Figure S1. Observed and modeled GSTs during the hydrological years 2016-2019 for a snow drift location (left panel) and a wind-exposed ridge (right panel). The modeled GST of the reference run without DA are shown in red. The prior ensemble (before DA) is shown in gray, with the prior ensemble mean displayed as the gray solid line and the prior ensemble range as the gray shaded area. The posterior results of the DA scheme assimilating in-situ derived FSCA are shown in blue, with the blue solid line being the posterior ensemble mean and the blue shaded area the posterior ensemble range. The RMSE of the monthly mean GSTs relative to the observations is given for the reference run and the ensemble means of the prior and posterior ensembles each.
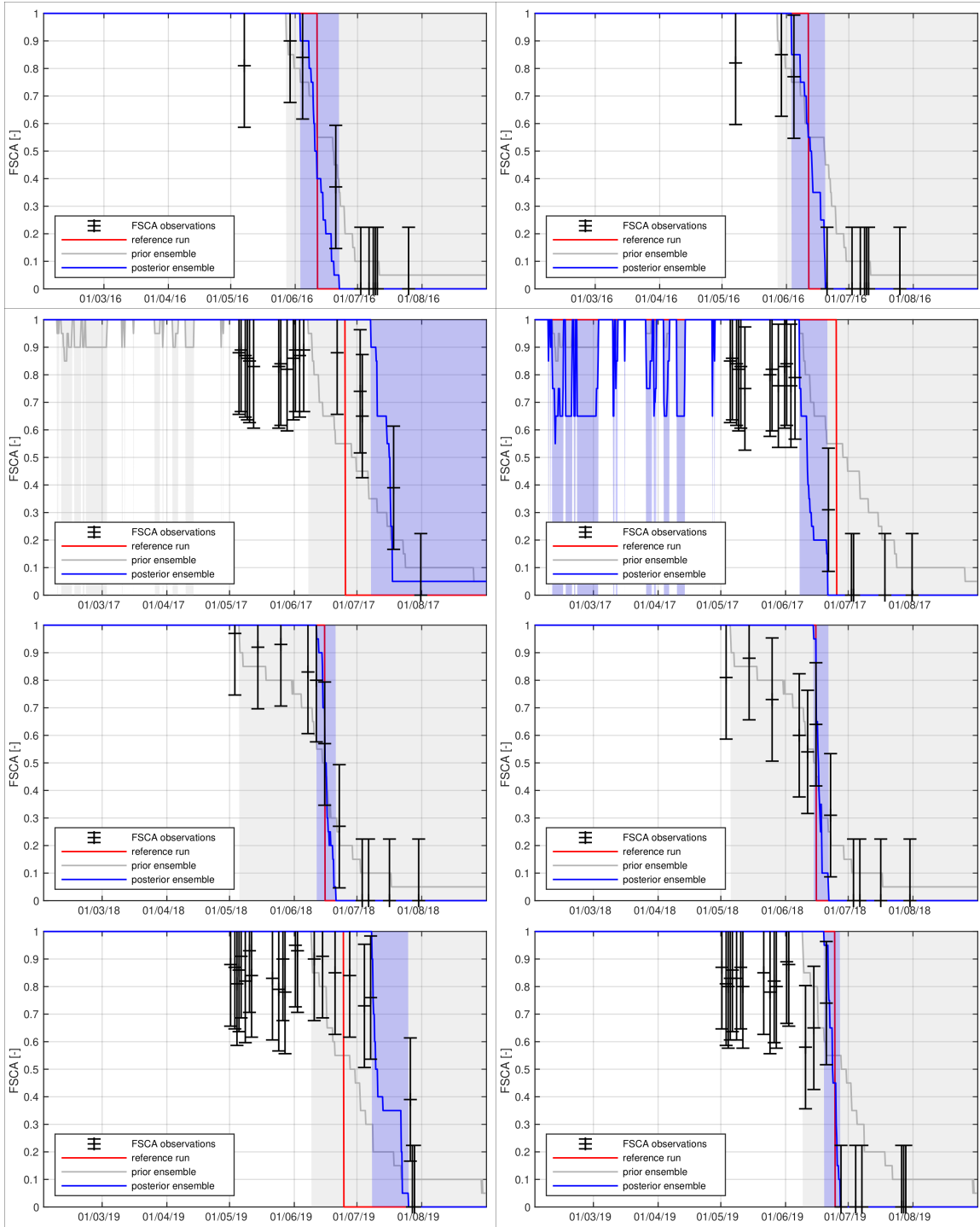
Figure S2. Sentinel-2 derived FSCA and modeled FSCA during the hydrological years of 2016-2019 for a snow drift location (left panel) and a wind-exposed ridge (right panel). The modeled FSCA of the reference run without DA is shown in red. The prior ensemble (before DA) is shown in gray, with the prior ensemble mean displayed as the gray solid line and the prior ensemble range as the gray shaded area. The posterior results of the DA scheme assimilating Sentinel-2 derived FSCA are shown in blue, with the blue solid line being the posterior ensemble mean and the blue shaded area the posterior ensemble range.
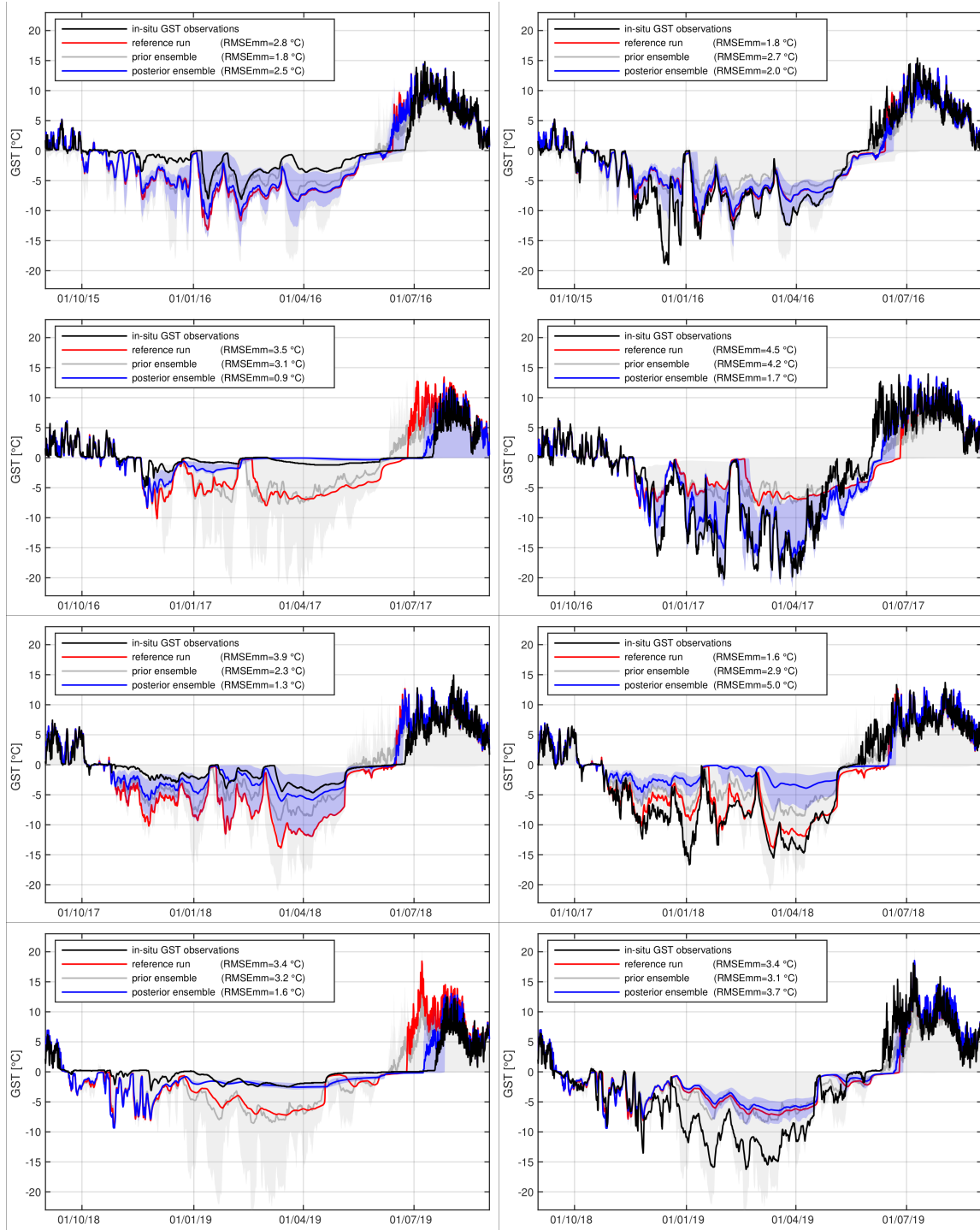
Figure S3. Observed and modeled GSTs during the hydrological years 2016-2019 for a snow drift location (left panel) and a wind-exposed ridge (right panel). The modeled GST of the reference run without DA are shown in red. The prior ensemble (before DA) is shown in gray, with the prior ensemble mean displayed as the gray solid line and the prior ensemble range as the gray shaded area. The posterior results of the DA scheme assimilating Sentinel-2 derived FSCA are shown in blue, with the blue solid line being the posterior ensemble mean and the blue shaded area the posterior ensemble range. The RMSE of the monthly mean GSTs relative to the observations is given for the reference run and the ensemble means of the prior and posterior ensembles each.
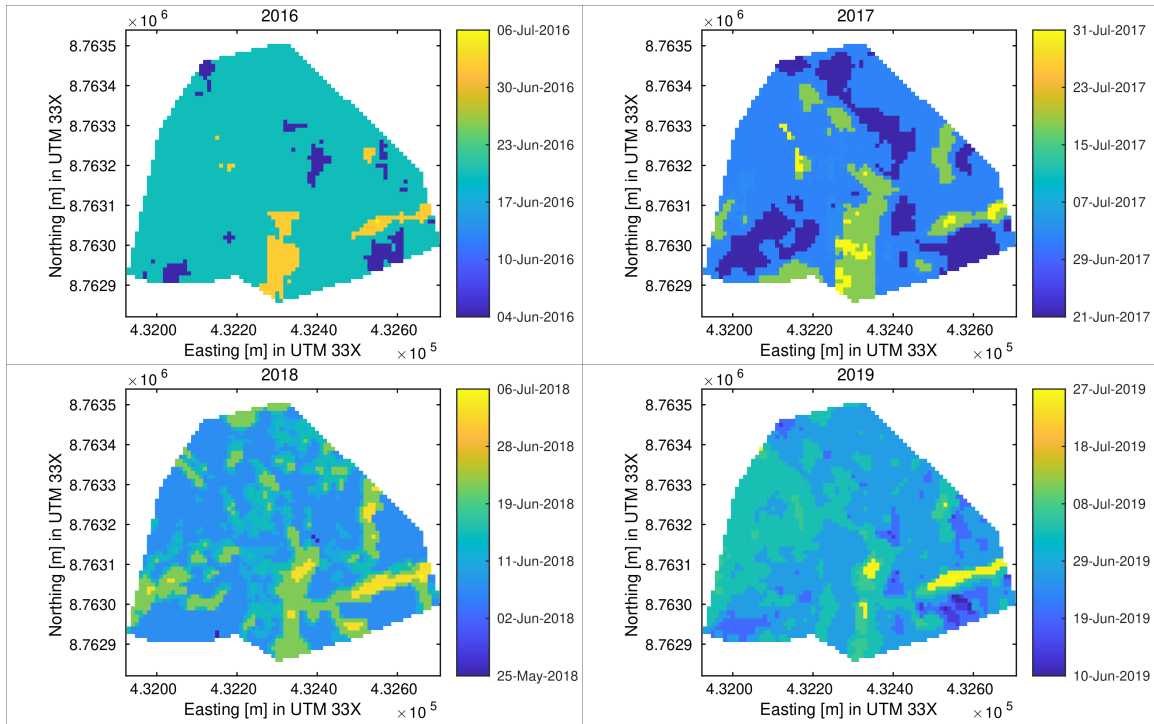
Figure S4. Maps of the meltout date (MOD) in the AOI for the hydrological years 2016-2019, obtained from the backmapping experiment (Sect. 3.5).