Amazônia. Região ainda conta com poucos projetos específicos, diz Inpa.

### **03 / 10 / 2012 Estação espacial pode ter missão de um ano de duração a partir de 2015**

Países chegaram a acordo sobre expedição mais longa na ISS. Período de permanência normalmente é de seis meses.

### **03 / 10 / 2012 Atual emissão de gases deve elevar oceano em mais de 1 m, diz estudo**

Previsão de cientistas é que nível do mar suba 1,1 m até o ano 3.000. Maior parte do gelo derretido deve ser proveniente da Groenlândia.

### **04 / 10 / 2012 Pesquisadores obtêm mapa completo das variações do genoma do arroz**

Estudo comprovou que arroz foi cultivado primeiramente no sul da China e depois foi levado para outras partes da Ásia.

### **04 / 10 / 2012 Empresa cria arpão para capturar lixo espacial**

Equipamento britânico permitiria trazer objetos em órbita de volta à Terra.

### **04 / 10 / 2012 Sociedade civil e governo vão discutir estratégias para resíduos sólidos em 2013**

As autoridades estaduais e municipais alertam, agora, para as dificuldades em desativar lixões. A política nacional prevê que todos os lixões do país sejam extintos até 2014.

### **04 / 10 / 2012 Pesquisa: 36% das espécies de tubarão estão ameaçadas no Brasil**

Um dos motivos é o apetite chinês por suas nadadeiras, servidas como iguaria que simboliza distinção social. Além disso, a dificuldade em discriminar espécies a olho nu faz com que as espécies ameaçadas de extinção venham parar como postas de cação no nosso prato.

### **04 / 10 / 2012 Expansão da energia eólica no Brasil desafia o setor elétrico, diz Moody's**

País precisa melhorar estrutura de transmissão de energia, afirma agência. Até o final de 2016, Brasil deve gerar 255 GW com a força dos ventos.

### **04 / 10 / 2012 Veneno da mamba negra é analgésico tão potente quanto à morfina, diz revista**

O veneno desta cobra contém péptidos que os pesquisadores batizaram como "mambalgins" e que, injetado em ratos, produzem uma analgesia tão forte como a morfina.

### **04 / 10 / 2012 Seca no Zimbábue restringe água em parque e mata ao menos 21 animais**

Apenas dez bebedouros continuam com água na reserva Hwange. Dezenove elefantes e dois rinocerontes já morreram devido à estiagem.

### **04 / 10 / 2012 Dinossauro anão herbívoro de presas afiadas é descoberto em coleção**

O novo dinossauro, um heterodontossauro herbívoro que viveu há 200 milhões de anos, tinha um bico curto parecido com o de um papagaio e duas presas frontais pontiagudas, além de dentes posteriores tanto na mandíbula superior quanto na inferior, utilizados para esmagar as plantas.

### **04 / 10 / 2012 Projeto Tamar busca marca de 15 mi de filhotes salvos na temporada**

A tarefa não é fácil porque exige atenção às milhares de fêmeas que, como se tivessem bússola ou GPS, retornam todos os anos à praia em que nasceram para cavar um ninho e por seus ovos, que depois são cobertos novamente com areia.

### **04 / 10 / 2012 Congresso da Costa Rica aprova projeto que proíbe caça esportiva**

Cientistas e indígenas ainda poderão capturar animais em alguns casos. País proíbe animais em circos e tem um quarto do território sob proteção.

### **04 / 10 / 2012 Cientistas identificam alta emissão de gás metano na Antiguidade**

Aumento coincide com auge do Império Romano e da dinastia chinesa Han. Desmatamento voltado à agricultura foi principal responsável.



## 04 / 10 / 2012 Incêndios em área de proteção ambiental no Pará sobem 60% em um ano

Entre julho e agosto, foram registrados mais de 2,4 mil focos de calor na unidade de conservação. Segundo fiscais ambientais que atuam na região, a situação na APA Triunfo do Xingu só deve melhorar em dois meses.

## 04 / 10 / 2012 Governo inclui dois municípios em lista de desmatadores da Amazônia

Anapu e Senador José Porfírio, no PA, terão fiscalização maior. Portaria do Ministério do Meio Ambiente retirou outros dois municípios.

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## EARTH PAGES

### The shuffling poles

Posted on October 11, 2012 by Steve Drury | [Leave a comment](#)

The mechanical disconnection of the lithosphere from the Earth's deep mantle by a more ductile zone in the upper mantle – the asthenosphere – suggests that the lithosphere might move independently. If that were the case then points on the surface would shift relative to the axis of rotation and the magnetic poles, irrespective of plate tectonics. So it makes sense to speak of absolute and relative motions of tectonic plates. The second relates to plates' motions relative to each other and to the ancient position of the magnetic poles, assumed to be reasonably close to that of the past pole of rotation, yet measurable from the direction of palaeomagnetism retained in rocks on this or that tectonic plate. Plotting palaeomagnetic pole positions through time for each tectonic plate gives the impression that the poles have wandered. Such apparent polar wandering has long been a key element in judging ancient plate motions. Absolute plate motion judges the direction and speed of plates relative to supposedly fixed mantle plumes beneath volcanic hot spots, the classic case being Hawaii, over which the Pacific Plate has moved to leave a chain of extinct volcanoes that become progressively older to the west. But it turns out that between about 80 to 50 Ma there are some gross misfits using the hot-spot frame of reference. An example is the 60° bend of the Hawaiian chain to become the Emperor seamount chain that some have ascribed to hot spots shifting (see <http://earth-pages.co.uk/2009/05/01/the-great-bend-of-the-pacific-ocean-floor/>).

Age of Pacific Ocean floor, showing the Hawaii-Emperor seamount chain in black. (credit: Wikipedia)

Ideas have shifted dramatically since it became clear that hot spots can shift, and there has been an attempt to estimate their actual motions (Dobrovine, P.V. et al. 2012. Absolute plate motions in a reference frame defined by moving hot spots in the Pacific, Atlantic, and Indian oceans. *Journal of Geophysical Research: Solid Earth*, v. 117, B09101, doi:10.1029/2011JB009072). It is early days for the revised view of absolute motion of the lithosphere and estimates go back only 120 Ma. However, one outcome has been a realistic examination of whether the positions of the poles have shifted through time; a possibility that is hidden in apparent polar wander paths. Since the mid-Cretaceous it seems that a slow and hesitant, but significant polar shuffle has taken place, varying between 0.1 and 1.0° Ma<sup>-1</sup>, starting in one direction and then the movement retraced its steps to achieve the current proximity of magnetic poles to the poles of rotation.

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Posted on October 10, 2012 by Steve Drury | [Leave a comment](#)

A landslide in Guerrero, Mexico in August, 1989. (credit: Wikipedia)

Just as modern humans were establishing a permanent foothold in Britain and engaging in the transition to settled farming and livestock husbandry disaster struck some of the most attractive Mesolithic real estate. Around 8 000 years ago the east coast of Scotland, from the Shetland Isles to the Firth of Forth, was struck by a tsunami as big as that affecting the north eastern island of Honshu in the Japan archipelago in 2011. It washed over low lying islands of Shetland and Orkney and roiled up the great inlets or firths of eastern mainland Scotland to leave thick sand deposits containing carcasses of whales and other large sea mammals. At that time, Britain was joined to the rest of Europe by marshy lowlands linking East Anglia and the Netherlands dubbed 'Doggerland' at the southern end of a huge gulf that became the North Sea. Final sea level rise removed that initial gateway to Britain, so we cannot judge what damage the tsunami wrought, but tools and animal bones dredged from the area show that it was full of game and people. A disaster, but not one linked to seismicity. The driving force has been recognised in a series of submarine scars off the west coast of Norway that witness massive slides of sediment on the sea bed area known as Storegga. Similar scars around the Hawaiian Islands and those making up the Azores and Canaries in the mid Atlantic bear witness to many large slippage events, on the sea bed and from the islands themselves. Recognising

signs of past tsunami damage in coastal areas worldwide reveals plenty of cases triggered by landslides rather than earthquakes.

The March 2011 Sendai tsunami and those which ravaged lands around the Indian Ocean in late 2004 formed because of vertical movements on major faults that dropped or shoved up the oceanic crust itself. Yet any sudden change in the shape of the sea floor will displace all the ocean water above, the difference from seismic tsunamis lies in the energy source: instead of tectonic plate forces, gravitational potential energy is released by slumps and slides. That may happen because of erosion producing unstable steep slopes, build up of sedimentary piles, large outpourings of lavas or slopes being destabilised by minor earthquakes or release of gases from the sediments themselves. The Mesolithic submarine slide at Storegga may have been set in motion by massive release of methane from gas-hydrate deposits, and such is the extent of scarring of the sea floor there that it must have happened before and may do so again.

Copper engraving showing the 1755 Lisbon tsunami overwhelming ships in the harbor. (credit: Wikipedia)

Realisation of the potential for tsunamis to be triggered by submarine and coastal slides has spurred bathymetric studies in a number of likely areas, including the Gorringe Bank that lies on the Atlantic floor just west of the Iberian Peninsula. It is tectonic in origin but has a thick veneer of sediment brought by Iberian river systems. On its northern flank is a 35 km long scar of a slip that moved 80 km<sup>3</sup> of sediment (Lo Iacono, C. and 11 others 2012. Large, deepwater slope failures: implications for landslide generated tsunamis. *Geology*, v. 40, p. 931-934). The Spanish-British-Italian group estimate that the slip would have generated a 15 m tsunami most likely to have affected the Iberian coast south of Lisbon. Conditions for slides of similar magnitude still exist on the Gorringe Bank. One unstable system ripe for collapse is present far out in the Atlantic on the south-east coast of the island of Picos in the Azores (Hildenbrand, A. et al. 2012. Large-scale active slump on the southeast flank of Picos Island, Azores. *Geology*, v. 40, p. 939-942). This is in a coastal area where repeated volcanism has piled up lavas on the flanks of the island's main volcanic edifice. Failure has already started, with a number of prominent arcuate scars having developed. The Picos slide moves very slowly sideways but vertical displacements are estimated at up to a centimetre a year. The volume of the slowly moving mass is an order of magnitude less than the fossil slide on the Gorringe Bank. Yet should it fail entirely, the slopes involved, the absence of water's slowing effect and the height of the mass might ensure comparable energy is delivered to the Atlantic Ocean, though the likely trajectory of tsunamis would be parallel to the coast of Africa rather than directly towards it.

Landslides of all kinds, though hazardous, have long been thought to be less of a risk to life globally than the more spectacular seismic and volcanic hazards, but there are few data to support that view. In an attempt to assess the annual risk properly, David Petley of Durham University, UK 'mined' world-wide landslide records for the seven years since 2004 (Petley, D. 2012. Global patterns of loss of life from landslides. *Geology*, v. 40, p. 927-930). There were more than 2600 recorded slope-failures that killed people and caused a total of more than 32 thousand fatalities: ten times more than previous vague estimates. This is a minimum because many landslides occur in very remote areas, especially in the mountainous regions of China and the Himalaya. The number of fatalities accompanying each event shows distinct signs, on a country-by-country basis, of a relationship with population density. Several international agencies are emerging that aim at means of measuring disaster risk, one being the Integrated Global Observing Strategy for Geohazards (IGOS).

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Scots experts to undertake study into threat posed to UK by tsunamis (scotsman.com)

Landslide fatalities are greater than previously thought (sciencedaily.com)

[http://www.youtube.com/watch?feature=player\\_detailpage&v=-Fdyngsr1FQ](http://www.youtube.com/watch?feature=player_detailpage&v=-Fdyngsr1FQ)

Natural Disasters List October 4, 2012-China landslide buries 18 school children! (disaster-report.com)

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Posted in Environmental geology and geohazards

Tagged Tsunami, Landslide, Landslip, Risk

Early animals and Snowball Earth

Posted on October 8, 2012 by Steve Drury | Leave a comment

The Earth 640 million years ago during the Marinoan 'Snowball' event (credit: Cornell University via Flickr)

Palaebiologists generally believe that without a significant boost to oxygen levels in the oceans macroscopic eukaryotes, animals in particular, could not have evolved. Although the first signs of a rise in atmospheric oxygen enter the stratigraphic record some 2.4 billion years ago and eukaryote microfossils appeared at around 2 Ga, traces of bulky creatures suddenly show up much later at ~610 Ma with possible fossil bilaterian embryos preserved in 630 Ma old sediments. An intriguing feature of this Ediacaran fauna is that it appeared shortly after one of the Neoproterozoic global glaciations, the Marinoan 'Snowball' event: a coincidence or was there some connection? It has looked very like happenstance because few if any signs of a tangible post-Marinoan rise in environmental oxygen have been detected. Perhaps the sluggish two billion-year accumulation of free oxygen simply passed the threshold needed for metazoan metabolism. But there are other, proxy means of assessing the oxidation-reduction balance, one of which depends on trace metals whose chemistry hinges on their variable valency. The balance between soluble iron-2 and iron-3 that readily forms insoluble compounds is a model, although iron itself is so common in sediments that its concentration is not much of a guide. Molybdenum, vanadium and uranium, being quite rare, are more likely to chart subtle changes in the redox conditions under which marine sediments were deposited.

Dickinsonia; a typical Ediacaran animal. Scale in cm (credit: Wikipedia)

Swapan Sahoo of the University of Nevada and colleagues from the USA, China and Canada detected a marked increase in the variability of Mo, V and U content of the basal black shales of the Doushantuo Formation of southern China, which contain the possible eukaryote embryos (Sahoo, S.K and 8 others 2012. Ocean oxygenation in the wake of the Marinoan glaciation. *Nature*, v. 489, p. 546-549). These rocks occur just above the last member of the Marinoan glacial to post-glacial sedimentary package and are around 632 Ma old. Since the black shales accumulated at depths well below those affected by surface waves that might have permitted local changes in the oxygen content of sea water the geochemistry of their formative environment ought not to have changed if global chemical conditions had been stable: the observed fluctuations may represent secular changes in global redox conditions. The earlier variability settles down to low levels towards the top of the analysed sequence, suggesting stabilised global chemistry.

What this might indicate is quite simple to work out. When the overall chemistry of the oceans is reducing Mo, V and U are more likely to enter sulfides in sediments, thereby forcing down their dissolved concentration in sea water. With a steady supply of those elements, probably by solution from basalt lavas at ocean ridges, sedimentary concentrations should stabilise at high levels in balance with low

concentrations in solution. If seawater becomes more oxidising it holds more Mo, V and U in solution and sediment levels decline. So the high concentrations in sediments mark periods of global reducing conditions, whereas low values signal a more oxidising marine environment. Sahoo et al.'s observations suggest that marine geochemistry became unstable immediately after the Marinoan glaciation but settled to a fundamentally more oxidising state than it had been in earlier times, perhaps by tenfold increase in atmospheric oxygen content. So what might have caused this and the attendant potential for animals to get larger in the aftermath of the Snowball Earth event? One possibility is that the long period of glaciers' grinding down continental crust added nutrients to the oceans. Once warmed and lit by the sun they hosted huge blooms of single-celled phytoplankton whose photosynthesis became an oxygen factory and whose burial in pervasive reducing conditions on the sea bed formed a permanent repository of organic carbon. The outcome an at-first hesitant oxygenation of the planet and then a permanent fixture opening a window of opportunity for the Ediacarans and ultimately life as we know it.

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Extreme climate change linked to early animal evolution (sciencedaily.com)

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Carbon capture and storage: dissolving it

Posted on September 28, 2012 by Steve Drury | 1 Comment

A Canadian carbon capture and storage project in Saskatchewan (credit: US Mission to Canada via Flickr)

Tucking away vast amounts of atmospheric carbon dioxide (carbon capture and storage or CCS), or at least that emitted by fossil-fuel power stations, is a widely suggested and well supported approach to slowing down global warming. It has two main downsides: if successful it helps maintain the dominance of fossil fuels and vast amounts of buried greenhouse gas might simply leak out some time. Ideally, the storage part of CCS would involve CO<sub>2</sub> being taken up by an inert solid. Carbonates may be stable enough but arranging the chemical reactions to make them seem difficult, the most widely considered being by encouraging weathering of ultramafic rocks to form magnesium carbonates as a by-product: huge areas would have to be coated with finely-ground peridotite. A less satisfactory approach would be to dissolve the gas in water held at great depths in sedimentary aquifers, but if that water doesn't move and doesn't get warmed it might do the trick.

Unsurprisingly, a lot of funds are available to research CCS and ideas are pouring forth, a recent, sober assessment focussing on the solubility option (Steele-MacInnis, M. et al. 2012. Volumetrics of CO<sub>2</sub> storage in deep saline formations. Environmental Science and Technology (August 2012 online) DOI: 10.1021/es301598t). The team from Virginia Tech and the US Department of Energy conclude that solution in brines trapped in deep aquifers may help, although solution is an equilibrium between gas and dissolved CO<sub>2</sub>, so that a gas layer in the aquifer is always likely to be present, even at high pressures. The only way of avoiding that is if the dissolved gas reacted with carbonate in the aquifer so that calcium and hydrogen-carbonate (HCO<sub>3</sub><sup>-</sup>) ions entered solution. That 'enhanced' solution is not so easy since, although it mimics the calcite-weathering effect by acid rain that naturally takes CO<sub>2</sub> from the atmosphere, calcite dissolves very sluggishly. But solution adds to the density of already dense brine so that it is less likely to leak upwards into more shallow aquifers. Their preferred technology is to liquefy the gas under pressure and pump that to deep aquifers where eventually the supercritical CO<sub>2</sub> liquid will dissolve. The problem is this: while experiment and theory suggest the approach will work, nobody knows how long CO<sub>2</sub> solution in brine will take. There needs to be a sizeable pilot study...

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China's first CCS project captures 40,000 tonnes of CO<sub>2</sub> (eco-business.com)

Shell To Build World's First Oil Sands Carbon Capture And Storage (CCS) Project (eurasiareview.com)

Carbon capture and fracking – the lowdown (environmentalresearchweb.org)

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Posted in Environmental geology and geohazards

Tagged Carbon capture and storage, CCS

Birth of a plate boundary rocks the planet

Posted on September 28, 2012 by Steve Drury | Leave a comment

Historical seismicity across the Sunda trench(credit: Wikipedia)

Few people will fail to remember the Indian Ocean tsunamis of 26 December 2004 because of their quarter-million death toll. The earthquake responsible for them resulted from thrusting movements on the subduction zone where part of the India-Australia plate descends beneath Sumatra. There have been some equally large but far less devastating events and many lesser earthquakes in the same region since. Some have been on the massive Wadati-Benioff zone but many, including two with magnitudes >8 in April 2012, have occurred well off the known plate boundary. Oddly, those two had strike-slip motions and were the largest such events since seismic records have been kept. Such motions where masses of lithosphere move past one another laterally can be devastating on land, yet offshore ones rarely cause tsunamis, for a simple reason: they neither lift nor drop parts of the ocean floor. So, to the world at large, both events went unreported.

To geophysicists, however, they were revealing oddities, for there is no bathymetric sign of an active sea-floor strike-slip fault. But there is a series of linear gravity anomalies running roughly N-S thought to represent transform faults that were thought to have shut down about 45 Ma ago (Delescluse, M. et al. 2012. April 2012 intra-oceanic seismicity off Sumatra boosted by the Banda-Aceh megathrust. Nature (on-line 27 September issue) doi:10.1038/nature11520). Examining the post-December 2004 seismic record of the area the authors noted a flurry of lesser events, mostly in the vicinity of the long dead fracture zones. Their analysis leads them to suggest not only that the Banda-Aceh earthquake and others along the Sumatran subduction zone reactivated the old strike-slip faults but that differences in the motion of the India-Australia plate continually stress the lithosphere. Indian continental crust is resisting subduction beneath the Himalaya thereby slowing plate movement in its wake. Ocean lithosphere north of Australia slides more easily down the subduction zone, so its northward motion is substantially faster, creating a torque in the region affected by the strike-slip motions. Ultimately, it is thought, this will split the plate into separate Indian and Australian plates.

Another surprising outcome of this complex seismic linkage in the far-east of the Indian Ocean is that the April strike-slip earthquake set the Earth ringing. For six days afterwards there was a five-fold increase in events of magnitudes greater than 5.5 more than 1500 km



away, including some of around magnitude 7.0 (Pollitz, F.F. et al. 2012. The 11 April 2012 east Indian Ocean earthquake triggered large aftershocks worldwide. Nature (on-line 27 September issue) doi:10.1038/nature11504). Although distant minor shocks often follow large earthquakes, this is the first time that a swarm of magnitude 5.5 and greater has been noticed.

#### Related articles

Maitani: Unusual Indian Ocean Earthquakes Hint at Tectonic Breakup: Scientific American (scientificamerican.com)

Magnitude-8.7 Quake Was Part of Crustal Plate Breakup (yubanet.com)

Royer, J.-Y. 2012. When an oceanic tectonic plate cracks. Nature, v. 490, p. 183-185.

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Posted in Tectonics

Tagged Earthquake, Indian Ocean, Indo-Australian Plate, Plate boundary, Plate tectonics

Erosion by jostling

Posted on September 21, 2012 by Steve Drury | Leave a comment

Inca dry stone wall in Sacsayhuamán fortress, Cusco, Peru (credit: Håkan Svensson via Wikipedia)

These days it is a rare thing for an entirely novel surface process to be discovered; two centuries of geomorphological and sedimentological studies seem to have exhausted all the basic possibilities with only a few bits and pieces to be filled in.

Go to the foot of any steep slope topped by hard rock in an arid or semi-arid area and you are sure to find a boulder field formed by a variety of mass-wasting processes, such as rockfalls. As often as not such boulders are rounded, the usual explanation being that the rounding has resulted either from chemical weathering in the up-slope colluvium or exfoliation ('onion-skin' formation) through physical weathering in situ. Boulders are simply too big to have been moved other than by toppling or glacial transport at high latitudes, so rounding by abrasion seems unlikely. Aeolian sandblasting tends to favour just one side of boulders and 'scallop' their surface.

The driest place on Earth, Chile's Atacama Desert, has plenty of boulder fields next to areas of high relief, and sure enough they are beautifully rounded, even though it has barely rained there for around 10 million years. Jay Quade of the University of Arizona, USA, with US, Australian and Israeli colleagues noticed that many of the boulders are surrounded by moat-like depressions and their sides, but not their tops, are nicely smoothed. These features suggested that some process had caused the boulders to move around and to rub one another, but whatever that was it had not caused even quite tall boulders to topple over (Quade, J. et al. 2012. Seismicity and the strange rubbing boulders of the Atacama Desert, northern Chile. Geology, 40, 851-854). An explanation was clearly something to puzzle over, until, that is, two of the authors returned to the area to make further observations. They were caught on the exposure by a magnitude 5.2 earthquake – a not uncommon experience in the foothills of the Andes – when the ton-sized boulders began to sway, rotate and jostle together with a great deal of noise. Here was the novel mechanism of erosion and 'granulation': seismic rubbing.

By dating the age of the exposed surfaces using cosmic-ray generated isotopes of beryllium and aluminium, the authors have been able to estimate that over the past 1.3 Ma the boulders have experienced between 40 to 70 thousand hours of rubbing. Indeed, it is quite likely that the whole boulder field, the upslope mass wasting and the sediment in which the boulders are embedded are products of seismicity. Oddly, just such jostling and rubbing of boulders and cobbles is characteristic of Inca architecture in the Andes, whose stonework used no cement but has minimal gaps between the blocks. Who is to deny that the Incas learned their unique building method from observing seismic rubbing.

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Posted in Sedimentology and stratigraphy

Tagged Atacama Desert, Earthquake, Rubbing boulders, Seismic erosion

Are Martian clays magmatic in origin?

Posted on September 16, 2012 by Steve Drury | Leave a comment

Artist's Concept of Curiosity's touchdown(credit: Wikipedia)

The remote detection of spectral features in the infrared that suggest abundant clay minerals on the surface of Mars is the basis for a widely-held view that Mars may once have had moist climatic conditions that encouraged life to form (see The Martian 'sexy beast' in September 2012 EPN). The presence of clays, along with suggestive landforms, has also been used to speculate that Mars once harboured long-lived lakes and perhaps even a huge ocean on its northern hemisphere, between 3.7 to 4.1 Ga. It was the clays that pitched the recently arrived Curiosity (aka Mars Exploration)Rover at the Gale crater and its central Aeolis Mons. The latter, also known as Mount Sharp, preserves about 5 km of layered rocks, the lowest of which are clay-rich and hypothesised to be sediments laid down in a lake that filled the crater. Provided Curiosity operates according to plan, we will know soon enough whether or not the layered rocks of Mount Sharp are indeed sediments, but a soon-to-be-published article suggests another explanation than weathering for the production of abundant clay minerals on Mars (Meunier, A. et al. 2012. Magmatic precipitation as a possible origin of Noachian clays on Mars. Nature Geoscience, published online 9 September 2012; DOI: 10.1038/NGE01572).

Layered rocks on the flanks of Mount Sharp in Gale crater from Curiosity's Mastcam (NASA Goddard via Flickr)

The French-US team provides evidence from terrestrial lavas that abundant iron- and magnesium-rich clays, known as smectites, may form at a late stage during crystallization of magma. If magma contains water – and most magmas do – as more and more anhydrous silicates crystallise during cooling water builds up in the remaining liquid. Once silicate crystallisation is complete there remains a watery fluid capable of reacting with some of the silicates to form clay minerals; a process often referred to as pneumatolysis. How much clay is formed depends on the initial water content of the magma. Pneumatolysis operates on hot lava, whereas weathering occurs at ambient temperature provided the climate is able to support liquid water at the surface. Mars is currently far too cold for that, and ideas of a wet surface environment earlier in the planet's history demand an explanation for a much warmer climate. Clay minerals do not appear to be present in Mars's younger rocks, so Meunier and colleagues suggest that as the planet's mantle evolved early water-rich magmas were gradually replaced by ones with less water: interior Mars was gradually de-gassed and its magmas lost the ability to alter minerals that crystallised from them.

Now, clay minerals are extremely resistant to change except through high-temperature metamorphism. Once formed they can be blown around – Mars has probably always been a very windy place – to end up in aeolian sediments that are plentiful on Mars. Also, if occasionally water flowed on the surface perhaps by subsurface water venting suddenly, fine-grained pneumatolytic clays would easily

be picked up, concentrated as flow speed lessened and deposited in waterlain sedimentary layers. A dilemma that faces the Curiosity science team is what significance to assign to clays in sediment layers, when they no longer provide unequivocal evidence of weathering. But will the resistant layers on Mount Sharp turn out to be pneumatolytically altered lava flows?

Note added 28 September 2012: The first scientific triumph of the Curiosity Rover is imagery of sediments in what had been suggested to be an alluvial fan washed into Gale crater. They show gravels with rounded pebbles.

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Curiosity finds ancient riverbed on Mars ([guardian.co.uk](http://guardian.co.uk))

Curiosity Rover Steps Right Into Ancient Riverbed on Mars ([wired.com](http://wired.com))

Hynek, B. 2012. Uninhabitable martian clays? *Nature Geoscience*, v. 5, p. 683-684.

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Posted in Planetary, extraterrestrial geology, and meteoritics

Tagged Clay minerals, Curiosity rover, Life on Mars, Mars, Mars Science Laboratory

Brittle-ductile deformation in subduction zones

Posted on August 25, 2012 by Steve Drury | Leave a comment

Eclogite: the red-brown mineral is garnet, omphacite is green and there is some white quartz. (credit: Kevin Walsh via Wikipedia)

The ultra-dense form of basalt, eclogite made from mainly garnet and a strange high-pressure, low-temperature pyroxene (omphacite) that forms from plagioclase and some of the basalt's ferromagnesian minerals, is possibly the most important rock there is. Without the basalt to eclogite transition that takes place when ocean-floor is subducted the density of the lithosphere would be insufficient to pull more ocean floor to destruction and maintain the planetary circulation otherwise known as plate tectonics. Since the transition involves the formation of anhydrous eclogite from old, cold and wet basalt water is driven upwards into the mantle wedge that lies over subduction zones. The encourages partial melting which creates andesite magmas and island arcs, the ultimate source of the Earth's continental crust.

Despite being cold and rigid, subducted oceanic lithosphere somehow manages to be moved en masse, showing its track by earthquakes down to almost 700 km below the Earth's surface. A major ophiolite in the Western Alps on the Franco-Italian border escaped complete loss to the mantle by rebounding upwards after being subducted and metamorphosed under high-P, Low-T condition when the Alps began to form. So the basaltic crustal unit is eclogite and that preserves a petrographic record of what actually happened as it descended (Angiboust, S. et al. 2012. Eclogite breccia in a subducted ophiolite: A record of intermediate depth earthquakes? *Geology*, v. 40, p. 707-710). The French geologists found breccias consisting of gabbroic eclogite blocks set in a matrix of serpentinite and talc. The blocks themselves are breccias too, with clasts of eclogite mylonite set in fine-grained lawsonite-bearing eclogite. The relationships in the breccias point to possibly earthquake-related processes, grinding and fracturing basalt as it was metamorphosed: an essentially brittle process, yet the shearing that forms mylonites does seem reminiscent of ductile deformation too.

The deformation seems to have been at the middle level of oceanic crust where oceanic basalt lavas formed above cumulate gabbro, their plutonic equivalents. Yet much deformation was also at the gabbro-serpentinite or crust-mantle boundary, where water loss from serpentinite may have helped lubricate some of the processes. Clearly the Monviso ophiolite will soon become a place to visit for geophysicists as well as metamorphic petrologists.

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Posted in Geochemistry, mineralogy, petrology and volcanology

Tagged Alps, Eclogite, Oceanic crust, Subduction

Whence Earth's water?

Posted on August 25, 2012 by Steve Drury | Leave a comment

Carbonaceous chondrite meteorite. (credit: Mila Zinkova via Wikipedia)

Comet Hyakutake. (credit: E. Kolmhofer & H. Raab via Wikipedia)

Because they can be so big, consist mainly of water ice and there are probably a great many lurking in the outer reaches of the solar system impacting comets have long been thought to have delivered the water that makes the Earth so dynamic and, so far as we know, the only place in near-space that hosts complex life. Remote sensing studies of the isotopic composition of water in one comet (Hartley 2) caused great excitement in 2011 by showing that its ratio of deuterium to hydrogen was very similar to that of Earthly ocean water. Other D:H ratios have recently been published from a suite of meteorites gleaned from the surface of Antarctic ice (Alexander, C.M.O'D. et al. 2012. The provenances of asteroids, and their contributions to the volatile inventories of the terrestrial planets. *Science*, v. 337, p. 721-723). These meteorites are carbonaceous chondrites thought to be the source of much of the solid material in planets of the Inner Solar System. To cut short a long and closely argued argument, it seems that the CI-type chondrites' water is isotopically quite different from that in analysed comets, knocking another popular hypothesis on the head; that comets and carbonaceous chondrites formed in the same part of the Solar System.

Since hydrocarbons in comets – known from interplanetary dust particles – contain hydrogen with a far richer complement of its heavy isotope deuterium than does cometary water ice, the crashing of entire comets onto planets such as the Earth would not produce the observed terrestrial D:H ratio even though their water ice alone does match it. The US, British and Canadian meteoriticists conclude what seems to be a unifying explanation whereby CI chondritic solids and volatiles alone would have been able to form the Inner Planets and their various complements of water by initial accretion. Comets as a second-stage source, in this account, are relegated to mere curiosities of the Solar System with little role to play other than occasional big impacts that may, or may not, have influenced evolution by the power that they delivered not through their chemistry.

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Tagged Carbonaceous chondrite, Comet, Earth's water

Is there misconduct in geoscientific research?

Posted on August 25, 2012 by Steve Drury | Leave a comment

Dreaming Spires (credit: Steve Daniels via Wikipedia)

Brian Deer, the British investigative journalist who exposed Andrew Wakefield's methods that implicated the MMR vaccine as a cause of autism, has broadened his scope to research misconduct throughout science (Deer, B. 2011. Doctoring the evidence: what the scientific establishment doesn't want you to know. The Sunday Times, 12 August 2012, p. 16). His article comes in the wake of several related articles in leading scientific journals (Enserink, M. 2012. Fraud-detection tool could shake up psychology. Science, 6 July 2012, p. 21-22. Macilwain, C. 2012. The time is right to confront misconduct. Nature, 2 August 2012, p. 7. Godlee, F. 2012. Helping institutions tackle research misconduct. The British Medical Journal, 10 August 2012). The focus has shifted in the last decade from a major campaign against plagiarism by students tempted by the information largesse of Wikipedia, Google and other electronic treasure troves to unwholesome behaviour among university academics. In an age when redundancy at universities has become an issue for the first time in nine centuries, many academics – frenzied by looming cuts – are engaged in a Gaderene rush for promotion and funding. The now obligatory stream of 'learned' papers seeks to justify their own puff and, equally as important, the puff of their departments, faculties and institutions trying to blag their corporate way through funding shortages. Misconduct is the child of education-as-commodity.

There are three mortal sins of academic fraudulence: plagiarism, including self-plagiarism (see Self-plagiarism, 6 January 2011); data falsification, including fiddling with those of other people (see Sabotage in Science, 4 November 2010), and fabrication of data, such as starting with a made-up graph and then using it to create plausible values in a table. Venial sins include publishing much the same data and interpretations again and again. The last highlights one of the reasons why miscreants get away with their chicanery and benefit from it; sloppy academic editing and even sloppier peer review.

Deer observes that 'The science establishment's consensus is that there is no need for outside scrutiny because ... science is above that kind of misconduct that has tainted the Roman Catholic church, politics, the press and, of course, the banks.' But, as in these notorious cases, the lid is coming off scientific misconduct, largely through the bravery of 'whistle-blowers' within the system. Yet the offenders who have been unmasked were unfortunate enough to work in institutions that have appropriate investigative mechanisms and the will at high office to use them. That determination to maintain the highest ethical standards is perhaps not as widespread as it once was.

Geoscientists have yet to figure much in the rogues' gallery of malfeasants, except for the odd light-fingered palaeontologist. That may have something to do with the vagueness of much of their scope, epitomised by the trajectory of a lithological boundary on a geological map of poorly exposed ground. Indeed, virtually every aspect of the science is open to many interpretations, and errors of omission are perhaps more common than those of commission – any field worker knows that they will inevitably have missed something. But there are quantitative, laboratory-based aspects of the science, such as radiometric dating, that are more readily scrutinised for malpractice. In the early days of using radioactive isotopes and their daughter products to work out an age for an igneous or metamorphic event a common analytical tool was the isochron plot, as in the Rb-Sr method. A 'good' age was signified by all the data points falling on or very close to the line of best fit from which an age was calculated. Consequently, there may well have been cases where errant data were conveniently 'lost', but there was no way of telling.

That it did happen emerged from the honesty of those isotope geochemists who openly admitted that some mass-spectrometry runs had been omitted because the samples showed some signs of 'contamination' or 'open-system behaviour'. For that they were merely taken to task by those who disagreed with their findings, but excused by those whose ideas the results supported: ethically honest. But how many Rb-Sr runs never made it to a published data table? Things are now a great deal more sophisticated than the days of punched tape and IBM cards in the geochemistry lab, geophysical software and that used for the growing cottage industry of process modelling. So much data and such a wealth of corrections that vast spreadsheets develop in the course of analysis, correction and calculation: few peer reviewers are going to go through data-processing steps with a fine-tooth comb, even if they have been lodged in public data repositories. Such settings provide ample scope for data invention, 'fiddling', 'fudging' and, in labs with a cavalier attitude to security, stealing but little way of pinning down any malpractice: that is, unless a culprit is either carelessly overconfident or a serial offender. A simple test that any peer reviewer might apply, most usefully at random, is to ask for a copy of laboratory notes associated with a manuscript. If one is not forthcoming, then suspicions will arise naturally.

A measure of just how much dodgy behaviour may go on is a survey conducted by Daniele Fanelli of the Institute for the Study of Science, Technology & Innovation, at the University of Edinburgh (Fanelli, D. 2009. How Many Scientists Fabricate and Falsify Research? A Systematic Review and Meta-Analysis of Survey Data. PLoS ONE, 4, e5738 <http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0005738>). In it he found that up to a third of all researchers admit – anonymously – to engaging in shoddy practices, while around 2% admitted to having fabricated, falsified or modified data or results at least once. When asked off the record about colleagues, 85% of researchers reported suspicious behaviour known to them, 14% for data falsification.

Ivory Towers, Chancery Lane, London. (credit: Colin Smith via Wikipedia)

Time cannot be far off when the red laser-beam spot moves across geoscience labs and individual geoscientists. Are they audited by disinterested peers and in such a small tightly-knit discipline are there such individuals? Do managing academics scrupulously keep records themselves and demand that their research fellows do likewise? Are there victims or witnesses brave enough to blow the whistle on any spite, fraud or slovenly methods, or will our science remain in its habitual state of bliss?

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