

# Kevin Bulthuis

Postdoctoral Researcher

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## Appointments

- 2020 – present **Nasa Postdoctoral Fellow**, *NASA Jet Propulsion Laboratory/California Institute of Technology, Sea Level and Ice (Earth Science Division), Pasadena (CA, USA)*.  
<https://science.jpl.nasa.gov/people/Bulthuis/>
- 2019 – 2020 **Teaching Assistant**, *Université de Liège*.
- 2015 – 2019 **F.R.S.-FNRS Research Fellow**, *Université de Liège, Computational and Stochastic Modelling (Aerospace and Mechanical Engineering Department) & Université Libre de Bruxelles, Laboratory of Glaciology (Department of Geosciences, Environment and Society)*.
- 2012 – 2015 **Student assistant**, *Université de Liège*.

## Education

- 2015 – 2020 **Ph.D.**, *Aerospace and Mechanical Engineering (Université de Liège) & Department of Geosciences, Environment and Society (Université Libre de Bruxelles)*,  
PhD thesis: Towards robust prediction of the dynamics of the Antarctic ice sheet: Uncertainty quantification of sea-level rise projections and grounding-line retreat with essential ice-sheet models.  
<https://hdl.handle.net/2268/242774>
- 2013 – 2015 **Master's Degree in Engineering Physics**, *Université de Liège (Belgium)*, Summa Cum Laude,  
Master's thesis: Multiphysics modeling of glacier flow: analysis and efficient numerical solution of a nonlinear coupled problem.  
<https://hdl.handle.net/2268/220353>
- 2010 – 2013 **Bachelor in Engineering Science**, *Université de Liège*, Summa Cum Laude.

## Research Interests

- General Ice-sheet modelling, geosciences, uncertainty quantification and stochastic analysis.  
Applications Uncertainty quantification in sea-level rise projections and ice-sheet models.

## Publications

- July 2021 V. Coulon, **K. Bulthuis**, P. L. Whitehouse, S. Sun, K. Haubner, L. Zipf and F. Pattyn. *Contrasting response of West and East Antarctic ice sheets to glacial isostatic adjustment*, *Journal of Geophysical Research: Earth Surface*, 126(7), e2020JF006003, <https://doi.org/10.1029/2020JF006003>.
- Feb. 2021 M. Arnst, C. Soize and **K. Bulthuis**. *Computation of Sobol indices in global sensitivity analysis from small data sets by probabilistic learning on manifolds*, *International Journal on Uncertainty Quantification*, 11(2), 1–23, <https://doi.org/10.1615/Int.J.UncertaintyQuantification.2020032674>.
- July 2020 **K. Bulthuis**, F. Pattyn and M. Arnst. *A multifidelity quantile-based approach for confidence sets of random excursion sets with application to ice-sheet dynamics*, *SIAM/ASA Journal on Uncertainty Quantification*, 8(3), 860–890, <https://doi.org/10.1137/19M1280466>.
- Feb. 2020 E. Hanna, F. Pattyn, F. Navarro, V. Favier, H. Goelzer, M. van den Broeke, M. Vizcaino, P. Whitehouse, C. Ritz, **K. Bulthuis** and B. Smith. *Mass balance of the ice sheets and glaciers – progress since AR5 and challenges*, *Earth Science Reviews*, 201, 102976, <https://doi.org/10.1016/j.earscirev.2019.102976>.

- Apr. 2019 **K. Bulthuis**, M. Arnst, S. Sun and F. Pattyn. *Uncertainty quantification of the multi-centennial response of the Antarctic ice sheet to climate change*, *The Cryosphere*, 13(4), 1349–1380, <https://doi.org/10.5194/tc-13-1349-2019>.

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## Support and Awards

- 2020 NASA Postdoctoral Program (NPP) Fellowship from the Universities Space Research Association (USRA).
- 2015 F.R.S-FNRS Research Fellowship from the Fonds de la recherche scientifique (F.R.S.-FNRS) de Belgique.
- 2015 Best master's thesis award supported by the association of engineers from the Université de Liège.
- 2010 Mobility grant supported by the Fernand Pisart Foundation from the Université de Liège.

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## Oral communications

- June 2021 **K. Bulthuis**. *The uncertain future of the Antarctic ice sheet – The importance of quantifying uncertainties in ice-sheet model projections*, GISS Sea Level seminar, Virtual seminar.
- Dec. 2020 Contributed speaker. **K. Bulthuis**, F. Pattyn and M. Arnst. *Uncertainty quantification of the Antarctic ice-sheet retreat using a multifidelity quantile-based approach for confidence sets of random excursion sets*, AGU Fall Meeting (AGU 2020), Virtual conference.
- May 2020 V. Coulon, **K. Bulthuis**, S. Sun, K. Haubner and F. Pattyn. *Contrasting response of West and East Antarctic ice sheets to glacial isostatic adjustment*, EGU General Assembly (EGU 2020), Virtual conference, <https://doi.org/10.5194/egusphere-egu2020-6974>.
- June 2019 Contributed speaker. **K. Bulthuis**, F. Pattyn and M. Arnst. *Estimation of confidence regions for random excursion sets with application to large-scale ice-sheet simulations*, 3rd International Conference on Uncertainty Quantification in Computational Sciences and Engineering (UNCECOMP 2019), Hersonissos, Greece, <http://hdl.handle.net/2268/238637>.
- Mars 2019 Contributed speaker. **K. Bulthuis**, M. Arnst, S. Sun and F. Pattyn. *Uncertainty quantification of the multi-centennial response of the Antarctic ice sheet to climate change*, SIAM Conference on Computational and Mathematical Issues in the Geosciences (SIAMGS19), Houston, TX, <https://hdl.handle.net/2268/233442>.
- Apr. 2018 Contributed speaker. **K. Bulthuis**, F. Pattyn, L. Favier and M. Arnst. *Stochastic modeling of uncertainties in fast essential Antarctic ice sheet model*, SIAM Conference on Uncertainty Quantification (SIAMUQ18), Garden Grove, CA, <https://hdl.handle.net/2268/222840>.
- Apr. 2017 Contributed speaker. **K. Bulthuis**, F. Pattyn, L. Favier and M. Arnst. *Uncertainty quantification of Antarctic contribution to sea-level rise using the fast Elementary Thermomechanical Ice Sheet (f.ETISh) model*, EGU General Assembly (EGU 2017), Vienna, Austria, <https://hdl.handle.net/2268/207549>.
- Sep. 2016 Contributed speaker. **K. Bulthuis**, F. Pattyn, L. Favier and M. Arnst. *Instability and abrupt changes in marine ice sheet behaviour*, 1st CRITICS Workshop and Summer School on Critical Transitions in Complex Systems, Kuhluse, Denmark, <https://hdl.handle.net/2268/201873>.

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## Conferences, seminars, workshops and summer school attended

- June 2018 *2018 Gene Golub SIAM Summer School: Inverse Problems: Systematic Integration of Data with Models under Uncertainty*, Breckenridge, CO, USA, June 12–30. **Topics include:** inverse problems, adjoint methods and Bayesian inference.
- Sept. 2017 *Summer School on Ice Sheets and Glaciers in the Climate System (Karthaus Summer School)*, Karthaus, Italy, September 12–23. **Topics include:** continuum mechanics, ice-sheet modelling and cryosphere-climate interactions.
- Jan. 2017 *Seminar on Bayesian Methods for the Physical Sciences*, Liège, Belgium, January 16–18. **Topics include:** Bayesian inference.

Aug. 2016 *1st CRITICS Workshop and Summer School on Critical Transitions in Complex Systems*, Kulluse, Denmark, August 28–September 3. **Topics include:** bifurcation theory, dynamical systems and stochastic differential equation.

Apr. 2016 *SIAM Conference on Uncertainty Quantification*, Lausanne, Switzerland, April 5–8, **Topics include:** uncertainty propagation, surrogate models and sensitivity analysis.

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## Computer Software & Languages

C/C++, Python, MPI, OpenMP, MATLAB, Julia, R, Unix, Microsoft Office, L<sup>A</sup>T<sub>E</sub>X

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## Professional memberships

European Geosciences Union (EGU)

American Geophysical Union (AGU)

Society for Industrial and Applied Mathematics (SIAM)

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## Language skills

French Native speaker

English Fluent

Dutch Good command

German Basic communication skills