

# Fanny Brun

Researcher (IRD/IGE)

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## EDUCATION

- 2015–2018 **PhD**, *Université Grenoble Alpes*, IGE/LEGOS, Advisers: Patrick WAGNON and Etienne BERTHIER.
- 2014–2015 **M.S. (M2)**, *Université Joseph Fourier*, Grenoble, Earth and Environment Science.
- 2012–2013 **M.S. (M1)**, *École Normale Supérieure*, Paris, Geosciences.
- 2011–2012 **B.S. (L3)**, *École Normale Supérieure*, Paris, Geosciences.
- 2009–2011 **Classe préparatoire aux grandes écoles**, *Lycée du Parc*, Lyon, Competitive exam results: École Normale Supérieure (rank 6) and concours d'entrée aux écoles d'agronomie A-BIO (rank 2).

## RESEARCH EXPERIENCE

- Jan. 2020 - **Researcher (Chargée de recherche)**, *IRD/IGE*, Grenoble.
- March - Dec. 2019 **Postdoctoral researcher**, *Department of Physical Geography - Utrecht University*, Utrecht, Adviser: Walter IMMERZEEL.  
Tibetan Plateau lakes and climate change
- November 2018 - **Postdoctoral researcher**, *Institut des géosciences de l'environnement (IGE)*, Grenoble, Advisers: Etienne BERTHIER and Patrick WAGNON.  
February 2019 Remote sensing of the cryosphere
- September 2015 - **PhD candidate**, *Institut des géosciences de l'environnement (IGE)*, Grenoble, Advisers: Etienne BERTHIER and Patrick WAGNON.  
Influence of debris on the mass balance of High Mountain Asia glaciers: a multiscale approach
- February - July 2015 **Master thesis**, *Eidgenössische Technische Hochschule (ETH)*, Zürich, Advisers: Francesca PELLICCIOTTI and Patrick WAGNON.  
Quantifying volume loss from ice cliffs on debris-covered glaciers using high resolution terrestrial and aerial photogrammetry
- June - July 2014 **Research associate**, *Université de Lausanne (UNIL)*, Lausanne, Advisers: Pierre VALLA, Georgina KING and Frédéric HERMAN.  
Constraining paleo-glacier dynamics using Optically Stimulated Luminescence (OSL) bedrock exposure dating
- October 2013 - May 2014 **Research associate**, *Laboratoire d'étude des Transferts en Hydrologie et Environnement (LTHE) & International Center for Integrated Mountain Development (ICIMOD)*, Grenoble & Katmandou, Advisers: Marie DUMONT and Patrick WAGNON.  
Seasonal changes in surface albedo of Himalayan glaciers from MODIS data and links with the annual mass balance
- March 2013 - July 2013 **Internship - M1**, *California Institute of Technology*, Pasadena, Adviser: Micheal LAMB.  
Experimental study of sediment transport in steep bedrock rivers
- June - July 2012 **Internship - L3**, *Laboratoire de Glaciologie et de Géophysique de l'environnement (LGGE)*, Grenoble, Adviser: Delphine SIX.  
Field work and glaciological data processing

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## FIELD CAMPAIGNS

- 2019 **Paiku Co basin, China**, *Setting up of meteorological stations and installation of pressure transducers in proglacial lakes*, 2 weeks.
- 2019 **Fedchenko Glacier, Tajikistan**, *Accumulation measurements*, 5 weeks.
- 2014, 2015, 2016, 2017, 2020, 2021, **Khumbu, Nepal**, *Glaciological and meteorological data collection on Mera and Changri Nup glaciers*, 1 month each time.
- June 2012 - now **French Alps**, *Glaciological data collection*.

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## TEACHING AND ADVISING

### Teaching

- 2015-2018 **Master and bachelor courses**, *Université Grenoble Alpes*, Geophysics, GIS, glaciology, statistics, Python programming.

### Advising

- 2022 Zoé Lacombe (Master 2; 6 months), 30%
- 2022 Arnaud Reboud (Master 2; 6 months), 30%
- 2021-2024 Arindra Khadka (PhD; 3 years), 50%, 1 publication in press
- 2020 Zoé Bessin (Master 2; 6 months), 5%, 1 publication
- 2020 Luc Berraud (Master 2; 6 months), 50%, 1 publication in review
- 2020 Janali Rezaei (Master 2; 5 months), 80%, 1 publication in prep.
- 2017 Camille Reverchon (Master 1; 2 months), 100%, 1 publication

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## LANGUAGES

- French **Mother tongue**
- English **Fluent**
- German **Basic knowledge**

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## PROJECTS

- 2022-2025 ANR JCJC - Impact of Future Rain/snow transition height On Glacier mass balance (iFROG); PI

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## AWARDS

- 2019 Prix Prud'homme; awarded by météo et climat for outstanding PhD dissertation
- 2019 Prix de thèse de l'UGA; awarded by Université Grenoble Alpes for outstanding PhD dissertation
- 2019 Prix de géophysique; awarded by the Comité National Français de Géodésie et Géophysique for outstanding PhD dissertation
- 2018 L'Oréal UNESCO - For women in science; 15 k€
- 2018 Outstanding Student Poster and PICO (OSPP) award; EGU 2018

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## OTHER

- Scientific Editor for *Journal of Glaciology*
- Co-chair of the Regional Assessment of Glacier Mass Change (RAGMAC) working group of the IACS (2019-2023)
- Member of the Global Terrestrial Network for Glaciers (GTN-G) Steering Committee (Advisory board)
- Guest Editor for the special issue "Regional Assessments of Glacier Mass Changes Based on Geodetic Methods" in *Frontiers in Earth Sciences*
- Reviewer for *The Cryosphere*, *Journal of Glaciology*, *Frontiers in Earth Sciences*, *Journal of Hydrology*, *Scientific*

*Reports, Cold Region Science and Technology, Earth and Planetary Science Letters, Earth Surface Processes and Landforms, Hydrological Processes, Remote sensing of environment, ESurf, Nature Geoscience, Nature Communication and Nature*

- Co-convener for EGU 2017 session on debris-covered glaciers and EGU 2020 and 2022 large scale glacier observation and modelling session

## PUBLICATIONS

\* denotes a student/postdoc, I contributed to advise

### In review

33. Béraud, L.\*, D. Cusicanqui, A. Rabatel, **Brun, F.**, C. Vincent, and D. Six: Glacier-wide seasonal and annual geodetic mass balances from Pléiades stereo images. Application to the Glacier d'Argentière, French Alps, *Journal of Glaciology*, in review.
32. Khadka, A.\*, P. Wagnon, **Brun, F.**, D. Shrestha, Y. Lejeune, and Y. Arnaud: Evaluation of ERA5-Land and HARv2 reanalysis data at high elevation in the upper Dudh Koshi basin (Everest region, Nepal), *Journal of Applied Meteorology and Climatology*, in review.

### 2022

31. Bessin, Z.\*, Dedieu, J.-P., Arnaud, Y., Wagnon, P., **Brun, F.**, Esteves, M., Perry, B., and Matthews, T.: Processing of VENμS Images of High Mountains: A Case Study for Cryospheric and Hydro-Climatic Applications in the Everest Region (Nepal), *Remote Sens.*, 14, 1098, <https://doi.org/10.3390/rs14051098>, 2022.

### 2021

30. Hugonnet, R., McNabb, R., Berthier, E., Menounos, B., Nuth, C., Girod, L., Farinotti, D., Huss, M., Dussailant, I., **Brun, F.**, and Käab, A.: Accelerated global glacier mass loss in the early twenty-first century, *Nature*, 592, 726–731, <https://doi.org/10.1038/s41586-021-03436-z>, 2021.
29. Lei, Y., T. Yao, L. Tian, Y. Sheng, Lazhu, J. Liao, H. Zhao, W. Yang, K. Yang, E. Berthier, **F. Brun**, Y. Gao, M. Zhu, and G. Wu (2021), Response of downstream lakes to Aru glacier collapses on the western Tibetan Plateau, *The Cryosphere*, 15(1), 199–214, 10.5194/tc-15-199-2021.
28. Shea, J. M., Kraaijenbrink, P. D. A., Immerzeel, W. W., and **Brun, F.**: Debris Emergence Elevations and Glacier Change, *Front. Earth Sci.*, 9, 895, <https://doi.org/10.3389/feart.2021.709957>, 2021.
27. Thomson, L., **Brun, F.**, Braun, M., and Zemp, M.: Editorial: Observational Assessments of Glacier Mass Changes at Regional and Global Level, *Front. Earth Sci.*, 8, <https://doi.org/10.3389/feart.2020.641710>, 2021.
26. Vincent, C., D. Cusicanqui, B. Jourdain, O. Laarman, D. Six, A. Gilbert, A. Walpersdorf, A. Rabatel, L. Piard, F. Gimbert, O. Gagliardini, V. Peyaud, L. Arnaud, E. Thibert, **F. Brun**, and U. Nanni (2021), Geodetic point surface mass balances: a new approach to determine point surface mass balances on glaciers from remote sensing measurements, *The Cryosphere*, 15(3), 1259–1276, 10.5194/tc-15-1259-2021.
25. Wagnon, P., **F. Brun**, A. Khadka\*, E. Berthier, D. Shrestha, C. Vincent, Y. Arnaud, D. Six, A. Dehecq, M. Ménégoz, and V. Jomelli (2021), Reanalysing the 2007–19 glaciological mass-balance series of Mera Glacier, Nepal, Central Himalaya, using geodetic mass balance, *Journal of Glaciology*, 67(261), 117–125, 10.1017/jog.2020.88.

### 2020

24. **Brun, F.**, D. Treichler, D. Shean, and W. W. Immerzeel (2020), Limited contribution of glacier mass loss to the recent increase in Tibetan Plateau lake volume, *Frontiers in Earth Science*, 8, 10.3389/feart.2020.582060.
23. Charton, J., V. Jomelli, I. Schimmelpfennig, D. Verfaillie, V. Favier, F. Mokadem, A. Gilbert, **F. Brun**, G. Aumaître, D. L. Bourlès, and K. Keddadouche (2020), A debris-covered glacier at Kerguelen (49°S, 69°E) over the past 15 000 years, *Antarctic Science*, 1–13, 10.1017/S0954102020000541.

## 2019

22. Berthier, E., and **F. Brun** (2019), Karakoram geodetic glacier mass balances between 2008 and 2016: persistence of the anomaly and influence of a large rock avalanche on Siachen Glacier, *Journal of Glaciology*, 10.1017/jog.2019.32.
21. **Brun, F.**, P. Wagnon, E. Berthier, V. Jomelli, S.B Maharjan, F. Shrestha, and P. D. A. Kraaijenbrink (2019), Heterogeneous Influence of Glacier Morphology on the Mass Balance Variability in High Mountain Asia, *Journal of Geophysical Research: Earth Surface*, 10.1029/2018JF004838.
20. Dehecq, A., N. Gourmelen, A. S. Gardner, **F. Brun**, D. Goldberg, P. W. Nienow, E. Berthier, C. Vincent, P. Wagnon, and E. Trouvé (2019), Twenty-first century glacier slowdown driven by mass loss in High Mountain Asia, *Nature Geoscience*, 12(1), 22–27, 10.1038/s41561-018-0271-9.
19. Dussaillant, I., E. Berthier, **F. Brun**, M. Masiokas, R. Hugonnet, V. Favier, A. Rabatel, P. Pitte, and L. Ruiz (2019), Two decades of glacier mass loss along the Andes, *Nature Geoscience*, 12(10), 802–808, 10.1038/s41561-019-0432-5.
18. Menounos, B., R. Hugonnet, D. Shean, A. Gardner, I. Howat, E. Berthier, B. Pelto, C. Tennant, J. Shea, M.-J. Noh, **F. Brun**, and A. Dehecq (2019), Heterogeneous Changes in Western North American Glaciers Linked to Decadal Variability in Zonal Wind Strength, *Geophysical Research Letters*, 46(1), 200–209, 10.1029/2018GL080942.
17. Mimeau, L., M. Esteves, I. Zin, H.-W. Jacobi, **F. Brun**, P. Wagnon, D. Koirala, and Y. Arnaud (2019), Quantification of different flow components in a high-altitude glacierized catchment (Dudh Koshi, Nepalese Himalaya), *Hydrology and Earth System Sciences*, 2019, 1–35, 10.5194/hess-2018-34.

## 2018

16. **Brun, F.**, P. Wagnon, E. Berthier, J. M. Shea, W. W. Immerzeel, P. D. A. Kraaijenbrink, C. Vincent, C. Reverchon\*, D. Shrestha, and Y. Arnaud (2018), Ice cliff contribution to the tongue-wide ablation of Changri Nup Glacier, Nepal, central Himalaya, *The Cryosphere*, 12(11), 3439–3457, 10.5194/tc-12-3439-2018.
15. Dussaillant, I., E. Berthier, and **F. Brun** (2018), Geodetic Mass Balance of the Northern Patagonian Icefield from 2000 to 2012 Using Two Independent Methods, *Frontiers in Earth Science*, 6, 8, 10.3389/feart.2018.00008.
14. Kääb, A., S. Leinss, A. Gilbert, Y. Bühler, S. Gascoïn, S. G. Evans, P. Bartelt, E. Berthier, **F. Brun**, W.-A. Chao, D. Farinotti, F. Gimbert, W. Guo, C. Huggel, J. S. Kargel, G. J. Leonard, L. Tian, D. Treichler, and T. Yao (2018), Massive collapse of two glaciers in western Tibet in 2016 after surge-like instability, *Nature Geoscience*, 11(2), 114–120, 10.1038/s41561-017-0039-7.
13. Miles, E. S., C. S. Watson, **F. Brun**, E. Berthier, M. Esteves, D. J. Quincey, K. E. Miles, and P. Wagnon (2018), Ablative and geomorphic effects of a supraglacial lake drainage and outburst event, Nepal Himalaya, *The Cryosphere*, 2018, 1–25, 10.5194/tc-2018-152.
12. Vincent, C., M. Dumont, D. Six, **F. Brun**, G. Picard, and L. Arnaud (2018), Why do the dark and light ogives of Forbes bands have similar surface mass balances?, *Journal of Glaciology*, 64, 236–246, 10.1017/jog.2018.12.
11. Wang, J., C. Song, J. T. Reager, F. Yao, J. S. Famiglietti, Y. Sheng, G. M. MacDonald, **F. Brun**, H. M. Schmied, R. A. Marston, and Y. Wada (2018), Recent global decline in endorheic basin water storages, *Nature Geoscience*, 11(12), 926–932, 10.1038/s41561-018-0265-7.

## 2017

10. **Brun, F.**, E. Berthier, P. Wagnon, A. Kääb, and D. Treichler (2017), A spatially resolved estimate of High Mountain Asia glacier mass balances from 2000 to 2016, *Nature Geoscience*, 10, 668–673, 10.1038/ngeo2999.
9. Lamb, M. P., **F. Brun**, and B. M. Fuller (2017), Direct measurements of lift and drag on shallowly submerged cobbles in steep streams: Implications for flow resistance and sediment transport, *Water Resources Research*, 53(9), 7607–7629, 10.1002/2017WR020883.

8. Lamb, M. P., **F. Brun**, and B. M. Fuller (2017), Hydrodynamics of steep streams with planar coarse-grained beds: Turbulence, flow resistance, and implications for sediment transport, *Water Resources Research*, 53(3), 2240–2263, 10.1002/2016WR019579.
7. Miles, E. S., J. F. Steiner, and **F. Brun** (2017), Highly variable aerodynamic roughness length ( $z_0$ ) for a hummocky debris-covered glacier, *Journal of Geophysical Research: Atmospheres*, 122(16), 8447–8466, 10.1002/2017JD026510.
6. Sherpa, S. F., P. Wagnon, **F. Brun**, E. Berthier, C. Vincent, Y. Lejeune, Y. Arnaud, R. B. Kayastha, and A. Sinisalo (2017), Contrasted surface mass balances of debris-free glaciers observed between the southern and the inner parts of the everest region (2007–15), *Journal of Glaciology*, 63(240), 637–651, 10.1017/jog.2017.30.

#### 2016

5. **Brun, F.**, P. Buri, E. S. Miles, P. Wagnon, J. Steiner, E. Berthier, S. Ragetti, P. Kraaijenbrink, W. W. Immerzeel, and F. Pellicciotti (2016), Quantifying volume loss from ice cliffs on debris-covered glaciers using high-resolution terrestrial and aerial photogrammetry, *Journal of Glaciology*, 62, 684–695, 10.1017/jog.2016.54.
4. Vincent, C., P. Wagnon, J. M. Shea, W. W. Immerzeel, P. Kraaijenbrink, D. Shrestha, A. Soruco, Y. Arnaud, **F. Brun**, E. Berthier, and S. F. Sherpa (2016), Reduced melt on debris-covered glaciers: investigations from Changri Nup Glacier, Nepal, *The Cryosphere*, 10, 1845–1858, 10.5194/tc-10-1845-2016.

#### 2015

3. **Brun, F.**, M. Dumont, P. Wagnon, E. Berthier, M. F. Azam, J. M. Shea, P. Sirguey, A. Rabatel, and A. Ramanathan (2015), Seasonal changes in surface albedo of Himalayan glaciers from MODIS data and links with the annual mass balance, *The Cryosphere*, 9(1), 341–355, 10.5194/tc-9-341-2015.
2. Shea, J., P. Wagnon, W. Immerzeel, R. Biron, **F. Brun**, and F. Pellicciotti (2015), A comparative high-altitude meteorological analysis from three catchments in the Nepalese Himalaya, *International Journal of Water Resources Development*, 31(2), 174–200, 10.1080/07900627.2015.1020417.

#### 2014

1. Scheingross, J. S., **F. Brun**, D. Y. Lo, K. Omerdin, and M. P. Lamb (2014), Experimental evidence for fluvial bedrock incision by suspended and bedload sediment, *Geology*, 42, 523–526, 10.1130/G35432.1.

### CHAPTERS IN BOOKS

1. Bolch, T., J. M. Shea, L. Shiyin, M. F. Azam, Y. Gao, S. Gruber, W. W. Immerzeel, A. Kulkarni, H. Li, A. A. Tahir, G. Zhang, Y. Zhang, A. Banerjee, E. Berthier, **F. Brun**, A. Kaab, P. Kraaijenbrink, G. Moholdt, L. Nicholson, N. Pepin, and A. Racoviteanu (2018), Chapter 7: Status and Change of the HKH-TP Cryosphere, in *Hindu Kush Himalayan Monitoring and Assessment Program (HIMAP)*.

### REFEREES

- Walter IMMERZEEL – Department of Physical Geography, Utrecht University, The Netherlands
- Etienne BERTHIER – Laboratoire d'étude en géophysique et océanographie spatiales (LEGOS), Toulouse, France
- Patrick WAGNON – Institut des géosciences de l'environnement (IGE), Grenoble, France
- Francesca PELLICCIOTTI – ETH, Zurich, Switzerland