

GLOSSARY OF GLACIER MASS BALANCE AND RELATED TERMS. J.G. Cogley, R. Hock, L.A. Rasmussen, A.A. Arendt, A. Bauder, R.J. Braithwaite, P. Jansson, G. Kaser, M. Möller, L. Nicholson, and M. Zemp. 2011. Paris: UNESCO-IHP (IHP-VII Technical documents in hydrology 86, IACS contribution 2), vi+114p, illustrated, soft cover. (Free download from URL: <http://unesdoc.unesco.org/images/0019/001925/192525E.pdf> or ordered as hard copy, at no charge, from ihp@unesco.org). doi:10.1017/S0032247411000805

Studying the behaviour of glaciers is crucial in working towards a better understanding of the earth's past, present, and future climate; glaciers play an important role in the hydrological cycles of polar and mountain regions around the world. As a relatively young science, glaciology has evolved and is still evolving quickly, and it is important that the glaciological community be able accurately to discuss our science. This reference volume has been published with the aim to revise past standards of glacier mass balance terminology.

Beyond a cross-referenced dictionary, in 114 clearly laid out and well cross-referenced pages, the glossary runs through an introduction, a history of terminology, formulations of mass balance, reporting of mass balance, departures from previous standards, units of measurement, the glossary itself, appendices on previous definitions and important constants/properties of water and ice, a bibliography, and an index.

Even before one reads it, one of this volume's greatest assets is that it is freely available in both electronic and soft-cover paper version. This means that it can be a reference for both institutional libraries as well as penniless students, and perhaps more importantly is even more easily searchable on the computer.

The definitions in the glossary have clearly been very well thought through and (so far in my inspection) are quite accurate. In their introduction, the authors take the opportunity to highlight some of the definitions considered to be of particular importance. They draw attention to the complex and usage-specific meanings of 'firn' (that is snow that has survived one ablation season or a structurally intermediate stage between snow and ice), the difference between 'refreezing' and 'internal accumulation' (that is the freezing of water that percolates to some depth within the glacier and when that depth is below the summer surface respectively), and the importance of consensus of the use of 'area' (as mapped area projected onto an ellipsoid rather than the true surface area taking into account the surface slope of glaciers). Beyond these featured points, as a student in remote sensing of glaciers, I find it encouraging to see accurate definitions of particular relevance to my research (for example 'geodetic method' and 'facies'). In addition, there is a wide-ranging, nuanced consideration of the role of particular remote platforms and sensors in mass balance measurement, which is particularly impressive given the soup of terminology that this subject has even outside of glaciological applications.

Despite the fact that the volume is dedicated to terminology, it is encouraging that while the glossary does appear pedantic it rather genuinely fills a need for finding a new consensus on

mass balance language. There is balance in the usage of both community-defined terms (for example specific mass balance, net mass balance) and the provision of corrections to mistakes which are commonly made in usage (for example 'Julian date' as against 'day of the year').

When reviewing a new glossary, it is important to consider those texts that it replaces. The authors themselves highlight two particular departures from Anon. (1969) that has long been the standard in the field. One is the terminology related to the time systems of collecting mass balance information that is becoming more and more important for data intercomparison. The second is suggesting the use of particular dimensions in mass balance values, selecting mass units (for example kg or kg m^{-2}) rather than volume (m or mm water equivalent). Another more recent text which is largely consistent with the new glossary is Cogley (2005). While this is a good summary on glacier mass and energy balance, the new glossary improves upon it in clarity as a reference and in emphasising wide access to the community. Cogley (2010) also provides some interesting background and anecdotes on the motivation for, and creation of, the new glossary.

In assessing the accuracy of the current glossary or any set of terms, Cogley (2010) highlighted one of the most salient points: 'There are good reasons for being concerned about clear terminology, but consistent usage by the members of a large community cannot be secured other than by consensus.' As such, the current glossary has a large task ahead of it, but one for which it appears to be well placed. I personally hope that this glossary is able to maintain status as some sort of living document, changing not on whim but being revised where determined by the glaciological community.

And while particular definitions are discussed by glaciologists around the world, another section which needs consensus is how best to manage glacier mass balance data. While making some valuable suggestions regarding metadata, the current glossary could be improved with a more detailed consideration of data management in glacier mass, providing guidance for new and experienced practitioners alike and including not only the mass balance numbers but also ancillary data sets. This is something that will probably continue to evolve along with the terminology itself.

In summary, the combination of not only up-to-date terms but also the physical and mathematical background of glacier mass balance makes this glossary a very helpful reference for the student and the experienced scientist alike. Accurate, accessible, and comprehensive, it has all the properties to make it a very useful and important reference for any glaciologist in the years to come. (Allen Pope, Scott Polar Research Institute, University of Cambridge, Lensfield Road, Cambridge CB2 1ER.)

References

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- Cogley, J.G. 2005. Mass and energy balances of glaciers and ice sheets. In: Anderson, M.G. (editor). *Encyclopedia of hydrological science*. New York: John Wiley and Sons, Ltd: entry 165.
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