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AMBIENTE BRASIL

Novo radar vai melhorar vigilância da floresta na Amazônia

Áreas que antes eram reconhecidas por satélites de maneira limitada em época de chuva agora vão ser captadas por um radar a partir do fim do ano. Imazon afirma que nova tecnologia não vai controlar o desmatamento.

Dilma inaugura neste sábado, em Porto Alegre/RS, o 1º aeromóvel do País

Veículo é movido pela força do vento em um duto elevado sobre a pista.

Arqueólogos encontram alto-relevo em pirâmide maia na Guatemala

Descoberta foi feita enquanto exploravam uma pirâmide maia de 600 DC. Escultura traz imagens de divindades e governantes, além de inscrição.

Filhotes de jacarés são encontrados em cativeiro ilegal no ES

Policiais chegaram ao local após denúncia anônima. Responsável pelos animais disse que iria soltá-los na natureza.

Nível de mercúrio no Rio Madeira está abaixo do esperado, revela estudo

Índice está quase mil vezes abaixo do permitido por legislação. Cerca de 1,6 mil famílias ribeirinhas estão sendo analisadas, em Rondônia.

Incra promete diminuir desmatamento nas áreas de assentamentos

Com base em dados de institutos especializados, o Ministério Público Federal identificou que o Incra é o maior desmatador da Amazônia. Até 2010, 133.644 quilômetros quadrados foram desmatados na área dos 2.163 projetos de assentamento.

Vacina experimental oferece proteção inédita contra malária

A vacina PfSPZ contém parasitas vivos e é complicada de ser feita porque exige que os cientistas dissequem as glândulas salivares dos mosquitos para alcançar os parasitas Plasmodium, que causam malária.

Proposta aprovada por consenso ainda pode receber ajustes durante 120 dias

Proposta aprovada por consenso ainda pode receber ajustes durante 120 dias.

Panda pode estar grávida em zoológico dos Estados Unidos

Inseminação artificial foi feita na fêmea Mei Xiang em março. Panda já teve dois filhotes, mas somente um, Tai Shan, sobreviveu.

Nascem dois raros tigres-de-Sumatra em zoológico dos EUA

Pelas próximas semanas, bichos não terão contato com humanos. Restam apenas 500 animais desse tipo na natureza.

Usina nuclear francesa tem vazamento importante de fumaça

O incidente ocorreu na usina nuclear Superphenix, em Creys-Malville. Um alarme automático detectou fumaça ao redor de um duto em um local técnico de 36 m².

Estudo constata que cachorros imitam seus donos ao bocejarem

Melhor amigo do homem sente a fadiga humana e repete o bocejo do dono. Cães bocejam mais frequentemente quando proprietário está envolvido.

Madeireiros vão pagar indenização de R\$ 21 milhões por desmatamento

A perícia identificou o desmatamento ilegal de uma área de 5.659 hectares de vegetação dentro da Terra Indígena Sararé, no Mato Grosso. Não cabe mais recurso.

Incêndio subterrâneo atinge Brasília há nove dias

O incêndio subterrâneo é uma espécie de incêndio florestal que acontece embaixo das raízes das plantas, em locais de concentração de húmus.

ICMBio cancela audiência pública sobre Trem do Corcovado

A audiência desta quinta-feira (8) teria como objetivo obter subsídios e informações adicionais para aprimoramento das minutas do edital de concessão, que deverá ser publicado em novembro.

Fósseis chineses propõem teorias diferentes para origem de mamíferos

Dois fósseis são possíveis chaves para entender origem de mamíferos. Ainda existem muitas divergências sobre o surgimento da classe.

Pesquisa da Fiocruz mostra vulnerabilidade dos municípios do Rio

A capital fluminense é a cidade mais vulnerável aos impactos das mudanças do clima previstas para os próximos 30 anos no Estado.

Estudo indica redução da resistência térmica da floresta amazônica

Segundo os pesquisadores, as regiões mais afetadas por este aquecimento recente "se encontram na zona sudeste, coincidindo com o chamado arco de desmatamento", que inclui as regiões de Rondônia, Mato Grosso e Pará, onde as práticas de desmatamento "foram mais agressivas nos últimos anos".

Par incomum de nuvens de gás é registrado em galáxia vizinha

As duas nuvens de gás, muito diferentes entre si, estão na Grande Nuvem de Magalhães, próxima da Via Láctea em escala cósmica.

Hong Kong confisca carregamento de marfim e peles de R\$ 12,2 milhões

Esta é a segunda apreensão no mês de produtos de espécies ameaçadas. Presença de chineses na África é responsável por uma onda de caça ilegal.

Chuva de meteoros terá máxima intensidade na segunda-feira

As Perseidas poderão ser vistas com maior intensidade na madrugada de 12 para 13.

Gravuras de 3 mil anos somem de sítios arqueológicos da Amazônia

As depredações foram denunciadas em documento enviado em março passado ao Instituto do Patrimônio Histórico e Artístico Nacional pela Federação das Organizações Indígenas do Alto Rio Negro, mas até o momento o órgão federal não se manifestou.

Brasil se une a vizinhos para incentivar avistamento de baleias

Os países latino-americanos reunidos no chamado Grupo de Buenos Aires, criado em 2005, têm proposto em repetidas oportunidades criar um santuário de baleias no Atlântico Sul, mas sua proposta ainda não teve sucesso junto à CBI.

Cientistas mapeiam rota precisa de migração de gerações de borboletas

Borboletas-monarcas são conhecidas pela migração nos EUA e México. Pesquisadores analisaram marcadores químicos nas asas dos insetos.

Prefeituras discutem em Brasília logística reversa de embalagens

Entidades municipais pedem condições técnicas, ambientais e financeiras para tocar o projeto.

Descoberto recentemente, planeta rosa tem tamanho similar a Júpiter

Nasa divulgou ilustração do exoplaneta GJ 504b. Ele fica a 57 anos-luz do nosso Sistema Solar.

Novos fósseis acrescentam mistério à evolução dos mamíferos

As análises dos fósseis mostram que os primeiros mamíferos surgiram entre 40 ou 50 milhões de anos antes do que sempre se tinha pensado, mas diferem em múltiplos aspectos no que diz respeito a sua evolução e adaptação posterior.

Nascimento de tubarão-zebra é filmado pela primeira vez

Pela primeira vez na Europa, um tubarão-zebra se reproduziu em cativeiro, e deu à luz após 10 de julho três filhotes.

Golfinhos têm a memória social mais longa já registrada em animais

Eles reconhecem um semelhante mesmo depois de 20 anos de separação. Estudo baseou-se em 43 golfinhos alojados em diferentes zoológicos.

Alemanha terá rodovia exclusiva para bikes

Rodovia exclusiva para ciclistas terá 60 quilômetros de extensão e acompanhará um dos trechos mais movimentados de uma das principais autoestradas da Alemanha.

Água contaminada com radiação tem vazado para o Pacífico há dois anos

Constatação sobre vazamento de Fukushima é do governo do Japão. Primeiro-ministro japonês definiu situação como um problema grave.

Proposta de lei sobre patrimônio genético segue em discussão

MMA coordena debate com todas as partes envolvidas em busca de solução consensual.

Projeto que busca energia sem fim por fusão nuclear vive fase crítica

Iniciativa internacional tenta recriar artificialmente processo que gera energia do Sol.

Identificada provável transmissão de gripe aviária entre humanos

Especialistas dizem que ainda é cedo para se falar em epidemia, mas alertam que essa hipótese não está descartada.

Campo magnético do Sol vai se inverter nos próximos meses, diz Nasa

A inversão de polaridade - isto é, Norte e Sul trocam de posição - ocorre no fim de cada ciclo solar, quando o dínamo magnético interno do Sol se reorganiza.

Relatório indica que 2012 bateu recorde de aumento do nível do mar

Além disso, 2012 esteve entre os 10 anos mais quentes desde que há registros, e países como os Estados Unidos e a Argentina tiveram o ano mais quente de suas histórias.

Hambúrguer artificial pode chegar aos supermercados em 20 anos

O sabor e a aparência são parecidos aos do hambúrguer de verdade. A carne desenvolvida em laboratório a partir de células-tronco de gado pode virar opção de consumo em duas décadas, defende criador.

Comunidades tradicionais pedem patrimônio com marco legal justo

Seminário discute reforma da legislação. Objetivo é obter apoio de todos os setores envolvidos.

Pela 1ª vez, Brasil sedia congresso internacional sobre múmias

O 8º Congresso Mundial de Estudos no Museu Nacional, no Rio de Janeiro, pretende reunir diferentes especialidades sobre mumificação e discutir técnicas de preservação, pesquisas menos invasivas, da microbiologia à paleoparasitologia.

Cientista descobre 33 novas espécies de formigas na América Central

Bichos vivem sob as folhas no chão da floresta e quase não enxergam. Achados foram publicados no periódico 'Zootaxa'.

Governo prepara portaria sobre modernização de térmicas

Portaria permitirá a modernização de térmicas a carvão antigas que emitem grandes volumes de CO2.

Casal de ambientalistas é ameaçado por caçador em mata de SC

O casal de ambientalistas passeava na mata próxima de sua casa com a filha em Atalanta (SC), quando um homem saiu dos arbustos apontando uma arma para um deles.

EUA preveem reduzir metas para biocombustíveis em 2014

Decisão irá oferecer alívio para refinarias que enfrentam dificuldades com os crescentes preços dos créditos de combustíveis renováveis.

Gestores do Mosaico Lagamar fazem reunião em Quatro Barras/PR

Promovido pelo ICMBio, encontro pretende fortalecer gestão participativa e integrada das unidades de conservação.

Ministério da Agricultura flexibiliza produção de queijo artesanal

São considerados queijos artesanais aqueles feitos com leite cru e maturados em período inferior a 60 dias.

'Bosque' futurista tem superárvores que funcionam como jardim vertical

Estruturas em forma de árvore de 50 m de altura abrigam 163 mil plantas. Local fica em complexo na Cingapura; copas captam energia solar.

Campanha nacional 'Minha Amiga é uma Anta' é lançada em Sorocaba/SP

Intuito é promover a preservação da espécie em todo o Brasil. Com público alvo infante-juvenil, campanha mostra que a anta é amiga.

Lobo-marinho aparece em píer de Ilhabela, no litoral norte de São Paulo

Técnicos disseram que animal parou na cidade para descansar. Fêmea, que mede 1,30 metro e pesa 50 quilos, não apresentava ferimentos.

Radiação da água em Fukushima aumentou 47 vezes nos últimos 5 dias

Amostras foram extraídas de um dos poços entre os reatores e o mar. Em julho, a operadora reconheceu vazamento de água subterrânea.

Pesquisadores tentam rastrear as origens de cão nativo americano

A atual teoria especula que os cães são descendentes de lobos que se vincularam a humanos entre 12 mil e 33 mil anos atrás.

Curiosity completa 1 ano em Marte e ganha 'Parabéns pra você'

Instrumento que recolhe amostras do solo foi usado para 'tocar' música. Astronautas na ISS também falaram ao vivo sobre aniversário do robô.

Antropólogos buscam no México os primeiros habitantes da América

Trinta ossadas de até 12 mil anos a.C. são analisadas por cientistas. Estudos de crânio, DNA e radiocarbono vão ajudar a comprovar teoria.

Alasca procura explicações para enxurradas em geleira

O que causa a enxurrada - e obriga cientistas e autoridades a buscar urgentemente formas de a prever e se preparar para ela - é a pressão. À medida que a água se acumula na depressão e busca um escape, ela pode erguer partes da geleira, ainda que ligeiramente, e, nesse movimento de suspensão, a água pode encontrar uma saída.

Emissão de gases de efeito estufa não teve redução efetiva em 2012

Em 2012, foram emitidos 71,6 milhões de toneladas de gás carbônico.

Estudo descarta falta d'água na Índia com degelo do Himalaia

As geleiras das bacias da região vão recuar de forma dramática e até 2100, no pior dos cenários, perderão, em média, a metade de seu volume. Mas, ao longo do século XXI, não deverá faltar água, porque o degelo adicional deverá permitir enfrentar um aumento na demanda hídrica nesta região do mundo, que tem forte crescimento demográfico.

Japão vê 'emergência' em vazamento de água radiativa de Fukushima

Água estaria subindo para superfície acima dos limites legais de radiação. Segundo diretor de agência, medidas adotadas são solução temporária.

Técnicos analisam se língua azul, doença de gado, pode se alastrar no Rio

O alerta foi feito por veterinários da Universidade Federal Fluminense, que detectaram o vírus em fevereiro em uma fazenda em Vassouras, área rural do sul fluminense, que matou ovelhas leiteiras e cordeiros e causou sequelas em vários animais.

Hospital das Cruzadas com cerca de mil anos é descoberto em Jerusalém

Local era movimentado e abrigava até 2 mil pacientes em emergências. Prédio ficava dividido por tipos de doenças e condições dos pacientes.

Primeiro hambúrguer feito em laboratório é provado em Londres

Gosto é próximo ao da carne bovina, mas falta gordura, dizem voluntários. Preparo do produto foi transmitido ao vivo em evento nesta segunda (5).

Cientistas argentinos conseguem estender em 50% a vida útil dos morangos

A quitosana, um biopolímero sem toxicidade, biocompatível e naturalmente degradável com atividade antimicrobiana, antiviral e antifúngica, tem a capacidade de diminuir a deterioração dos frutos, permitindo assim um maior tempo de armazenamento.

Cientistas reproduzem cavalo ameaçado com inseminação artificial

Potra de cavalo-de-Przewalski nasceu no Instituto Smithsonian, nos EUA. Variedade é considerada última de cavalo selvagem ainda viva.

Pesquisa promete elevar produção do azeite de dendê

Também conhecido como óleo de palma, o azeite comestível extraído do dendê é adicionado a muitos produtos comuns da rotina diária. O óleo é também usado como biocombustível.

Cientistas desenvolvem arroz resistente à seca

Segundo cientistas, a melhoria genética para tornar a planta tolerante à seca é uma das estratégias mais promissoras para enfrentar o problema. A tecnologia tem condições de favorecer o crescimento das raízes para que a planta possa alcançar reservas mais profundas de água no solo.

Fernando de Noronha reduz lixo oferecendo refil de água para turistas

Por enquanto, a iniciativa foi implantada nos Postos de Informação e Controle de duas praias do arquipélago: Golfinho Sancho e Sueste.

Peixe de aquário se reproduz mesmo após quase 1 ano morto

Os machos da espécie *Lebiste* conseguem armazenar seus espermatozoides no corpo das fêmeas por dez meses ou mais, garantindo a

continuidade de sua linhagem.

ONG faz campanha por pandas com 1,6 mil animais de brinquedo

Bichos vão circular pela Alemanha pelos próximos três meses. Número corresponde à quantidade de pandas ainda vivos no mundo.

Legislação sobre repartição de benefícios é complexa

Dois cientistas políticos de universidades europeias farão diagnóstico dos problemas do marco regulatório brasileiro.

Avó ajuda a amamentar bebê elefante em zoo de Israel

Para tratadora, porém, cuidados da 'avó coruja' foram longe demais.

Nasa espera que fase "sortuda" da Curiosity continue

Os cientistas esperam descobrir se os nichos favoráveis à vida em Marte são comuns e se algum carbono orgânico foi preservado nas rochas do planeta.

Grupo de voluntários para colonizar Marte em 2023 se reúne nos EUA

40 pessoas viram palestra da empresa Mars One; 78 mil já se inscreveram. Planeta tem ambiente hostil, pouco oxigênio e temperatura média de 63° C.

Vacina brasileira contra a Aids será testada em macacos

Imunizante desenvolvido e patenteado por pesquisadores da Faculdade de Medicina da USP mostrou alta potência em camundongos.

SCIENCE

Expression of terrain and surface geology in high-resolution helicopter-borne gravity gradient (AGG) data: Examples from Great Sand Dunes National Park, Rio Grande Rift, Colorado

Benjamin J. Drenth

The Leading Edge. 2013; 32(8): p. 924-930

<http://tle.geoscienceworld.org/cgi/content/abstract/32/8/924?ct=ct>

Mathematica strat column

Christopher L. Liner

The Leading Edge. 2013; 32(8): p. 966-968

<http://tle.geoscienceworld.org/cgi/content/abstract/32/8/966?ct=ct>

Advancements in satellite gravity gradient data for crustal studies

Jorg Ebbing, Johannes Bouman, Martin Fuchs, Verena Lieb, Roger

Haagmans, J. A. C. Meekes, and Rader Abdul Fattah

The Leading Edge. 2013; 32(8): p. 900-906

<http://tle.geoscienceworld.org/cgi/content/abstract/32/8/900?ct=ct>

Characterizing heterogeneity in a glaciofluvial deposit using architectural elements, Limehouse, Ontario, Canada

J.M. Slomka, C.H. Eyles, and Timothy Fisher

Canadian Journal of Earth Sciences. 2013; 50(9): p. 911-929

<http://cjes.geoscienceworld.org/cgi/content/abstract/50/9/911?ct=ct>

Prediction of blast-induced vibration by adaptive neuro-fuzzy inference system in Karoun 3 power plant and dam

Mohamad Ataei and Mehdi Kamali

Journal of Vibration and Control. 2013; 19(12): p. 1906-1914

<http://jvc.sagepub.com/cgi/content/abstract/19/12/1906?ct=ct>

Reassessment of *Ischnacanthus? scheii* Spjeldnaes (*Acanthodii*, *Ischnacanthiformes*) from the latest Silurian or earliest Devonian of Ellesmere Island, arctic Canada

Carole J. Burrow and Hans Sues

Canadian Journal of Earth Sciences. 2013; 50(9): p. 945-954

<http://cjes.geoscienceworld.org/cgi/content/abstract/50/9/945?ct=ct>

Geon 12 crustal extension in the central Grenville Province, implications for the orogenic architecture, and potential influence on the emplacement of anorthosites

Aphrodite Indares, Abdelali Moukhsil, and William Peck

Canadian Journal of Earth Sciences. 2013; 50(9): p. 955-966

<http://cies.geoscienceworld.org/cgi/content/abstract/50/9/955?ct=ct>

Age and growth in *Mylephagus bipartitus*, a Late Cretaceous freshwater guitarfish from Alberta, Canada

Alycia E. Wilson, Michael G. Newbrey, Donald B. Brinkman, Todd D. Cook, Andrew G. Neuman, and Hans Sues

Canadian Journal of Earth Sciences. 2013; 50(9): p. 930-944

<http://cies.geoscienceworld.org/cgi/content/abstract/50/9/930?ct=ct>

Contrasting changes in surface waters and barrens over the past 60 years for a subarctic forest-tundra site in northern Manitoba based on remote sensing imagery

Charles Umbanhowar, Jr., Philip Camill, Mark Edlund, Christoph Geiss, Wesley Durham, Dahna Kreger, William Molano, Charlie Raskob, Mary Stocker, Andrea Tvera, Jordan Williams, and Boyan Brodaric

Canadian Journal of Earth Sciences. 2013; 50(9): p. 967-977

<http://cies.geoscienceworld.org/cgi/content/abstract/50/9/967?ct=ct>

New Early Triassic coelacanth in the family Laugiidae (Sarcopterygii: Actinistia) from the Sulphur Mountain Formation near Wapiti Lake, British Columbia, Canada

Andrew J. Wendruff, Mark V.H. Wilson, and Hans Sues

Canadian Journal of Earth Sciences. 2013; 50(9): p. 904-910

<http://cies.geoscienceworld.org/cgi/content/abstract/50/9/904?ct=ct>

Variation and taxonomy of Asiamerican eutherian mammal *Paranyctoides*

Alexander Averianov, J. David Archibald, and Hans Sues

Canadian Journal of Earth Sciences. 2013; 50(9): p. 895-903

<http://cies.geoscienceworld.org/cgi/content/abstract/50/9/895?ct=ct>

Carboniferous and Lower Permian sedimentological cycles and biotic events of South China

Xiangdong Wang, Wenkun Qie, Qingyi Sheng, Yuping Qi, Yue Wang, Zhuoting Liao, Shuzhong Shen, and Katsumi Ueno

Geological Society, London, Special Publications. published 6 August 2013, 10.1144/SP376.11

<http://sp.lyellcollection.org/cgi/content/abstract/SP376.11v1?ct=ct>

Origins of bone repair in the armour of fossil fish: response to a deep wound by cells depositing dentine instead of dermal bone

Zerina Johanson, Moya Smith, Anton Kearsley, Peter Pilecki, Elga Mark-Kurik, and Charles Howard

Biol Lett. 2013; 9(5): p. 20130144

<http://rsbl.royalsocietypublishing.org/cgi/content/abstract/9/5/20130144?ct=ct>

The Strawberry Volcanics: generation of 'orogenic' andesites from tholeiite within an intra-continental volcanic suite centred on the Columbia River flood basalt province, USA

Arron Steiner and Martin J. Streck

Geological Society, London, Special Publications. published 6 August 2013, 10.1144/SP385.12

<http://sp.lyellcollection.org/cgi/content/abstract/SP385.12v1?ct=ct>

Performance of airborne gravity gradiometers

Mark H. Dransfield and Asbjorn N. Christensen

The Leading Edge. 2013; 32(8): p. 908-922

<http://tle.geoscienceworld.org/cgi/content/abstract/32/8/908?ct=ct>

Large Pt anomaly in the Greenland ice core points to a cataclysm at the onset of Younger Dryas

Michail I. Petaev, Shichun Huang, Stein B. Jacobsen, and Alan Zindler

PNAS. 2013; 110(32): p. 12917-12920

<http://www.pnas.org/cgi/content/abstract/110/32/12917?ct=ct>

Advancements in understanding the aeromagnetic expressions of basin-margin faults--An example from San Luis Basin, Colorado

V. J. S. Grauch, Paul A. Bedrosian, and Benjamin J. Drenth

The Leading Edge. 2013; 32(8): p. 882-891

<http://tle.geoscienceworld.org/cgi/content/abstract/32/8/882?ct=ct>

Phytosauria

Michelle R. Stocker and Richard J. Butler

Geological Society, London, Special Publications. 2013; 379(1): p. 91-117

<http://sp.lyellcollection.org/cgi/content/abstract/379/1/91?ct=ct>

Consequences of flight height and line spacing on airborne (helicopter) gravity gradient resolution in the Great Sand Dunes National Park and Preserve, Colorado

M. Andy Kass

The Leading Edge. 2013; 32(8): p. 932-938

<http://tle.geoscienceworld.org/cgi/content/abstract/32/8/932?ct=ct>

New INTERPRETATION journal result of cooperative efforts

Vern Stefanic

The Leading Edge. 2013; 32(8): p. 962

<http://tle.geoscienceworld.org/cgi/content/abstract/32/8/962?ct=ct>

Early Crocodylomorpha

Randall B. Irmis, Sterling J. Nesbitt, and Hans-Dieter Sues

Geological Society, London, Special Publications. 2013; 379(1): p. 275-302

<http://sp.lyellcollection.org/cgi/content/abstract/379/1/275?ct=ct>

Aetosauria: a clade of armoured pseudosuchians from the Upper Triassic continental beds

Julia B. Desojo, Andrew B. Heckert, Jeffrey W. Martz, William G.

Parker, Rainer R. Schoch, Bryan J. Small, and Tomasz Sulej

Geological Society, London, Special Publications. 2013; 379(1): p. 203-239

<http://sp.lyellcollection.org/cgi/content/abstract/379/1/203?ct=ct>

Rauisuchia

Sterling J. Nesbitt, Stephen L. Brusatte, Julia B. Desojo, Alexandre

Liparini, Marco A. G. De Franca, Jonathan C. Weinbaum, and David J.

Gower

Geological Society, London, Special Publications. 2013; 379(1): p. 241-274

<http://sp.lyellcollection.org/cgi/content/abstract/379/1/241?ct=ct>

Anatomy, phylogeny and palaeobiology of early archosaurs and their kin

Sterling J. Nesbitt, Julia B. Desojo, and Randall B. Irmis

Geological Society, London, Special Publications. 2013; 379(1): p. 1-7

<http://sp.lyellcollection.org/cgi/content/extract/379/1/1?ct=ct>

Non-dinosaurian Dinosauriomorpha

Max C. Langer, Sterling J. Nesbitt, Jonathas S. Bittencourt, and

Randall B. Irmis

Geological Society, London, Special Publications. 2013; 379(1): p. 157-186

<http://sp.lyellcollection.org/cgi/content/abstract/379/1/157?ct=ct>

Building a three-dimensional near-surface geologic and petrophysical model based on borehole data: A case study from Chemery, Paris Basin, France

Paola Sala, Marcel Frehner, Nicola Tisato, and O. Adrian Pfiffner

AAPG Bulletin. 2013; 97(8): p. 1303-1324

<http://aapgbull.geoscienceworld.org/cgi/content/abstract/97/8/1303?ct=ct>

Learning through Computer Model Improvisations

Catharina Landstrom, Sarah J. Whatmore, and Stuart N. Lane

Science Technology Human Values. 2013; 38(5): p. 678-700

<http://sth.sagepub.com/cgi/content/abstract/38/5/678?ct=ct>

The Distribution of London Residential Property Prices and the Role of Spatial Lock-in

Christian Nygaard and Geoffrey Meen

Urban Stud. 2013; 50(12): p. 2535-2552

<http://usj.sagepub.com/cgi/content/abstract/50/12/2535?ct=ct>

The role of fluid pressure and diagenetic cements for porosity preservation in Triassic fluvial reservoirs of the Central Graben, North Sea

Binh T. T. Nguyen, Stuart J. Jones, Neil R. Goulty, Alexander J.

Middleton, Neil Grant, Alison Ferguson, and Leon Bowen

AAPG Bulletin. 2013; 97(8): p. 1273-1302

<http://aapgbull.geoscienceworld.org/cgi/content/abstract/97/8/1273?ct=ct>

Mechanisms of shale gas storage: Implications for shale gas exploration in China

Fang Hao, Huayao Zou, and Yongchao Lu
AAPG Bulletin. 2013; 97(8): p. 1325-1346
<http://aapgbull.geoscienceworld.org/cgi/content/abstract/97/8/1325?ct=ct>

Accommodation-based coal cycles and significant surface correlation of low-accommodation Lower Cretaceous coal seams, Lloydminster heavy oil field, Alberta, Canada: Implications for coal quality distribution
Gareth R. L. Chalmers, Ron Boyd, and Claus F. K. Diessel
AAPG Bulletin. 2013; 97(8): p. 1347-1369
<http://aapgbull.geoscienceworld.org/cgi/content/abstract/97/8/1347?ct=ct>

Variable gas content, saturation, and accumulation characteristics of Weibei coalbed methane pilot-production field in the southeastern Ordos Basin, China
Yanbin Yao, Dameng Liu, and Yongkai Qiu
AAPG Bulletin. 2013; 97(8): p. 1371-1393
<http://aapgbull.geoscienceworld.org/cgi/content/abstract/97/8/1371?ct=ct>

Seismic geomorphological analysis and hydrocarbon potential of the Lower Cretaceous Cromer Knoll Group, Heidrun field, Norway
Lorena Moscardelli, Sarika K. Ramnarine, Lesli Wood, and Dallas B. Dunlap
AAPG Bulletin. 2013; 97(8): p. 1227-1248
<http://aapgbull.geoscienceworld.org/cgi/content/abstract/97/8/1227?ct=ct>

Geothermal convection in South Atlantic subsalt lacustrine carbonates: Developing diagenesis and reservoir quality predictive concepts with reactive transport models
Gareth D. Jones and Yitian Xiao
AAPG Bulletin. 2013; 97(8): p. 1249-1271
<http://aapgbull.geoscienceworld.org/cgi/content/abstract/97/8/1249?ct=ct>

Surface deformation and stress interactions during the 2007-2010 sequence of earthquake, dyke intrusion and eruption in northern Tanzania
Juliet Biggs, Michael Chivers, and Michael C. Hutchinson
Geophys. J. Int. published 2 August 2013, 10.1093/gji/ggt226
<http://gji.oxfordjournals.org/cgi/content/abstract/ggt226v1?ct=ct>

A micromechanical analysis of time-dependent behavior based on subcritical damage in claystones
Y Huang and JF Shao
International Journal of Damage Mechanics. 2013; 22(6): p. 773-790
<http://ijd.sagepub.com/cgi/content/abstract/22/6/773?ct=ct>

Shifts in stomatal traits following the domestication of plant species
Ruben Milla, Natalia de Diego-Vico, and Nieves Martin-Robles
J. Exp. Bot. 2013; 64(11): p. 3137-3146
<http://jxb.oxfordjournals.org/cgi/content/abstract/64/11/3137?ct=ct>

Solid and drift geology in forensic investigations
Alastair Ruffell
Geological Society, London, Special Publications. published 7 August 2013, 10.1144/SP384.15
<http://sp.lyellcollection.org/cgi/content/abstract/SP384.15v1?ct=ct>

Electrochemical Oxidation of Graphite Electrodes Contaminated With Common Coal Minerals in a Molten Carbonate Electrolyte
Scott W Donne and John Tulloch
Electrochemical Society Meeting Abstracts. 2013; MA2013-02(14): p. 783
<http://ma.ecsdl.org/cgi/content/abstract/MA2013-02/14/783?ct=ct>

Electrochemical Oxidation of Graphite Electrodes Contaminated With Common Coal Minerals in a Molten Carbonate Electrolyte
Scott W Donne and John Tulloch
Electrochemical Society Meeting Abstracts. 2013; MA2013-02(11): p. 783
<http://ma.ecsdl.org/cgi/content/abstract/MA2013-02/11/783?ct=ct>

Chitin Amendment Increases Soil Suppressiveness toward Plant Pathogens and Modulates the Actinobacterial and Oxalobacteraceal Communities in an Experimental Agricultural Field
Mariana Silvia Cretoiu, Gerard W. Korthals, Johnny H. M. Visser, and Jan Dirk van Elsas
Appl. Envir. Microbiol. 2013; 79(17): p. 5291-5301
<http://aem.asm.org/cgi/content/abstract/79/17/5291?ct=ct>

Bacterially Induced Weathering of Ultramafic Rock and Its Implications for Phytoextraction

Cristina Becerra-Castro, Petra Kidd, Melanie Kuffner, Angeles Prieto-Fernandez, Stephan Hann, Carmela Monterroso, Angela Sessitsch, Walter Wenzel, and Markus Puschenreiter
Appl. Envir. Microbiol. 2013; 79(17): p. 5094-5103 Open Access
<http://aem.asm.org/cgi/content/abstract/79/17/5094?ct=ct>

Characterization of the stem anatomy of the Eocene fern *Dennstaedtiopsis aerenchymata* (Dennstaedtiaceae) by use of confocal laser scanning microscopy

Chris S. Shi, J. William Schopf, and Anatoliy B. Kudryavtsev
Am. J. Botany. published 7 August 2013, 10.3732/ajb.1300027
<http://www.amjbot.org/cgi/content/abstract/ajb.1300027v1?ct=ct>

Multiresolution imaging of mantle reflectivity structure using SS and P'P precursors

Ryan Schultz and Yu J. Gu
Geophys. J. Int. published 7 August 2013, 10.1093/gji/ggt266
<http://gji.oxfordjournals.org/cgi/content/abstract/ggt266v1?ct=ct>

Comparison of deterministic and stochastic earthquake simulators for fault interactions in the Lower Rhine Embayment, Germany

Sebastian Hainzl, Gert Zoller, Gilbert B. Brietzke, and Klaus-G. Hinzen
Geophys. J. Int. published 7 August 2013, 10.1093/gji/ggt271
<http://gji.oxfordjournals.org/cgi/content/abstract/ggt271v1?ct=ct>

Lithospheric P- and S-wave velocity models of the Sicilian area using WAM tomography: procedure and assessments

Marco Calo, Laura Parisi, and Dario Luzio
Geophys. J. Int. published 7 August 2013, 10.1093/gji/ggt252
<http://gji.oxfordjournals.org/cgi/content/abstract/ggt252v1?ct=ct>

Monitoring increases in fracture connectivity during hydraulic stimulations from temporal variations in shear wave splitting polarization

Alan F. Baird, J.-Michael Kendall, James P. Verdon, Andreas Wuestefeld, Todd E. Noble, Yongyi Li, Martin Dutko, and Quentin J. Fisher
Geophys. J. Int. published 7 August 2013, 10.1093/gji/ggt274
<http://gji.oxfordjournals.org/cgi/content/abstract/ggt274v1?ct=ct>

Morphological stasis in an ongoing gastropod radiation from Lake Malawi

Bert Van Bocxlaer and Gene Hunt
PNAS. published 7 August 2013, 10.1073/pnas.1308588110
<http://www.pnas.org/cgi/content/abstract/1308588110v1?ct=ct>

Origins of bone repair in the armour of fossil fish: response to a deep wound by cells depositing dentine instead of dermal bone

Zerina Johanson, Moya Smith, Anton Kearsley, Peter Pilecki, Elga Mark-Kurik, and Charles Howard
Biol Lett. 2013; 9(5): p. 20130144
<http://rsbl.royalsocietypublishing.org/cgi/content/abstract/9/5/20130144?ct=ct>

Penepplain formation in southern Tibet predates the India-Asia collision and plateau uplift: REPLY

Ralf Hetzel, Istvan Dunkl, Vicky Haider, Marcus Strobl, Hilmar von Eynatten, Lin Ding, and Dirk Frei
Geology. 2013; 41(9): p. e297-298e Open Access
<http://geology.gsapubs.org/cgi/content/full/41/9/e297?ct=ct>

Penepplain formation in southern Tibet predates the India-Asia collision and plateau uplift: COMMENT

Yuntao Tian, Barry P. Kohn, Andrew J.W. Gleadow, and Shengbiao Hu
Geology. 2013; 41(9): p. e295-296e Open Access
<http://geology.gsapubs.org/cgi/content/full/41/9/e295?ct=ct>

The thickness of subduction plate boundary faults from the seafloor into the seismogenic zone

Christie D. Rowe, J. Casey Moore, Francesca Remitti, and the IODP Expedition 343/343T Scientists
Geology. 2013; 41(9): p. 991-994
<http://geology.gsapubs.org/cgi/content/abstract/41/9/991?ct=ct>

The oldest evidence of bioturbation on Earth: REPLY

Vladimir Rogov, Vasilii Marusin, Natalia Bykova, Yuriy Goy, Konstantin

- Nagovitsin, Boris Kochnev, Galina Karlova, and Dmitriy Grazhdankin
Geology. 2013; 41(9): p. e300 Open Access
<http://geology.gsapubs.org/cgi/content/full/41/9/e300?ct=ct>
- Molybdenum isotopic evidence for oxic marine conditions during the latest Permian extinction
Bernadette C. Proemse, Stephen E. Grasby, M.E. Wieser, B. Mayer, and B. Beauchamp
Geology. 2013; 41(9): p. 967-970
<http://geology.gsapubs.org/cgi/content/abstract/41/9/967?ct=ct>
- Onset of North Atlantic Deep Water production coincident with inception of the Cenozoic global cooling trend: COMMENT
Martyn Stoker, Alick Leslie, Kevin Smith, Jana Olavsdottir, Howard Johnson, and Jan Sverre Laberg
Geology. 2013; 41(9): p. e291 Open Access
<http://geology.gsapubs.org/cgi/content/full/41/9/e291?ct=ct>
- Steady rotation of the Cascade arc
Ray E. Wells and Robert McCaffrey
Geology. 2013; 41(9): p. 1027-1030 Open Access
<http://geology.gsapubs.org/cgi/content/abstract/41/9/1027?ct=ct>
- Slab flattening trigger for isotopic disturbance and magmatic flare-up in the southernmost Sierra Nevada batholith, California
Alan D. Chapman, Jason B. Saleeby, and John Eiler
Geology. 2013; 41(9): p. 1007-1010
<http://geology.gsapubs.org/cgi/content/abstract/41/9/1007?ct=ct>
- Elevated pCO₂ leading to Late Triassic extinction, persistent photic zone euxinia, and rising sea levels
Caroline M.B. Jaraula, Kliti Grice, Richard J. Twitchett, Michael E. Bottcher, Pierre LeMetayer, Apratim G. Dastidar, and L. Felipe Opazo
Geology. 2013; 41(9): p. 955-958
<http://geology.gsapubs.org/cgi/content/abstract/41/9/955?ct=ct>
- A different ocean acidification hazard--The Kolumbo submarine volcano example
Peter G. Brewer
Geology. 2013; 41(9): p. 1039-1040
<http://geology.gsapubs.org/cgi/content/full/41/9/1039?ct=ct>
- Sea-level-induced seismicity and submarine landslide occurrence
Daniel S. Brothers, Karen M. Luttrell, and Jason D. Chaytor
Geology. 2013; 41(9): p. 979-982
<http://geology.gsapubs.org/cgi/content/abstract/41/9/979?ct=ct>
- Rapid coastal subsidence in the central Ganges-Brahmaputra Delta (Bangladesh) since the 17th century deduced from submerged salt-producing kilns
Till J.J. Hanebuth, Hermann R. Kudrass, Jorg Linstadter, Badrul Islam, and Anja M. Zander
Geology. 2013; 41(9): p. 987-990
<http://geology.gsapubs.org/cgi/content/abstract/41/9/987?ct=ct>
- Upwelling, rifting, and age-progressive magmatism from the Oki-Daito mantle plume
Osamu Ishizuka, Rex N. Taylor, Yasuhiko Ohara, and Makoto Yuasa
Geology. 2013; 41(9): p. 1011-1014
<http://geology.gsapubs.org/cgi/content/abstract/41/9/1011?ct=ct>
- Massive Cretaceous-Paleogene boundary deposit, deep-water Gulf of Mexico: New evidence for widespread Chicxulub-induced slope failure
Richard A. Denne, Erik D. Scott, David P. Eickhoff, James S. Kaiser, Ronald J. Hill, and Joan M. Spaw
Geology. 2013; 41(9): p. 983-986
<http://geology.gsapubs.org/cgi/content/abstract/41/9/983?ct=ct>
- Silica gel formation during fault slip: Evidence from the rock record
J.D. Kirkpatrick, C.D. Rowe, J.C. White, and E.E. Brodsky
Geology. 2013; 41(9): p. 1015-1018 Open Access
<http://geology.gsapubs.org/cgi/content/abstract/41/9/1015?ct=ct>
- Holocene sea-level change derived from microbial mats

Daniel Livsey and Alexander R. Simms
Geology. 2013; 41(9): p. 971-974
<http://geology.gsapubs.org/cgi/content/abstract/41/9/971?ct=ct>

Paleozoic-aged brine and authigenic helium preserved in an Ordovician shale aquiclude

I.D. Clark, T. Al, M. Jensen, L. Kennell, M. Mazurek, R. Mohapatra, and K.G. Raven
Geology. 2013; 41(9): p. 951-954
<http://geology.gsapubs.org/cgi/content/abstract/41/9/951?ct=ct>

Comparison of microstructures in superplastically deformed synthetic materials and natural mylonites: Mineral aggregation via grain boundary sliding

Takehiko Hiraga, Tomonori Miyazaki, Hidehiro Yoshida, and Mark E. Zimmerman
Geology. 2013; 41(9): p. 959-962
<http://geology.gsapubs.org/cgi/content/abstract/41/9/959?ct=ct>

Lithospheric convective instability could induce creep along part of the San Andreas fault

Laetitia Le Pourhiet and Jason Saleeby
Geology. 2013; 41(9): p. 999-1002
<http://geology.gsapubs.org/cgi/content/abstract/41/9/999?ct=ct>

Rapid pulses of uplift, subsidence, and subduction erosion offshore Central America: Implications for building the rock record of convergent margins

Paola Vannucchi, Peter B. Sak, Jason P. Morgan, Ken'ichi Ohkushi, Kohtaro Ujiie, and the IODP Expedition 334 Shipboard Scientists
Geology. 2013; 41(9): p. 995-998
<http://geology.gsapubs.org/cgi/content/abstract/41/9/995?ct=ct>

Carbon cycle feedbacks during the Oligocene-Miocene transient glaciation

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Geology. 2013; 41(9): p. 963-966 Open Access
<http://geology.gsapubs.org/cgi/content/abstract/41/9/963?ct=ct>

Onset of North Atlantic Deep Water production coincident with inception of the Cenozoic global cooling trend: REPLY

Michael W. Hohbein, Philip F. Sexton, and Joseph A. Cartwright
Geology. 2013; 41(9): p. e292 Open Access
<http://geology.gsapubs.org/cgi/content/full/41/9/e292?ct=ct>

Variation of East Asian monsoon precipitation during the past 21 k.y. and potential CO₂ forcing

Huayu Lu, Shuangwen Yi, Zhengyu Liu, Joseph A. Mason, Dabang Jiang, Jun Cheng, Thomas Stevens, Zhiwei Xu, Enlou Zhang, Liya Jin, Zhaohui Zhang, Zhengtang Guo, Yi Wang, and Bette Otto-Bliesner
Geology. 2013; 41(9): p. 1023-1026
<http://geology.gsapubs.org/cgi/content/abstract/41/9/1023?ct=ct>

A potential barrier to deep Antarctic circumpolar flow until the late Miocene?

I.W.D. Dalziel, L.A. Lawver, J.A. Pearce, P.F. Barker, A.R. Hastie, D.N. Barfod, H-W. Schenke, and M.B. Davis
Geology. 2013; 41(9): p. 947-950
<http://geology.gsapubs.org/cgi/content/abstract/41/9/947?ct=ct>

Rheological controls on the emplacement of extremely high-grade ignimbrites

Genevieve Robert, Graham D.M. Andrews, Jiyang Ye, and Alan G. Whittington
Geology. 2013; 41(9): p. 1031-1034
<http://geology.gsapubs.org/cgi/content/abstract/41/9/1031?ct=ct>

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Petrology

Vol. 21, No. 4, 2013

A simultaneous English language translation of this journal is available from Pleiades Publishing, Ltd. Distributed worldwide by Springer. *Petrology* ISSN 0869-5911.

Mutual Interaction of Redox Pairs in Silicate Melts: $V^{5+}/V^{4+}/V^{3+}/V^{2+}$ Tetrad and Other Equilibria

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High-Pressure Ultramafics in the Lower Crustal Rocks of the Pekul'ney Complex, Central Chukchi Peninsula. 2. Internal Structure of Blocks and Ultramafic Bodies, Geologic and Geodynamic Setting of Rock Formation

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Chronology of the Formation of the Gabbro-Syenite-Granite Series of the Oshurkovo Pluton, Western Transbaikalia

G. S. Ripp, I. A. Izbrodin, A. G. Doroshkevich, E. I. Lastochkin, M. O. Rampilov,

S. A. Sergeev, A. V. Travin, and V. F. Posokhov p. 375 [abstract](#)

Back-Arc Paleo-Tethys Related Blueschist from Central Iran, South of Chupanan, Isfahan Province

Ghodrat Torabi and Shoji Arai p.393 [abstract](#)

EARTH PAGES

Assessing submarine great-earthquake statistics fails

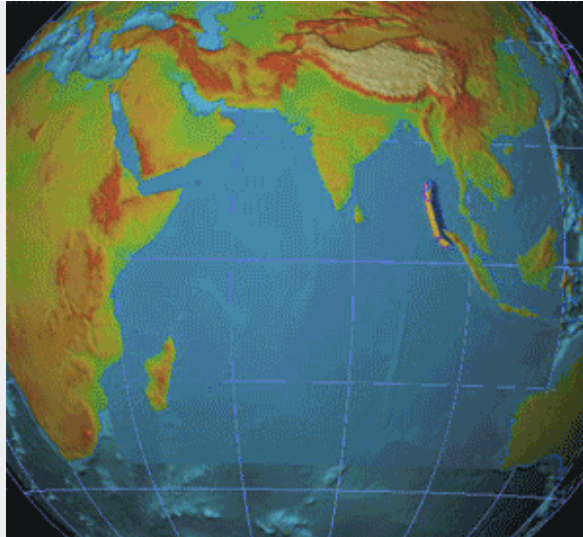
Posted on July 31, 2013 by Steve Drury | [2 Comments](#)

Geologists who study [turbidites](#) assume that the distinctive graded beds from which they are constructed and a range of other textures represent flows of slurry down unstable steep slopes when submarine sediment deposits are displaced. Such [turbidity currents](#) were famously recorded by the severing of 12 transatlantic telecommunication cables off Newfoundland in 1929. This happened soon after an earthquake triggered 100 km hr^{-1} flows down the continental slope, which swept some 600 km eastwards.



Typical structures in Upper Carboniferous turbidites near Bude, Cornwall, UK (credit: Flickr, Earthwatcher)

Sea beds at destructive margins provide the right conditions for repeated turbidity currents and it is reasonable to suppose that patterns should emerge from the resulting turbidite beds that in some way record the seismic history of the area. British and Indonesian geoscientists set out to test that hypothesis at the now infamous plate margin off Sumatra that hosted the great Aceh Earthquake and tsunamis of 26 December 2004 to kill 250 thousand people around the rim of the Indian Ocean (Sumner, E.J. *et al.* 2013. Can turbidites be used to reconstruct a paleoearthquake record for the central Sumatra margin? *Geology*, v. **41**, p.763-766).



Animation of Indonesian tsunami of 26 December 2004 (credit: Wikipedia)

Cores through turbidite sequences along a 500 km stretch of the margin formed the basis for this important attempt to test the possibility of recording long-term seismic statistics. To avoid false signals from turbidity currents stirred up by storms, floods and slope failure from rapid sediment build-up 17 sites were cored in deep water away from major terrestrial sediment supplies, which only flows triggered by major earthquakes would be likely to reach. To calibrate core depth to time involved a variety of radiometric and stratigraphic methods

Disappointingly, few of the sites on the submarine slopes recorded turbidites that match events during the 150-year period of seismic records in the area, none being correlatable with the 2004 and 2005 great earthquakes. Indeed very little correlation of distinctive textures from site to site emerged from the study. Some sites on slopes revealed no turbidites at all from the last 150 years, whereas turbidites in others that could be accurately dated occurred when there were no large earthquakes. Only cores from the deep submarine trench consistently preserved near-surface turbidites that might record the 2004 and 2005 great earthquakes.

These are surprising as well as depressing results, but perhaps further coring will discover what kind of bathymetric features might yield useful and consistent seismic records from sediments.

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Not-so-light, but essential reading

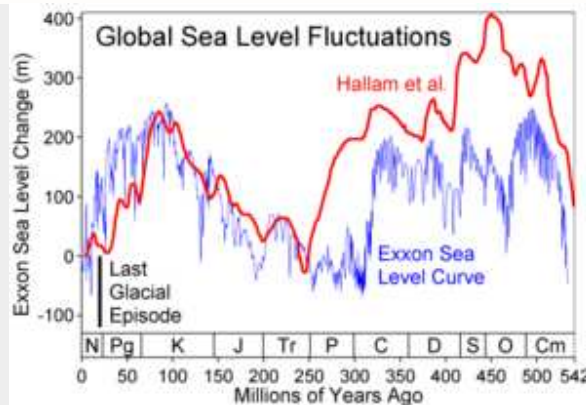
Posted on [July 25, 2013](#) by [Steve Drury](#) | [Leave a comment](#)

In its 125th year the Geological Society of America is publishing invited reviews of central geoscience topics in its Bulletin. They seem potentially useful for both undergraduate students and researchers as accounts of the 'state-of-the-art' and compendia of references. The latest focuses on major controls on past sea-level changes by processes that operate in the solid Earth (Conrad, C.P. 2013. The solid Earth's influence on sea level. *Geological Society of America Bulletin*, v. **125**, p. 1027-1052), a retrospective look at how geoscientists have understood large igneous provinces (Bryan, S. E. & Ferrari, L. 2013. Large igneous provinces and silicic large igneous provinces: Progress in our understanding over the last 25 years. *Geological Society of America Bulletin*, v. **125**, p. 1053-1078) and the perennial topic of how granites form and end up in intrusions (Brown, M. 2013. Granite: From genesis to emplacement *Geological Society of America Bulletin*, v. **125**, p. 1079-1113).

Sea level change

Conrad covers sea-level changes on the short- (1 to 100 years), medium- (1 to 100 ka) and long term (1 to 100 Ma). The first two

mainly result from local deformation of different kinds associated with glacial loading and unloading. These result in changes in the land surface, the sea surface nearby and on thousand year to 100 ka timescales to ups and downs of the sea-bed. Global sea-level changes due to melting of continental glaciers at the present day amount to about half the estimated 2 to 3 mm of rise each year. But increasingly sensitive measures show it is more complex as the rapid shifts of mass involved in melting ice also result in effects on the solid Earth. At present solid mass is being transferred polewards, but at rates that differ in Northern and Southern hemispheres and which are changing with anthropogenic influences on glacial melting. Viscous movement of the solid Earth is so slow that effects from previous glacial-interglacial episodes continue today. As a result rapid elastic movements are tending to produce relative sea-level falls in polar regions of up to 20 mm per year with rising sea level focusing on areas between 30°N and 30°S. The influence of the slower viscous mass transfer has an opposite sense: sea-level rise at high latitudes. Understanding the short- and medium-term controls is vital in predicting issues arising in the near future from natural and anthropogenic change.



Comparison of two sea level reconstructions during the last 500 Ma. (credit: Wikipedia)

Most geologists are concerned in practice with explanations for major sea-level changes in the distant past, which have a great deal to do with changes in the volumes of the ocean basins. If the global sea-floor rises on average water is displaced onto former land to produce transgressions, and subsidence of the sea floor draws water down from the land. Conrad gives a detailed account of what has been going on since the start of the Cretaceous Period, based on the rate of sea-floor spreading, marine volcanism and sedimentation, changes in the area of the ocean basins and the effects of thermally-induced uplift and subsidence of the continents, showing how each contribution acted cumulatively to give the vast transgressions and regressions that affected the late Phanerozoic. On the even longer timescale of opening and closing of oceans and the building and disintegration of supercontinents the entire mantle becomes involved in controls on sea level and a significant amount of water is chemically exchanged with the mantle.

Large igneous provinces



The Web of Science database marks the first appearance in print of "large igneous province" in 1993, so here is a topic that is indeed

new, although the single-most important attribute of LIPs, 'flood basalt' pops up three decades earlier and the term 'trap' that describes their stepped topography is more than a century old. Bryan and Ferrari are therefore charting progress in an exciting new field, yet one that no human – or hominin for that matter – has ever witnessed in action. One develops, on average, every 20 Ma and since they are of geologically short duration long periods pass with little sign of one of the worst things that our planet can do to the biosphere. In the last quarter century it has emerged that they blurt out the products of energy and matter transported as rising plumes from the depths of the mantle; they, but not all, have played roles in mass extinctions; unsuspected reserves of precious metals occur in them; they play some role in the formation of sedimentary basins and maturation of petroleum and it seems other planets have them – a recipe for attention in the early 21st century. Whatever, Bryan and Ferrari provide a mine of geological entertainment.

Granites

In comparison, granites have always been part of the geologist's canon, a perennial source of controversy and celebrated by major works every decade, or so it seems, with twenty thousand 'hits' on Web of Science since 1900 (WoS only goes back that far). Since the resolution of the plutonist-neptunist wrangling over granite's origin one topic that has been returned to again and again is how and where did the melting to form granitic magma take place? If indeed granites did form by melting and not as a result of 'granitisation'. Lions of the science worried at these issues up to the mid 20th century: Bowen, Tuttle, Read, Buddington, Barth and many others are largely forgotten actors, except for the credit in such works as that of Michael Brown. Experimental melting under changing pressure and temperature, partial pressures of water, CO₂ and oxygen still go on, using different parent rocks. One long-considered possibility has more or less disappeared: fractional crystallisation from more mafic magma might apply to other silicic plutonic rocks helpfully described as 'granitic' or called 'granitoids', but granite (*sensu stricto*) has a specific geochemical and mineralogical niche to which Brown largely adheres. For a while in the last 40 years classification got somewhat out of hand, moving from a mineralogical base to one oriented geochemically: what Brown refers to as the period of 'Alphabet Granites' with I-, S- A- and other-type granites. Evidence for the dominance of partial melting of pre-existing continental crust has won-out, and branched into the style, conditions and heat-source of melting.



Typical granite tor near Kisumu, Kenya (credit: Wikipedia)

All agree that magmas of granitic composition are extremely sticky. The chemical underpinnings for that and basalt magma's relatively high fluidity were established by physical chemist Bernhardt Patrick John O'Mara Bockris (1923-2013) but barely referred to, even by Michael Brown. Yet that high viscosity has always posed a problem for the coalescence of small percentages of melt into the vast blobs of low density liquid able to rise from the deep crust to the upper crust. Here are four revealing pages and ten more on how substantial granite bodies are able to ascend, signs that the puzzle is steadily being resolved. Partial melting implies changes in the ability of the continental crust to deform when stressed, and this is one of the topics on which Brown closes his discussion, ending, of course, on a 'work in progress' note that has been there since the days of Hutton and Playfair.

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Rope and dope in lake sediments

Posted on [July 24, 2013](#) by [Steve Drury](#) | [Leave a comment](#)

Sediments built up on lake beds are a fruitful source of proxy data for all kinds of time series – mainly climatic and ecological. Pollen, other organic remains, various stable isotopes, and a range of organic geochemical data calibrated to time using magnetostratigraphy, C-14 dating and astronomical 'pacemakers'. Suddenly there is another proxy: [cannabinol](#), the metabolite of tetrahydrocannabinol the principal psychoactive component of marijuana (Lavrieux, M. *et al.* 2013. Sedimentary cannabinol tracks the history of hemp [retting](#). *Geology*, v. **41**, p. 751-754). The compound is detectable at the parts per billion level thanks to advances in monitoring the use of drugs, particularly in sports persons – it ends up in the urine of users. So the paper by a team of French Earth scientists has a somewhat irresistible draw, the more so from the opening sentence of its abstract, 'Hemp (*Cannabis* sp.) has been a fundamental plant for the development of human societies'. Indeed it has, for the earliest records date back to the Neolithic in China, perhaps back to 12 ka ago.



Cultivation of hemp for fibre and grain in France. (credit: Wikipedia)

But then all becomes clear: they speak of hemp fibres used in rope and some textiles, and the climatic adaptability of the plant that has ensured its spread from Equator to north of the Arctic Circle and lesser southern latitudes. But there is an element of tongue-in-cheek, or at least so it seemed to me, as the objective of their research is to chart to emergence and rise of [rope making](#) in Central France. Freeing the useful fibres from *Cannabis* stems requires the plant to be soaked and subject to microbial action that breaks down soft tissue, know as retting that is also used in flax and coir production. The resin breaks down to cannabinol, which is therefore a perfect proxy for Hemp retting.

Lac d'Aydat is geologically famous as it formed when a lava flow from one of the puys of the Massif Central blocked a valley and became a dam. It figured in the pioneering volcanological research of English geologist George Julius Poulett *Scrope*. *Its new place in science rests on* Lavrieux *et al.*'s chronologically calibrated time series for retting from the lake's muds. Hemp pollen in the section betrays the start of *Cannabis* cultivation in the Auvergne between 500-650 AD, but hemp retting in the lake is marked by a cannabinol spike in the 13th century and increases in pollen. It fell-off sharply in the late 19th century, probably as a result of being outcompeted by more easily processed cotton.

Almost 7 centuries of *Cannabis* processing in central France actually took a toll as cannabinol is toxic to fish and cattle. Despite a 1669 Royal Ordinance against hemp retting in French rivers it continued unchecked in Lac d'Aydat, but more likely than secret retting tucked away in a remote corner of France it stemmed from the ordinance being widely flouted. That it ended with the rise of cotton is not so convincing as hemp is still a staple in rope manufacture, and when the US entered World War II large tracts of land were placed under *Cannabis* to produce naval cordage; the reason why it still grows wild in abundance across many States. There is plenty of

evidence, including this, that use of *Cannabis* for cordage came rather late, and plenty in support of its cultivation and wide spread before the Iron Age for 'relaxation'.

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Fracking and earthquakes

Posted on [July 19, 2013](#) by [Steve Drury](#) | [Leave a comment](#)

[Review of Fracking Issues](#) posted on 31 May 2013 briefly commented on a major academic study of the impact of [shale gas](#) exploitation on groundwater. The 12 July 2013 issue of *Science* follows this up with a similar online, extensive treatment of how underground disposal of fracking fluids might influence seismicity in new gas fields (Ellsworth, W.J. 2013. Injection-induced earthquakes. *Science*, v. **341**, p. 142 and doi: 10.1126/science.1225942) plus a separate paper on the same topic (van der Elst, N.J. *et al.* 2013. Enhanced remote earthquake triggering at fluid-injection sites in the Midwestern United States. *Science*, v. **341**, p.164-167).



Major shale gas basins (credit: Wikipedia)

It was alarm caused by two minor earthquakes (<3 local magnitude) that alerted communities on the Fylde peninsula and in the seaside town of Blackpool to worrisome issues connected to Cuadrilla Resources' drilling of exploratory fracking wells. These events were put down to the actual hydraulic fracturing taking place at depth. Such low-magnitude seismic events pose little hazard but nuisance. The two reports in *Science* look at longer-term implications associated with regional shale-gas development. All acknowledge that the fluids used for hydraulic fracturing need careful disposal because of their toxic hazards. The common practice in the 'mature' shale-gas fields in the US is eventually to dispose of the fluids by injecting them into deep aquifers, which [Vidic *et al.*](#) suggested that 'due diligence' in such injection of waste water should ensure limited leakage into shallow domestic groundwater.

The studies, such as that by William Ellsworth, of connection between deep waste-water injection and seismicity are somewhat less reassuring. From 1967 to 2001 the central US experienced a steady rate of earthquakes with magnitudes greater than 3.0, which can be put down to the natural background of seismicity in the stable lithosphere of mid North America. In the last 12 years activity at this energy level increased significantly, notably in areas underlain by targets for shale-gas fracking such as the Marcellus Shale of the north-eastern US. The increase coincides closely with the history of shale-gas development in the US. The largest such event (5.6 local magnitude) destroyed 14 homes in Oklahoma near to such a waste-injection site. Raising the fluid pressure weakens faults in the vicinity thereby triggering them to fail, even if their tectonic activity ceased millions of years ago: many retain large elastic strains dependent on rock strength.

Apart from the mid-continent New Madrid seismic zone associated with a major fault system parallel to the Mississippi, much of the central US is geologically simple with vast areas of flat-bedded sediments with few large faults. The same cannot be said for British geology which is riven with major faults formed during the Caledonian and Variscan orogenies, some of which in southern Britain were re-activated by tectonics associated with the Alpine events far off in southern Europe. Detailed geological maps show surface-breaking

faults everywhere, whereas deep coal mining records and onshore seismic reflection surveys reveal many more at depth. A greater population density living on more 'fragile' geology may expect considerably more risk from industrially induced earthquakes, should Britain's recently announced 'dash' for shale gas materialise to the extent that its sponsors hope for.

Nicholas van der Elst and colleagues' paper indicates further cause for alarm. They demonstrate that large remote earthquakes. In the 10 days following the 11 March 2011 Magnitude 9.0 Sendai earthquake a swarm of low-energy events took place around waste [injection wells](#) in central Texas, to be followed 6 months later by a larger one (4.5 local magnitude). Similar patterns of injection-related seismicity followed other distant great earthquakes between 2010 and 2012. Other major events seem not to have triggered local responses. The authors claim that the pattern of earth movements produced by such global triggering might be an indicator of whether or not fluid injection has brought affected fault systems to a critical state. That may be so, but it seems little comfort to know that one's home, business or community is potentially to be shattered by intrinsically avoidable seismic risk.

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[Africa-Europe exchange of faunas in the Late Miocene](#)

Posted on [July 15, 2013](#) by [Steve Drury](#) | [Leave a comment](#)

The extremely hazardous seaway through the Straits of Gibraltar and the waterless deserts of the Levant presented considerable barriers to natural exchange of animal groups between Africa and Eurasia throughout the period of hominin evolution known from the African Pliocene and Pleistocene record. These barriers were breached by hominins only occasionally. Through most of the Miocene and back to the Mesozoic Era Iberia and what is now Morocco were separated by a wide seaway preventing faunal exchange. That Betic Seaway eventually closed with the tectonic collision of the two sides to form the modern [Betic cordillera](#) in southern Spain towards the end of the Miocene. This left [parts of the Mediterranean to evaporate](#) during what is known as the [Messinian Salinity Crisis](#), which reached completion at 5.59 Ma. Yet this Europe-Africa connection was short-lived, being breached by what is regarded as one of the most dramatic events in Cenozoic history: the [Zanclean Flood](#). At 5.33 Ma the [Atlantic burst through](#) what is now the Straits of Gibraltar to refill the Mediterranean Basin within a period between a few months and two years. The flooding began as a vast system of rapids some 1 km high with an estimated flow a thousand times that of the modern Amazon.



Strait of Gibraltar from space, with Spain on the left and Morocco on the right.) (credit: Wikipedia)

During the existence of the Europe-Africa land bridge it was possible for animals to move between north-west Africa and western Europe. Evidence that such an exchange did take place comes from a number of Late Miocene localities in southern Spain and North Africa. The first recorded migrants into Spain were African gerbils, then evidence mounted for larger animals, including hippos and early camels moving into Europe and a reverse migration of rabbits and mice. One of the Spanish sites (Gibert, L. *et al.* 2013. Evidence for an African-Iberian mammal dispersal during the pre-evaporitic Messinian. *Geology*, v. **41**, p. 691-694) has allowed precise magnetostratigraphic dates to be put on the migrations. The Spanish-US team suggests conditions ripe for migration were in three distinct phases: around 6.3 Ma when hippos managed to swim to Europe; around 6.2 Ma which saw European small mammals making the journey south and camels moving to Europe; in a 300 ka window of opportunity from 5.6 to 5.3 Ma for African mice to make the journey into Europe. Several distinct episodes probably reflect some ups and downs of sea level related to glacial retreats and advances in Antarctica.

One implication of the short-lived Messinian land bridge is that it may have been followed by primates, though evidence has yet to be found. A particularly interesting genus, suggested by some as a possible common ancestor for hominins and chimpanzees, is *Oreopithecus* a bipedal ape recorded from the Miocene of Italy

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Afar: the field lab for continental break-up

Posted on [July 8, 2013](#) by [Steve Drury](#) | [Leave a comment](#)

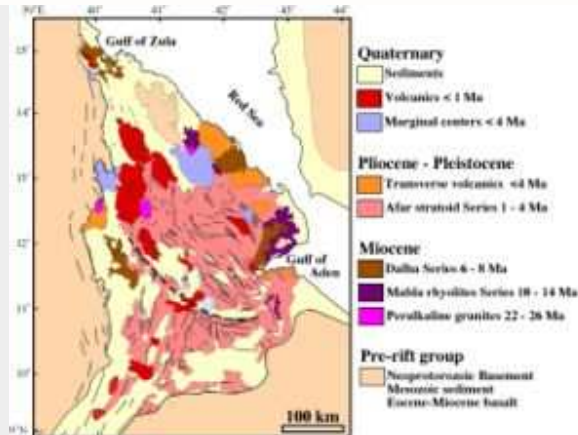
The [Afar Depression](#) of Ethiopia and Eritrea is a feature of tectonic serendipity. It is unique in showing on land the extensional processes and related volcanism that presage [sea-floor spreading](#). Indeed it hosts three rift systems and a triple junction between the existing Red Sea and Gulf of Aden spreading centres and the [East African Rift System](#) that shows signs of future spalling of Somalia from Africa. Afar has been a focus of geoscientific attention since the earliest days of plate theory but practical interest has grown rapidly over the last decade or so when the area has become significantly more secure and safe to visit. Two recent studies seem to have overturned one of the most enduring assumptions about what drives this epitome of continental break-up.



Simulated perspective view of the Afar depression from the south (credit: Wikipedia)

From the obvious thermal activity deep below Afar, linked with volcanism and high heat flow, a mantle hot spot and rising plume of deep mantle has been central to ideas on the tectonics of the area. A means of testing this hypothesis is the use of seismic data to assess the ductility and temperature structure of deep mantle through a form of tomography. The closer the spacing of seismic recording stations and the more sensitive the seismometers are the better the resolution of mantle structure. Afar now boasts one of the densest seismometer networks, rivalling the Earthscope USArray. <http://earth-pages.co.uk/2009/11/01/the-march-of-the-seismometers/> and it is paying dividends (Hammond, J.O.S. and 10 others 2013. Mantle upwelling and initiation of rift segmentation beneath the Afar Depression. *Geology*, v. **41**, p.635-638). The study brought together geoscientists from Britain, the US, Ethiopia, Eritrea and Botswana,

who used data from 244 seismic stations in the Horn of Africa to probe depths down to 400 km with a resolution of about 50 km. The tomographic images show no clear sign of the kind of narrow plume generally associated with the notion of a 'hot spot'. Instead they pick out shallow (~75 km depth) P- and S-wave low-velocity features that follow the axes of the three active rift systems. The features coalesce at depth; in some respects the opposite of a classic plume that has a narrow 'stem' that swells upwards to form a broad 'head'. If there ever was an Afar Plume it no longer functions. Instead, the rifts and associated lithospheric thinning are associated with a mantle upwelling that is being emplaced passively in the space made available by extensional tectonics. This is closely similar to what goes on beneath active and well-established mid-ocean spreading centres where de-pressuring of the rising mantle results in partial melting and basaltic magmatism along the rift system. Perhaps this is a sign that full sea-floor spreading in Afar is imminent, at least on geological timescales.



Simplified geologic map of the Afar Depression. (credit: Wikipedia after Beyene and Abdelsalam (2005))

For once, mantle geochemists and geophysicists have data that support a common hypothesis (Ferguson, D.J. and 8 others 2013. Melting during late-stage rifting in Afar is hot and deep. *Nature*, v. **499**, p. 70-73). This US-British-Ethiopian team compares the trace element geochemistry of Recent basaltic lavas erupted along the axis of the Afar rift that links with the Red Sea spreading centre with equally young lavas from volcanoes some 20 km from the axis. Both sets of lavas are a great deal more enriched in incompatible trace elements that are generally enriched in melt compare with source than are ocean-floor basalts sampled from the mid-Red Sea rift. Modelling rare-earth element patterns in particular suggests that partial melting is going on at depths where garnet is stable in the mantle instead of spinel. This suggests that a strong layer, about 85 km down in the upper mantle is beginning to melt – magmas formed by small degrees of partial melting generally contain higher amounts of incompatible trace elements than do the products of more extensive melting. Estimates of the temperature of melting from lavas extruded at the rift axis than off-axis are significantly higher than expected at this depth suggesting that deeper mantle is rising faster than it can lose heat. The depth of melting tallies with the thermal feature picked out by seismic tomography. The two teams converge on passively induced upwelling of hot asthenosphere while the Afar lithosphere is slowly being extended. The degree of melting beneath Afar is low at present, so that to become like mid-ocean ridgebasalts a surge in the fraction of melting is needed. That would happen if the strong mantle layer fails plastically so that more asthenosphere can rise higher by passive means. The geochemists persist in an appeal to an Afar Plume for the 30 Ma old flood basalts that plaster much of the continental crust outside Afar. Those plateau-forming lavas, however, are little different in their trace element geochemistry from off-axis Afar basalts. Yet they are not obviously associated with an earlier episode of lithospheric extension and passive mantle upwelling. Most geologists who have studied the flood basalts would agree that they preceded the onset of rifting but have little idea of the actual processes that went on during that mid-Oligocene volcanic cataclysm.

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Tagged [Afar triangle](#), [Horn of Africa](#), [Plate tectonics](#), [Red Sea](#), [Sea-floor spreading](#), [Volcano](#)

Early humans could probably kill at a distance

Posted on [June 30, 2013](#) by [Steve Drury](#) | [3 Comments](#)

It is always refreshing when physical anthropologists perform experiments as well as pondering on bones. It turns out that examining the bio-mechanics of college baseball players can provide useful clues about where in fossil anatomy to look for signs of potential big-game hunters. Anyone who can hurl a baseball, or one of the smaller but much harder red ones preferred by non-Americans, at speeds exceeding 100 kph could in all likelihood bring down a substantial prey animal with a rock and even more so with a spear. At the heart of an important examination of what our forebears might have done to get a meaty meal (Roach, N.T. *et al.* 2013. Elastic energy storage in the shoulder and the evolution of high-speed throwing in *Homo*. *Nature*, v. **498**, p. 483-486) is a US-Indian team's sophisticated study of college baseball players' throwing action using high-speed video, radar and precise timing techniques.



Matt Kata throwing for the Houston Astros (Photo credit: Wikipedia)

It seems that there are several physiological phases in demon ball throwing: rotation of the torso; rotation flexion and extension of the shoulder; flexion and extension of the elbow; and wrist extension. All of these contribute to acceleration of the ball before release. While the thrower steps forward the arm is cocked so that ligaments, tendons and muscles crossing the shoulder become stretched, thereby storing energy. During the acceleration phase the bend in the elbow is snapped straight adding yet more power. Readers should note the difference between this action and that of a bowler in cricket, where the elbow snap is banned on pain of severe penalty and public humiliation of the bowler who 'chucks'. Since a fast bowler also adds energy by running into the crease, this is a humanitarian aspect of the Rules of cricket, although several legal West Indian bowlers of the past 40 years are still remembered with terror by their batsmen contemporaries. No such stricture is placed on the baseball pitcher who has no run-up.

These observations focus attention on the structure of shoulder and elbow, yielding a robust means of predicting how fast throwers with different configurations may have thrown objects. Chimpanzees make poor players of ball games, although they will throw the odd stick, but just for aggressive show. The same goes for the earliest hominins for which we have suitable fossil material: australopithecines may occasionally have eaten carrion but they couldn't throw rocks or spears with enough force to bring down anything and their throwing

range would have been pathetic. Not so *Homo erectus*! They were well equipped in the hurling department and could, were they so inclined, have hunted equally as well as modern humans. Interestingly, earlier hominins had some of the physiological necessities of decent throwing, but not all of them. So it seems that the full combination emerged in the evolution of our own genus around 2 Ma ago,

This is in contrast to a view held by some anthropologists, such as Christopher Boehm of the University of Southern California, that big game hunting using projectile weapons emerged only with anatomically modern humans after 250 ka, and most likely only reached its acme 45 ka ago. That assumption, at least by Boehm, is central to notions of how social activities centred on meat sharing may have helped evolve morals, such as altruism and shame (see Boehm, C. 2012. *Moral Origins: The Evolution of Virtue, Altruism and Shame*. Basic Books, New York). That *H. erectus* would have been able to harness sufficient energy to kill at a distance casts doubt on such assertions. Mere foraging does not require throwing-capable physiology, so how it evolved in early humans with neither the inclination nor bodies to at least begin throwing projectiles at potential prey is something that school might consider.

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Arctic climate in the run-up to the Great Ice Age

Posted on [June 30, 2013](#) by [Steve Drury](#) | [Leave a comment](#)

Around 3.6 Ma ago a large extraterrestrial projectile slammed into the far north-east of Siberia forming crater 16 km across. The depression soon filled with water to form [Lake El'gygytgyn](#), on whose bed sediments have accumulated up to the present. A major impact close to the supposed start of Northern Hemisphere glacial conditions was a tempting target for coring: possibly two birds with one stone as the lowest sediments would probably be impact debris and boreal lake sediments of this age are as rare as hens' teeth. The sedimentary record of Lake El'gygytgyn has proved to be a climate-change treasure trove (Brigham-Grette, J and 15 others 2013. [Pliocene](#) warmth, polar amplification, and stepped [Pleistocene](#) cooling recorded in NE Arctic Russia. *Science*, v. **340**, p. 1421-1426).



Lake El'gygytgyn impact crater. (credit: Wikipedia)

The team of US, Russian, German and Swedish scientists discovered that the sedimentary record was complete over a depth of 318 m

and so promised a high resolution climate record. The striking feature of the sediments is that they show cyclical variation between five different facies, four of which are laminated and so preserve intricate records of varying weathering and sediment delivery to the lake. The sediments also contain pollens and diatom fossils, and yield good magnetic polarity data. The last show up periods of reversed geomagnetic polarity, which provide age calibration independent of relative correlation with marine isotope records.

A host of climate-related proxies, including pollen from diverse tree and shrub genera, variations in silica due to changes in diatom populations and organic carbon content in the cyclically changing sedimentary facies are correlated with global climate records based on marine-sediment stable isotope. These records reveal intricate oscillations between cool mixed forest, cool coniferous forest, taiga and cold deciduous forest, with occasional frigid tundra conditions through the mid- to late Pliocene. Compared with modern conditions NE Siberia was much warmer and wetter at the start of the record. Around the start of the Pleistocene sudden declines to cooler and drier conditions appear, although until 2.2 Ma ago average summer conditions seem to have been higher than at present, despite evidence from marine proxies of the onset of glacial-interglacial cycles in the Northern Hemisphere.

In detail, Lake El'gygytyn revealed some surprises including rapid onset of a lengthy cold-dry spell of tundra conditions between 3.31 to 3.28 Ma. The first signs that the lake was perennially frozen appear around 2.6 Ma, well before evidence for the first continental glaciation in North America, presaged by signs around 2.7 Ma that winters consistently became colder than present ones. Overall the lake record presents a picture of a stepped shift in climate in the run-up to the Great Ice Age. Lake El'gygytyn seems set to become the standard against which other, more patchy records around the Arctic Ocean are matched and correlated. Indeed it is the longest and most detailed record of climate for the Earth's land surface, compared with 120 and 800 ka for the Greenland and Antarctic ice-caps.

Modelling their findings against likely atmospheric CO₂ levels the authors provide grist to the media mill which focuses on how the late Pliocene may be a model for a future warm Earth if emissions are not curtailed, with visions of dense polar forests

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In the mantle wet may not imply soft

Posted on [June 17, 2013](#) by [Steve Drury](#) | [Leave a comment](#)

For half a century the Earth's planetary dynamism – plate movements, [mantle convection](#) and so on – has been ascribed to its abundance of water. Experiments on the [ductility](#) of quartz seemed to show that it became much weaker under hydrous conditions, and that was assumed to hold for all common silicates, a view backed up by experiments that deformed minerals under varying conditions. It was widely believed that even a few parts per million in a rock at depth would weaken it by orders of magnitude, a view that increasingly dominated theoretical tectonics on scales up to the whole lithosphere and at different mantle depths. Strangely, the founding assertion was not followed up with more detailed and sophisticated work until the last year or so. Though rarely seen in bulk, the dominant mineral in the mantle is olivine and that is likely to be a major control over ductility at depth, in plumes and other kinds of convection.



Peridotite xenoliths —olivines are light green crystals, pyroxenes are darker. (credit: Wikipedia)

Experimental work at the temperatures and pressures of the mantle has never been easy, and that becomes worse the more realistic the mineral composition of the materials being investigated. High-T, high-P research tends to focus on as few variables as possible: one mineral and one variable other than P and T is the norm. This applies to the latest research (Fei, H. *et al.* 2013. Small effect of water on upper mantle rheology based on silicon self-diffusion coefficients. *Nature*, v. **498**, p. 213-215) but the measurements are of the rate at which silicon atoms diffuse through olivine molecules rather than direct measurements of strain. The justification for this approach is that one of the dominant processes involved in plastic deformation is a form of structural creep in which atoms diffuse through molecules in response to stress – the other is 'dislocation creep' achieved by the migration of structural defects in the atomic lattice.

Contrary to all expectations, changing the availability of water by 4 to 5 orders of magnitude changed silicon diffusion by no more than one order. If confirmed this presents major puzzles concerning Earth's mantle and lithosphere dynamics. For instance, the weak zone of the asthenosphere cannot be a response to water and nor can the relative immobility of hotspots. Confirmation is absolutely central, in the sense of repeating Fei *et al.*'s experiments and also extending the methods to other olivine compositions – magnesium-rich forsterite was used, whereas natural olivines are solid solutions of Mg- and Fe-rich end members – and to materials more representative of the mantle, e.g. olivine plus pyroxene as a minimum (Brodholt, J. 2013. Water may be a damp squib. *Nature*, v. **498**, p. 18-182)

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Yes, it was hot during the Permian

Posted on [June 17, 2013](#) by [Steve Drury](#) | [1 Comment](#)

For those of us living in what was the heart of Pangaea – Europe and North America – more than 250 Ma ago this item's title might seem like the ultimate truism. However, despite our vision of desert dune sands and evaporating inland seas, glaciation blanketed much of the Gondwana part of the supercontinent until the Middle Permian then lying athwart the South Pole. That would go a long way to accounting for extreme dryness at low to mid-latitudes, especially in the deep interior of Pangaea, but just how hot might tropical climates have been? The deglaciation of Gondwana was abrupt and has been touted as an analogue for a possible anthropogenic closure to the Cenozoic glacial epoch that began around 34 Ma in Antarctica and has periodically gripped land at northern latitudes as low as 40°N for the last 2.5 Ma. Since the present distribution of continents is totally different from the unique pole-to-pole shape of Pangaea, that is probably a view that is not widely held by palaeoclimatologists. Nonetheless, getting hard data on Permian conditions has an intrinsic interest for most geoscientists.



Playa lake in Death Valley, USA (credit: Wikipedia)

One of the best ways of measuring past temperatures, whether surficial or deep within the crust, almost directly is based on fluids trapped within minerals formed at the time of interest. In Permian strata there is no shortage of suitable material in the form of evaporite minerals, especially common salt or halite. A distinctive chevron-like texture develops in halite that forms at the water-atmosphere interface in playa lakes that dry out every year. When thin sections of samples that contain fluid inclusions are slowly heated the air bubbles trapped in salt during crystallisation gradually homogenise with the other trapped fluids. Based on samples that have formed at the present day under a range of air temperatures, the temperature of homogenisation indicates the prevailing air temperature accurately. So well, in fact, that it is possible to assess diurnal temperature variations in suitable halite crystals.

Results have been obtained from Middle Permian halites in Kansas, USA (Zambito, J.J. & Benison, K.C. 2013. Extremely high temperatures and paleoclimate trends recorded in Permian ephemeral lake halite. *Geology*, v. **41**, p. 587-590). In part of the section studied air temperatures reached 73°C, compared with a modern maximum of 57°C recorded in halites from the playas of Death Valley. Moreover, they exhibit changes of more than 30°C during daily cycles. But that kind of weather is common in other hot dry areas today, such as the Dasht-e Lut in eastern Iran. Also, the full data show crystallisation at lower temperatures (maxima of 30-40°C) in part of the sequence. What is noteworthy is that these data are the first quantitative indicators of weather before the last 2.5 Ma. Since evaporites extend back into the Precambrian, the method will undoubtedly extend accuracy and precision to paleoclimate where only proxies and a modicum of guesswork were previously available.