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AMBIENTE BRASIL

Especialistas discutem possíveis vínculos entre mudanças climáticas e furacões
Estudos mostram que houve aumento na incidência de furação. IPCC prevê que estes fenômenos serão mais intensos nos próximos anos.

Nações fracassam em acordo para proteger mares ao redor da Antártida
Para tentar contornar impasse sobre a criação de grandes áreas marinhas protegidas haverá outra rodada de negociações em julho de 2013.

Pesquisadores de SC reproduzem porcos in vitro pela primeira vez no Brasil
Seis leitões nasceram na madrugada da última segunda-feira (29), no Centro de Ciências Agroveterinárias da universidade, em Lages, a

217 km de Florianópolis, na serra catarinense.

Mosca 'assassina' deposita larva para decapitar formigas 'invasoras'
As moscas caçam as formigas e injetam um ovo em seu corpo. O ovo se transforma em uma larva, que então migra para a cabeça dos insetos. Essas larvas liberam uma substância química capaz de dissolver membranas, acabando por fim na decapitação das formigas.

Taj Mahal será abastecido com energia solar
A planta da usina solar já recebeu aprovação do Ministério de Energias Renováveis da Índia.

Menos desmatamento até 2020
Governo assume compromissos ousados, mas factíveis, para proteger os biomas.

Lideranças indígenas querem urgência na demarcação de terras de guaranis kaiowás
"Já ouvimos muito discurso bonito, recebemos cesta básica, mas isso não resolve. Queremos a demarcação do nosso território", afirmou o líder kaiowá Elizeu Lopes.

Elefante emite sons semelhantes a palavras em coreano, diz estudo
Mamífero de zoo da Coreia do Sul consegue 'falar' ao menos 5 palavras. Convivência em excesso com humanos pode ter influenciado animal.

Rio multa siderúrgica em R$ 10,5 milhões por poluição
A Secretaria Estadual do Ambiente do Rio de Janeiro anunciou nesta quinta-feira (1º) que aplicou multa de R$ 10,5 milhões à Companhia Siderúrgica do Atlântico por mais uma ocorrência de chuva de prata, em Santa Cruz.

Robô que monitora clima no mar dos EUA 'sobrevive' à tempestade Sandy
Robô que monitora clima no mar dos EUA 'sobrevive' à tempestade Sandy.

Cientistas descobrem molécula que obriga células cancerígenas a suicidar-se
A descoberta pode servir como base para um novo tratamento contra o câncer.

Meteorito de 300 quilos é descoberto na Polônia
Cientistas afirmam que análise do meteorito vai ajudar a entender composição do córtex da Terra.

Astrônomos encontram supernovas dos primórdios do Universo
Em defesa do Velho Chico
UnB e MMA inauguram centro de pesquisa voltado para a conservação e disseminação de conhecimentos sobre o Vale do São Francisco

Após recordes de calor, frente fria derruba temperaturas pelo país
Feriado de Finados deve ter chuva e queda de 10 ºC em cidades como SP. Seca prolongada e ilhas de calor podem ter influenciado calor em excesso.

Agricultura deve apostar em diversidade para enfrentar mudanças climáticas
Especialistas reunidos no Uruguai afirmam que mudanças no clima já podem ser percebidas nos dias de hoje e que soluções não podem ser descartadas.

Cidades sustentáveis
Conama realiza estudo inédito que pretende avaliar a capacidade de suporte das regiões metropolitanas brasileiras, além de definir critérios para orientar o crescimento dos centros urbanos.

Bogotá sediará congresso sobre cidades e mudanças climáticas em novembro
O congresso abordará temas diversos, da preservação ambiental ao transporte público, saúde, meios de comunicação, desigualdade social e planejamento territorial.

Suspensão de liminar não acaba com conflito entre índios e fazendeiros, diz líder guarani kaiowá
Segundo Elizeu Lopes, após décadas esperando que o Estado demarcasse novos territórios indígenas e desse um basta ao grave conflito fundiário entre índios e produtores rurais que se estabeleceram na região ao longo do século passado, os guaranis kaiowás de Mato Grosso do Sul decidiram ocupar e lutar pelas terras que afirmam terem pertencido aos seus antepassados.

Governo assina 20 parcerias para produzir 19 remédios e duas vacinas
Três ministérios, 12 laboratórios públicos e 17 privados fecharam acordos. Medicamentos são contra Aids, câncer, asma, hemofilia e outras doenças.

Bananas terão papel-chave na alimentação em mundo 'aquecido'
Conclusão consta em estudo recém-divulgado que afirma que produto pode resistir melhor a aumentos de temperatura.

Navio pesqueiro é detido em Galápagos com 41 tubarões mortos
Animais são de três espécies diferentes e foram pescados ilegalmente. Os 21 tripulantes estão em prisão preventiva até investigações começarem.

Concreto e outros produtos que se 'autoconsertam' são aposta da ciência
Está sendo testado cimento que se recompõe com bactéria 'acionada' pela chuva; princípios semelhantes podem ser usados para consertar telas de smartphones e até aviões.

Estudo: alimentos causam quase 1/3 das emissões do efeito estufa

O relatório, intitulado "Mudança Climática e Sistemas Alimentares", estima que a produção de alimentos gere 19% a 29% de todas as emissões humanas. A estimativa da ONU era de 14%.

Ambientalistas protestam em Roma fantasiados de animais
Manifestação aconteceu diante de zoológico da cidade, na Itália. Ato ocorreu após zoo ter registrado três mortes recentes de animais.

Animais de zoológico ganham brinquedos no Dia das Bruxas
Ursos polares, condores e filhotes de jaguar 'celebraram' Halloween na Califórnia.

Solo de Marte é semelhante ao do Havaí, diz Nasa
Como os cientistas já desconfiavam, a maior parte do solo é composta por materiais basálticos de origem vulcânica.

Curiosity encontra em Marte minerais semelhantes aos de vulcão havaiano
Primeira amostra de solo analisada por jipe-robô continha feldspato e olivina, minerais tipicamente associados a erupções vulcânicas.

Ônibus espacial Endeavour começa a ser exibido em museu dos EUA
Veículo aposentado em 2011 ficará em centro de exposição de Los Angeles. Estudantes, pais e professores se reuniram para ver cerimônia de abertura.

Pesquisador do Butantan descobre 9 espécies de aranhas caranguejeiras
Novas espécies habitam árvores em diferentes regiões do Brasil. Descobertas foram publicadas na revista 'ZooKeys'.

São Paulo registrou na quarta-feira a temperatura mais alta do ano, segundo Inmet
O dia foi também de baixa umidade relativa do ar em quase todo o estado.

ONU quer limitar exploração do mar para proteger pesca em países pobres
Práticas como poluição e sobrepesca ameaçam produção de alimentos. Até metade da carne consumida na África Ocidental vem da pesca.

Economia da natureza mostra que proteger o ambiente compensa
De acordo com o estudo Economia dos Ecossistemas e Biodiversidade, o mundo perde por ano de US$ 2 trilhões a US$ 5 trilhões devido à destruição das florestas. Conservá-las, entretanto, custaria apenas US$ 45 bilhões.

Tribunal derruba ordem para retirada de índios de fazenda em Iguatemi
Nova decisão foi anunciada pelo ministro da Justiça, em Brasília. Liminar que determinava desapropriação levou tribo a 'pedir' morte coletiva.

Curitiba/PR registra 35°C, a maior temperatura de outubro desde 1936
No Paraná, a maioria das cidades registraram temperaturas acima dos 30°C nesta terça-feira. O calor no final do mês é recorrente da primavera, estação de transição, com características do inverno e do verão.

Viagem espacial de US$ 107 mil será vendida em feira de Gramado/RS
Tour espacial dura uma hora e exigirá preparação especial dos passageiros. Festival de Turismo de Gramado será realizado de 22 a 25 de novembro.

Mais de 260 áreas verdes já foram identificadas em Manaus/AM
Até o final deste ano a Semmas pretende identificar mais 20 áreas, que serão devidamente sinalizadas com placas, e os moradores do entorno conscientizados sobre a preservação de tais locais.

Capivaras migram para entorno de usina hidrelétrica, em Porto Velho/RO
Animais vivem acima da barragem da Usina de Santo Antônio. Capivaras não estão em extinção e nem oferecem riscos, diz biólogo.

Ibama embarga 2 mil hectares de área na região norte de Mato Grosso
Instituto identificou exploração ilegal em Feliz Natal. Ibama apreendeu vários caminhões e tratores na região.

O mar e a Lei Florestal
Quinze ministérios e outros órgãos discutem como a zona costeira pode ser explorada de modo ecologicamente sustentável.

Ministra do Meio Ambiente confirma retirada de ocupação irregular no Jardim Botânico do Rio
Segundo Izabella Teixeira, as remoções cumprem decisão do Tribunal de Contas da União que, em setembro, obrigou o governo a delimitar e registrar em cartório os limites do Jardim Botânico.

Indígenas são capacitados para trabalhar como Agente Ambiental Voluntário
O curso de capacitação que formou os novos gestores na administração e monitoramento dos recursos naturais em suas aldeias foi realizado no Centro Cultural da Aldeia São Francisco do Patauá, por meio da parceria entre a Secretaria de Estado para os Povos Indígenas e o Ibama.

Vacinação contra aftosa no Nordeste pode ser prorrogada ou suspensa em função da seca
A segunda etapa de intervenção em bovinos e búfalos começa no dia 1º de novembro, com expectativa de imunizar 150 milhões de animais em todo o país.

Ativistas do Greenpeace fantasiados de peixes protestam no Chile
Manifestantes seminus fizeram ato contra nova lei de pesca do país. Protesto ocorreu nesta terça-feira (30) na cidade chilena de Valparaíso.

Sapo considerado extinto na natureza vai ser reintroduzido na Tanzânia
'Nectophrynoides asperginis' só existe em cativeiro desde 2009, diz IUCN. Animais criados nos EUA serão libertados nesta semana no país.

Instituto Nacional de Pesquisas da Amazônia completa 60 anos
Instituição já tem 71 patentes e outros 52 pedidos de registro feitos. Inpa foi criado por Vargas para que brasileiros pesquisassem Amazônia.

Pandas gigantes comem bambu após voltarem para reserva na China
Por causa de terremoto, animais ficaram 4 anos fora da cidade de Wolong. Primeiros 18 desses mamíferos já retornaram para a base em Sichuan.

Noroeste dos EUA avalia estragos após passagem de Sandy
Após causar 67 mortes no Caribe, Sandy deixou 43 vítimas fatais nos Estados Unidos e uma no Canadá. Mais de oito milhões de residências ficaram sem eletricidade na manhã desta terça-feira.

Estudo aponta semelhanças entre o cérebro de tubarões e o humano
Conhecimento pode gerar novos métodos para repelir o animal. Pesquisa foi feita na Austrália, onde ataques de tubarões são um problema.

Mudança climática torna chuvas do Pacífico Sul imprevisíveis, diz estudo
Região pode ter tanto enchentes quanto secas, com combinação de fatores. Ilhas já são ameaçadas pela possibilidade de aumento do nível do mar.

Nova espécie de lagarto é descoberta por cientistas da Austrália
Réptil foi encontrado em área próxima à cidade de Perth. 'Ctenotus ora' já corre risco de desaparecer devido à expansão urbana.

Serviço Geológico confirma fim da vazante do Rio Negro, em Manaus/AM
Rio Negro começou apresentar evolução no nível das águas na capital. CPRM diz que ainda não é possível prever se cheia de 2013 será histórica.

Neandertais podem ter produzido ferramentas de ossos, diz estudo
Objetos em sítio arqueológico têm idade próxima a restos de neandertais. Pesquisa foi publicada nesta segunda-feira (29) no periódico 'PNAS'.

OMS alerta que inundações e secas no Brasil, geradas por mudanças climáticas, causam uma série de doenças
O estudo revela que as doenças mais comuns causadas pelas alterações climáticas têm relação direta com uma série de fatores, como poluição e infraestrutura local.

Geração de energia por hidrelétrica precisa dobrar até 2050, diz agência
Propostas foram apresentadas pela Agência Internacional de Energia. Objetivo é limitar as emissões de gases que provocam o efeito estufa.

Rondônia é o 2º estado do Brasil que mais desmata, diz Ibama
Presidente do Ibama discute ações de combate com o governo do estado. Para as fiscalizações, RO vai contar com reforço de 150 pessoas.

Aumentam atendimentos no Hospital Veterinário de Uberaba, MG, em 2012
Neste ano, hospital teve 293 atendimentos até o mês de setembro. Veterinário conta que traumas estão entre os casos mais registrados.

Lages, SC, é 1ª cidade do país a realizar fertilização in vitro de suínos
Seis suínos nasceram nesta segunda-feira (29) na Serra Catarinense. Processo foi desenvolvido na Faculdade de Medicina Veterinária da Udesc.

Chegada do homem a Marte pode ser ameaça para o planeta
Cientistas afirmam que a chegada do homem a Marte pode ser uma grande ameaça para o planeta vermelho, uma vez que trilhões de micróbios viajariam com cada astronauta que pisar em solo marciano.

Índios de MS se reúnem com vice-procuradora-geral em Brasília
Nesta segunda (29) eles reforçaram que não pretendem deixar fazenda. 'Vamos lutar até o último guerreiro', dizem em carta, segundo o MPF.

Cientistas criam exame barato para detectar câncer e aids
O exame ainda é um protótipo e revela a presença de uma doença ou de um vírus - mesmo em pequena quantidade no corpo - usando um sistema de cores.

Espécie de golfinho chega à beira da extinção com apenas 55 indivíduos
Greenpeace alerta que golfinho do Maui, que habita o litoral da Nova Zelândia, é capturado acidentalmente por pescadores.

Organização diz que 11 mil índios colombianos foram forçados a sair de suas regiões
A maior parte dos atos de violência foi atribuída a grupos insurgentes e forças de segurança.

Copa e efeito estufa
Estratégias de mitigação e compensação das emissões de gases geradas pelas obras da Copa do Mundo de 2014 são novamente discutidas.

Estudo de australianos e brasileiros mostra que abelhas distinguem Picasso de Monet
Pesquisa revelou que insetos conseguem diferenciar pinturas de estilos distintos.

DNA de verme levanta dúvida sobre classificação de animais
Animal marinho conhecido como 'verme-pênis' foi analisado na Noruega. Nomenclatura biológica por formação da boca e do ânus poderia mudar.

Tsunami chega ao Havaí sem provocar danos graves e alerta é retirado
Foram registradas apenas ondas consideradas pequenas. A maior delas, nos primeiros 45 minutos do tsunami, mediu 1,5 metro, em Maui, segundo o Centro de Alerta de Tsunamis do Pacífico.

Celular com formato de relógio armazena energia solar
A ideia é que ele seja útil para aqueles usuários que costumam se esquecer de recarregar a bateria do aparelho. O Leaf consegue transformar a luz do Sol em energia para o celular funcionar com bateria extra.

Pesquisadores brasileiros publicam trabalho com Nobel de Medicina
O trabalho descreve o potencial de um receptor de neuropeptídios chamado GRPR na proteção contra sepse e inflamação.

Polícia na Tailândia apreende 16 filhotes de tigre em caminhonete
Animais estavam sendo transportados por motorista que recebeu equivalente a R$ 1 mil para traficá-los.

Biólogos monitoram comportamento de botos no litoral de São Paulo
População de 200 botos-cinza do estuário de Cananéia é objeto de estudo há 30 anos.

Brasil quer produzir biodiesel com resíduos pesqueiros
O objetivo da iniciativa é ampliar o aproveitamento dos recursos pesqueiros e aquícolas, que muitas vezes acabam indo para o lixo, e ainda agregar valor ao trabalho dos pescadores, fomentando, assim, o desenvolvimento sustentável no setor.

Pesquisa aponta como tiranossauro devorava triceratops
Predador jurássico arrancava cabeça de dinossauro para comer, diz estudo. Marcas de dentes em 18 fósseis de triceratops permitiram fazer pesquisa.

Sonda Dragon completa primeira missão privada de transporte espacial
A SpaceX se transforma assim na primeira empresa privada que completa uma missão de transporte espacial e, por isso, abre as portas para novos usos e contratos com empresas privadas depois que o fim da era das naves deixará a Nasa às custas da russa Soyuz.

Macaco astro do Facebook é capturado na Flórida após três anos de fuga
Rhesus escapava tentativas de captura desde 2009, e ganhou status de celebridade na rede social, onde tem 87 mil fãs.

Cientista brasileiro e Nobel de Física pesquisam superfluidos
Projeto que explora fronteiras da Física é conduzido pelo grupo de Vanderlei Bagnato (USP e Cepof) em colaboração com pesquisadores do MIT.

Arqueólogos encontram restos de povoado pré-histórico na Bulgária
Fotos foram feitas em setembro pelo Instituto de Arqueologia da Bulgária. Local pode ser a mais antiga cidade pré-histórica na Europa.

Degelo impede pousos em bases da Antártica
Para aterrissagem segura, temperatura precisa ser de pelo menos -5º C.

Usina de Fukushima ainda pode estar vazando radiação no mar, diz estudo
Tokyo Electric Power, que opera usina nuclear, não descarta possibilidade. Peixes fisgados perto da cidade indicam presença de césio radioativo.

MMA e FAO mais próximos
Ministra Izabella Teixeira propõe criação de pequeno grupo de trabalho para desenvolver agenda comum.

MPF pede novo mandado judicial para desocupação de terra indígena em Mato Grosso
A área pertence aos índios xavantes, mas é ocupada ilegalmente por cerca de 7 mil não indígenas.

Furação 'Sandy' deixa 26 mortos e 4 desaparecidos no Haiti
'Sandy' passou como furacão de categoria 2 na quarta-feira e quinta-feira por Jamaica e Cuba, onde causou pelo menos uma dúzia de mortes e originou fortes chuvas no Haiti, República Dominicana e Porto Rico, entre outras nações da região.

Arqueólogos encontram tumba maia de 1,7 mil anos na Guatemala
Arqueólogos localizaram a tumba na Província de Retalhuleu, em um templo, e acreditam que o túmulo pode ser de um antigo governante maia ou líder religioso que viveu há cerca de 2 mil anos.

Uma tonelada de peixes mortos aparece em praias do litoral sul de São Paulo
Os peixes teriam sido apanhados a cerca de três quilômetros da costa e levados à praia por correntes marítimas.

Disputa entre índios e produtores rurais em MS é histórica
Ordem judicial prevê retirada de 170 índios de fazenda. Funai e MPF recorreram, e indígenas prometem resistir.

Sul da Itália é atingido por terremoto de 5,3 graus na escala Richter
O terremoto causou estragos em alguns edifícios e, pelo menos, um morto.

Carta de Einstein é comprada por pouco mais de US$ 3 milhões
Conhecida como "Carta de Deus", a correspondência revela pensamentos íntimos do cientista sobre religião, Deus e tribalismo.

Mais de 40 baleias encalham e morrem em ilha no Oceano Índico
Animais foram encontrados nas Ilhas Andaman, na Baía de Bengala. Encalhe em massa seria fenômeno natural causado por 'desorientação'.

Cultivo de soja em áreas recém-desmatadas da Amazônia cresce 57%
Plantações em MT, PA e RO ocupam 184 km² de áreas abertas após 2006. Moratória da soja, um pacto contra o desmatamento, foi renovada.

22 / 10 / 2012 Possível mascote dos Jogos de 2016, mico é alvo de projetos para salvá-lo
Mico-leão-dourado está ameaçado de extinção no país. Reflorestamento da Mata Atlântica no Rio pode ajudar primata brasileiro.

22 / 10 / 2012 Pesticidas põem colônias de zangões em risco
As Nações Unidas estimam que um terço de toda a alimentação baseada em vegetais depende da polinização das abelhas, e cientistas têm se mostrado perplexos pela redução do número de abelhas principalmente na América do Norte e na Europa, em anos recentes.

22 / 10 / 2012 Foguete russo Soyuz é erguido no Cazaquistão para missão espacial
Aeronave levará três astronautas para Estação Espacial Internacional. Decolagem está prevista para acontecer na próxima terça-feira.

22 / 10 / 2012 Casos de tétano no país caem 43% entre 2001 e 2011, diz ministério
No período de dez anos, quantidade de infectados foi de 578 para 327. Queda é atribuída ao reforço em campanhas de vacinação.

22 / 10 / 2012 Ibama autoriza início da operação da hidrelétrica Jirau
Entre as condições para a usina iniciar a operação estão a manutenção dos programas ambientais direcionados à etapa construtiva e programas relativos à fase de operação.

22 / 10 / 2012 Feiras indígenas promovem a preservação de sementes e mudas
Evento é realizado por tribos indígenas da etnia Caiapó. A troca de sementes úteis é realizada em meio a festas e danças.

22 / 10 / 2012 Vestidos de panda, chineses participam de campanha em Xangai
Objetivo é divulgar escolha de embaixadores para conservação da espécie. Urso panda é considerado ameaçado de extinção.

22 / 10 / 2012 Empresa britânica faz combustível a partir de ar e água
Para entusiastas, uso de gás carbônico e hidrogênio em 'nova gasolina' amenizaria aquecimento global, mas muitos são céticos.

22 / 10 / 2012 Brasil participa da construção de superobservatório astronômico
Batizado de CTA (Cherenkov Telescope Array), o futuro observatório tem o objetivo pouco modesto de investigar as engrenagens de fenômenos como a matéria escura e os buracos negros.

22 / 10 / 2012 Roraima quer ser o primeiro Ecoestado do mundo
O projeto, que tem como tripé um Estado ecologicamente sustentável, economicamente viável e socialmente justo, foi apresentado pela primeira vez durante a Conferência Rio+20, em junho passado.

22 / 10 / 2012 Polícia apreende mais de 1 tonelada de carvão em reserva ambiental
Crime aconteceu em Juquiá, no Vale do Ribeira, interior de São Paulo. Carvão era feito a partir de madeira nativa da Mata Atlântica.

22 / 10 / 2012 USP pesquisa molécula capaz de reverter a morte de células cerebrais
Segundo a pesquisa, a bradicinina é capaz de reverter a morte dos neurônios induzida pela excessiva ativação de receptores de glutamato.

22 / 10 / 2012 Em reunião, países fecham acordo para dobrar fundo da biodiversidade
Governos concordaram em elevar recursos para países pobres até 2015. Acordo ocorreu no último dia de convenção da ONU, na Índia.

22 / 10 / 2012 Simulados preparam populações do Sul e Sudeste para desastres naturais
De acordo com o secretário nacional de Defesa Civil, Humberto Viana, os treinamentos, que vêm ocorrendo em vários estados desde maio de 2011, ajudaram a diminuir o número de mortes em casos de eventos climáticos extremos, como enxurradas e deslizamentos.

23 / 10 / 2012 Coreia do Sul deve lançar satélite no dia 26, diz ministro
O foguete será levado ao ponto de lançamento na quarta-feira e um navio da guarda costeira se dirigirá às águas internacionais, perto das Filipinas, para acompanhar sua trajetória.

23 / 10 / 2012 Usina Jirau recebe licença e deve começar a gerar energia no início do próximo ano
O documento permite o início do funcionamento da usina, que terá capacidade instalada de 3,75 mil megawatts, que serão gerados por 44 turbinas do tipo bulbo.

23 / 10 / 2012 Baleias brancas são capazes de imitar a voz humana, revela estudo

Pesquisadores analisaram beluga que vivia em fundação da Califórnia (EUA). Animal modificou mecânica vocal para produzir sons parecidos com a fala.

23 / 10 / 2012 Fóssil de 215 milhões de anos pode decifrar origem das tartarugas
Restos de exemplar milenar foram encontrados em aterro na Polônia. Pesquisadores querem descobrir mais detalhes sobre este réptil.

23 / 10 / 2012 Governo vai lançar plano para desonerar setor da pesca
Segundo o Ministério da Pesca e Aquicultura, a meta é produzir 2 milhões de toneladas anuais de pescado até 2014.

23 / 10 / 2012 Comissão francesa rejeita estudo que vincula milho transgênico a câncer
Conselho de Biotecnologia afirmou que estudo usou métodos inadequados e que não foi encontrada relação entre tumores e consumo de milho transgênico.

23 / 10 / 2012 Subprodutos da produção de bioenergia geram materiais recicláveis para a indústria
Empresas do Brasil e do Canadá investigam processos inovadores para a utilização dos resíduos da produção de biodiesel na indústria de material elétrico e outras aplicações.

23 / 10 / 2012 Ancestral mais antigo do homem se parecia com esquilo, aponta estudo
'Purgatorius' viveu há 66 milhões de anos, após extinção dos dinossauros. Fósseis do animal foram descobertos nas Montanhas Rochosas, nos EUA.

23 / 10 / 2012 Governo e empresas vão adquirir navio de pesquisas de R$ 162 milhões
Petrobras, Vale, Marinha e Ministério da Ciência vão investir recursos. Previsão do governo é que navio seja entregue em 2013.

23 / 10 / 2012 Pesticidas agrícolas matam abelhas e prejudicam polinização, diz estudo
Zangões mortos por produtos químicos impactam colônias. Grande parte de alimentação global de vegetais depende da polinização.

23 / 10 / 2012 Incêndio no parque Lapa Grande destrói 10 hectares de mata nativa
Brigadistas do IEF e bombeiros trabalharam no combate às chamas. A suspeita é de que tenha sido um incêndio criminoso.

23 / 10 / 2012 Cientistas relacionam lençol freático esvaziado a tremor na Espanha
Fenômeno de magnitude 5,1 atingiu Lorca em 2011 e matou nove pessoas. Terremoto teria sido causado por redução no nível do aquífero local.

23 / 10 / 2012 Cientistas pegam 6 anos de cadeia por subestimar risco de abalo na Itália
Grupo de 7 fazia parte da comissão de 'grandes riscos'. Eles tranquilizaram população de L'Aquila antes de tremor que matou 300.

23 / 10 / 2012 Nova espécie de mosquito ameaça guerra contra a malária no Quênia
Cientistas encontraram inseto que carregava parasita causador da doença. Espécie é considerada potencialmente perigosa por viver ao ar livre.

23 / 10 / 2012 Operação Azimbre II apreende 900 kg de pescado e 6 mil quelônios, no AM
Fiscalização apreendeu também tracajá e madeira ilegal. A ação resultou na aplicação R$ 29 milhões em multas.

23 / 10 / 2012 Falha em motor de foguete faz EUA adiar missão secreta
A missão misteriosa do Veículo de Teste Orbital-3 estava programada para decolar no topo de um foguete Atlas 5 em 25 de outubro do Complexo de Lançamento Espacial 41, em Cabo Canaveral, na Flórida.

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EARTH PAGES

Short fuse on clathrate bomb?
Posted on October 31, 2012 by Steve Drury | Leave a comment

Gas hydrate (methane clathrate) block embedded in seabed sediment (Photo credit: Wikipedia)
The biggest tsunami to affect inhabitants of Britain, mentioned in the earlier post Landslides and multiple dangers, emanated from the Storegga Slide in the northern North Sea west of Norway. That submarine debris flow was probably launched by gas hydrates beneath the sea bed breaking down to release methane thereby destabilising soft sediments on the continental slope. Similar slides were implicated in breaking Europe-America communications in the 20th century, such as the Grand Banks Slide of 1929 that severed submarine cables up to 600 km from the source of the slide. Even now, much Internet traffic is carried across oceans along optic-fibre cables, breakages disrupting and slowing services. A more mysterious facet of clathrate breakdown is its possible implication in unexplained and sudden losses of ships. When gas escapes to the surface, the net density of seawater decreases, the more so as the proportion of bubbles increases. Ship design and cargo loading rests on an assumed water density range from fresh to salt water and for different temperatures at high and low latitudes.

Gulf stream map (credit: Wikipedia)
The Atlantic seaboard of the USA hosts some of the best-studied accumulations of clathrates in the top 100-300 m of seabed sediments. Since their discovery these ‘cage complexes’ of mainly methane and carbon dioxide trapped within molecules of water ice have been studied in detail. Importantly, the temperatures at which they form and the range over which they remain stable depend on pressure and therefore depth below the sea surface. At atmospheric pressure solid methane hydrate is unstable at any likely temperature and requires -20°C to form at a pressure equivalent to 200 m water depth. Yet is stable at temperatures up to 10°C 500 m down and 20°C at a depth of 2 km. Modern sea water cools to around 0°C at depths greater than 1.5 km, so gas hydrates can form virtually anywhere that there is a source of methane or CO2 in seafloor sediment. In the sediments temperature increases sharply with depth beneath the

seabed due to geothermal heat flow thereby limiting the clathrate stability zone to the top few hundred metres.

Two factors may lead to clathrate instability: falling sea level and sea-floor pressure or rising sea-floor temperature. Many gas-hydrate deposits, especially on the continental shelf and continental edge are likely to be close to their stability limits, hence the worries about destabilisation should global warming penetrate through the water column. The western North Atlantic is an area of especial concern because the Gulf Stream flows northward from the Caribbean to pass close to the US seaboard off the Carolinas: that massive flow of tropical warm water has been increasing during the last 5 thousand years so that its thermal effects are shifting westwards.

Geophysicists Benjamin Phrampus and Matthew Hornbach of the Southern Methodist University in Dallas, Texas have used thermal modelling to predict that gas-hydrate instability is imminent across 10 thousand square kilometres of the Caroline Rise (Phrampus, B.J. & Hornbach, M.J. 2012. Recent changes to the Gulf Stream causing widespread gas hydrate destabilization. Nature, v. 490, p. 527-530). As a test they analysed two seismic reflection profiles across the Carolina Rise, seeking anomalies known as bottom-simulating reflectors that signify free gas in the sediments. These are expected at the base of the gas-hydrate zone and their presence helps assess sediment temperature. At depths less than 1 km the base of the gas-hydrates modelled from the present temperature profile through the overlying seawater lies significantly above the base's signature on seismic lines. The deeper levels probably formed under cooler conditions than now – probably eight degrees cooler – and may be unstable. If that is correct, the Caroline Rise area seems set to release around 2.5 Gt of methane to add to atmospheric greenhouse warming. The Storegga Slide also lies close to the northern track of the Gulf-Stream – North Atlantic Drift…

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Una parodia della giustizia?
Posted on October 23, 2012 by Steve Drury | 1 Comment

Damage caused by the L' Aquila earthquake of 6 April 2009. (credit: Reuters)
Lying above a destructive plate margin, albeit a small one, Italy is prone to earthquakes. Seismometers detect a great many of low magnitude that no one notices and that do no obvious damage to buildings. From 2006 to autumn 2008 the Abruzzo region on the eastern flank of the Appenine mountains of central Italy experienced a background of one low-magnitude tremor every day (Papadopoulos, G.A. et al. 2010. Strong foreshock signal preceding the L'Aquila (Italy) earthquake (Mw 6.3) of 6 April 2009. Natural Hazards and Earth System Sciences, v. 10, p. 19-24). In the following 6 months the rate more than doubled but the epicentres continued to be almost randomly situated. Things changed dramatically in the 10 days following 27 March 2009: the pace increased to twenty times the normal 'background' and epicentres clustered directly beneath the regional capital L' Aquila (population 73 thousand) close to a known fault line. At 3.32 am on 6 April 2009 the Paganica fault failed less than 10 km below L' Aquila, directing most of the Magnitude 6.3 energy at the town. This was the deadliest earthquake in Italy for three decades; 308 people died 1500 were injured and 40 thousand found themselves homeless. Silvio Berlusconi, not a man to flinch from controversy, commented on German TV about the homeless, 'Of course, their current lodgings are a bit temporary. But they should see it like a weekend of camping'.

Former Italian President Silvio Berlusconi (credit: Wikipedia)
L' Aquila has a dismal history of seismic damage, having been devastated before: 7 times since the 14th century. Having grown on a foundation of lake-bed sediments, notorious for amplifying ground movements, the city was clearly in a high-risk status in much the same manner as Mexico City. Shaken several times before and built with no regard to seismicity, much of L' Aquila's centuries-old building stock was incapable of resisting the event of 6 April 2009: up to 11 thousand building were damaged, some collapsing completely.

Not only was the earthquake preceded by an increasing pace of foreshocks, but many local people reported strange 'earth lights' during the months beforehand (Fidani, C. The earthquake lights (EQL) of the 6 April 2009 Aquila earthquake, in Central Italy.Natural Hazards and Earth System Sciences, v. 10, p. 967-978). In fact, so many sightings were made that plans have been outlined for a CCTV monitoring network in rural areas.

So, this disaster was not short of signs that all was not well in Abruzzo, in a seismic sense: historical precedent; poor urban siting; foreshocks and oddities that have come to be associated with impending energy release. But was this litany sufficient to predict the place, date, and magnitude of what was coming? Plate tectonics, local structural geology and worldwide seismicity allow geophysicists to assess risk from earthquakes in the same way as hydrologists can outline flood-prone areas: literally on flood plains. Yet there are few if any records of a devastating earthquake having been predicted anywhere with sufficient accuracy to allow evacuation and mitigation of death and injury. That is despite the fact that teams of seismologists in the western US, Japan, Italy and several other well-off countries continually monitor seismic events even with a power many orders of magnitude less than those which kill or injure. Such bodies are faced with a dreadful choice in the face of evidence like that summarised above: warn tens of thousands to evacuate, organise such an exodus in a few days and prepare accommodation for them, or advise that similar seismic escalations rarely lead to massive damage with an estimate of the probability of risk. Both choices are guesswork for there are no rigorous equations that spell 'doom' or 'all clear' from such data. Earthquakes are not rainstorms or hurricanes, as 250 thousand dead people on the shores of the Indian Ocean bear grim witness.

Despite broad knowledge of the deep uncertainty associated with earthquakes and volcanic eruptions – no longer privy to specialist scientists these days, even in the least developed parts of the world – the Italian authorities saw fit to prosecute six earth scientists and a public official for multiple manslaughter. Because they provided "inaccurate, incomplete and contradictory" information about what

might have been the aftermath of tremors felt ahead of 6 April 2009 earthquake, a regional court sentenced all of them to six years in prison – two years more than even the prosecution demanded – and they are to pay the equivalent of £6.7 million in compensation. This was not a jury verdict, but the decision of a single judge, Marco Billi. No scientist, even one poring over data from the Large Hadron Collider in search of the Higgs boson, would every claim that what they report is perfectly accurate, complete and incontrovertible. The L'Aquila Seven never said they were certain that no earthquake would ensue, and the city's people were well aware of what risk they faced in much the same way that Neapolitans living on the slopes of Vesuvius know that one day they may be incinerated.

This is a travesty of justice so bizarre that one must look to the famous adage of Roman Law: qui bono? Certainly not the victims and their mourners, and definitely not science because any sensible Italian geophysicist will in future simply play dumb. There is already a huge world wide outcry, not just from outraged scientists.

Added 25 October 2012: The 12 October issue of Science carried a lengthy summary of proceedings early in the trial (Cartlidge, E. 2012. Aftershocks in the courtroom. Science, v. 338, p. 185-188). Read Nature's editorial on the L' Aquila verdict here and further comment.

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New twist on lunar origin
Posted on October 22, 2012 by Steve Drury | Leave a comment

Artistic impression of the moon-forming giant impact. (credit: Wikipedia)
Although a few would-be space faring countries have ambitions, a post-Apollo crewed mission to the Moon is unlikely for quite a while. Yet moon-struck curiosity goes on: currently there is a surge in re-examining the lunar samples brought back more than 40 years ago. The Lunar Sample Laboratory Facility in Houston holds about a third of a ton of rock and regolith. I suppose part of the reason why lunar rocks are being re-analysed – in fact some for the first time – is because new or improved methods are available, but frustration among a growing community of planetary geochemists having little more than meteorites to peer at probably plays a role as well. Since Hartman and Davis first suggested it, the giant impact theory for the Moon's origin has dominated geochemical ideas. Most tangible is that of a magma ocean, floated plagioclase crystals from its fractional crystallisation probably having formed the glaring white lunar highlands composed of anorthosite. More subtle are ideas about what happened to the Mars-sized planet that did the damage to Earth and flung vaporised rock into orbit to accrete into the new Moon, and the effects of the stupendous energy on the geochemistry of all three bodies. Directed at all that is new research on isotopes of zinc (Paniello, R.C. et al. 2012. Zinc isotope evidence for the origin of the Moon. Nature, v. 490, p. 376-379).

The focus on zinc is because it is easily vaporised compared with more refractory materials, such as calcium an titanium, and as well as being 'volatile' it has five naturally occurring isotopes with relative atomic masses of 64 (the most abundant), 66, 67, 68 and 70. In general, isotopes of an element behave in slightly different ways during geological and cosmological processes, which changes their proportions in the products; a process known as 'mass-fractionation'. Paniello and colleagues from Washington University, Missouri and the Scripps Institution of Oceanography, California USA found that Moon rocks are enriched in the heavier isotopes of zinc yet depleted in total zinc compared with terrestrial rocks and meteorites supposed to have come from Mars. Unlike those two planets the Moon's zinc deviates from its abundance relative to other elements recorded by chondritic meteorites. This zinc depletion tallies with volatile loss from incandescent vapour blurted from the colliding planets. But it doesn't help with the detailed predictions from the giant-impact model. A variety of scenarios suggest that the Moon should be made from remnants of the inbound impactor's mantle, yet studies of other elements' isotopes indicate that the Moon is rather Earth-like. But not those of zinc, so it looks like they have to be explained by a complete rethink of the whole hypothesis (Elliott, T. 2012. Galvanized lunacy. Nature, v. 490, p. 346-7).

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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 (Doubrovine, 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 Geophysics 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-1, 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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Landslides and multiple dangers
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 carcases 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 and 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 km3 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 si,ilar 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-sale active slump on the southeast flan 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 ar estimated at up to a centimetre a year. The volume of the slowly moving mass is an order of magnitude less that 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 time 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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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)
Palaeobiologists 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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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 CO2 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 be coated with finely-ground peridotite. A less satisfactory approach would 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 CO2 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 CO2, 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 (HCO3-) ions entered solution. That 'enhanced' solution is not so easy since, although it mimics the calcite-weathering effect by acid rain that naturally takes CO2 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 CO2 liquid will dissolve. The problem is this: while experiment and theory suggest the approach will work, nobody knows how long CO2 solution in brine will take. There needs to be a sizeable pilot study…

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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 (Polliitz, 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.

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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 'scallops' 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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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/NGEO1572).

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