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Dr. Ingo Sasgen

Email: ingo.sasgen@awi.de

Research Interest

I am a geophysicist, with a specialization in satellite geodesy and dedicated to developing new remote sensing applications for improving our knowledge of the Polar Regions. My research focusses on the ice mass changes, regional sea-level change and their connection to the climate drivers, both from the observational and modelling perspective. For more than a decade, I have contributed to the satellite gravimetry missions GRACE and GRACE-FO as member of European Science Team. Currently, I am working on transitions in the Polar climate and related impacts on various system components. In future, I would like to enhance the synergy between different satellite observations and work on seasonal forecasts and projections of ice sheet mass change.

Professional Service

2017 - 2019	Commissary speaker of the topic **Sea-level change at AWI**, anchored as theme in the institutional research program (during AWI evaluation).
2015 - present	**German GRACE / GRACE Follow-on Level 3 Product Development Team**, responsible for development of high-level cryosphere mass balance products by combination of satellite measurements (e.g. CryoSat-2)
2015 - present	Spokesperson of the Topic **Sea-level change and coastal impacts** (ca. 15 participants) of the **Helmholtz cross-institutional Regional Climate Change Initiative** (www.reklim.de; total ca. 100 participants).
2015 - present	Active in **public outreach at AWI** on ice mass and sea-level change
2016 - present	Contribution to **Ice Sheet Mass Balance Inter-Comparison Exercise** in the fields gravity and glacial-isostatic adjustment
2017 (*started)*	**Arctic Report Card contribution** of GRACE ice-mass balance for Greenland, starting for year 2017
2017 *(started)*	**World Climate Research Programme on Global Sea Level Budget Assessment,** headed by Dr. Anny Cazenave, assigned as main participant in working group **mass budget, Greenland and Antarctica ice sheet, and glacial-isostatic adjustment.**
2009 – 2015	**Spokesman of German young geoscientists group**, consulting the German Research Foundation in matters of career development
2013 - 2015	**Contractor of the European Space Agency (ESA)**, management and scientific lead of project on separating ice changes and Earth rebound in satellite observations over Antarctica, involving four European university partners.

Education

2009	**Free University Berlin** (Germany). PhD, Institute of Meteorology. Dissertation *(summa cum laude)*: "Present-day ice-mass changes and glacial-isostatic adjustment from Gravity Recovery and Climate Experiment (GRACE) and geophysical modelling" supervised by Z. Martinec (GFZ; now: Dublin Inst. Adv. Studies, Dublin, Ireland).
2003	**Ludwig-Maximilians-University & Technical University of Munich** (Germany). Diplom degree *(very good)* in geophysics with specialization in satellite geodesy (TU Munich). Thesis: "Geodetic signatures of glacial changes in Antarctica" supervised by D. Wolf (GFZ).
2000 - 2001	**University of Toronto** (Canada). Visiting student at Geology and Physics Departments. Took graduate courses in statistics, geophysics, paleoclimate, geomorphology and Earth rheology.
1998	**Ludwig-Maximilians-University Munich** (Germany). Vordiplom degree *(very good)* in geophysics with examinations in mathematics, theoretical and experimental physics and chemistry.

Professional Experience

2016 - present	**Research Scientist at Alfred-Wegener-Institute Bremerhaven (Germany).** Climate Sciences and Geosciences Division. Development of an operationalized GRACE & GRACE-Follow-on ice-mass balance product. Glacial-isostatic adjustment modelling. Management of sea-level activities in Helmholtz Network REKLIM.
2013 - 2015	**Research Scholar at Pennsylvania State University (USA)**, Department of Geosciences, awarded by German Academic Exchange Service (DAAD). Investigating ice / solid Earth coupling in Amundsen See Embayment, Antarctica, in collaboration with D. Pollard and R. Alley.
2012 - 2015	**Management & Scientific Lead of European Space Agency (ESA)**, Project REGINA (Contract Nr. 4000107393/12/I-NB). Determining "Regional Glacial Isostatic Adjustment (GIA) and CryoSat Elevation rate Corrections in Antarctica"; consortium including Universities of Glasgow, Newcastle and Bristol (UK) and Technical University Munich (Germany). ESA technical officer: M. Drinkwater.
2012	**Research Visitor at Jet Propulsion Laboratory (USA)**. Re-assessing GIA in Antarctic including GRACE and GPS for ice-mass balance inter-comparison (IMBIE), in cooperation with E. Ivins.
2009 - 2013	**Research Fellow and PhD supervisor at GFZ (Germany)**. Improved ice-mass balance by assimilation of GRACE and SLI data to 3D viscoelastic earth model. Grant for own position plus PhD candidate position awarded by German Research Foundation (DFG).

2005 - 2009	**Research Assistant at GFZ (Germany)**, Helmholtz cross-institutional program EOS, Determined filtering and inversion methods for GRACE temporal gravity data for studying solid Earth and cryosphere, in collaboration with Z. Martinec.
2004	**Student Research Assistant at GFZ (Germany)**. Forward modelling of glacial-isostatic adjustment in Antarctica, in collaboration with D. Wolf.
1999	**Intern at Bayerisches Geologisches Landesamt München (Germany)**. Development of maps of magnetic anomalies for Bavaria using ArcGIS.

Peer-Reviewed Journal Publications

2019

The IMBIE Team; Mass balance of the Greenland Ice Sheet from 1992 to 2018. *Nature*, 2019, doi: 10.1038/s41586-019-1855-2. **Contribution: Impact analysis for glacial-isostatic adjustment model.**

Tapley, B.; Watkins, M.; Flechtner, F.; Reigber, C.; Bettadpur, S.; Rodell, M.; ***Sasgen, I**; Famiglietti, J.; Landerer, F.; Chambers, D.; Reager, J.T.; Gardner, A. S.; Save, H.; Ivins, E.; Swenson, S.; Boening, C.; Dahle, C.; Wiese, D.; Dobslaw, H.; Tamisiea, M.; Velicogna, I.; Contributions of GRACE to understanding climate change. *Nat. Clim. Change Review* (invited), 2019, 9, 358-369. doi:10.1038/s41558-019-0456-2, **Lead author of cryosphere section. *Overall corresponding author.**

Sasgen, I.; Konrad, H.; Helm, V.; Grosfeld, K.; High -resolution mass trends of the Antarctic Ice Sheet through a spectral combination of satellite gravimetry and radar altimetry observations, Remote Sens. 2019, 11(2), 144; doi:10.3390/rs11020144

2018

Sasgen, I., Martín-Español, A., Horvath, A., Klemann, V., Petrie. E.J., Wouters, B., Horwath, M., Pail, R., Bamber, J.L., Clarke, P.J., Konrad, H., Wilson, T. & Drinkwater, M. R. (2018), Altimetry, gravimetry, GPS and viscoelastic modelling data for the joint inversion for glacial isostatic adjustment in Antarctica (ESA STSE Project REGINA), Earth Syst. Sci. Data, doi: 10.5194/essd-10-493-2018 .

2017

Sasgen, I., Martín-Español, A., Horvath, A., Klemann, V., Petrie. E.J., Wouters, B., Horwath, M., Pail, R., Bamber, J.L., Clarke, P.J., Konrad, H. & Drinkwater, M. R. (2017), Joint inversion estimate of regional glacial isostatic adjustment in Antarctica considering a lateral varying Earth structure (ESA STSE Project REGINA), Geophys. J. Int., doi: 10.1093/gji/ggx368.

2016

Khan, S. A., **Sasgen, I.**, Bevis, M., van Dam, T., Bamber, J. L.,Wahr, J., Willis, M., Kjær, K. H. Wouters, B., Helm, V., Csatho, B., Fleming, K., Bjørk, A. A., Aschwanden, A., Knudsen, P. (2016): Iceland hotspot track in southeast Greenland causes huge present-day vertical viscoelastic motion of the bedrock, *Sci. Adv.*, doi: 10.1126/sciadv.1600931.

Konrad, H., **Sasgen, I.**, Klemann, V., Thoma, M., Grosfeld, K., Martinec, Z. (2016): Sensitivity of grounding-line dynamics to viscoelastic deformation of the solid-earth in an idealized scenario. Polarforschung, 85, 2, 89-99, doi:10.2312/polarforschung.85.2.89.

Muto, A., Peters, L. .E., Gohl, K., **Sasgen, I.**, Alley, R. B., Anandakrishnan, S., Riverman, K. (2016): Subglacial bathymetry and sediment distribution beneath Pine Island Glacier ice shelf modeled using aerogravity and in situ geophysical data: New results. Earth Planet. Sci. Lett., 433, doi:10.1016/j.epsl.2015.10.037.

Sips, M., Unger, A., Rawald, T., & **Sasgen, I.** (2016): Exploring mass variations in the Earth system. Cartography and Geographic Information Science, 43(1), 3-15.

Zhang, L., Dobslaw, H., Dahle, C., **Sasgen, I.** and Thomas, M. (2016): Validation of MPI-ESM Decadal Hindcast Experiments with Terrestrial Water Storage Variations as Observed by the GRACE Satellite Mission. Meteorologische Zeitschrift, 25 (6), doi: 10.1127/metz/2015/0596.

2015

Konrad, H., **Sasgen, I.**, Pollard, D. & Klemann, V. (2015): Potential of the solid-Earth response for limiting long-term West Antarctic Ice Sheet retreat in a warming climate. Earth Plant. Sci. Lett., 432, 254-264.

Dobslaw, H., Bergmann-Wolf, I., Dill, R., Forootan, E., Klemann, V., Kusche, J.,**Sasgen, I.** (2015): The Updated ESA Earth System Model for Future Gravity Mission Simulation Studies. Journal of Geodesy, doi: 10.1007/s00190-014-0787-8.

Martinec, Z., **Sasgen, I.**, Velímský, J. (2015): The forward sensitivity and adjoint-state methods of glacial isostatic adjustment. Geophys. J. Int., 200(1), 77-105.

2014

Wouters, B., Bonin, J. A., Chambers, D. P., Riva, R. E. M., **Sasgen, I.**, Wahr, J. (2014): GRACE, time-varying gravity, Earth system dynamics and climate change. Reports on Progress in Physics, 77(11), 116801.

2013

Konrad, H., Thoma, M.,**Sasgen, I.**,Klemann, V., Grosfeld, K., Barbi, D., Martinec, Z. (2013): The deformational response of a coupled thermomechanical ice sheet model and a viscoelastic solid Earth model. Surveys in Geophysics, doi: 10.1007/s10712-013-9257-8.

Wouters, B., Bamber, J., van den Broeke, M., Lenaerts, J., **Sasgen, I.** (2013): Limits in detecting acceleration of ice sheet mass loss due to climate variability. Nature Geosci., 6, 613–616, doi:10.1038/ngeo1874.

Sasgen, I., Konrad, H., van den Broeke, M., Ivins, E., Bamber, J., Martinec, Z. (2013): Antarctic regional ice-mass trends 2002 to 2012 from GRACE satellite gravimetry and an improved estimate of glacial-isostatic adjustment. The Cryosphere, 7, 1499–1512, 2013.

Dobslaw, H., Flechtner, F., Bergmann, I., Dahle, C., Dill, R., Esselborn, S., **Sasgen, I.**, Thomas, M. (2013): Simulating high-frequency atmosphere-ocean mass variability for dealiasing of satellite gravity observations: AOD1B RL05 (. J. Geophys. Res. Oceans, 118, 3704–3711, doi:10.1002/jgrc.20271.

2012

Panet, I., Flury, J., Biancale, R., Gruber, T., Johannessen, J., van den Broeke, M., van Dam, T., Hughes, C., Ramillien, G., **Sasgen, I.**, Seoane, L., Thomas, M. (2012): Earth System Mass Transport Mission (e.motion): A Concept for future Earth Gravity Field Measurements from Space. Surv Geophys 34:141–163, doi: 10.1007/s10712-012-9209-8.

Sasgen, I., van de Broeke, M. R., Bamber, J., Rignot, E., Sorensen, L., Wouters, B., Martinec, Z., and Simonsen, S. B. (2012): Timing and origin of recent regional ice-mass loss in Greenland. Earth Plant. Sci. Lett., 333-334, 293-303 p., doi:10.1016/j.epsl.2012.03.033. **Cited in IPCC AR5**.

Sasgen, I., Klemann V., Martinec, Z.(2012): Towards the inversion of GRACE gravity fields for present-day ice-mass changes and glacial-isostatic adjustment in North America and Greenland. Journal of Geodynamics, doi: 10.1016/j.jog.2012.03.004.

2010

Sasgen, I., Dobslaw, H.,Martinec, Z., Thomas, M. (2010): Satellite gravimetry observation of Antarctic snow accumulation related to ENSO. Earth and Planetary Science Letters, 299, 3-4, 352-358. doi: 10.1016/j.epsl.2010.09.015

Sasgen, I., Martinec, Z., Bamber, J. (2010): Combined GRACE and InSAR estimate of West Antarctic ice-mass loss. Journal of Geophysical Research, 115, F04010. 10.1029/2009JF001525

2009

Bevis, M., Kendrick, E., Smalley, R., Dalziel, I., Caccamise, D., **Sasgen, I.**, Helsen, M., Taylor, F.W., Zhou, H., Brown, A., Raleigh, D., Willis, M., Wilson, T., Konfal, S. (2009): Geodetic measurements of vertical crustal velocity in West Antarctica and the implications for ice mass balance. Geochemistry Geophysics Geosystems (G3), 10, Q10005. 10.1029/2009GC002642.

Jacoby, W. R., Hartmann, O., Wallner, H., Smilde, P. L., Bürger, S., Sjöberg, L. E., Erlingsson, S., Wolf, D., Klemann, V., **Sasgen, I.** (2009): Temporal Gravity Variations near Shrinking Vatnajökull Ice Cap, Iceland. Pure and Applied Geophysics, 166, 8-9, 1283-1302. 10.1007/s00024-009-0499-9.

2007

Sasgen, I., Martinec, Z., Fleming, K. (2007): Regional ice-mass changes and glacial-isostatic adjustment in Antarctica from GRACE. Earth and Planetary Science Letters, 264, 3-4, 391-401. 10.1016/j.epsl.2007.09.029.

Sasgen, I., Martinec, Z., Fleming, K. (2007): Wiener optimal combination and evaluation of the Gravity Recovery and Climate Experiment (GRACE) gravity fields over Antarctica. Journal of Geophysical Research, 112, B04401. 10.1029/2006JB004605.

2006

Sasgen, I., Martinec, Z., Fleming, K. (2006): Wiener optimal filtering of GRACE data. Studia Geophysica et Geodaetica, 50, 4, 499-508.

Selected Presentations

2017

Sasgen, I. & the REGINA Team: Combination of multiple space-geodetic measurement: results of the STSE Project REGINA. ESA Polar Science Collocation Meeting, ESA-ESRIN, Frascati, Italy, 28-30 June 2017. *(Invited)*

2016

Sasgen, I.: The changing Polar ice sheets: reconciling space-geodetic observations with modelling. Kolloquium at the Department of Ocean Circulation and Climate Dynamics, GEOMAR Helmholtz Centre for Ocean Research Kiel Research, Kiel, Germany, 21 November 2016. *(Invited)*

Sasgen, I.: The Greenland surface-mass balance in 2012 and 2013 from GRACE, CryoSat-2 and atmosphere models. Greenland surface-mass balance workshop, Lamont-Doherty Laboratory, 8-10 September 2016 *(invited participation)*

2013

Sasgen, I., Konrad, H., Alley, R.B.: Advances in geodetic estimates of glacial-isostatic adjustment in Antarctica and their implications for refined ice sheet / solid Earth modelling. G42A-07. AGU Fall Meeting 2013, San Francisco, USA, 12 December 2013. *(Invited)*

Sasgen, I.: Geodetic Estimates of the Regional Mass Evolution of the Polar Ice Sheets. International Symposium Asia-Pacific Space Geodynamics (APSG) Project on APSG 2013 Program "Cross-Disciplinary Role of Space Geodesy in Natural Hazards Mitigation, Geodynamics and Climate Change Science", Columbus, Ohio, USA, 14 October 2013. *(Invited)*

2012

Sasgen, I.: On lithosphere-cryosphere interactions. DynaQlim workshop, Ruhr-Universität Bochum (Germany). *(Invited)*

Sasgen, I.: Greenland's ice mass change from space observations. JPL Centre for Climate Sciences, Pasadena (USA), Broadcast via JPL TV. *(Invited)*

Sasgen, I., Bamber, J., van de Broeke, M. R.,Sorensen, L., Wouters, B., Martinec, Z., Horwath, M., Konrad, H., Rignot, E.: On regional ice sheet mass balance from GRACE, the mass budget method, and ICESat. General Assembly European Geosciences Union, Vienna (Austria). *(Invited)*

Sasgen, I., van de Broeke, M. R., Bamber, J., Rignot, E., Sorensen, L., Wouters, B., Martinec, Z., and Simonsen, S. B.: Recent changes of the Greenland Ice Sheet: Insights from GRACE, ICESat and InSAR/Regional Climate Modelling. SLALOM-2012 - Sea-Level and Adjustment of the Land Observations and Model, Athens (Greece). *(Invited)*

2011

Sasgen, I.: Veränderungen der polaren Eisschilde. Klimawandel in Regionen, 2. REKLIM-Konferenz, Leipzig (Germany). *(Invited)*

2010

Sasgen, I.: Antarctic and Greenlandic ice-sheet contribution to global sea-level change from GRACE. EU-Project ice2sea, 1. Open Forum, Krakow (Poland). *(Invited)*

Selected Reports

2015

Sasgen, I. & the REGINA Consortium (2015): ESA ITT CryoSat+ REGINA: Final Report (D6.1) for determining Regional glacial isostatic adjustment and CryoSat elevation rate corrections in Antarctica. Issue 2.2, Doc. Ref. REGINA_D6_1_issue_2.2, http://dep1doc.gfz-potsdam.de/documents/91, www.regina-science.eu.

2012

Sips, M., Rawald, T., **Sasgen, I.**, Unger, A. (2012): Exploration of spatial and temporal signatures in multiple components of a Geodetic Earth System Model. In: Seppelt, R., Voinov, A.A., Lange, S., Bankamp, D. (Eds.), Managing Resources of a Limited Planet: Pathways and Visions under Uncertainty.

2011

ESA-ITT NG2 Team incl. **Sasgen, I.** (2011): Assessment of a Next Generation Gravity Mission to Monitor the Variations of Earth's Gravity Field, ESA ESTEC Contract No.: 22672/09/NL/AF.

2009

Sasgen, I. (2009): Present-day ice-mass changes and glacial-isostatic adjustment from Gravity Recovery and Climate Experiment (GRACE) and geophysical modelling. *PhD thesis*, http://www.diss.fu-berlin.de/diss/receive/FUDISS_thesis_000000013564 (last accessed 30. 5. 2017)