

Figure S1. Comparison of observed and modelled soil water potential (SWP, top figures) and soil water content (SWC, bottom figures) in 1995 and 2000 for a Norway spruce stand at Asa using four methods that relate soil water to  $g_{sto}$  (see Methods section for details).

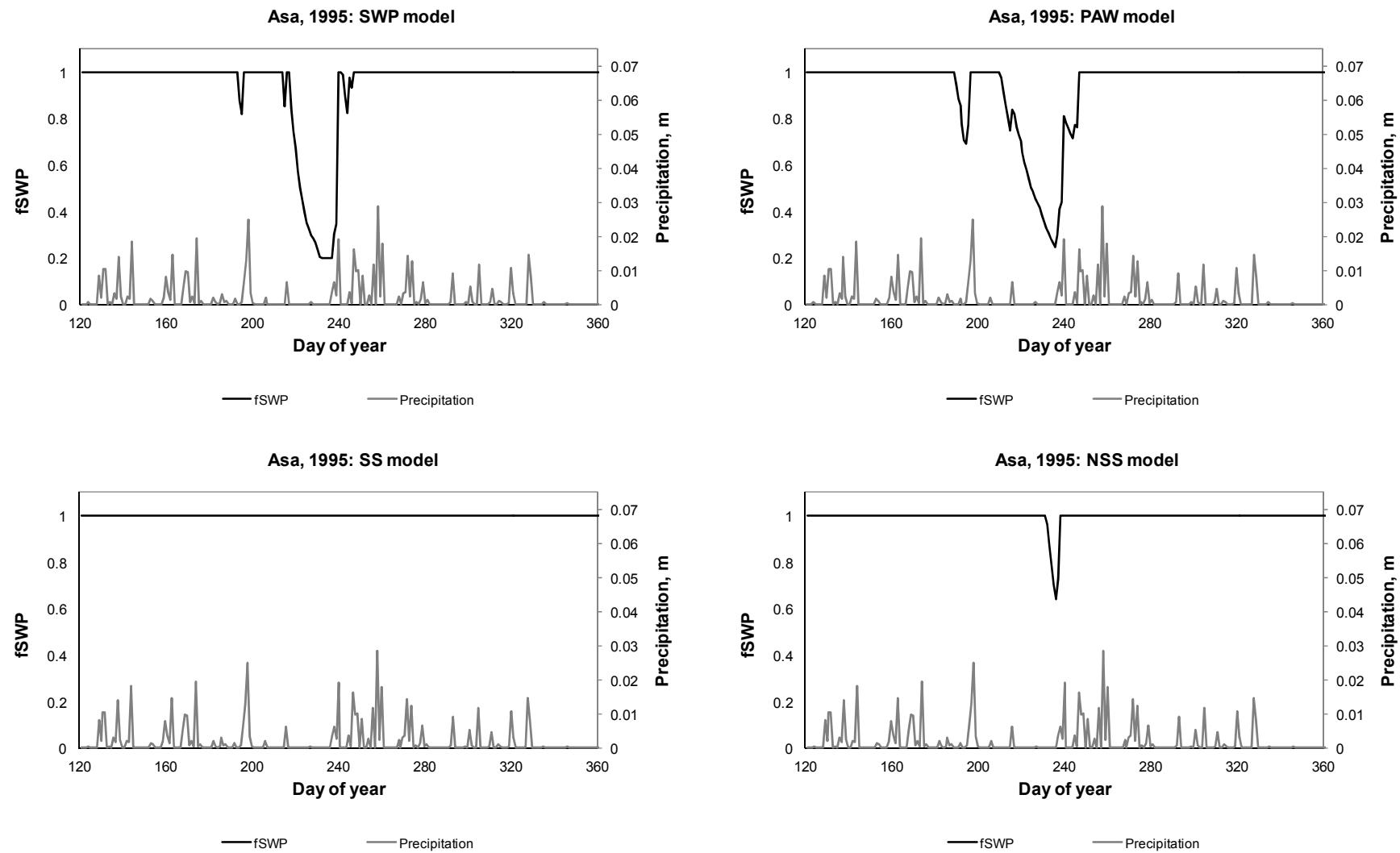


Figure S2. Precipitation and  $f_{SWP}$  in 1995 for a Norway spruce stand at Asa using four methods that relate soil water to  $g_{sto}$  (see Methods section for details).

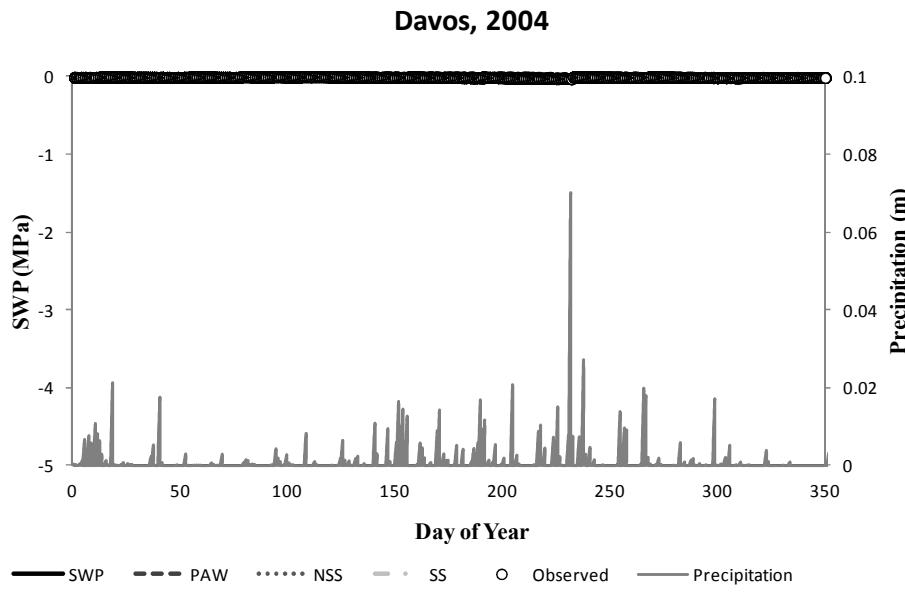


Figure S3. Comparison of observed and modelled soil water potential ( $SWP$ ) in 2004 for a Norway spruce stand in Davos using four methods that relate soil water to  $g_{sto}$  (see Methods section for details).

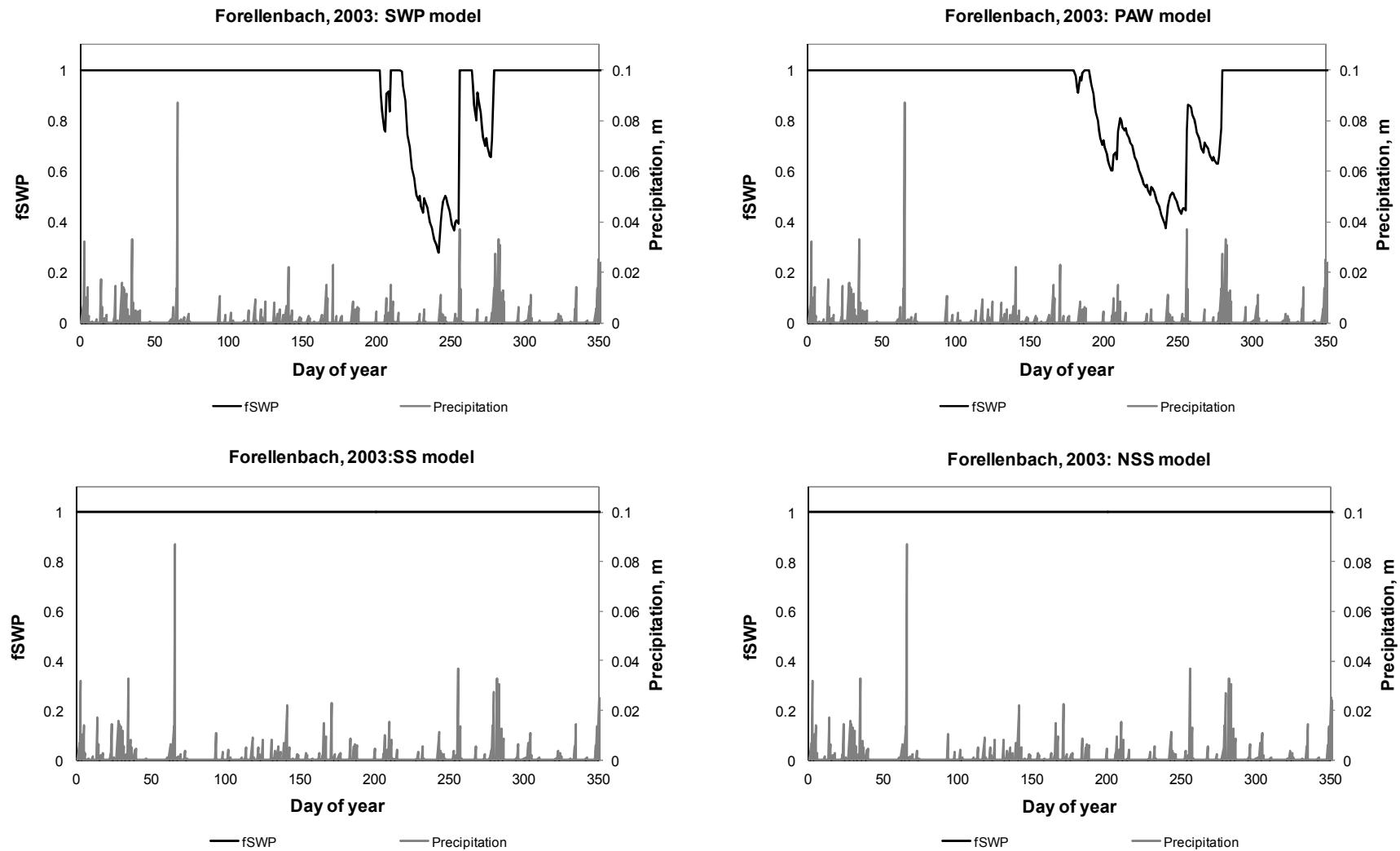


Figure S4. Precipitation and  $f_{SWP}$  in 2003 for a beech stand at Forellenbach using four methods that relate soil water to  $g_{sto}$  (see Methods section for details).

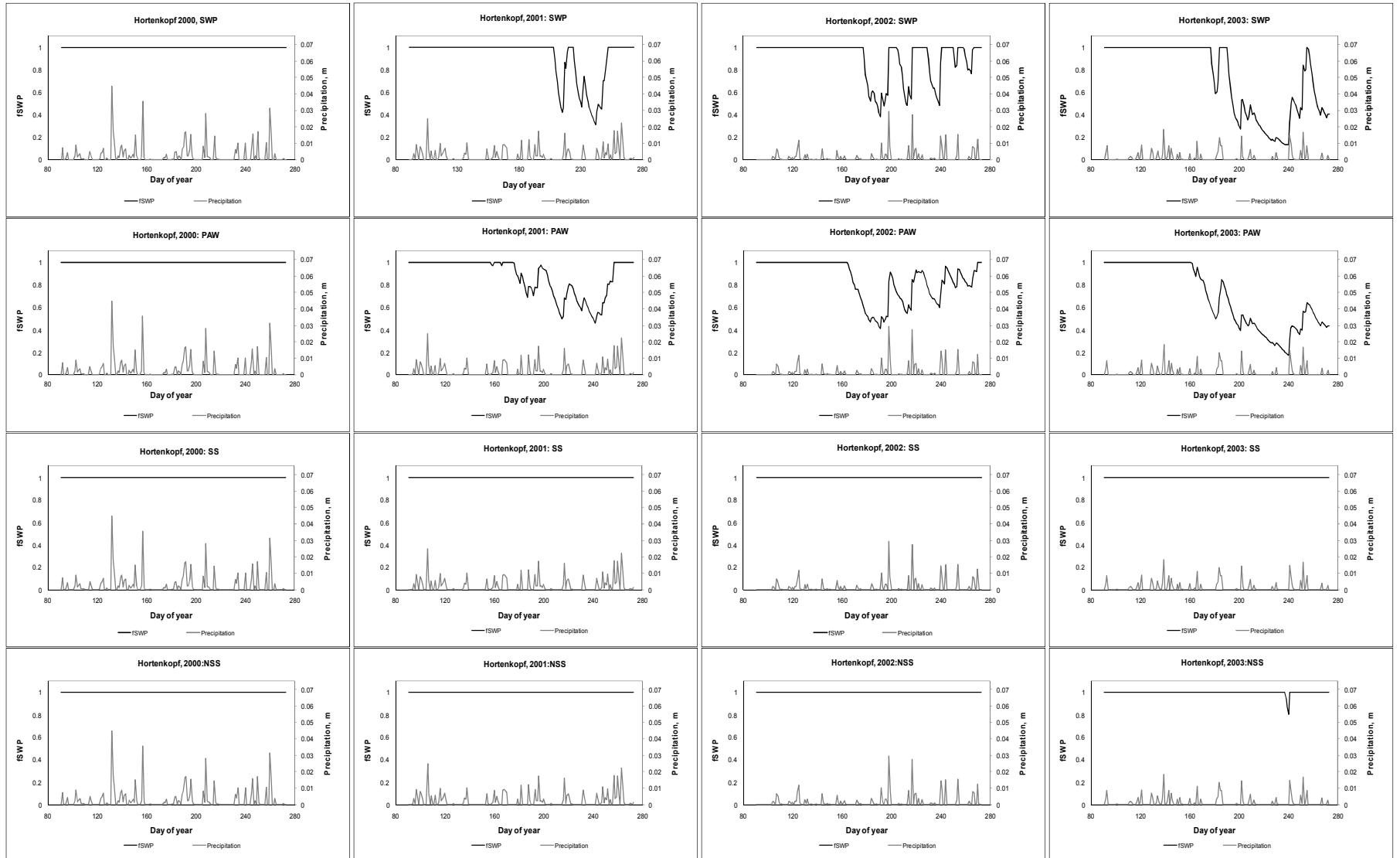


Figure S5. Precipitation and  $f_{SWP}$  in 2000, 2001, 2002 and 2003 for a mixed beech and temperate oak stand at Hortenkopf using four methods that relate soil water to  $g_{sto}$  (see Methods section for details).

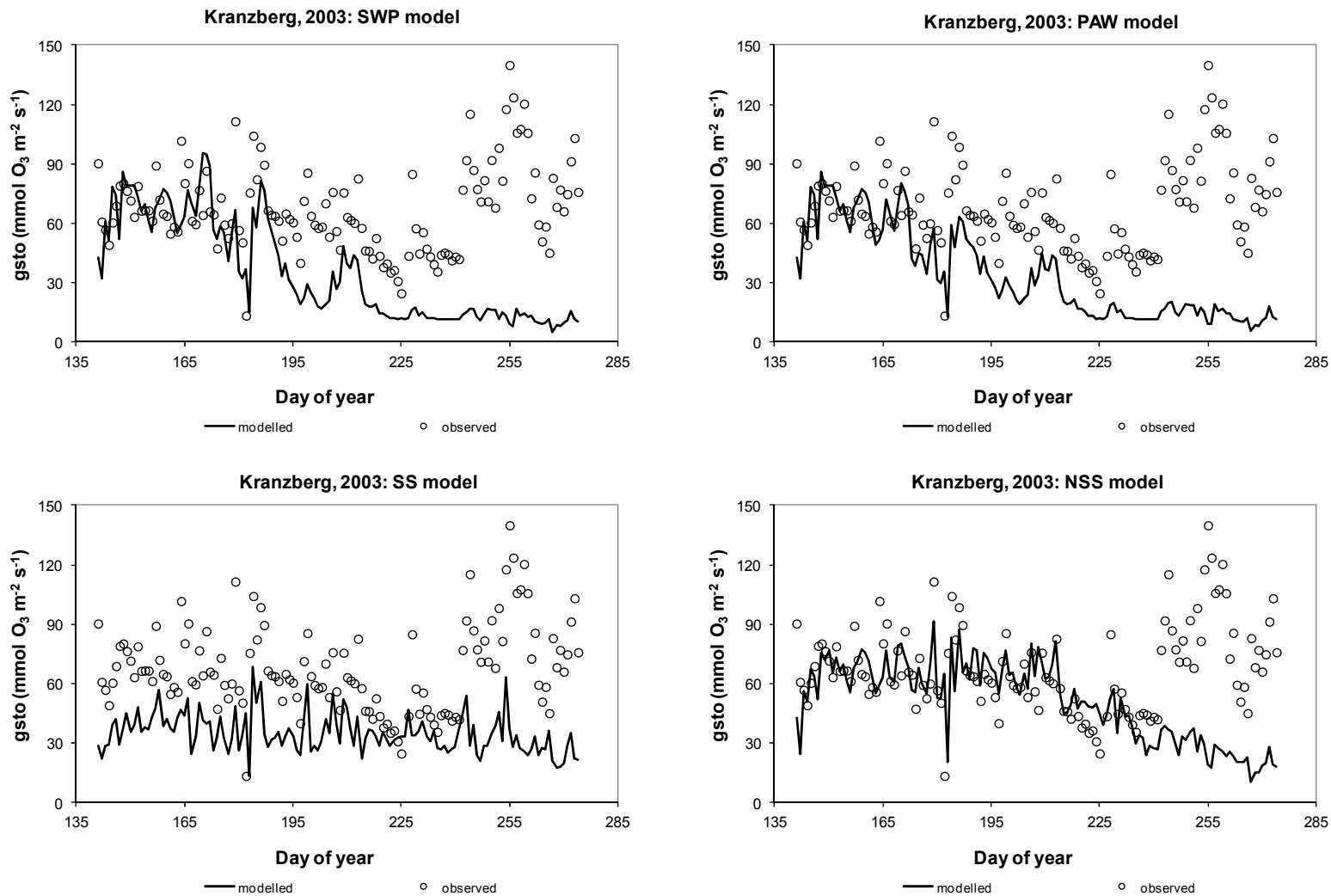


Figure S6. Modelled and observed  $g_{sto}$  of a beech leaf at Kranzberger Forst using four methods that relate soil water to  $g_{sto}$  (see Methods section for details).

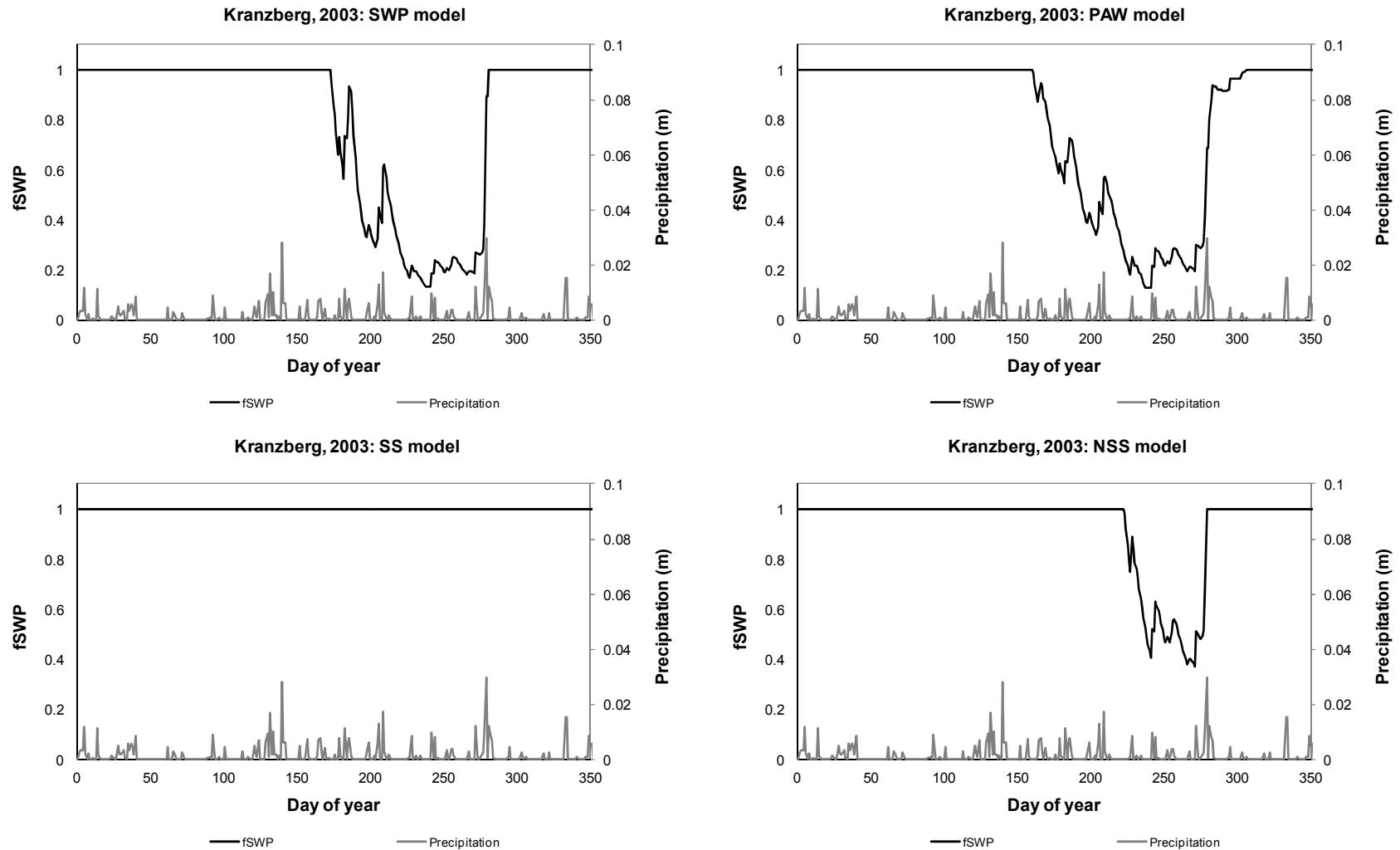


Figure S7. Precipitation and  $f_{SWP}$  in 2003 for a beech stand at Kranzberger Forst using four methods that relate soil water to  $g_{sto}$  (see Methods section for details).

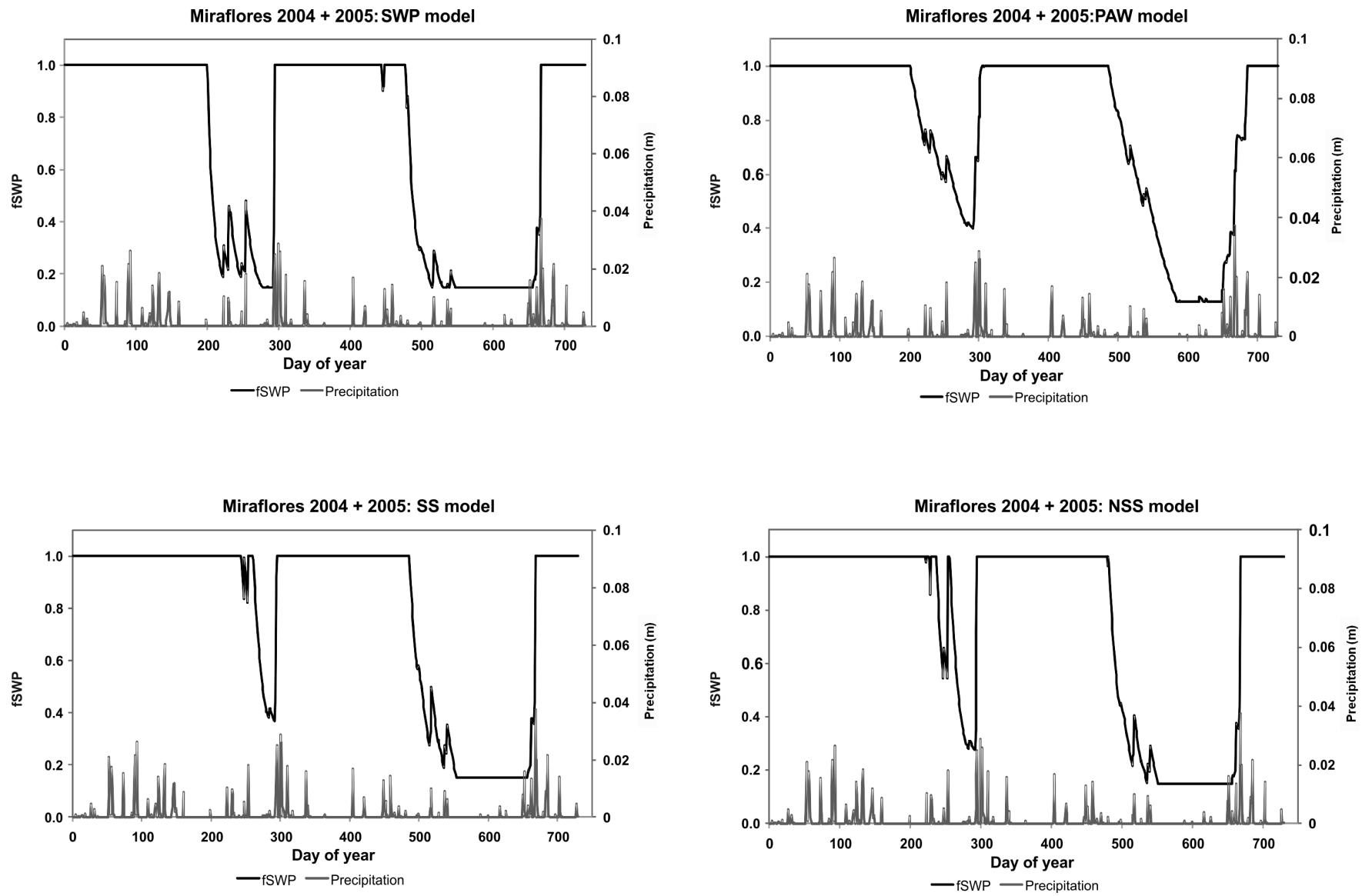


Figure S8. Precipitation and  $f_{SWP}$  in 2004 and 2005 for a holm oak stand at Miraflores de la Sierra using four methods that relate soil water to  $g_{sto}$  (see Methods section for details).

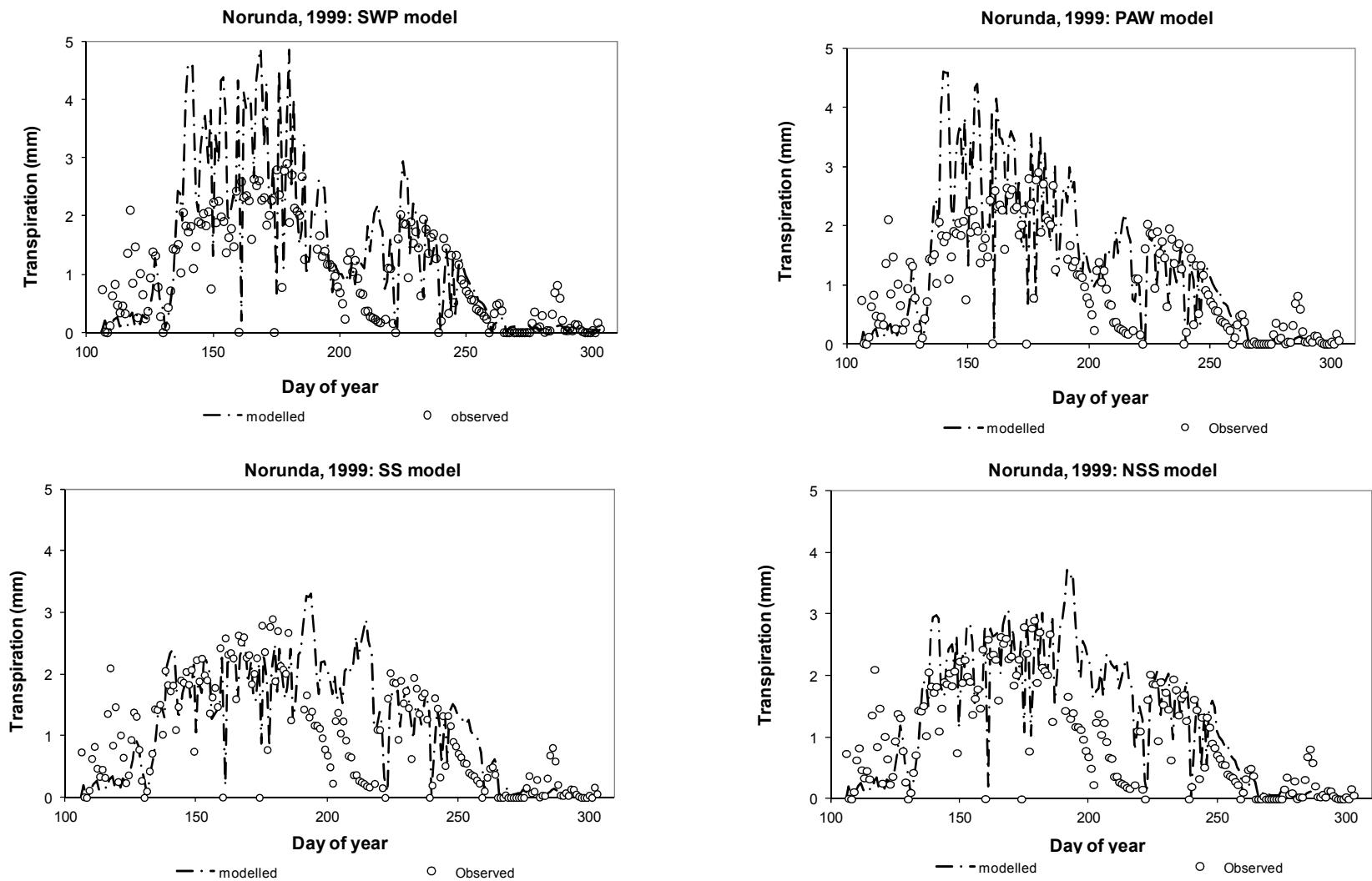


Figure S9. Comparison of observed and modelled transpiration in 1999 for a mixed Norway spruce and Scots pine stand at Norunda using four methods that relate soil water to  $g_{sto}$  (see Methods section for details).

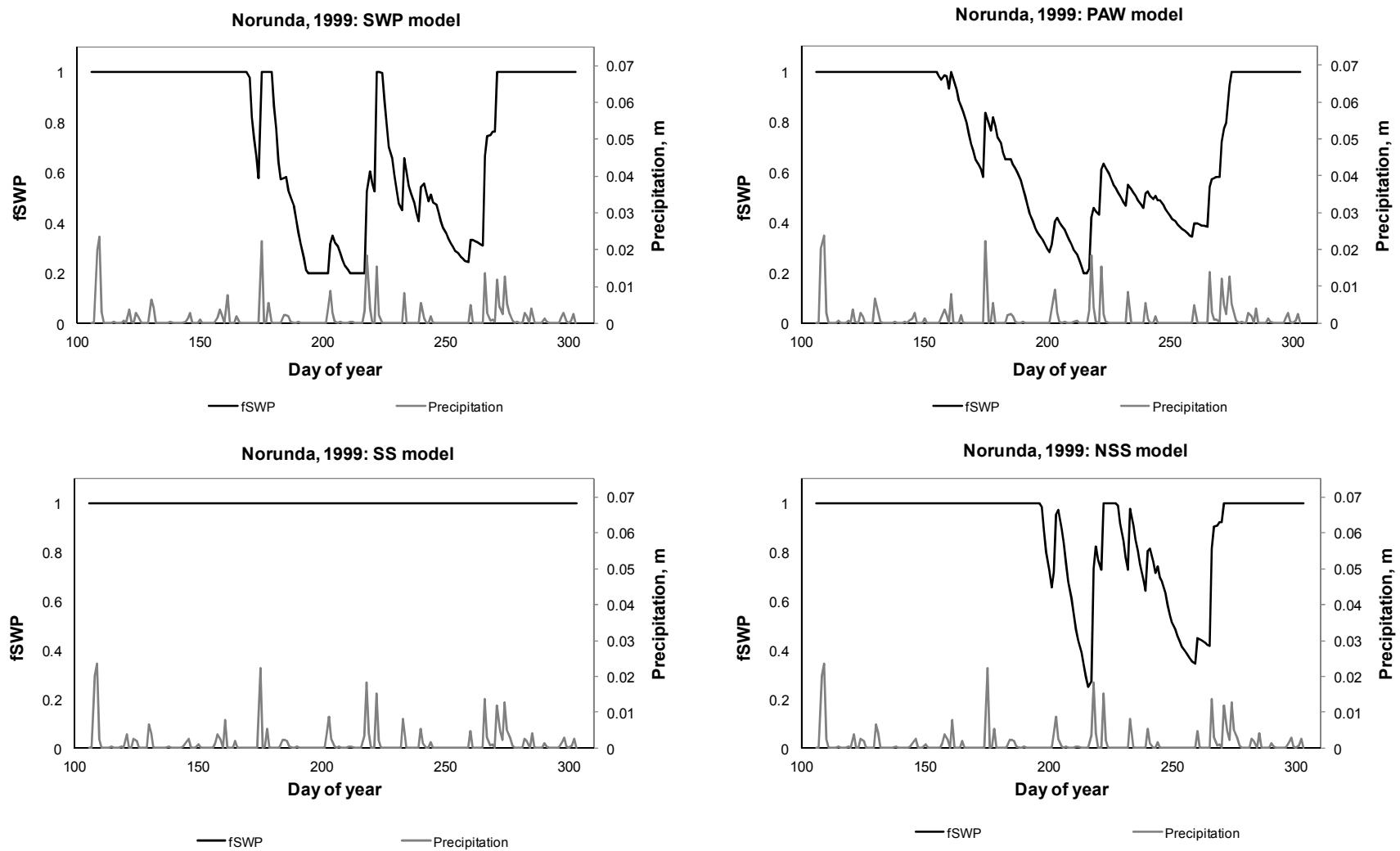


Figure S10. Precipitation and  $f_{SWP}$  in 1999 for a mixed Norway spruce and Scots pine stand at Norunda using four methods that relate soil water to  $g_{sto}$  (see Methods section for details).

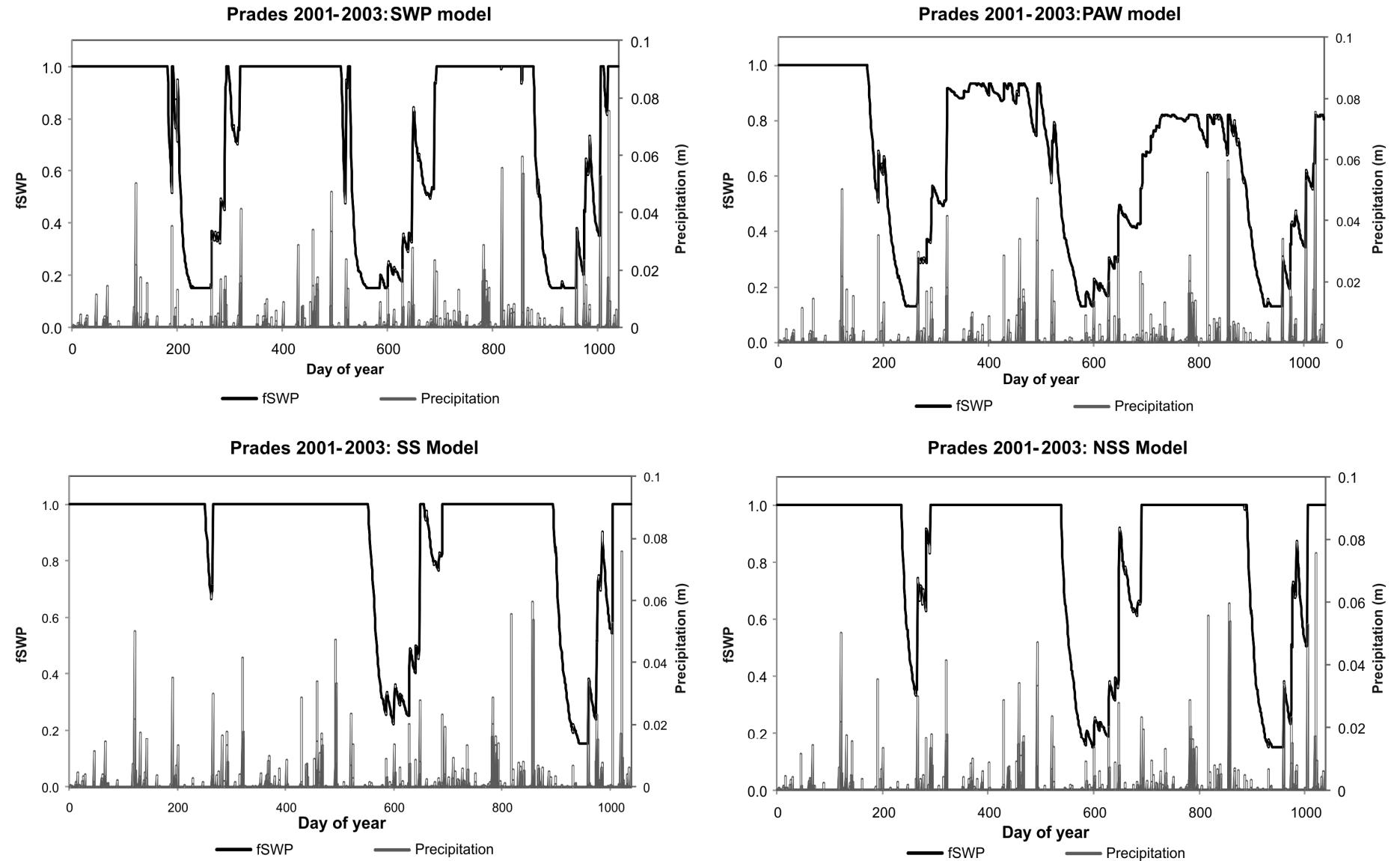


Figure S11. Precipitation and  $f_{SWP}$  in 2001, 2002 and 2003 for a holm oak stand at Prades using four methods that relate soil water to  $g_{sto}$  (see Methods section for details).

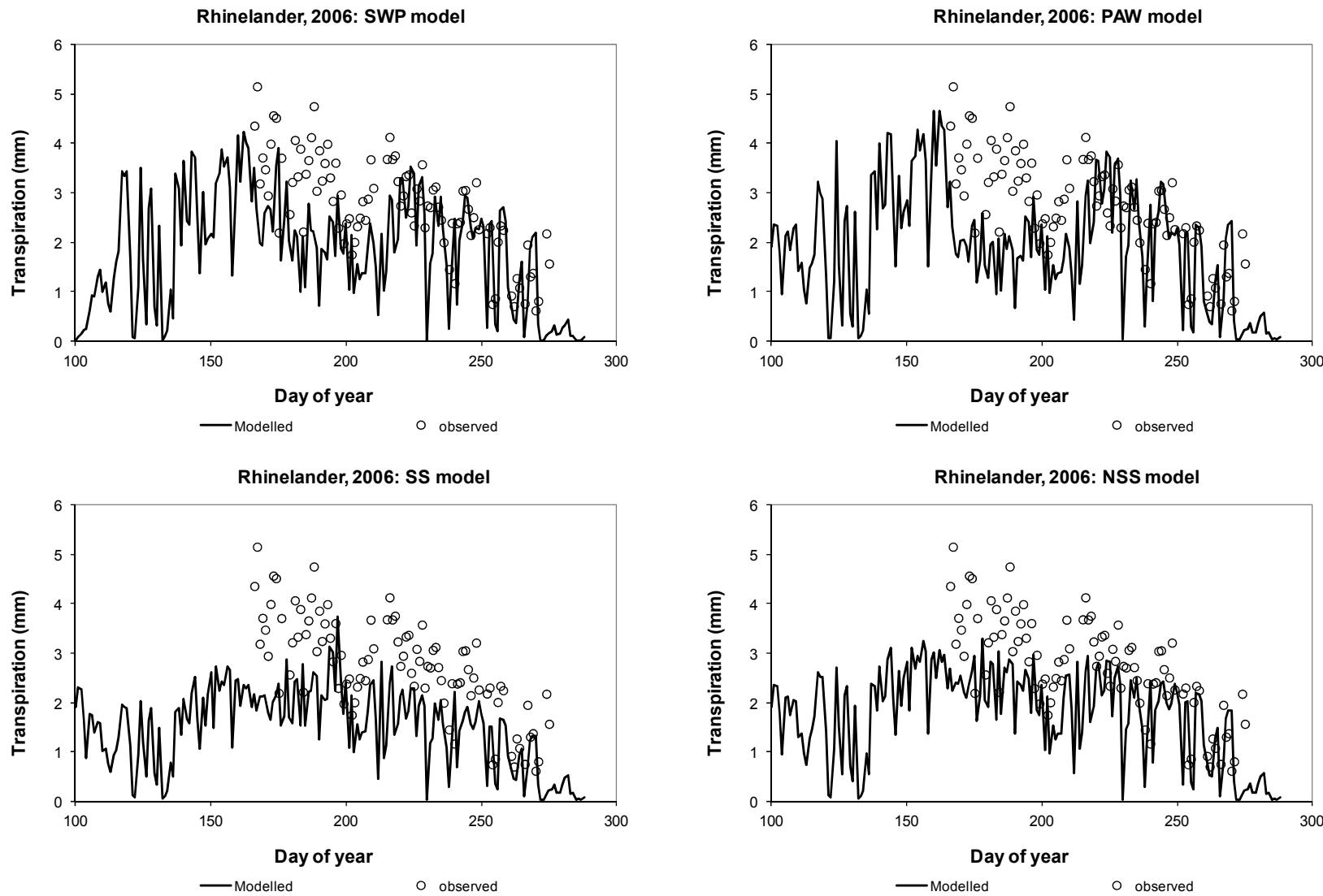


Figure S12. Comparison of observed and modelled transpiration in 2006 for a mixed aspen-birch stand at Rhinelander using four methods that relate soil water to  $g_{sto}$  (see Methods section for details).

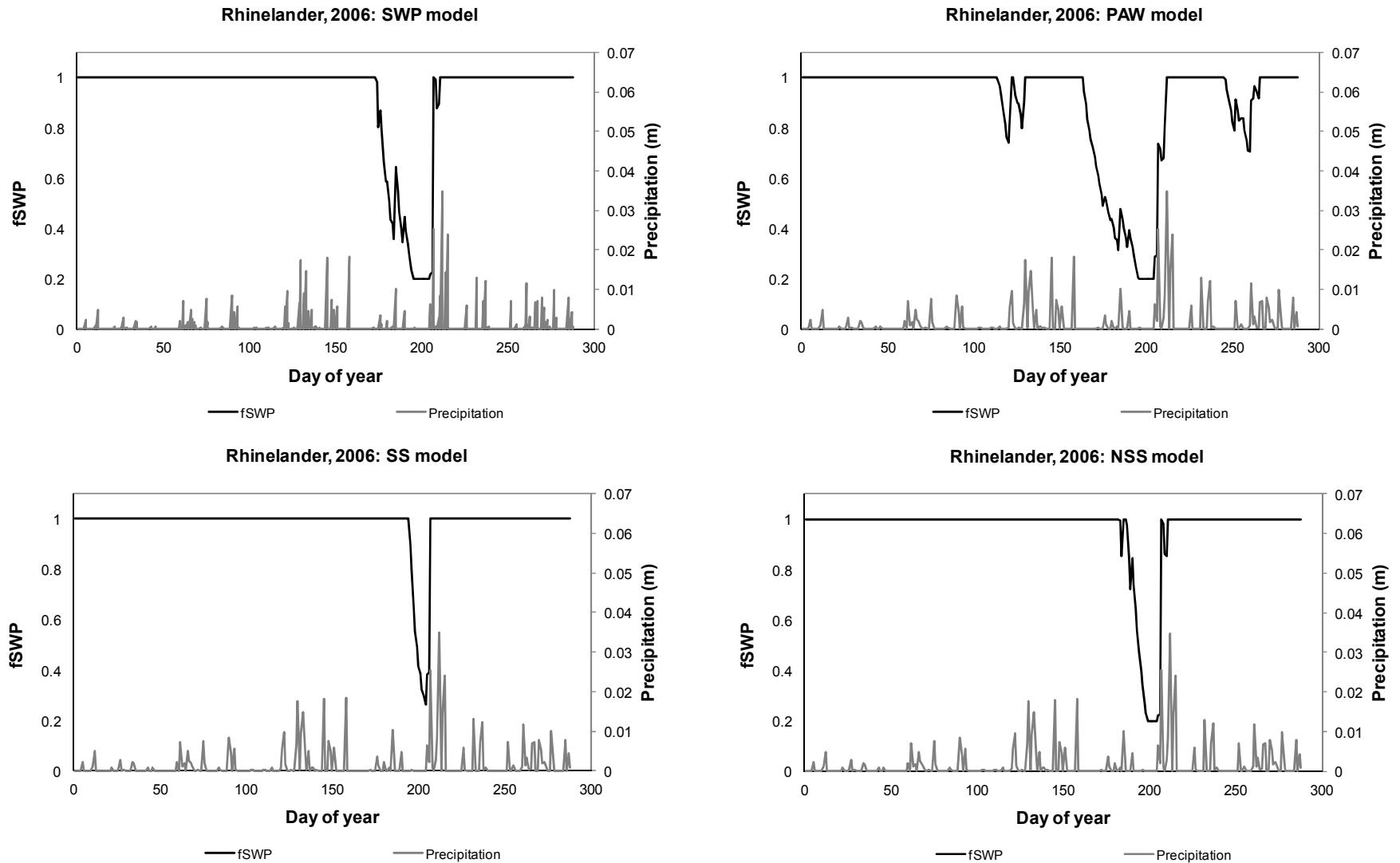


Figure S13. Precipitation and  $f_{SWP}$  in 2006 for a mixed aspen-birch stand at Rhinelander using four methods that relate soil water to  $g_{sto}$  (see Methods section for details).

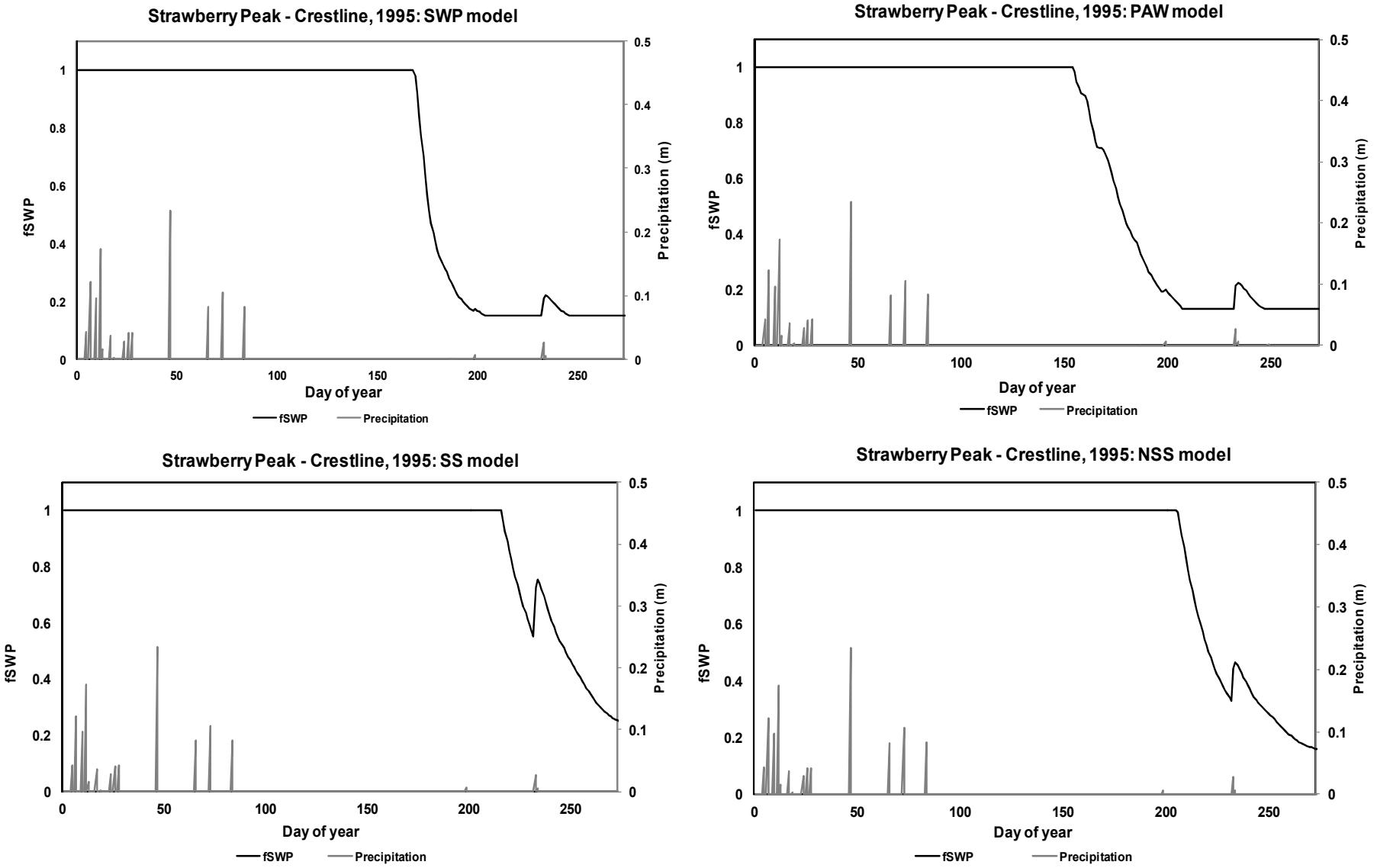


Figure S14. Precipitation and  $f_{SWP}$  in 1995 for an evergreen oak stand at Strawberry Peak/Crestline using four methods that relate soil water to  $g_{sto}$  (see Methods section for details).