Geoscientific
Model Development

Supplement of

The NASA Eulerian Snow on Sea Ice Model (NESOSIM) v1.0: initial model development and analysis

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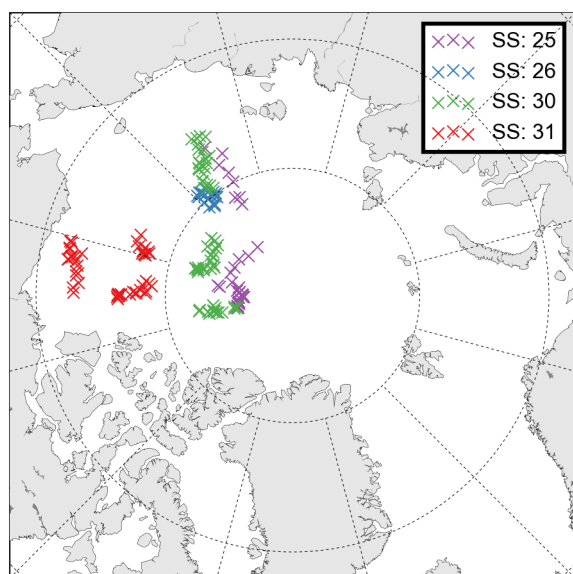*Correspondence to:* Alek A. Petty (alek.a.petty@nasa.gov)

Figure S1: Map of the drifting Soviet station data used in this study. The number indicates the respective station number.
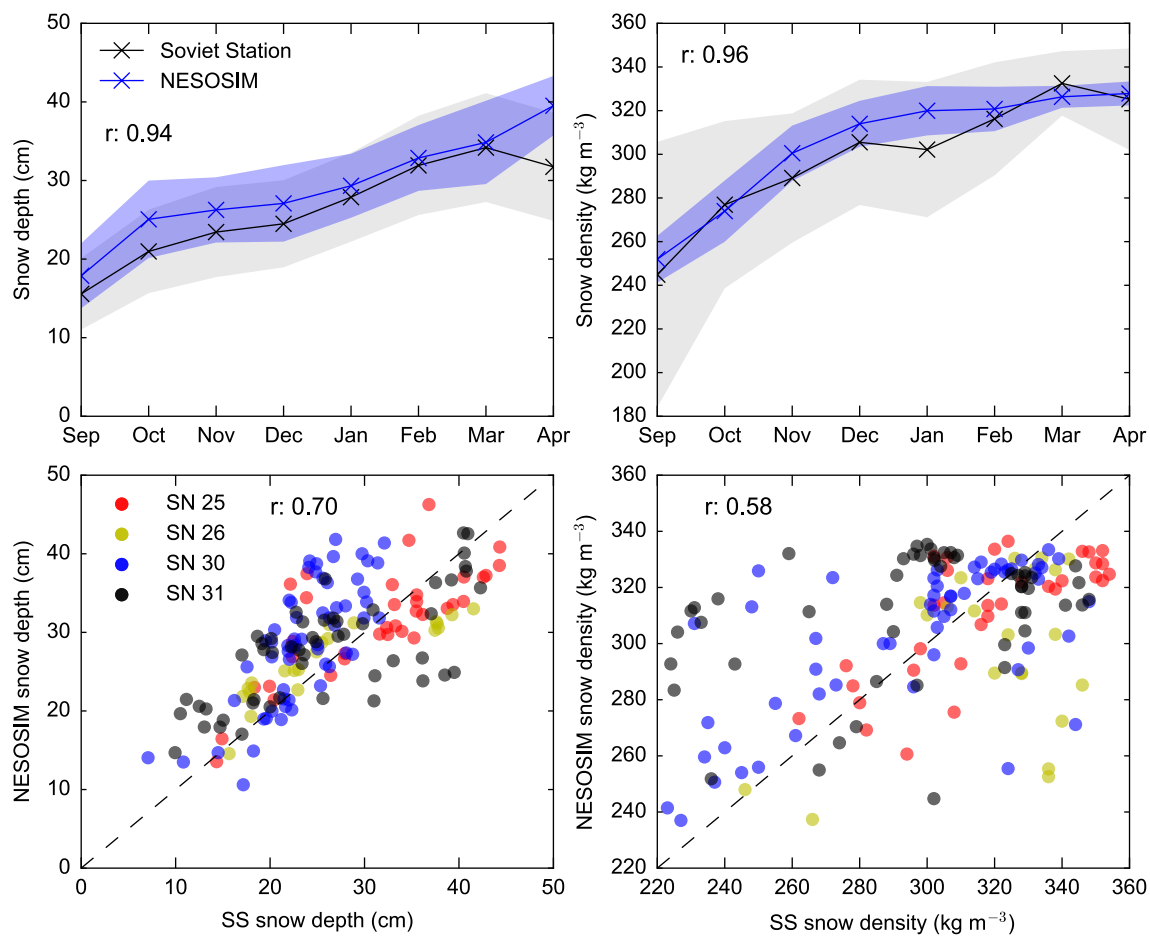
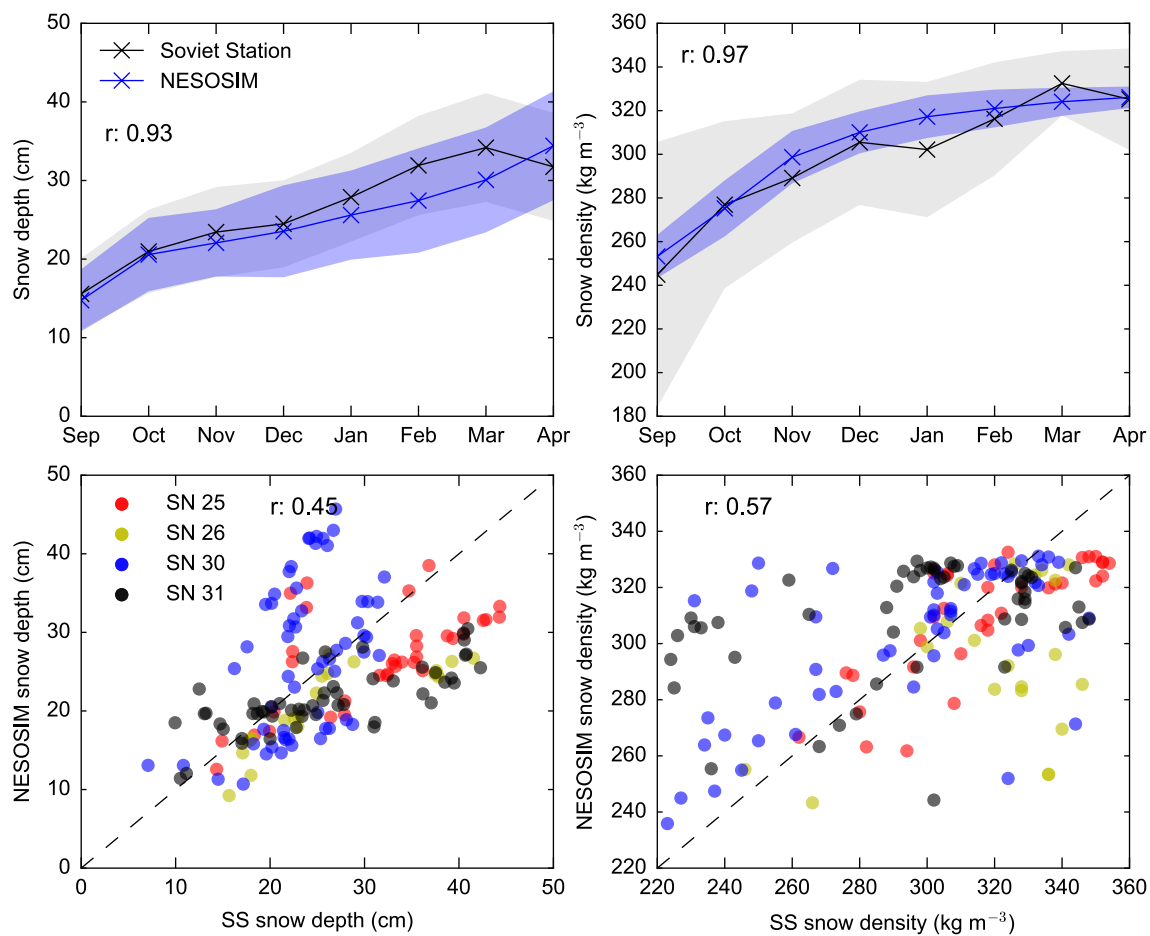**Figure S2:** As in Figure 5 but for NESOSIM forced by the JRA-55 snowfall data.

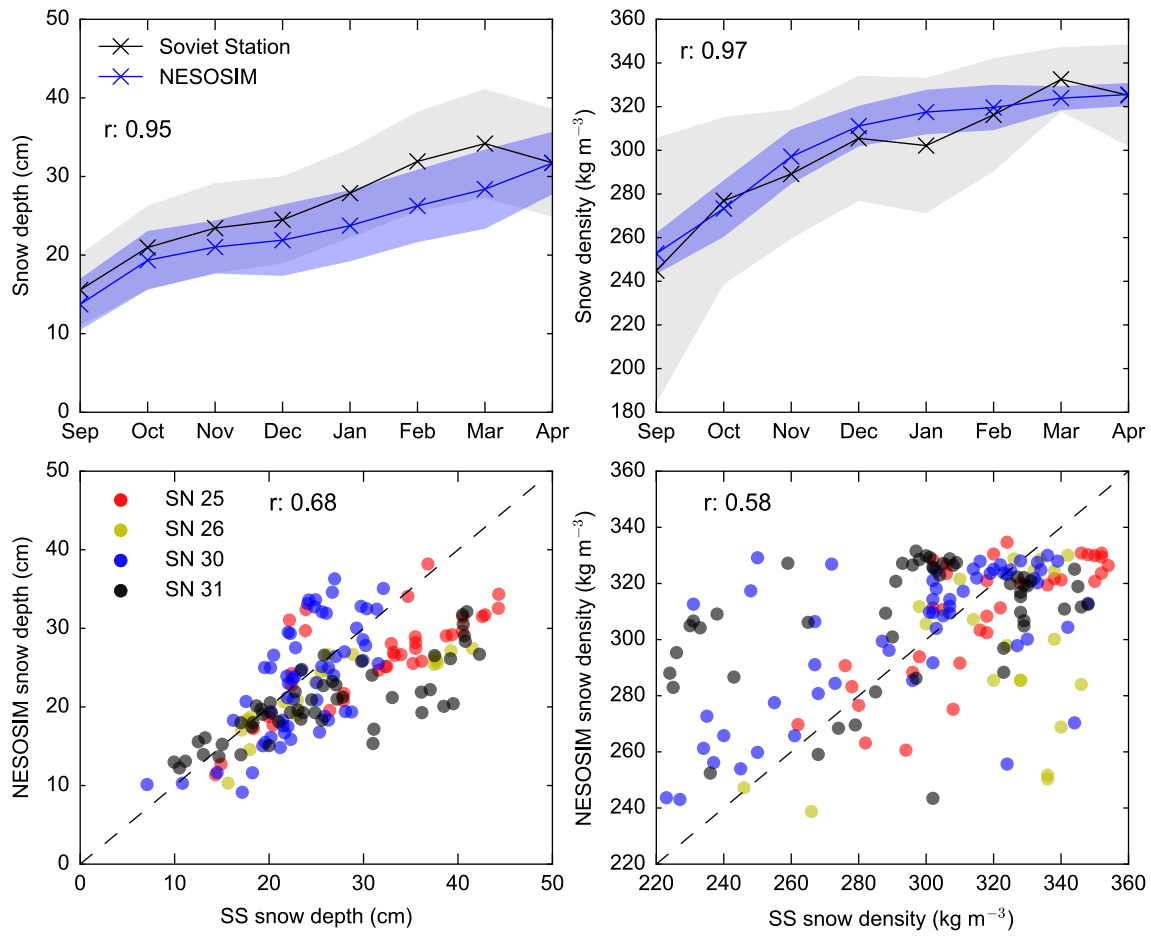**Figure S3:** As in Figure 5 but for NESOSIM forced by the MERRA snowfall data.

Figure S4: As in Figure 5 but for NESOSIM forced by the MEDIAN-SF snowfall data.
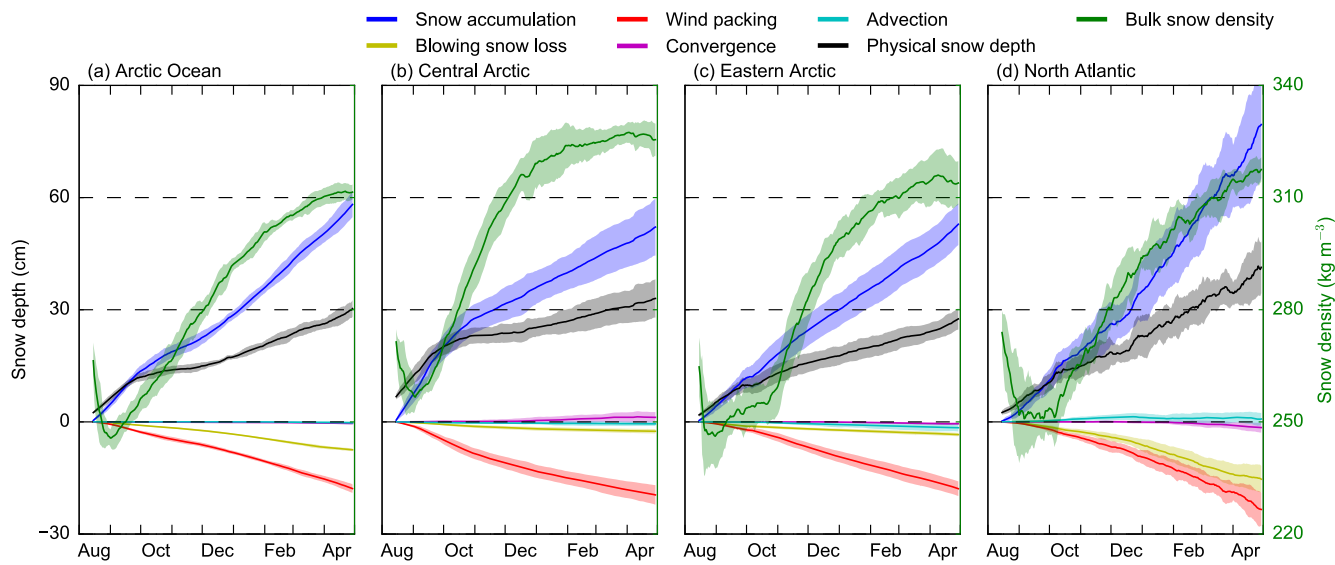
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Figure S5: As in Figure 8 but for the regional snow depth/density results initiated on August 15th 1980-1990.
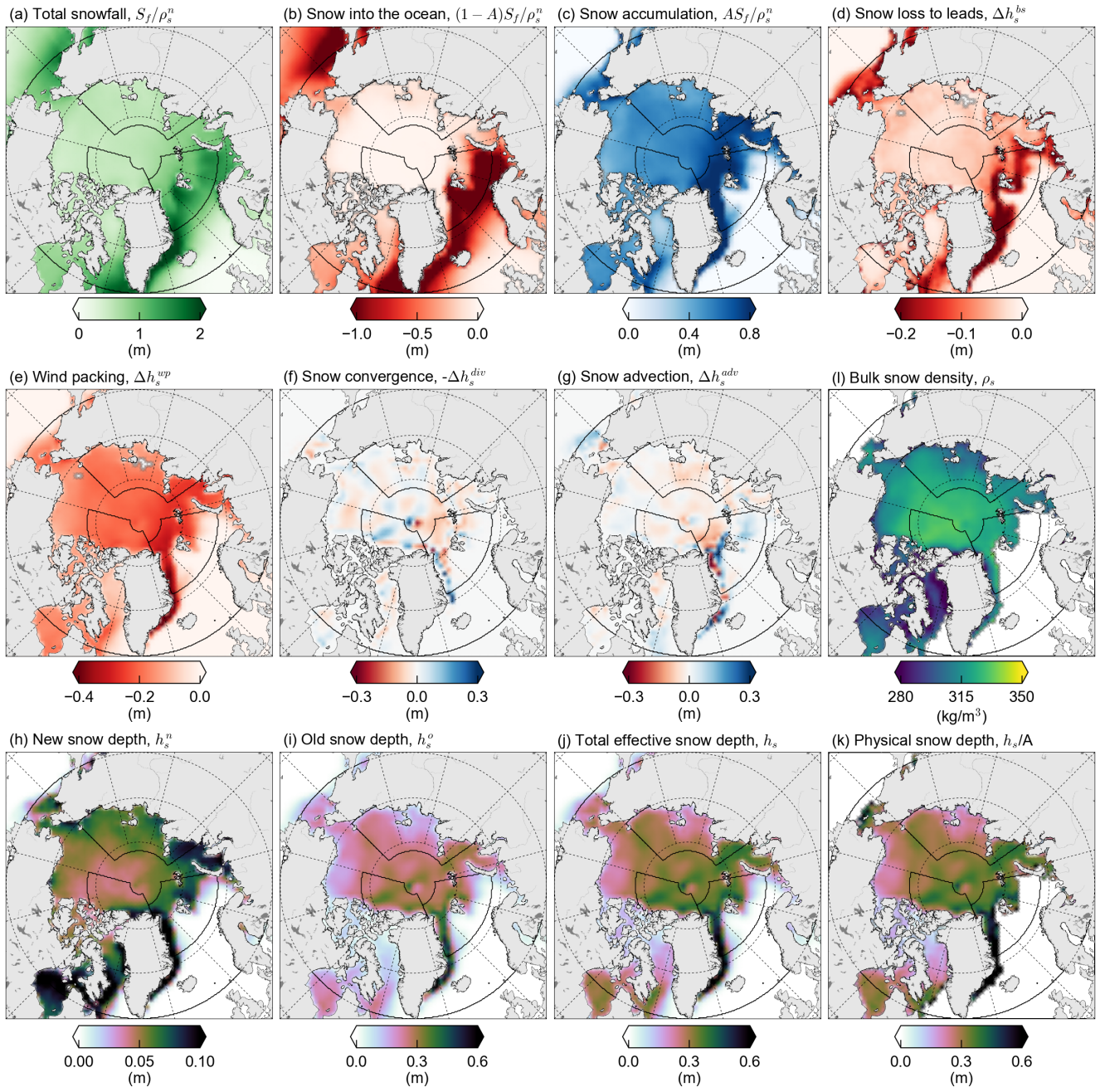
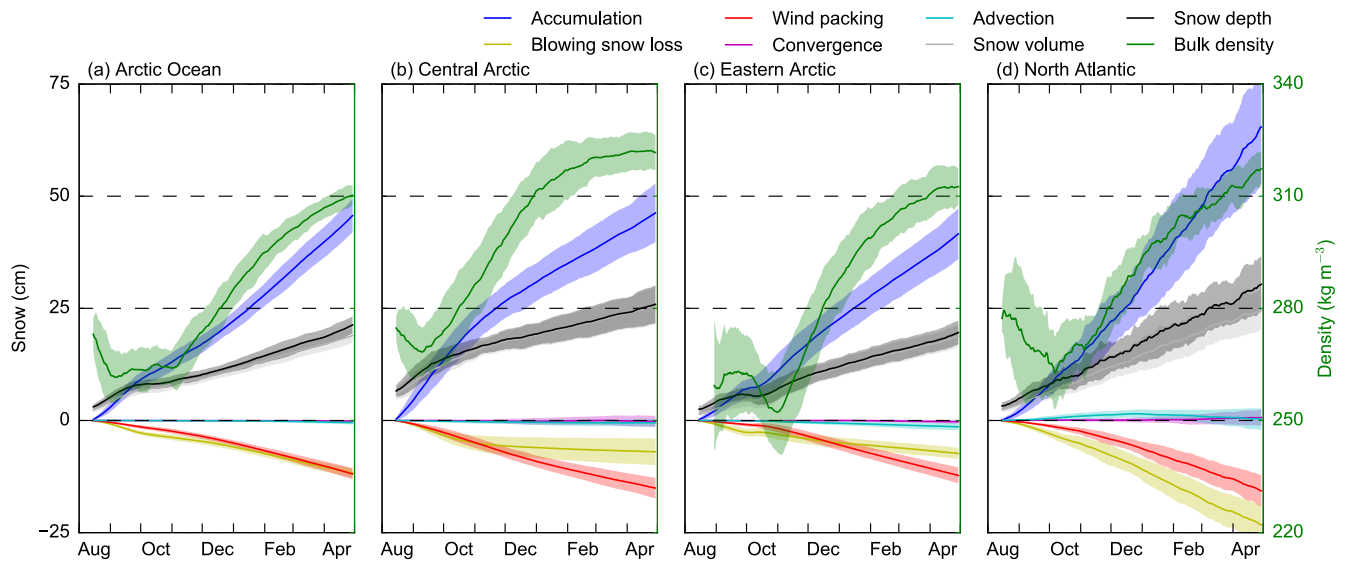**Figure S6:** As in Figure 9 but for the 1981-1991 May 1st mean budget terms.

The panels show:

(a) Total snowfall, S_f/ρ_s^n

(b) Snow into the ocean, $(1-A)S_f/\rho_s^n$

(c) Snow accumulation, AS_f/ρ_s^n

(d) Snow loss to leads, Δh_s^{bs}

(e) Wind packing, Δh_s^{wp}

(f) Snow convergence, $-\Delta h_s^{div}$

(g) Snow advection, Δh_s^{adv}

(l) Bulk snow density, ρ_s

(h) New snow depth, h_s^n

(i) Old snow depth, h_s^o

(j) Total effective snow depth, h_s

(k) Physical snow depth, h_s/A

Figure S7: As in Figure 8 but for the default/ERA-I NESOSIM simulations forced with the NASA Team ice concentration data.
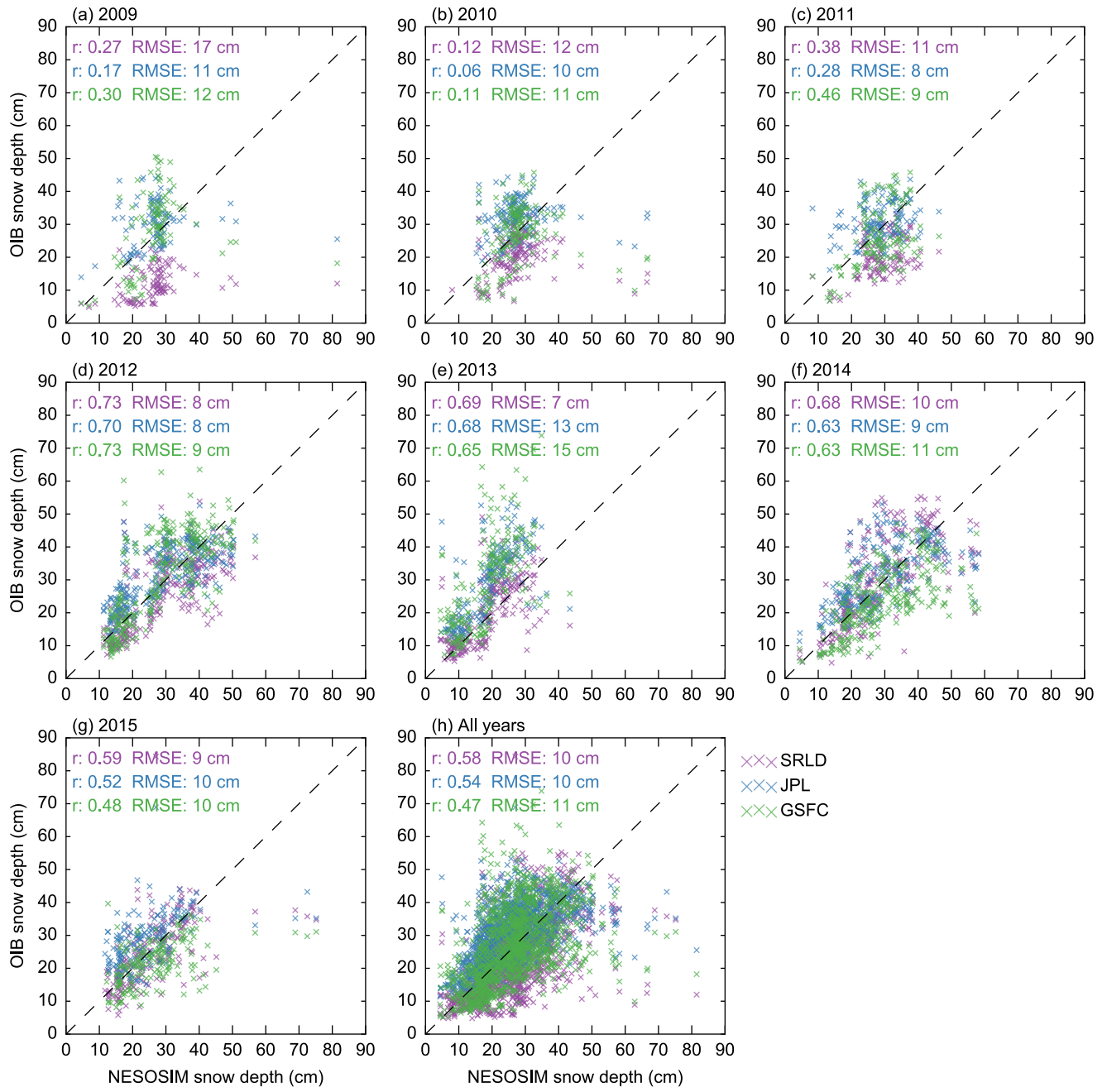
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Figure S8: As in Figure 15 but for the regressions shown separately for the various years (and all years, h). The correlation coefficients and root mean squared errors are also shown in Table 5.
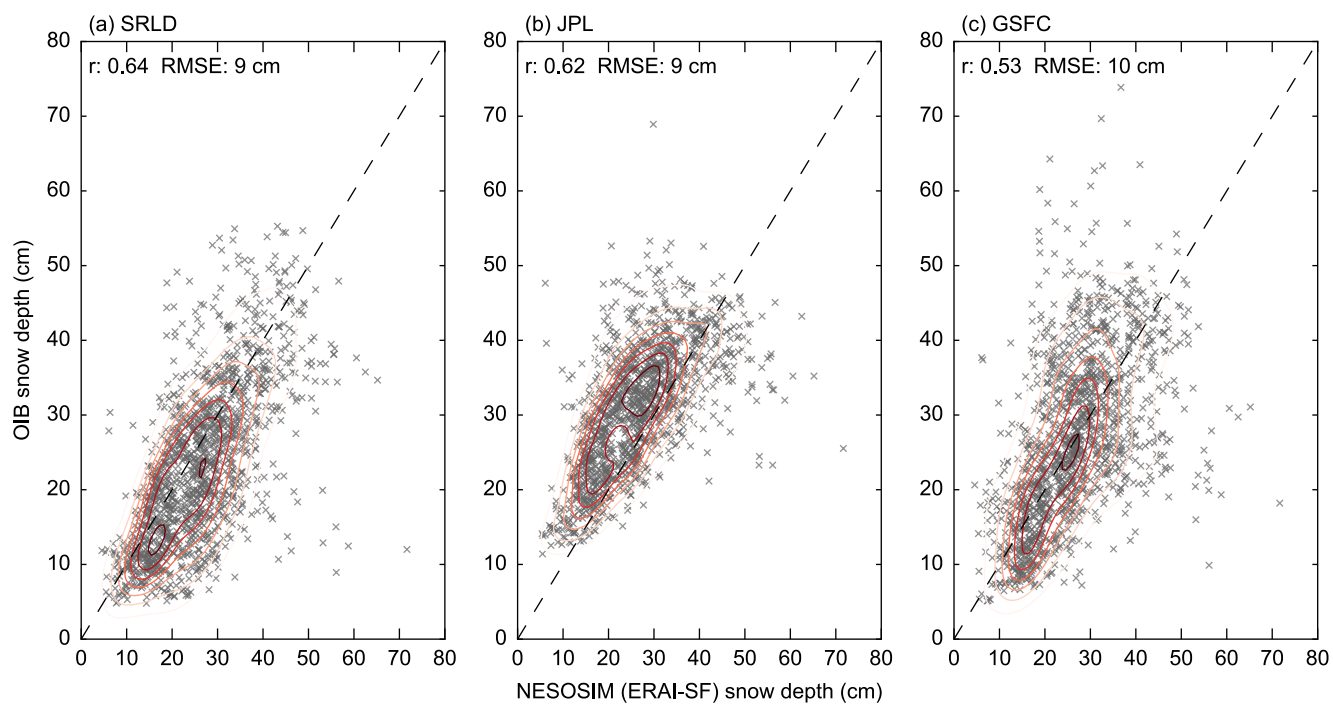
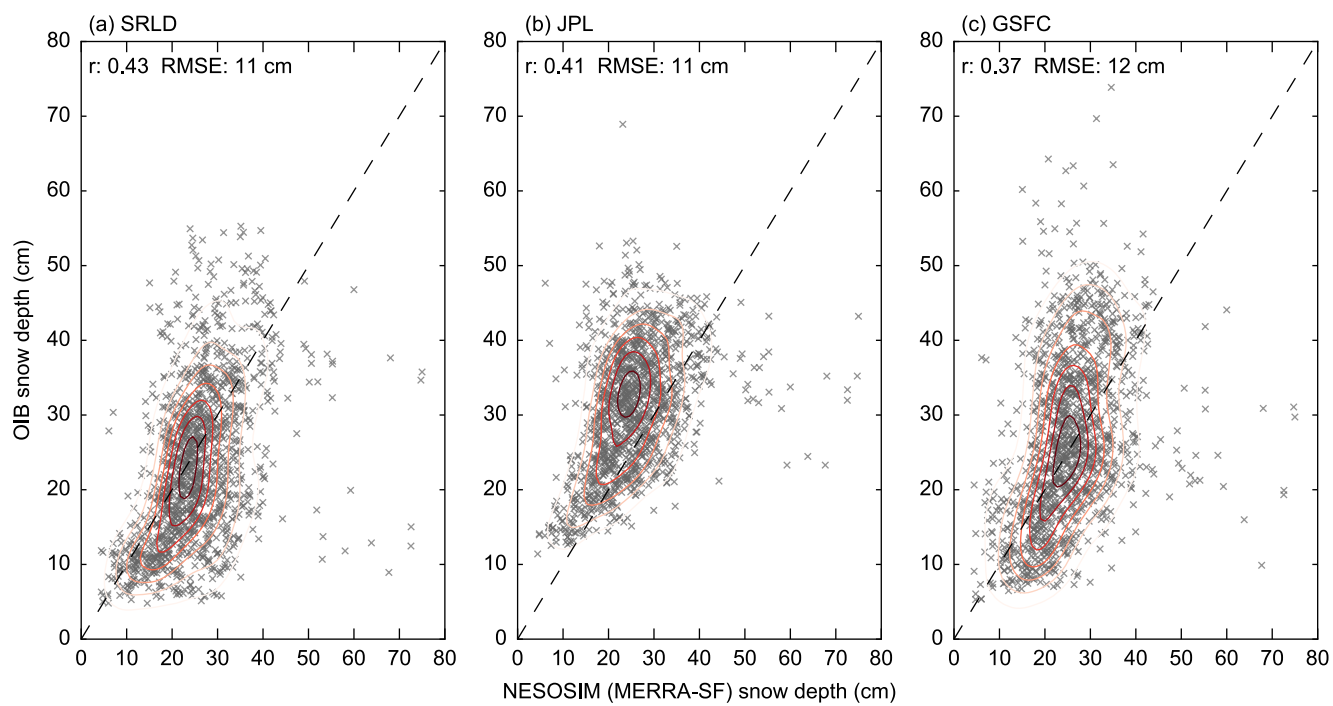**Figure S9:** As in Figure 15 but for the ERAI forced simulations.

Figure S10: As in Figure 15 but for the MERRA forced simulations.
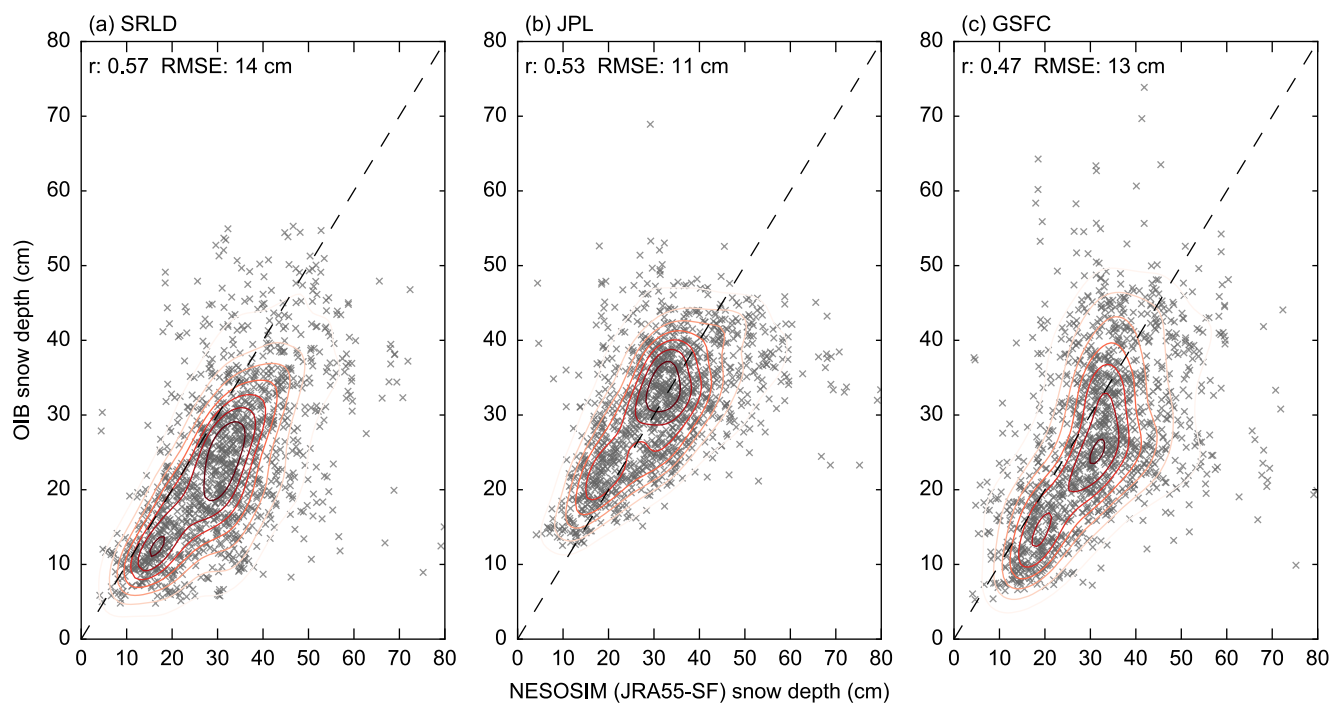
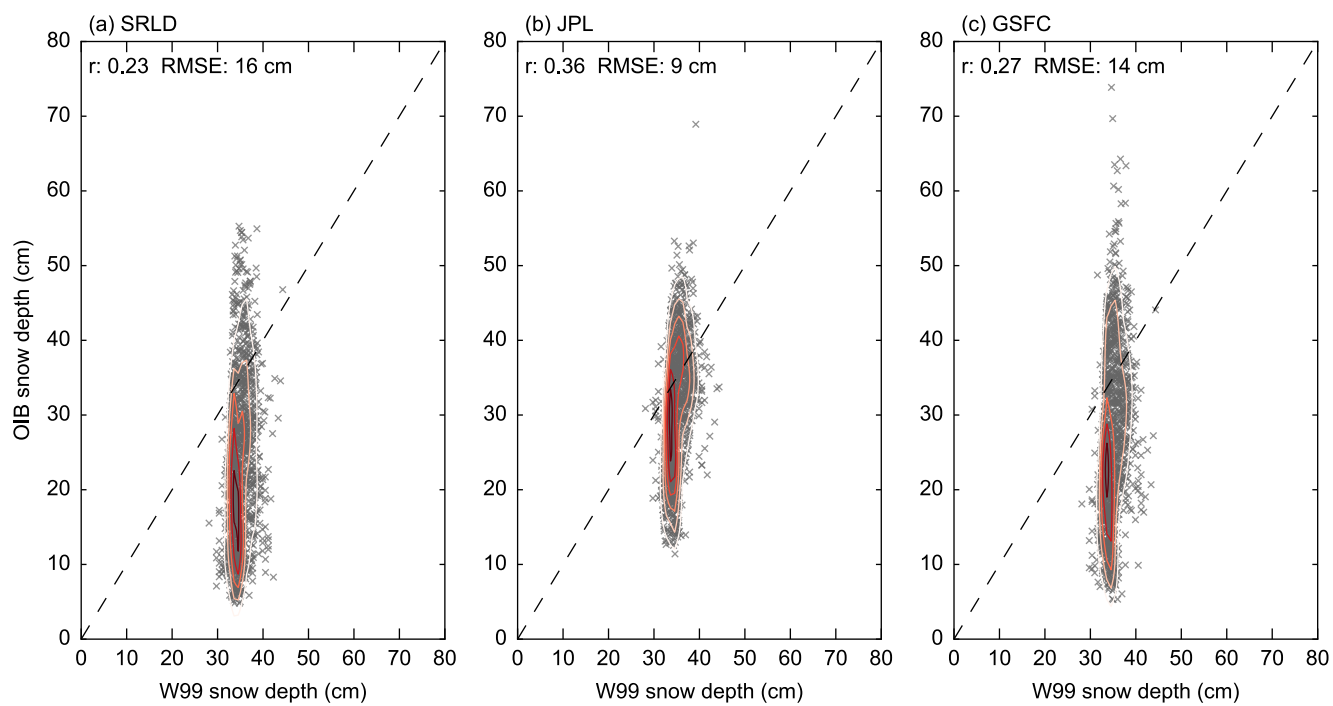**Figure S11:** As in Figure 15 but for the JRA-55 forced simulations.

Figure S12: As in Figure 16 but for the unmodified Warren climatology.