



## Letter from the EGU President

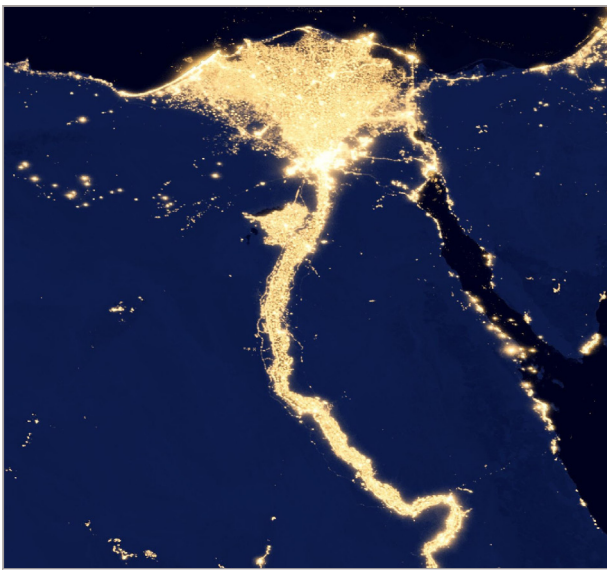
### New thinking, data and models for doing geosciences in the Anthropocene



In my letter in the September issue of GeoQ I noted: "It may no longer suffice to treat humans as boundary conditions in an isolated way but as an integral part of the coupled human-nature system when advancing Earth system sciences in the Anthropocene." Now, in December, we have a full issue dedicated to the Anthropocene. In this letter I would like to propose three theses on doing geosciences in the Anthropocene and illustrate them with examples:

- Thesis 1: We need a new thinking to treat humans as an integral part of the geosystem.
- Thesis 2: There are (new) data that allow such integration.
- Thesis 3: We need new models that capture the co-evolution of people and the geosystem.

**New thinking.** Most textbooks start from the assumption that the geosystem can best be studied without human effects. There are of course very good reasons for leaving out humans, as they add enormously to the complexity. Yet, there is an increasing number and variety of patterns that can no longer be explained without integrating anthropogenic processes. A new thinking that revolves around the dynamic coupling of geo-processes and human action/reaction is therefore needed: a genuine two-way coupling rather than boundary conditions that have been the norm in the past. An example of this new thinking has been furnished by [Kandasamy et al. \(2014\)](#) who analysed the drivers of a 'pendulum swing' between agricultural development and environmental health in the Murrumbidgee River basin, Australia, in the 20<sup>th</sup> century. They explained how societal norms, policy frameworks, water fluxes and quality in the landscape depended on each other, resulting in an emergent behaviour that could not possibly be understood by looking



Nightlights across the Nile River and Delta region. (Source: [Ceola et al. 2014](#))

at individual factors in isolation. Often such systems are 'slow-fast systems' that produce interesting dynamics by the coupling across space and timescales.

**New data.** For better understanding how humans are integrated in the geosystem, data are needed that reflect this coupling. The past approach has often been to consider the human fingerprint a nuisance and filter it out to get 'clean' data. Yet, perhaps now is the time to leave the human effect in the data and seek to represent the entire system. Even more importantly, there is a need for new data, or use of existing data in a new way, that exactly addresses the human component. An example of this new data and data use has been furnished by [Ceola et al. \(2014\)](#) who analysed satellite nightlight data to show that nocturnal lights close to rivers are consistently related to flood damages. They found increasing nightlights to be associated with flood damage intensification around the world. The nightlight data are an excellent example of creative research where data collected for completely different reasons are used in a geoscience context to unravel new patterns of human-geosystem interactions.

**New models.** As the complexity of coupled systems increases, modelling becomes increasingly difficult. Once political processes come in, for example, there is little hope of deterministic descriptions. I believe there are opportunities for new model types that conceptualise processes in an integrated way, taking advantage of co-evolutionary principles of the geosystem, including humans. While such models are not inconsistent with micro-scale physics and chemistry, they exploit laws at more integrated scales. An example of a simple model deciphering co-evolutionary characteristics has been furnished by [Gao et al. \(2014\)](#) who inferred the water storage capacity of the root zone at the catchment scale from effective rainfall and plant transpiration. They demonstrated that the ecosystems dynamically design their root systems to bridge droughts that re-occur every two decades but no more than that, as it is increasingly expensive in terms of carbon allocation to roots. These kinds of models may play an increasingly important role in understanding the patterns we see in the Anthropocene.

Obviously, many other recent examples of creative thinking, data usage, and modelling exist across the geosciences. If interested, you may want to explore this emerging research direction starting from papers such as those mentioned here. Creativity is the key, and we can learn from each other across different disciplines in the geosciences. The theme of the [next EGU General Assembly](#), A Voyage Through Scales, is intended to work as a coherent thread, fostering creativity across the geosciences.

*Günter Blöschl*  
EGU President

# Division reports

## News brought to you from three EGU divisions

In each edition of GeoQ division presidents or deputy presidents contribute reports that update EGU members with news from their divisions. Issue 12 gives voice to Charlotte Krawczyk (Seismology), Norma B. Crosby (Solar–Terrestrial Sciences) and Susanne Buiter (Tectonics and Structural Geology).

### Seismology

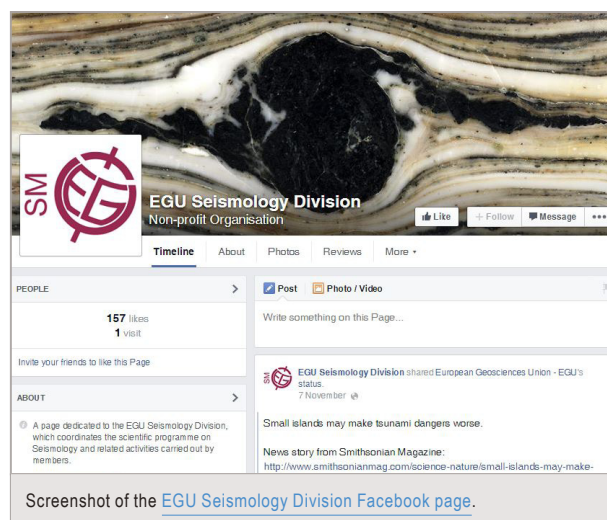
The ongoing work of the EGU Seismology (SM) Division is guided by the idea that a broadening of our research topics and an opening to wider, interdisciplinary collaborations within the EGU will foster the scientific exchange and will address the growing need for the combination of basic science and applied topics. Here, seismology as a discipline is significant since it contributes to a large variety of both basic and applied thematic fields and urgent questions. SM, therefore, wants to strengthen its value by enhancing the development from static to dynamic models, from acquisition parameters to petrophysical properties, and from geomodels to geotechnical applications. Thereby, our ability to make relevant predictions for the future is also growing.

This concern shaped the SM programme at the EGU 2014 General Assembly and also continues its way in the [call for abstracts](#) for the 2015 meeting. Here, we give particular emphasis to the programme sub-group ‘Geophysical imaging of the Earth’s interior across scales’ that is immediately linked to next year’s General Assembly theme, A Voyage Through Scales. Approximately half of all sessions proposed in the SM group are co-organised sessions. They connect not only to tectonics, geodynamics or natural hazards (the nearest solid Earth divisions), but also interact with geophysical instrumentation, hydrology, geomorphology, cryosphere or soil system sciences.

Highlights at the 2014 General Assembly included the Beno Gutenberg Medal Lecture by [Gregory Beroza](#) and the poster sessions that demonstrated the activity of the SM group and its need for discussion in addition to oral presentations. Three outstanding student posters (OSP) were identified this year that will be awarded during the Division Meeting next year. [Many thanks](#) to Valentí Sallarés (Barcelona) for organising the OSP awards during the last two years, and welcome to Laura Peruzza (Trieste) who is volunteering for this from now on.

Our division communication was greatly enhanced by the set-up of two web-based platforms driven by the SM Young Scientist Representative Matthew Agius (Malta): a [seismoblog](#) and a [Facebook page](#) are waiting for your clicks, messages, and input.

The community itself drives the division forward. Therefore, please don’t forget to leave a time slot free in your 2015 General Assembly schedule for the Division Meeting, which will be held during the lunch break immediately preceding the Beno Gutenberg Medal



Lecture. Since I will step down after four years of activity, the Division Meeting 2015 will also be the opportunity to welcome our new division president that we will [elect](#) this fall.

*Charlotte Krawczyk*  
SM Division President

### Solar–Terrestrial Sciences

At the 2014 General Assembly, the Solar–Terrestrial Sciences (ST) Division programme was comprised of six sub-groups (Sun and Heliosphere; Magnetosphere; Ionosphere and Thermosphere; Theory, Simulations, Solar System Plasma Physics; Space Weather and Space Climate; Society, Education and Public Outreach). Like every year, there were new sessions as well as the traditional ST sessions. Overall, oral sessions were well attended, and poster sessions were very successful and well appreciated by the participants.

At ST division level Rumi Nakamura was awarded the 2014 Julius Bartels Medal for her outstanding contributions to the understanding of the complex plasma physical processes within the magnetosphere and the magnetotail of the Earth through all phases of the substorm cycle. The 2014 Hannes Alfvén Medal was awarded to Karl Schindler for his illuminating contributions to the dynamics of the solar corona, the magnetosphere and astrophysical plasmas through elegant theoretical analyses of fundamental plasma phenomena such as equilibria, stability, current sheets and reconnection. Recently, the [2015 awards and medals were announced](#); they will be awarded at the upcoming 2015 General Assembly.

Noé Lugaz was awarded at Union level, receiving the 2014 Arne Richter Award for Outstanding Young Scientists for his innovative contributions to the understanding of coronal mass ejections. Furthermore, the 2014 Jean Dominique Cassini Medal & Honorary

Membership was awarded to Stamatios M. Krimigis for his key discoveries and his seminal contributions in solar, interplanetary, magnetospheric and planetary physics. The award was also bestowed in recognition of his leadership in the design and implementation of new experiments and new space science missions and his pivotal role in space science policy.

At the EGU 2014 General Assembly, the ST Division Meeting was attended by more than 100 people. The new EGU By-Laws were highlighted and Olga Malandraki was approved for the role of 2015 ST Deputy President by the meeting participants. Furthermore, ST officers and ST Division Medal Committees for 2015 were also approved. The Union Assembly Outstanding Student Poster (OSP) Award 2013 for ST was awarded to Beate Krøvel Humberstet for the poster entitled 'Untangling the space-time ambiguity of pulsating aurora', and Beate was approved by the meeting participants to be the Division's first Young Scientist Representative. Mike Pinnock gave a presentation on the ST journal *Annales Geophysicae* ([ANGEO](#)); the community is encouraged to submit their work to this open access journal. The updated [ST Education and Public Outreach \(EPO\) webpage](#) was presented by Athanasios Papaioannou and includes EPO sub-webpages covering websites, books, and videos; inputs from the community are very welcome.

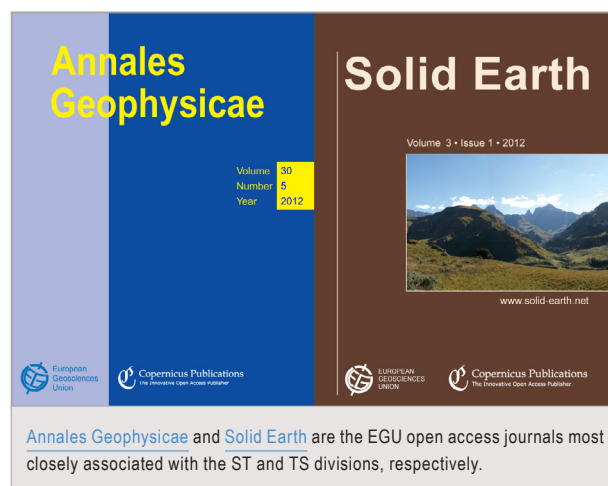
Next year will see a new ST President and therefore I would like to end this short report by thanking both the ST Scientific Officers, as well as the ST Liaison Officers, who have contributed enthusiastically to the ST Division during these last four years. Finally, I would like to thank all the participants that have attended ST sessions and contributed to their success: without *you* there would be no unique EGU meeting.

*Norma B. Crosby*  
ST Division President

## Tectonics and Structural Geology

The activities of the Division of Tectonics and Structural Geology (TS) focus on rock deformation at all scales, from microstructures to plate tectonics, and from extension, via oblique deformation, to shortening. The division therefore covers a wide range of topics and we can only achieve our goal of understanding Earth dynamics through close collaboration with many disciplines. I am very pleased to see our interdisciplinary character reflected in our [session programme](#) for the 2015 General Assembly! Next year, our programme will have several PICO sessions, we are organising workshops for the first time, and we have many new topics – do check out our programme!

Over the last year, we have established closer links with our sister organisation, the Structural Geology and Tectonics Division of the Geological Society of America (GSA), through co-organised sessions at our respective meetings. We will follow this up also in 2015, starting with the session 'Mountains across the oceans: Caledonian, Variscan and Appalachian orogenies through time', which will appear at EGU2015 and GSA2015.



*Annales Geophysicae* and *Solid Earth* are the EGU open access journals most closely associated with the ST and TS divisions, respectively.

Since early this year, Charlotte Fillon is our Division Young Scientist (YS) Representative. Young scientists have their own forum and [webpages](#) and are not only represented at the division level, but also in the EGU Programme Committee. For TS, we had a first YS meeting at the 2014 GA and we are planning to follow up with YS short courses and hopefully a reception at the 2015 GA.

Our division medal, the 2015 Stephan Mueller Medal, will be awarded to Evgueni Burov. He will hold a medal lecture at the General Assembly 2015 and I hope you will all join in celebrating this prestigious award! After an evaluation of over 110 posters, the TS Outstanding Student Poster Award for 2014 was awarded to Adina Pusok. A big thank you to all judges, it is only because of your volunteer work that so many student posters can be evaluated!

Further division news is that the Emile Argand Conference on Alpine Geological Studies will be held in Briançon in the French Alps from 13–20 September 2015. The 3<sup>rd</sup> EGU Summer School on Structural Analysis of Crystalline Rock is planned for August 2015. Keep an eye on our [website](#) and the [meeting calendar](#) to find Tectonics and Structural Geology meetings of interest.

Finally, I would like to draw your attention to the EGU open access journal *Solid Earth* which received its second impact factor of a good 2.155. *Solid Earth* is dedicated to multidisciplinary research on the composition, structure and dynamics of the Earth from the surface to the deep interior at all spatial and temporal scales. This is a perfect fit for research related to our division and I would encourage everyone to consider submitting the results of their latest research to the journal.

Information about TS and its activities can be found on our [webpage](#) and now also on [Facebook](#). Follow us for division news!

*Susanne Buiter*  
TS Division President