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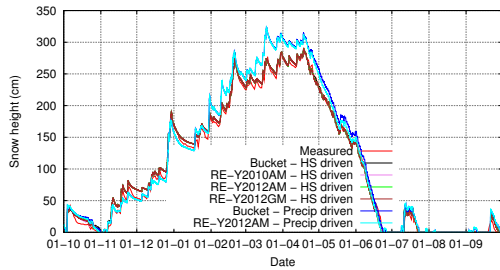


*Supplement of*

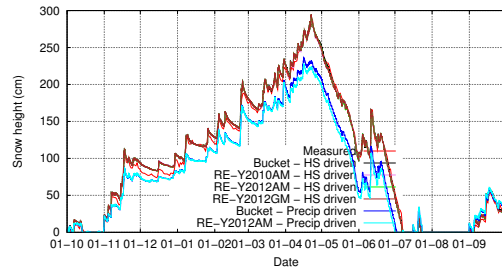
## **Verification of the multi-layer SNOWPACK model with different water transport schemes**

**N. Wever et al.**

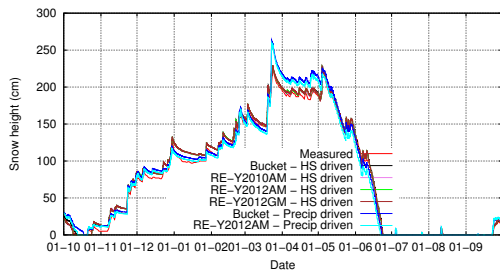
*Correspondence to:* N. Wever (wever@slf.ch)



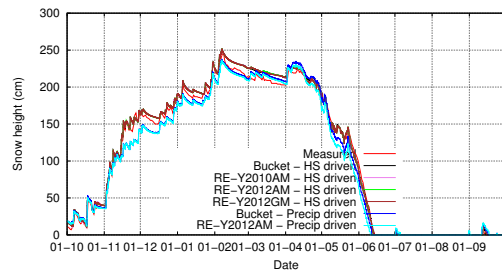
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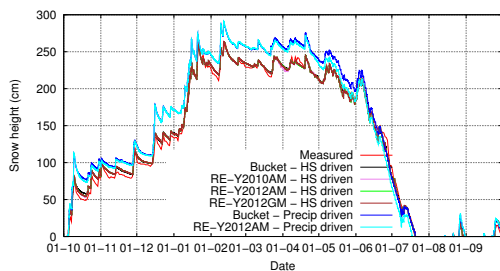
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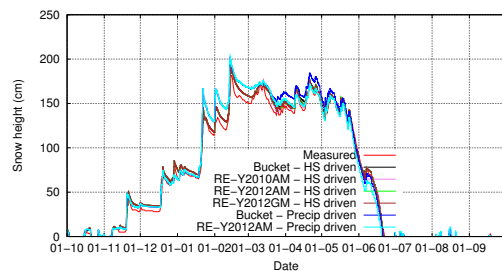
(c) 2001-2002



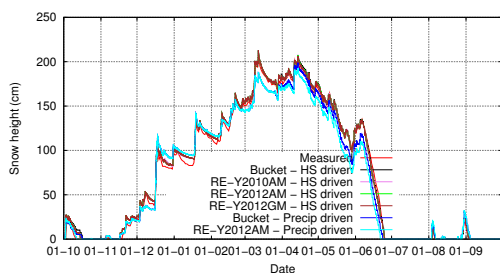
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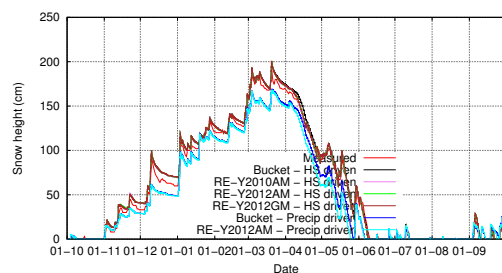
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(f) 2004-2005



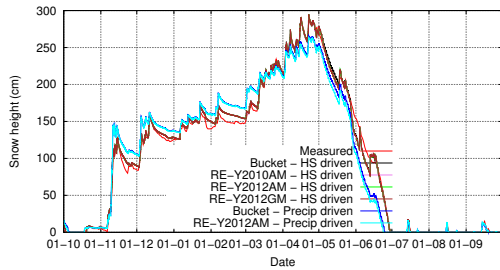
(g) 2005-2006



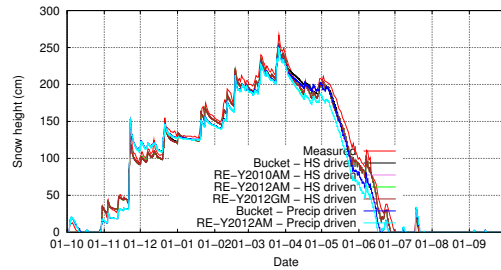
(h) 2006-2007

Figure S1: Measured and modelled snow height for different model setups.

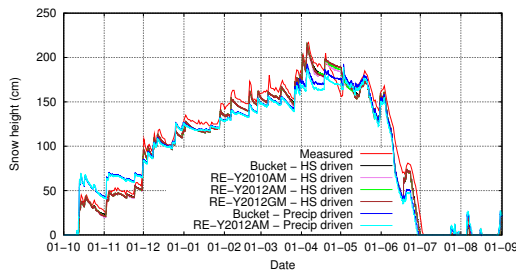




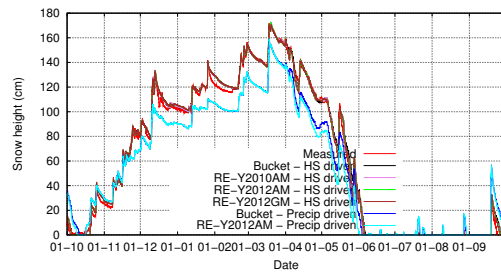
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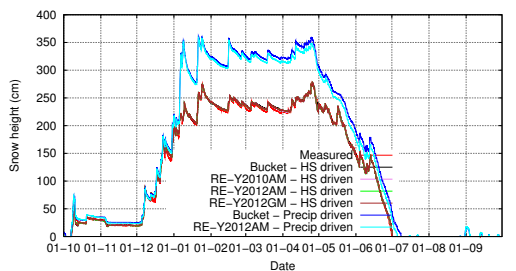
(b) 2008-2009



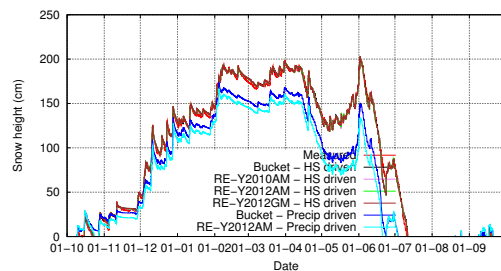
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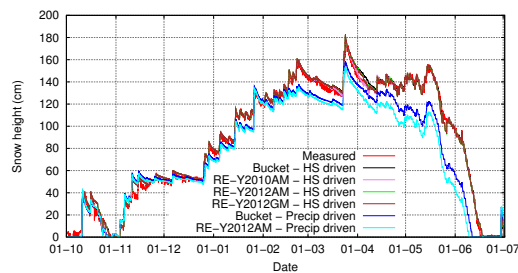
(d) 2010-2011



(e) 2011-2012



(f) 2012-2013



(g) 2013-2014

Figure S2: Measured and modelled snow height for different model setups, continued.

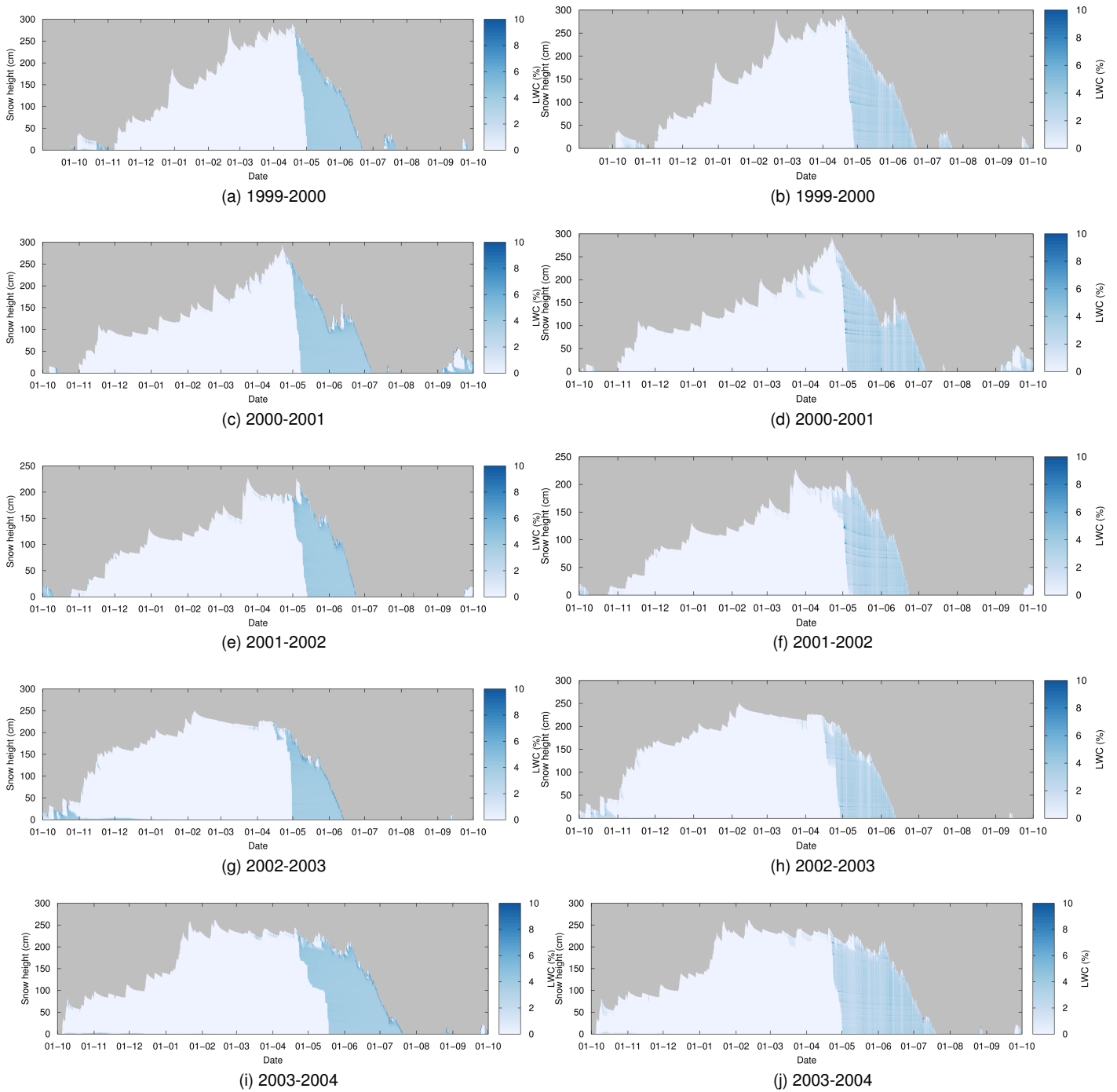


Figure S3: LWC (%) for the snow height-driven simulations with the bucket scheme (left), and with RE-Y2012AM (right).

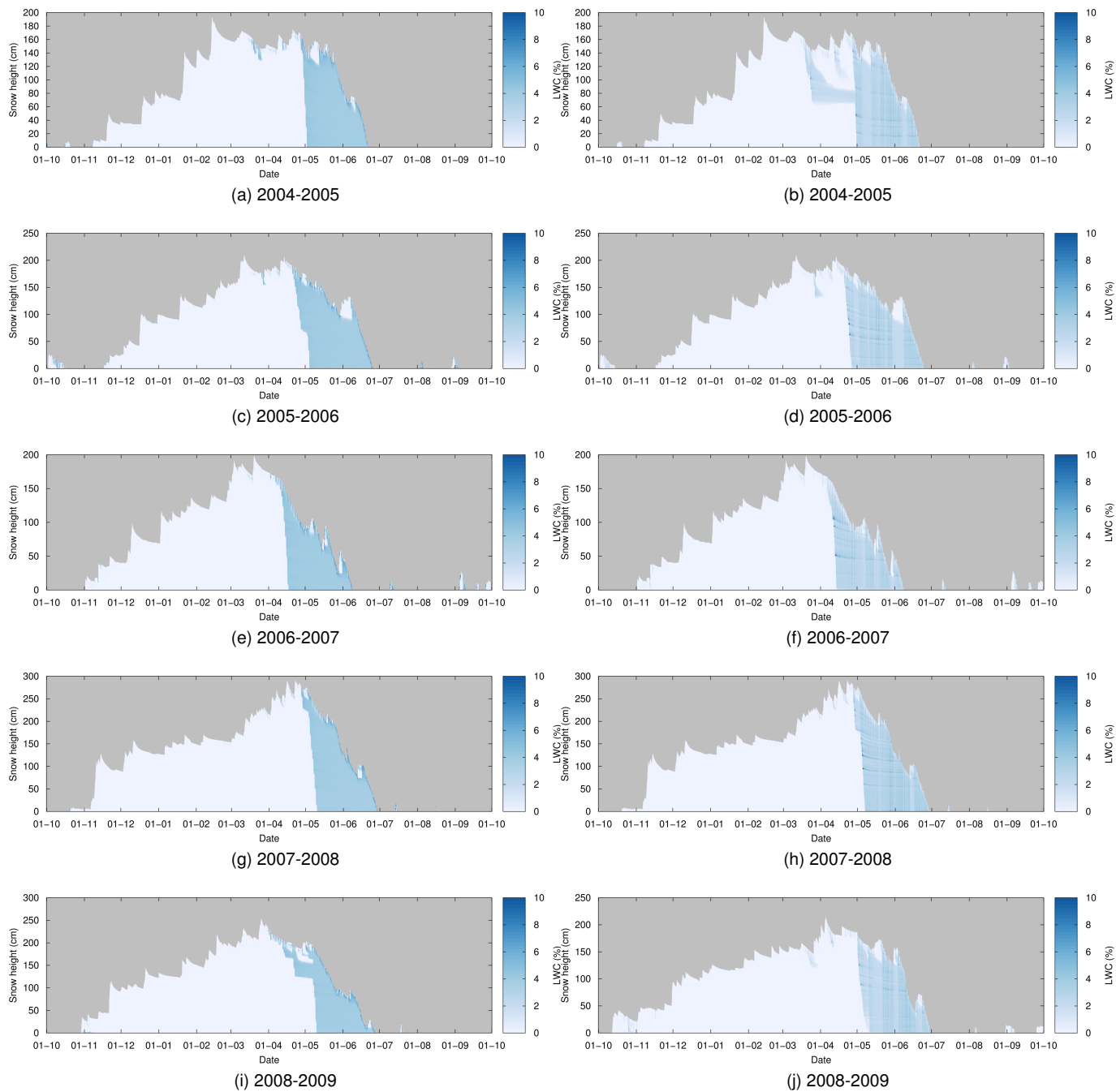


Figure S4: LWC (%) for the snow height-driven simulations with the bucket scheme (left), and with RE-Y2012AM (right), continued.

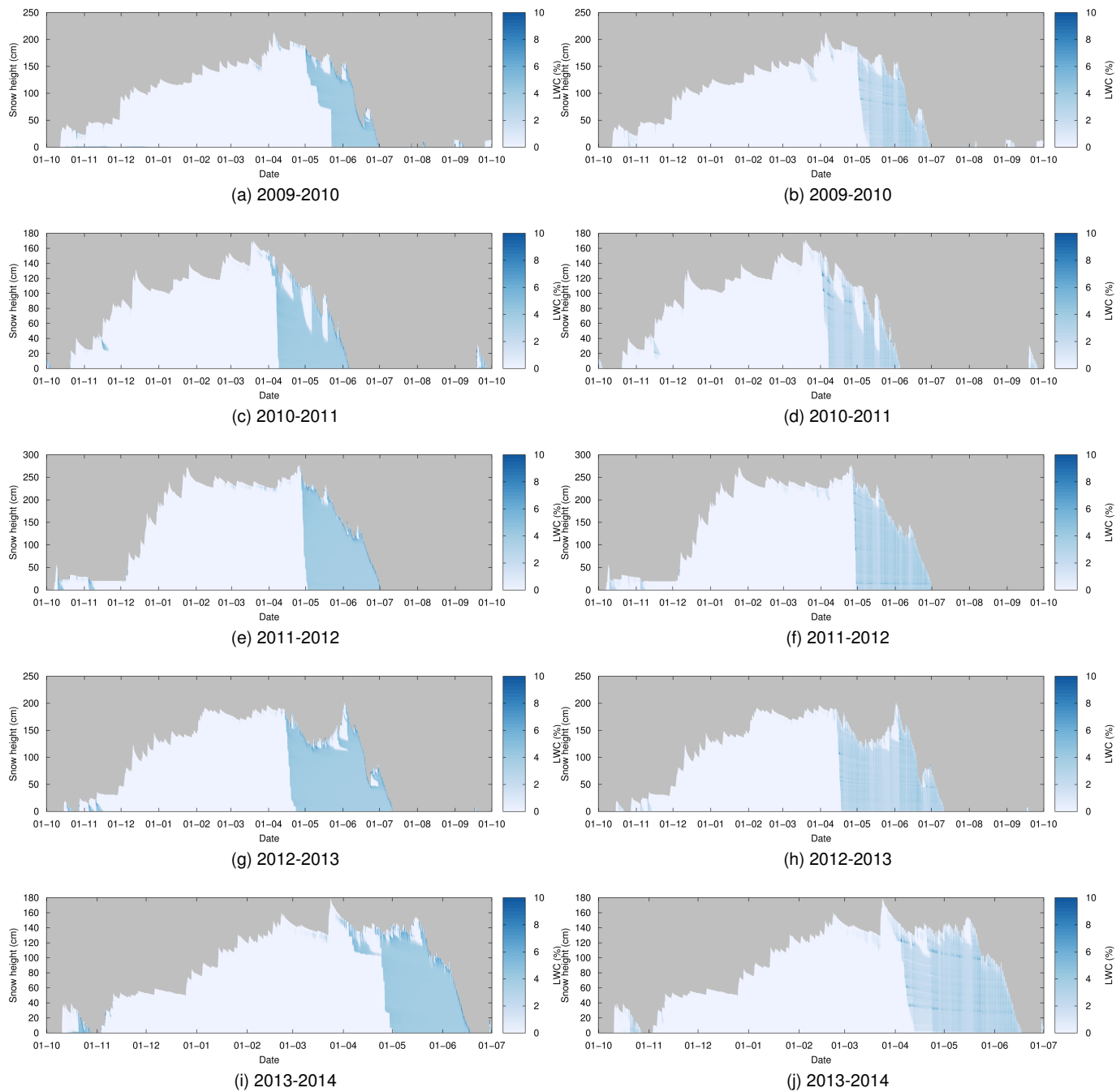
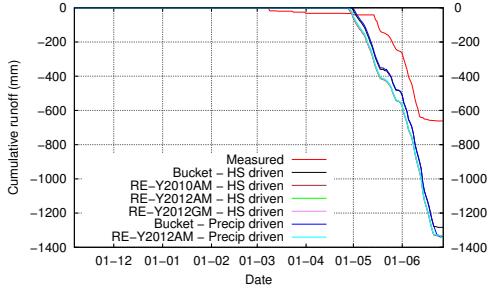
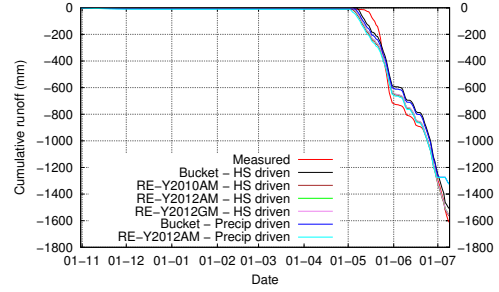


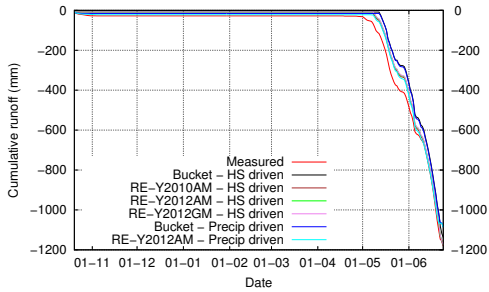
Figure S5: LWC (%) for the simulations with the bucket scheme (left), and with RE-Y2012AM (right), continued.



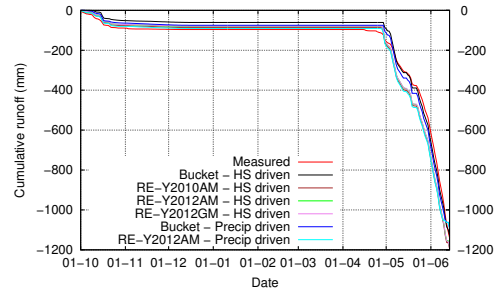
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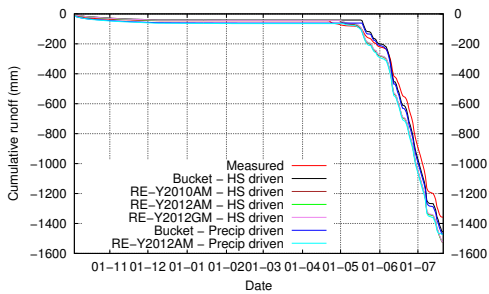
(b) 2000-2001



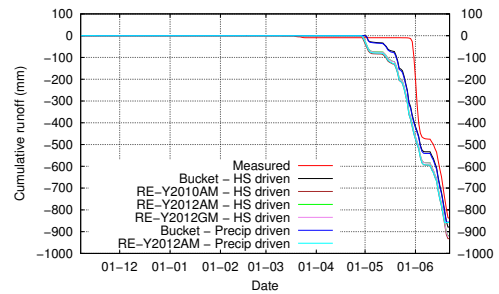
(c) 2001-2002



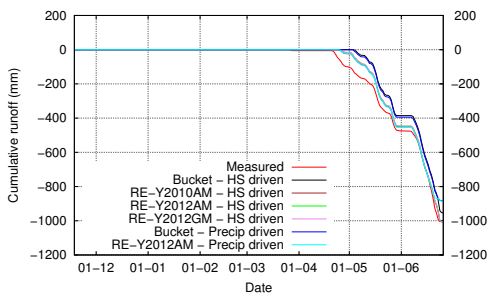
(d) 2002-2003



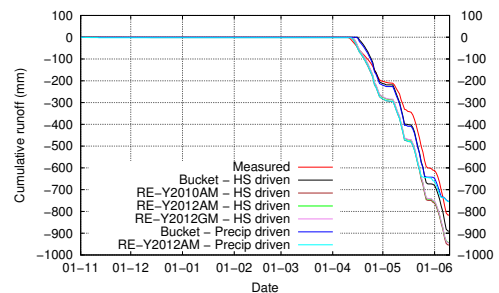
(e) 2003-2004



(f) 2004-2005

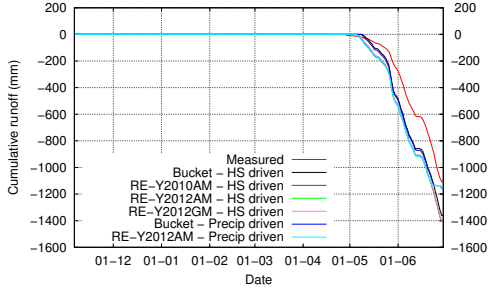


(g) 2005-2006

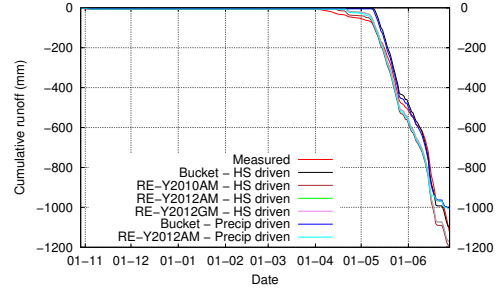


(h) 2006-2007

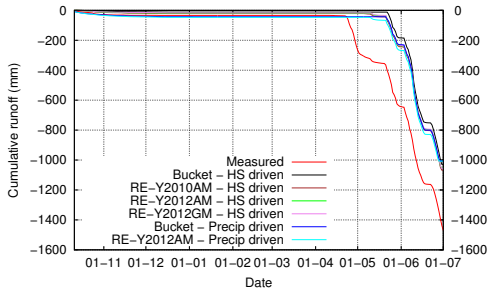
Figure S6: Cumulative runoff (mm).



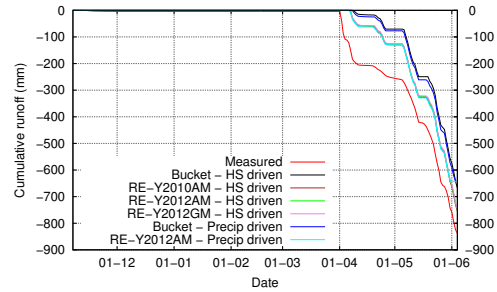
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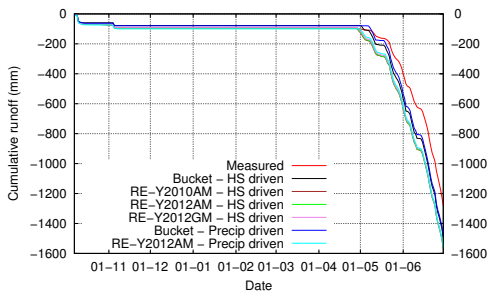
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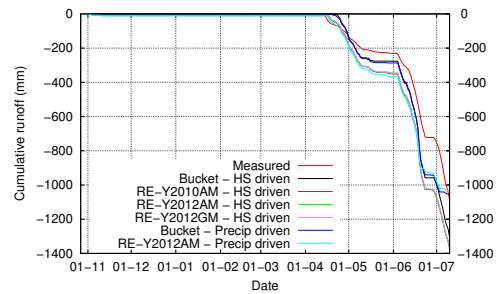
(c) 2009-2010



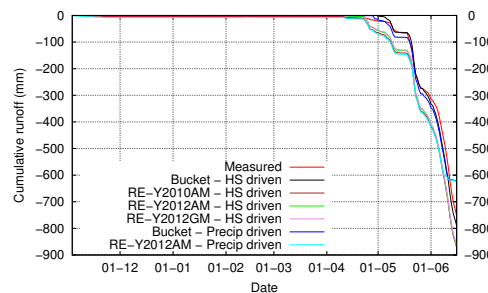
(d) 2010-2011



(e) 2011-2012



(f) 2012-2013



(g) 2013-2014

Figure S7: Cumulative runoff (mm), continued.

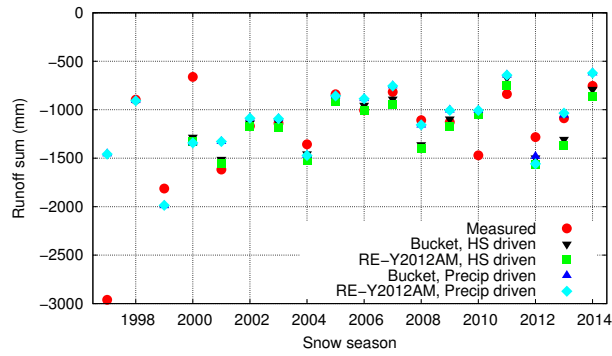


Figure S8: Seasonal runoff sums (mm) from the perspective of the snowpack mass balance (negative values denote snowpack outflow).

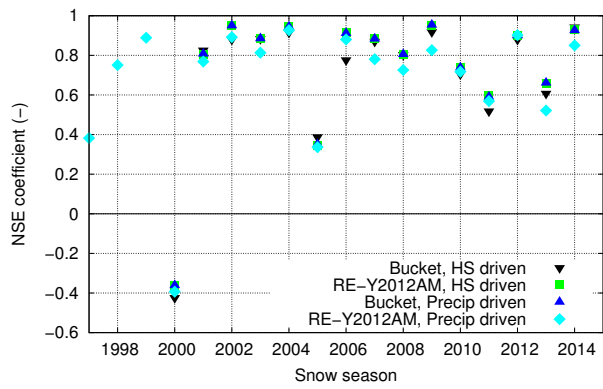


Figure S9: Nash-Sutcliffe model efficiency coefficients for daily runoff sums.

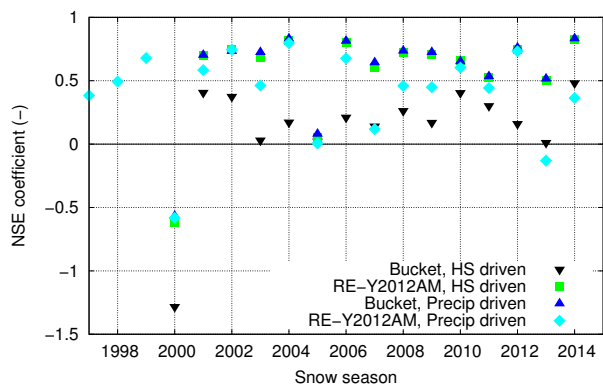


Figure S10: Nash-Sutcliffe model efficiency coefficients for hourly runoff sums.

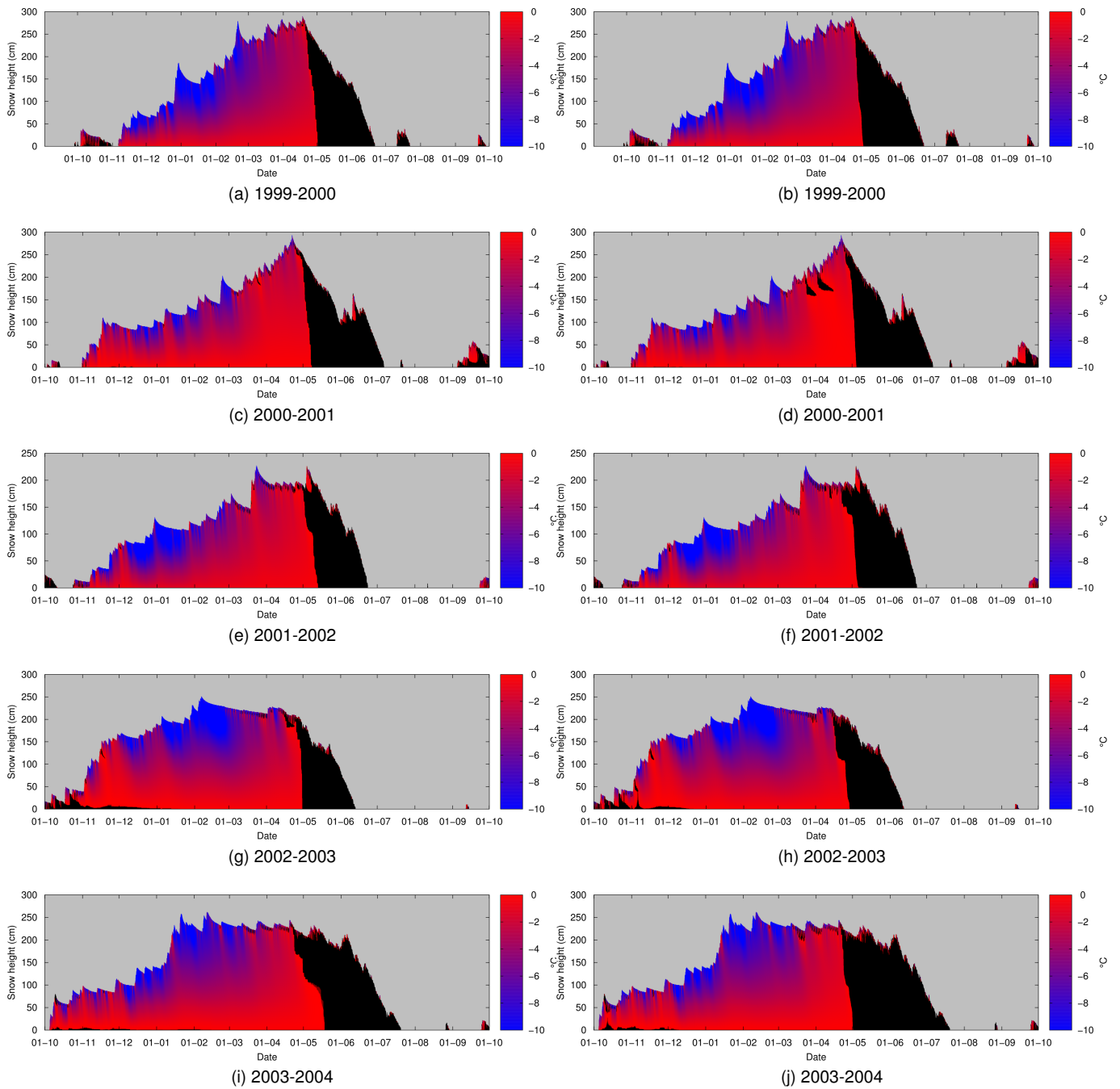


Figure S11: Snow temperature ( $^{\circ}\text{C}$ ) for the snow height-driven simulations with the bucket scheme (left), and with RE-Y2012AM (right). Snow at exactly  $0^{\circ}\text{C}$  coloured black to mark areas of the snowpack that are melting or freezing.



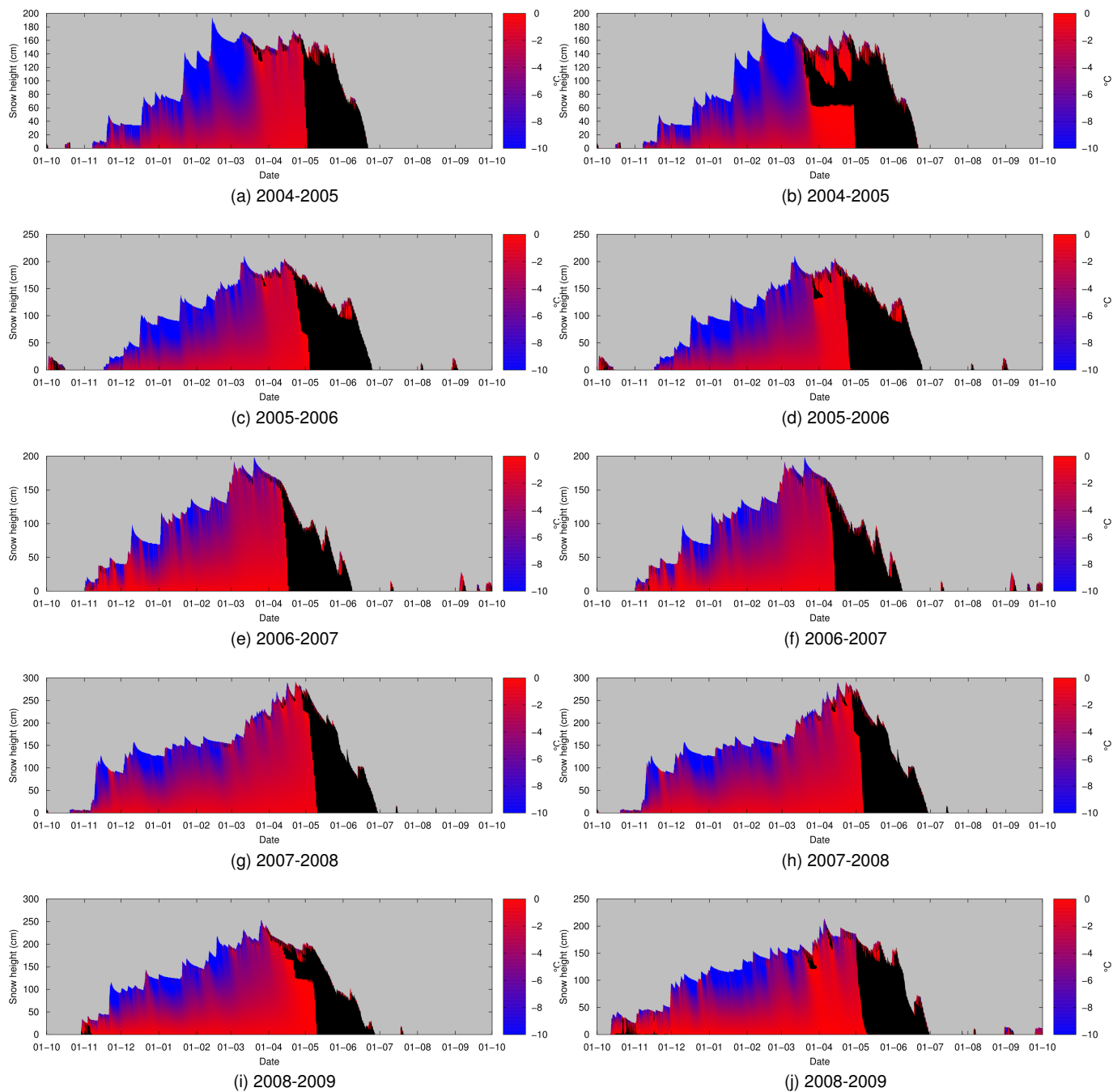


Figure S12: Snow temperature ( $^{\circ}\text{C}$ ) for the snow height-driven simulations with the bucket scheme (left), and with RE-Y2012AM (right), continued. Snow at exactly  $0^{\circ}\text{C}$  coloured black to mark areas of the snowpack that are melting or freezing.

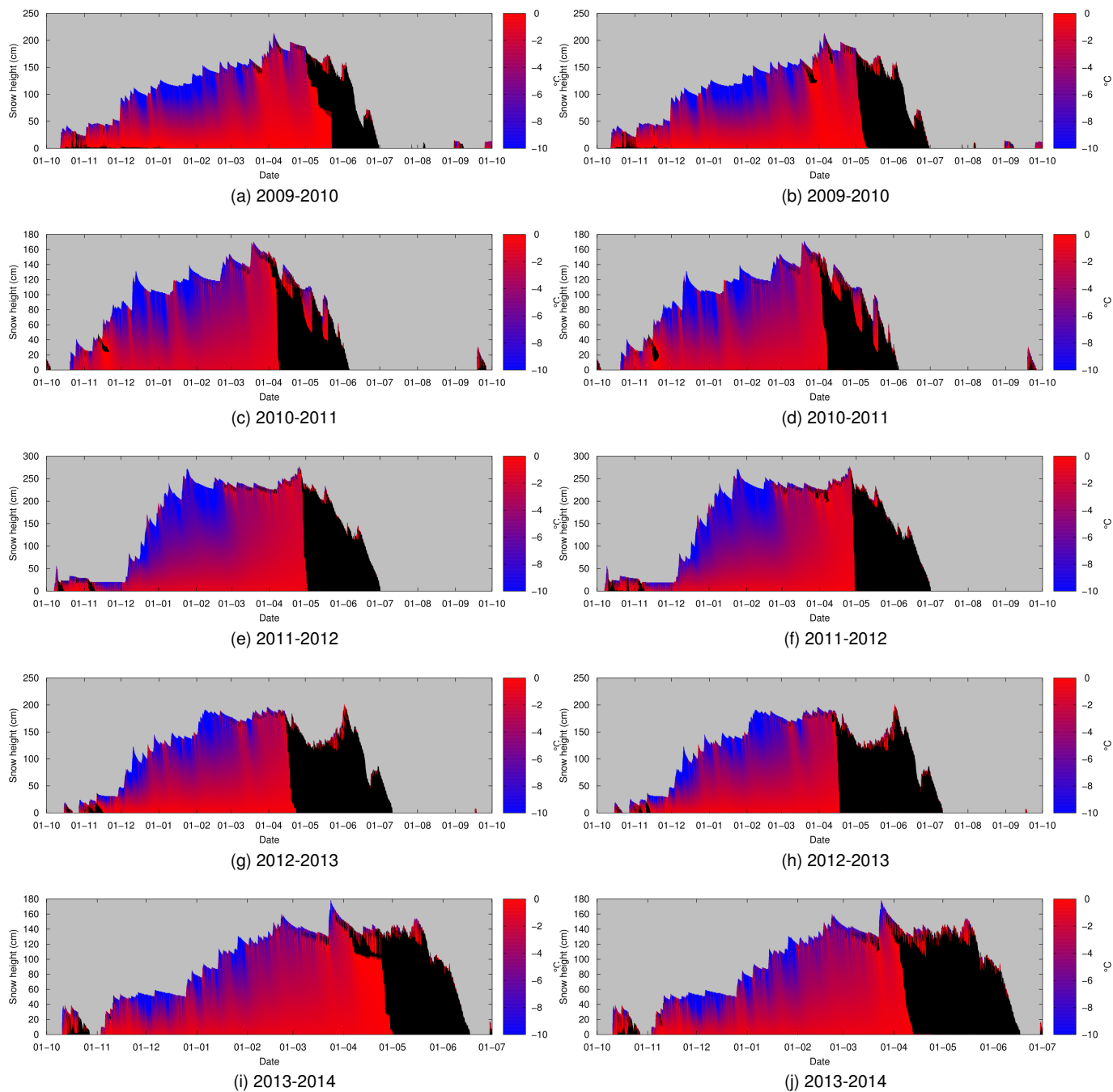
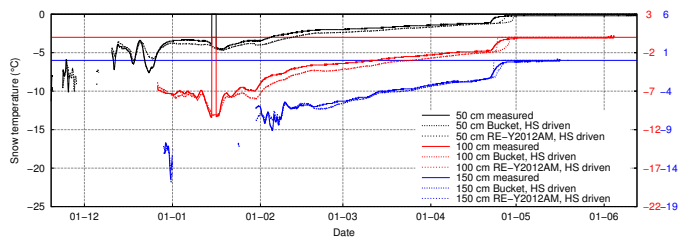
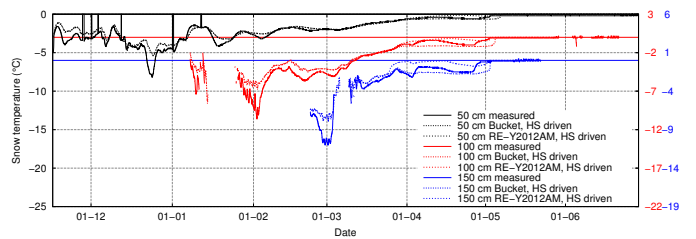


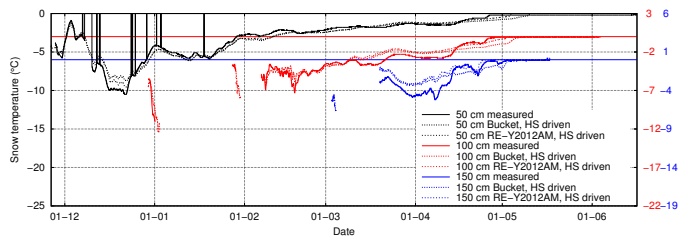
Figure S13: Snow temperature ( $^{\circ}\text{C}$ ) for the snow height-driven simulations with the bucket scheme (left), and with RE-Y2012AM (right), continued. Snow at exactly  $0^{\circ}\text{C}$  coloured black to mark areas of the snowpack that are melting or freezing.



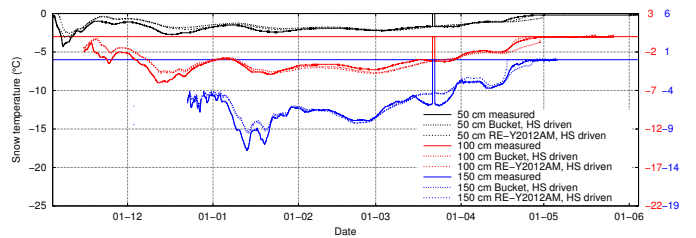
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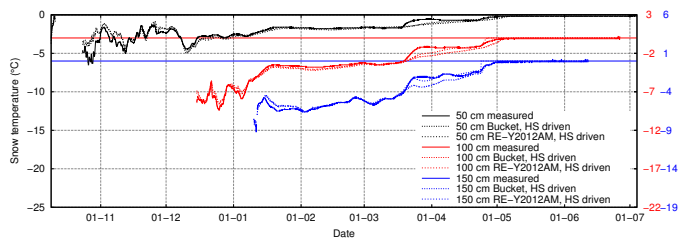
(b) 2000-2001



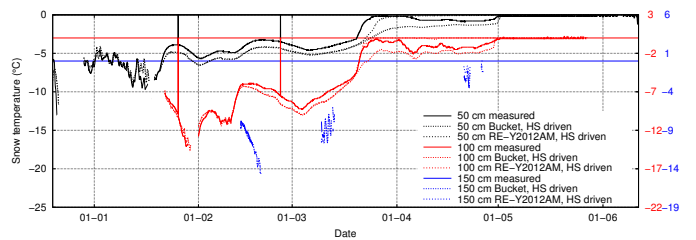
(c) 2001-2002



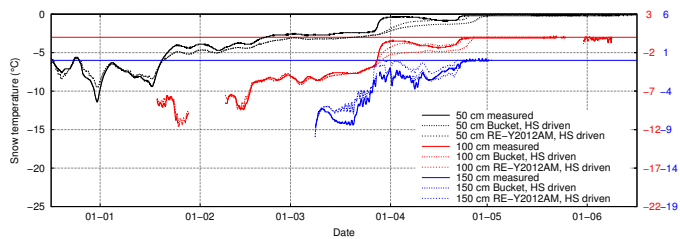
(d) 2002-2003



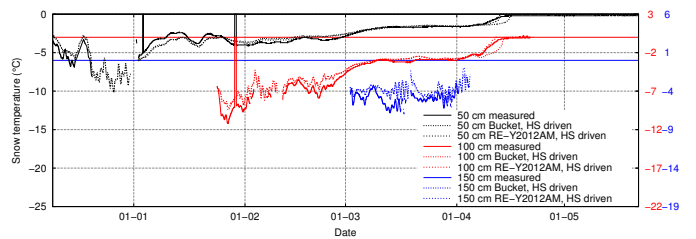
(e) 2003-2004



(f) 2004-2005

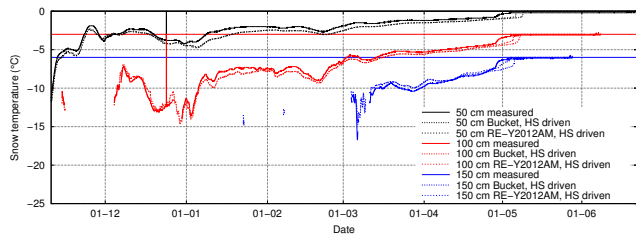


(g) 2005-2006

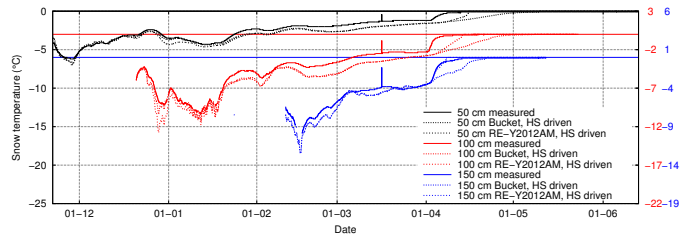


(h) 2006-2007

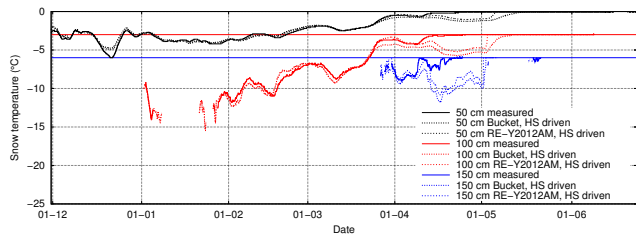
Figure S14: Measured and modelled snow temperatures at 50, 100 and 150 cm above the surface. Values are only plotted when the snow height was at least 20 cm more than the height of the temperature sensor.



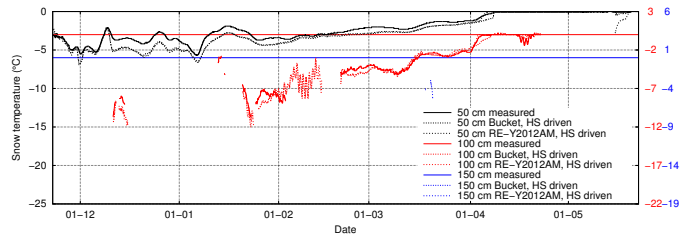
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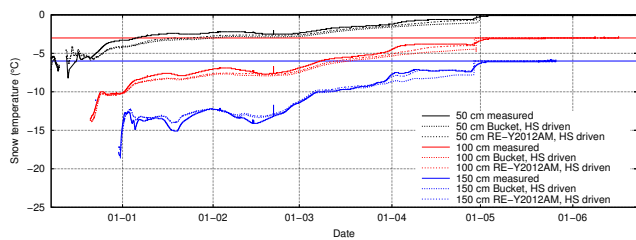
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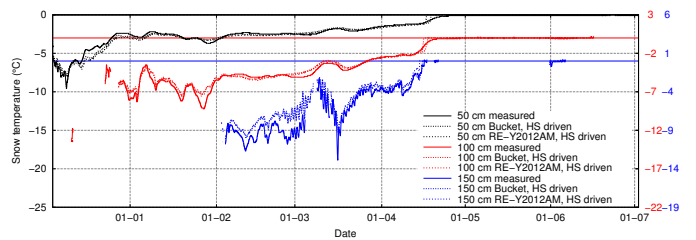
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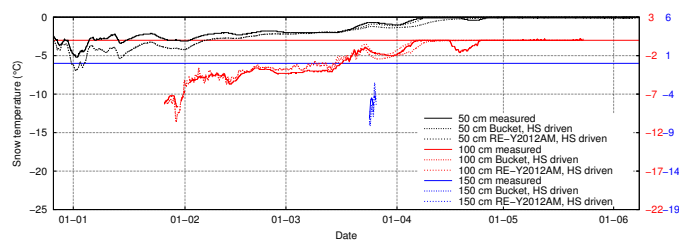
(d) 2010-2011



(e) 2011-2012



(f) 2012-2013



(g) 2013-2014

Figure S15: Measured and modelled snow temperatures at 50, 100 and 150 cm above the surface, continued. Values are only plotted when the snow height was at least 20 cm more than the height of the temperature sensor.

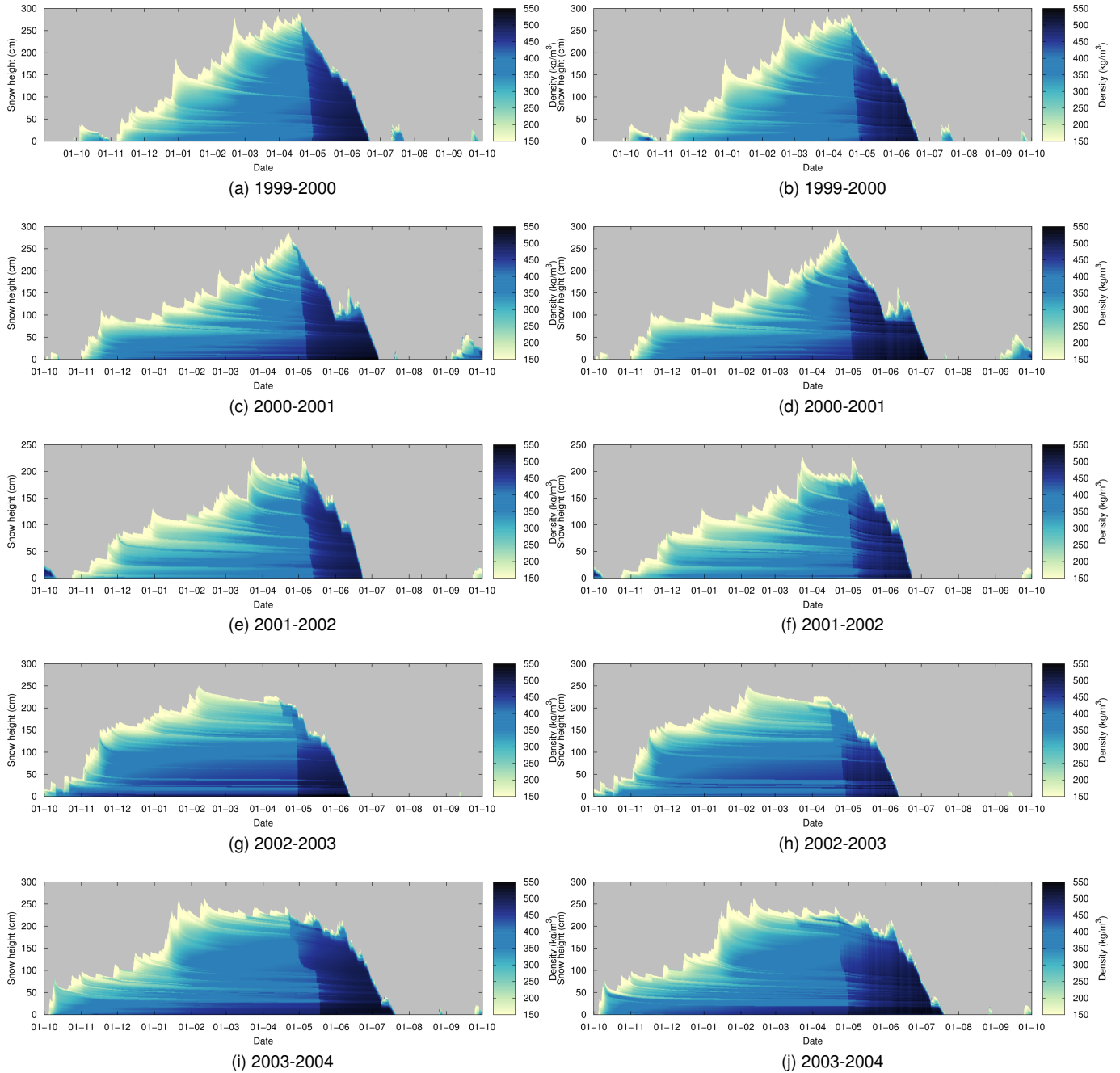


Figure S16: Snow density ( $\text{kg m}^{-3}$ ) for the snow height-driven simulations with the bucket scheme (left), and with RE-Y2012AM (right).

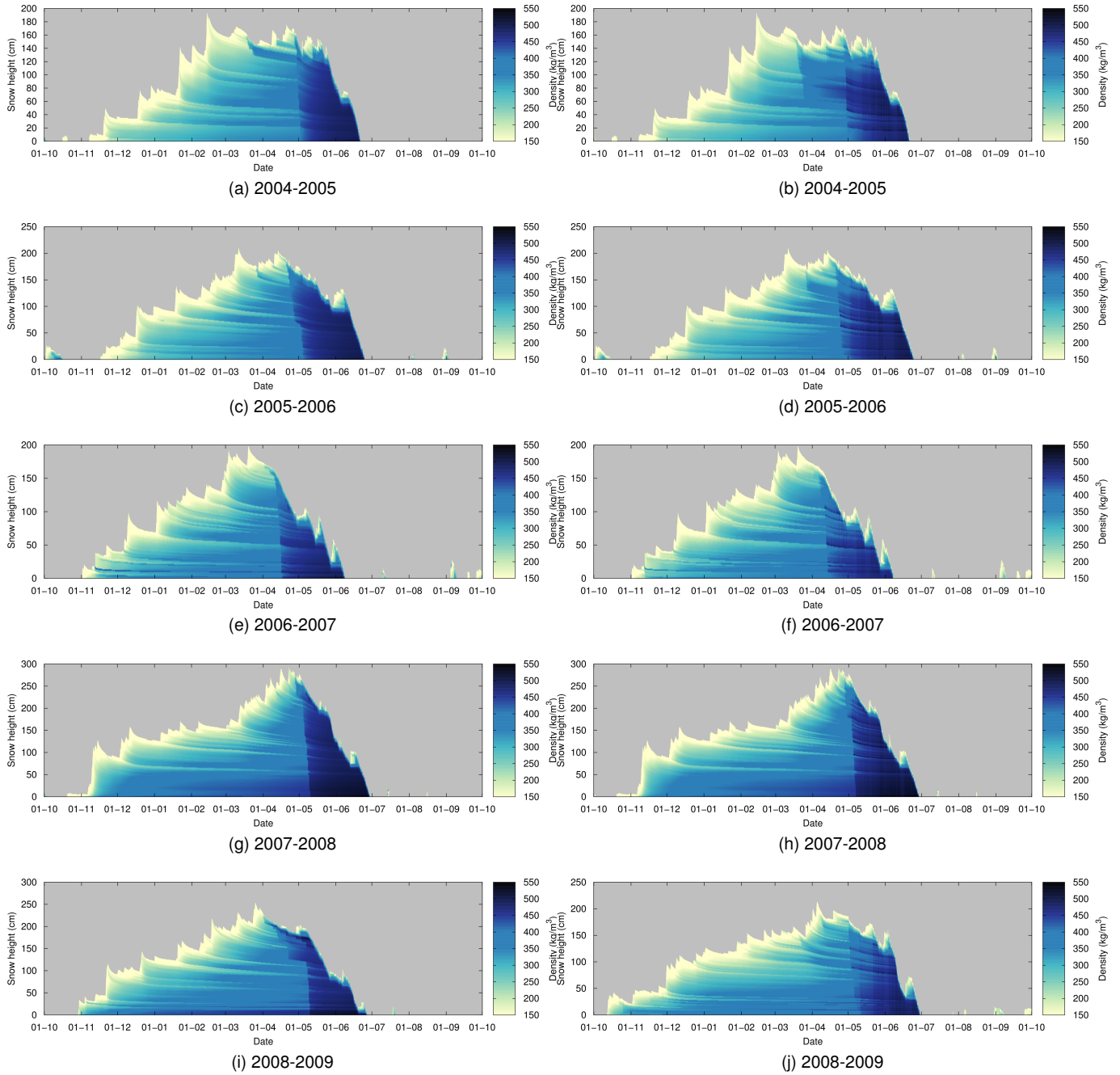


Figure S17: Snow density ( $\text{kg m}^{-3}$ ) for the snow height-driven simulations with the bucket scheme (left), and with RE-Y2012AM (right), continued.

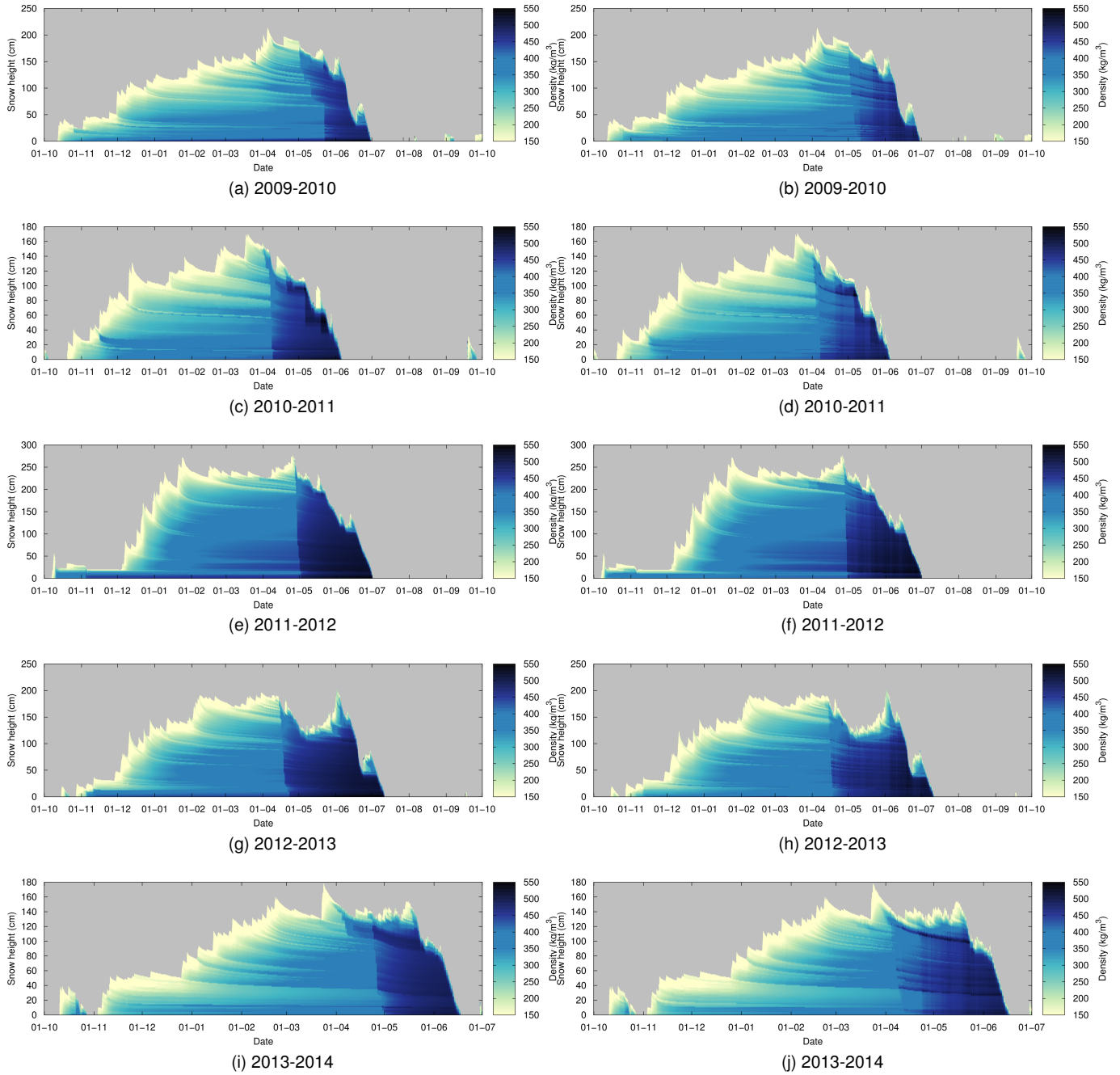
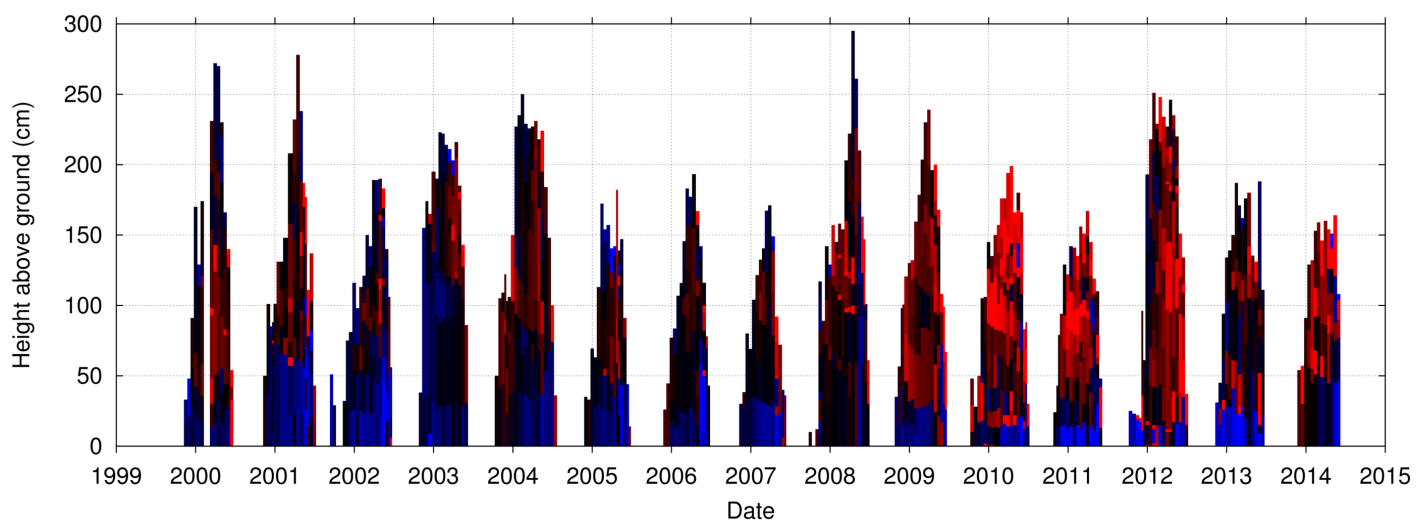
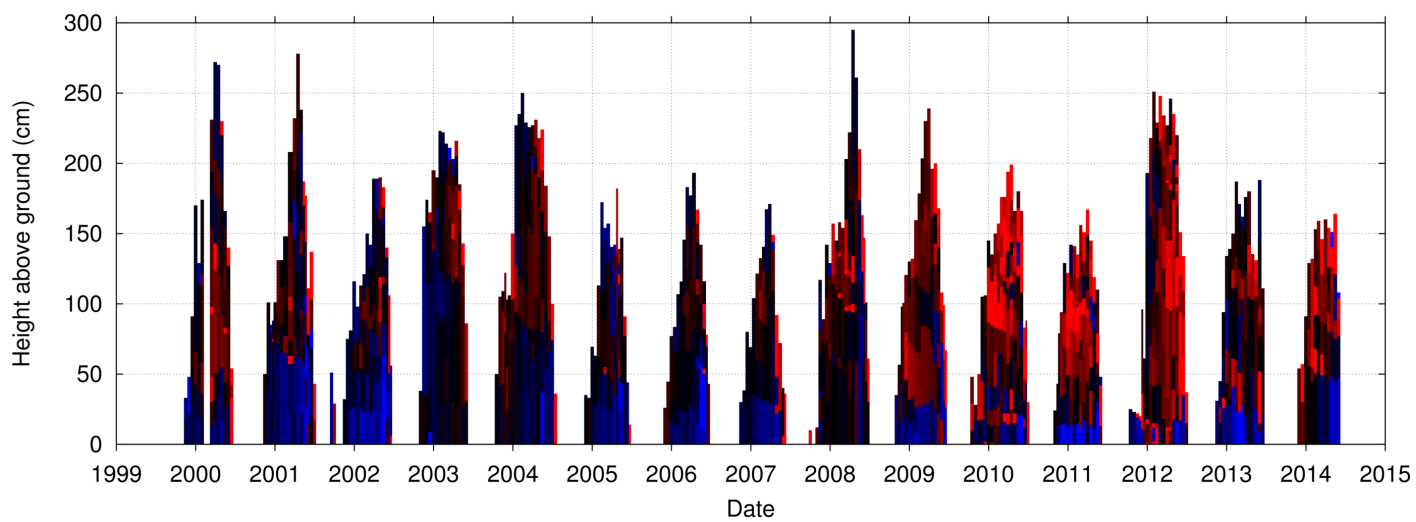


Figure S18: Snow density ( $\text{kg m}^{-3}$ ) for the snow height-driven simulations with the bucket scheme (left), and with RE-Y2012AM (right), continued.



(a)



(b)

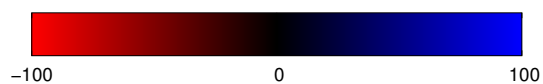


Figure S19: Difference between modelled and measured density (kg m<sup>-3</sup>) for snow height driven simulations with the bucket scheme (a) and RE-Y2012AM (b).



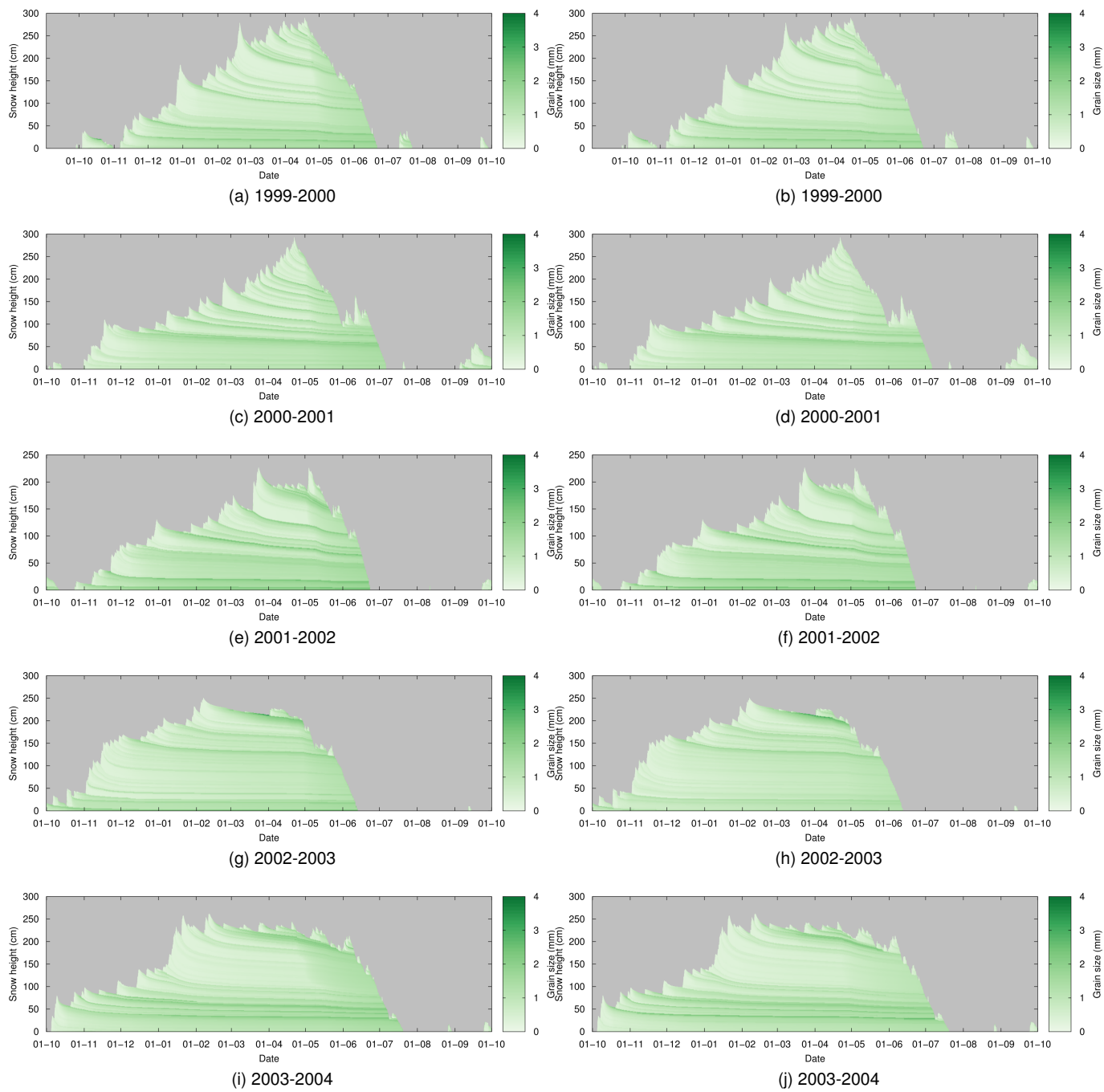


Figure S20: Grain size (mm) for the snow height-driven simulations with the bucket scheme (left), and with RE-Y2012AM (right).

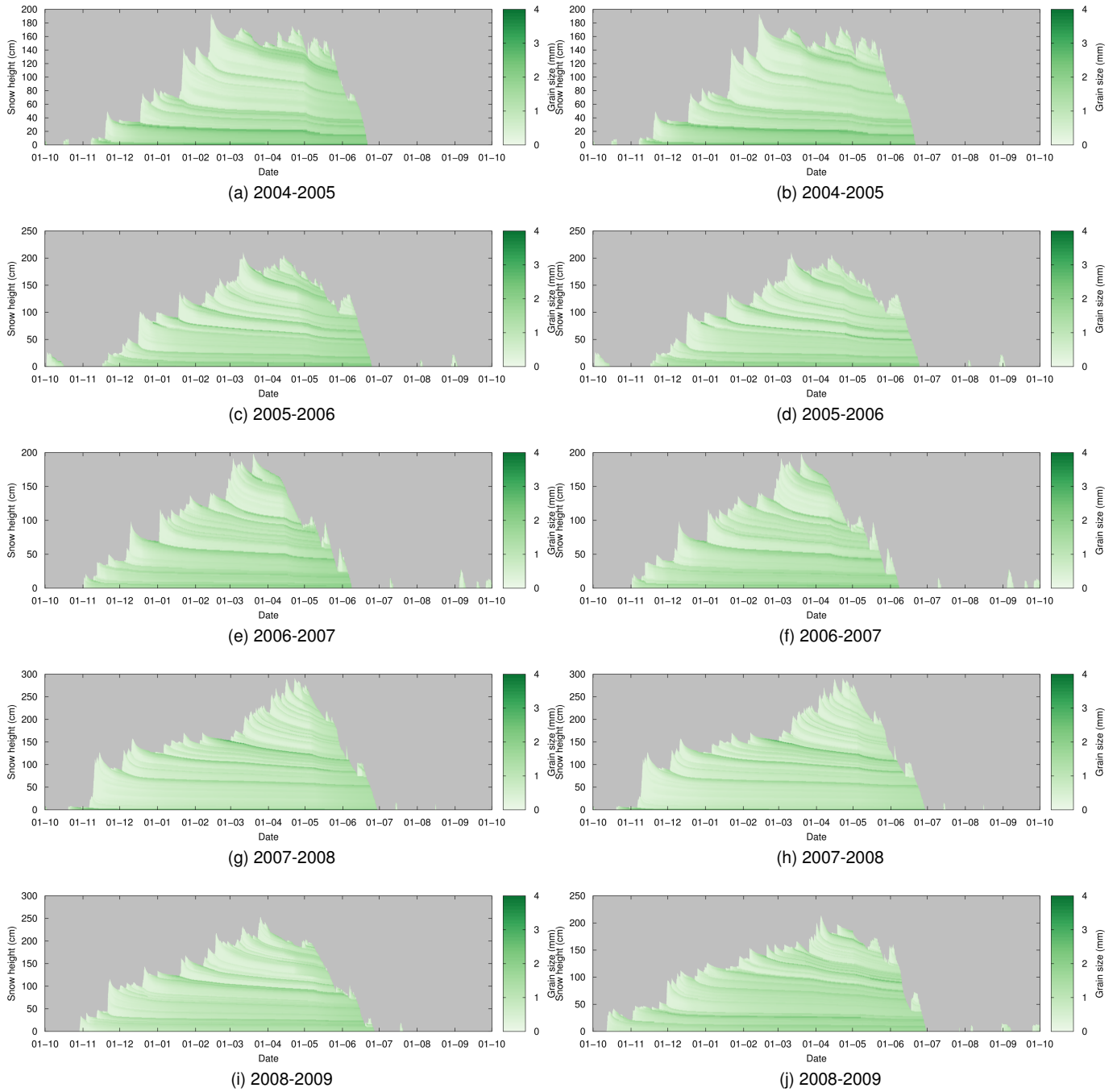


Figure S21: Grain size (mm) for the snow height-driven simulations with the bucket scheme (left), and with RE-Y2012AM (right), continued.

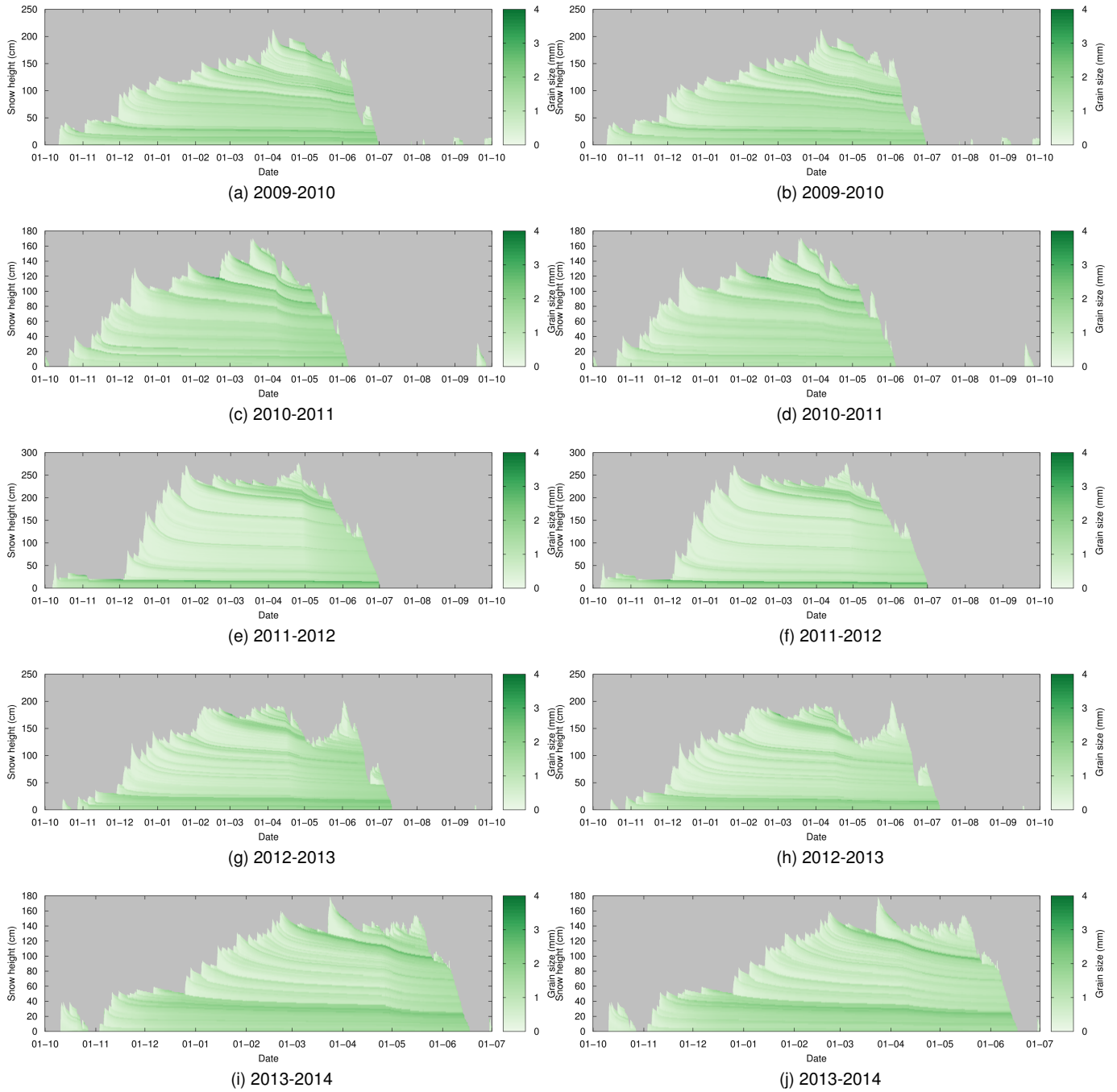


Figure S22: Grain size (mm) for the snow height-driven simulations with the bucket scheme (left), and with RE-Y2012AM (right), continued.