**C2SM Newsletter June 2016** **Vol. 21**

### Tina Schnadt starts as C2SM's new Executive Director

Christina Schnadt Poberaj officially joined C2SM on June 1st as Executive Director, taking over from Isabelle Bey. Tina has a strong climate modeling background, and has worked in C2SM member groups at both IAC and Empa. She brings several years of management experience, extensive links to the national and European climate modeling community, and strong leadership to C2SM. Tina has had a good start at C2SM and for those of you whom she hasn't yet met, she is looking forward to working with you as part of the C2SM community.

We would also like to thank Isabelle for her contribution to C2SM over the years and wish her all the best in her new position at MeteoSwiss as head of the Regional Center West in Geneva.

### C2SM advisory board member David Bresch is appointed Professor of Weather and Climate Risk

David Bresch was appointed Professor for Weather and Climate Risk, a joint professorship between MeteoSwiss and the Department of Environmental Systems Science at ETH Zurich. David's joint professorship will focus on the interface between weather and climate, and society, while combining research on weather, climate, impacts, adaptation, resilience, economy and risk. David brings in-depth knowledge about climate, climate impacts, natural hazards and sustainability, over 15 years of experience in private industry and reinsurance, and an excellent national and international network to ETH. David will be part of the Institute for Environmental Decisions (IED) at ETH and will officially start in September 2016.

### C2SM member Heini Wernli awarded ECMWF Fellowship

Heini Wernli, Professor of Atmospheric Dynamics at IAC and C2SM member, has been awarded a prestigious three-year Fellowship from ECMWF. The Fellowship is a great honor and will allow Heini and his group to strengthen their existing co-operation with ECMWF experts and focus on pressing research questions such as: *Why is it that forecasts involving warm conveyor belts sometimes go wrong?* and *How can we improve our understanding of the microphysical cloud processes in warm conveyor belts and of their interaction with the larger-scale flow?*

### New activities in scientific visualization

Scientific visualization support is being offered to the C2SM community as of April 1st. Members have already submitted some exciting proposals to the SciViz panel, with the following two products currently being developed: 1) A tool to include images of meteorological fields (e.g. temperature and velocity) as overlays (geo-referenced) on

Google Earth wherein they will be displayed as animations. 2) A tool to animate the flow pattern on selected pressure levels using Lagrangian particle tracking. Particles will be released in the flow and their trajectories will be animated as thin strings that slowly fade, with new particles continuously released and tracked. New proposals will be reviewed on a continual basis, and we're looking forward to your ideas.

A wiki dedicated to visualization is also under development, and we welcome your ideas or requests for content. We also encourage you to share your valuable experience with us by contributing to it. In addition to the wiki and full projects (submitted as proposals), support can also be provided to groups when preparing their own visualizations, for such things as format conversion, e.g., converting NetCDF metadata to a CF-convention compliant form (which then allows the users to read the data into software such as ParaView). For all queries and proposal submission, please contact Tarun Chadha. Please check our scientific visualization page for the latest news and information.

**Swiss Climate Scenarios CH2018**

New national climate change scenarios are currently being developed in the CH2018 initiative. This project runs as a focus area of the recently founded National Center for Climate Services (NCCS) and involves the C2SM partners MeteoSwiss and ETH among other institutions. The CH2018 scenarios will build upon the latest regional climate model projections over Europe from the CORDEX initiative. To provide the CH2018 scenarios in a user-oriented format, a survey on user needs across Switzerland has been conducted to serve as a starting point. Compared to the preceding CH2011 scenarios, the new scenarios will bring added value in various aspects, such as quantitative information on extreme changes and moderate climate indices, an improved downscaling approach and a better account of the observed record and natural variability. First preliminary results of the new scenarios are expected in early 2017. The scenarios will be disseminated through printed material and the web platform of the NCCS. A common strategy for this web platform is currently being designed. For this purpose, 17 different web platforms from 14 countries have been reviewed in a recent report in terms of visualization, dissemination, guidance, provision of data and user interactions.

***Publications:***

Sigel M, Fischer A, Zubler E, Liniger M; 2016: Dissemination of climate change scenarios – a review of existing scenario platforms. Technical Report MeteoSwiss, 257, 88 pp.

Survey report on end-user needs (in German): MeteoSchweiz: 2016, Analyse der Nutzerbedürfnisse zu nationalen Klimaszenarien, Fachbericht MeteoSchweiz, 258, 92 pp.

**Upcoming events of interest for the C2SM Community**

- **Klimarunde 2016:** This year's Klimarunde, "Der globalisierte Klimawandel: Wie betrifft er uns?" will take place on Tuesday, 8 November 2016, organized jointly by C2SM, MeteoSwiss and the Energy Science Center at ETH. This year's topic will address external and internal risks and opportunities for Switzerland related to both weather and climate, and how we will, as a society, deal with these risks and opportunities. Leading experts will discuss: *How will a strong El Niño affect the supply of Swiss chocolate? How does extreme weather in Asia affect the supply of smart phones in Europe?* and *What does buying soap and sunscreen have to do with climate change?* More information and a detailed program will be available soon on our website.
- **Seminar talk:** 04 July 2016, 16:15, CHN P12: Philippe Ciais, Observed regional carbon budgets imply reduced soil heterotrophic respiration. This talk is part of the 2016 Special Seminar Series Greenhouse Gas Fluxes and Sinks, organized jointly by C2SM and the CCES MAIOLICA II project.
- **Course:** MPI/OpenMP, 22 - 25 August 2016: ETH Scientific IT Services (SIS) is offering an Introductory course in parallel programming with MPI/OpenMP, given by Dr. Rolf Rabenseifner, HLRS.
- **Summer School 2016:** The Swiss Climate Summer School: Climate Risks - Coping with Uncertainty, organized jointly by the Oeschger Centre for Climate Change Research and C2SM, will take place from 28 August - 2 September 2016 in Grindelwald, Switzerland. Young researchers from all fields of climate research will gather in Grindelwald to hear from leading experts on emergent climate risks and vulnerability, what is "dangerous climate change", and ethics and climate policy.
- **Summer School 2017:** The Swiss Climate Summer School 2017 will take place from 3 - 8 September 2017 at the Centro Stefano Franscini (CSF) on Monte Verita (Ascona, Southern Switzerland) and will feature the theme "High-Resolution Climate: Observations, Models and Projections". The school is organised by Christoph Schär together with colleagues from ETH Zurich, Oeschger Centre for Climate Change Research in Bern, MeteoSwiss and C2SM. Further information will follow this fall on our website.
- **Conference:** The 10th International Carbon Dioxide Conference, ICDC10, will take place from 21 - 25 August 2017 Interlaken, Switzerland. The program will focus on an integrated, interdisciplinary view of the global carbon cycle and its perturbation by humans. Abstract submission and registration will open in September 2016.

**Paper: A stronger decline in future land carbon uptake**

As part of the C2SM project *CarboCount CH*, Stefanos Mystakidis and colleagues used observation-based fluxes of evapotranspiration (ET) and gross primary production (GPP) to constrain terrestrial carbon cycle projections from an ensemble of 19 Earth System Models (ESMs) within the CMIP5 project. The observation-based constraints used in the study reveal that by the end of the century, there is a substantial decrease in the projected GPP and a reduction of ~50% in the inter-model spread in GPP in the constrained CMIP5 models. These results are consistent with the tendency of current terrestrial biosphere models to overestimate GPP when compared to reference data products. Since the terrestrial biosphere acts as a sink for about one third of the total anthropogenic $CO_2$ emissions, a better understanding of changes in future land carbon uptake has important implications for narrowing down uncertainties in the global carbon cycle and how it will respond to future climate change. The *CarboCount CH* was a collaborative "SNF Sinergia" hosted by C2SM and ran from 2012-2015. Stefanos did this work as part of his PhD in the group of Sonia Seneviratne, where he is now a postdoc.

***Article (open access):*** Mystakidis, S., E.L. Davin, N. Gruber and S.I. Seneviratne, 2016: Constraining future terrestrial carbon cycle projections using observation-based water and carbon flux estimates, Global Change Biology, 22, 2198–2215, doi: 10.1111/gcb.13217

**Paper: Reducing sources of uncertainty in climate projections at local scales**

A recent study in *Earth's Future* by C2SM community members Simone Fatichi and Paolo Burlando, apply a state-of-the-art downscaling technique to climate model output from CMIP5 to partition the three main sources of uncertainty in future local scale projections: anthropogenic forcing, climate model, and internal climate variability. The results show that at the local scale, uncertainty of the mean and extremes of precipitation is irreducible because it is almost entirely due to internal climate variability. Conversely, they find that projected changes in air temperature and other variables can be largely constrained, given more accurate greenhouse gas emission scenarios. For precipitation mean and extremes, this has important implications – if historical internal variability is properly accounted for, this may be sufficient for understanding a wide range of possible future trajectories. This is an important finding for informing future impact and adaptation studies, and improving decision-making under climate change.

***Article (open access):*** Fatichi, S., V.Y. Ivanov, A. Paschalis, N. Peleg, P. Molnar, S. Rimkus, J. Kim, P. Burlando, and E. Caporali (2016): Uncertainty partition challenges the predictability of vital details of climate change, Earth's Future, 4, doi:10.1002/2015EF000336.

**Paper: A new mesoscale pathway for energy transfer to the ocean**

As part of the *CHIRP2* project, "Modeling the water cycle in a changing climate", David Byrne, C2SM Chair Nicolas Gruber, and colleagues from the UP group show that oceanic eddies can provide an important pathway for the transfer of energy into the ocean. Using a coupled high resolution atmosphere-ocean model of the South Atlantic, they show that in the presence of a large-scale wind gradient, this conduit enhances the kinetic energy contained in the circulation of the South Atlantic by up to 10%. Large wind gradients prevail over much of the Southern Ocean north of the Polar Front, resulting in optimal conditions for this transfer of energy to matter over large parts of the ocean. Until now, mesoscale atmosphere-ocean interactions were thought to play little role in energy transfer from the atmosphere to the ocean. Although it is still unclear how this newly uncovered energy pathway will affect the large-scale ocean circulation, changes resulting in this pathway will likely have far reaching effects on important ocean processes at different scales, and in-turn affect the oceanic uptake of $CO_2$ and heat from the atmosphere.

***Article (open access)***: Byrne, D., M. Münnich, I. Frenger, N. Gruber, 2016: Mesoscale atmosphere ocean coupling enhances the transfer of wind energy into the ocean. Nat. Commun. 7:11867, doi: 10.1038/ncomms11867.

**Paper: Can cirrus cloud seeding help cool the planet?**

In their recent paper, Blaž Gasparini and C2SM member Ulrike Lohmann address the potential of cirrus cloud seeding to offset the net warming effect of cirrus clouds on the global energy balance. Using the ECHAM-HAM general circulation model, they studied the response of cirrus clouds to four simplified global seeding strategies, and found no significant cooling effects. The cirrus cloud radiative effects were found to be positive (at TOA, 5.7 W/m$^2$) in the global annual average, which confirms their geoengineering potential in counteracting the Earth's increasing energy balance. In contrast to other recent studies, however, which show a significant climate effect from cirrus cloud seeding, their

study finds the effect to be limited, primarily due to a decrease in the ice crystal radius after seeding. Given the large uncertainties in both observations and modeling of cirrus clouds, this study is a step towards better understanding the microphysical properties that govern the overall balance between the SW cooling and LW warming effects of cirrus clouds.

***Article (open access):*** Gasparini, B., and U. Lohmann, 2016: Why cirrus cloud seeding cannot substantially cool the planet, J.Geophys. Res. Atmos., 121, 4877–4893, doi:10.1002/2015JD024666.

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