Preliminary documentation to interpret the new SNC COOP climate/GIS based Douglas fir swiss needle cast foliar retention model

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The new SNC model (SNC_V4) is similar to the one released March 2007 (SNC_V2) but differs in the following ways:

1) The new model is based on PRISM climate map derived June dew point deficit (Avg Temperature - Dew point, DPD90.06) rather than July relative humidity
2) The new climate layers were downscaled from new PRISM 800m resolution temperature layers to 90m using geographically weighted regression (GWR)
3) The new model uses PRISM based winter (Dec-Feb) average temperature (T90.w) rather than winter degree-days
4) The new model uses revised aspect (asp36) which is a function of elevation and aspect
5) The new model was built using Mainwaring and Maguire et al. pre-commercial thinning (PCT) and GIS (growth impact study-coastal only) sites (N=40) rather than Manter et al. sites and aerial survey data used for the SNC_V2 model

The SNC_V4 regression model:
foliar retention = f(DPD90.06 + T90.w + asp36)

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Coefficients:
                    Estimate  Std. Error  t value Pr(>|t|)
(Intercept)         2.2587289  0.5641222   4.004 0.000309 ***
DPD90.06)           0.4307804  0.0956948   4.502 7.16e-05 ***
T90.w              -0.0020561  0.0006868  -2.994 0.005031 **
asp36              -0.1799832  0.0689210  -2.611 0.013189 *
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
Residual standard error: 0.3884 on 35 degrees of freedom
Multiple R-Squared: 0.6706,     Adjusted R-squared: 0.6424
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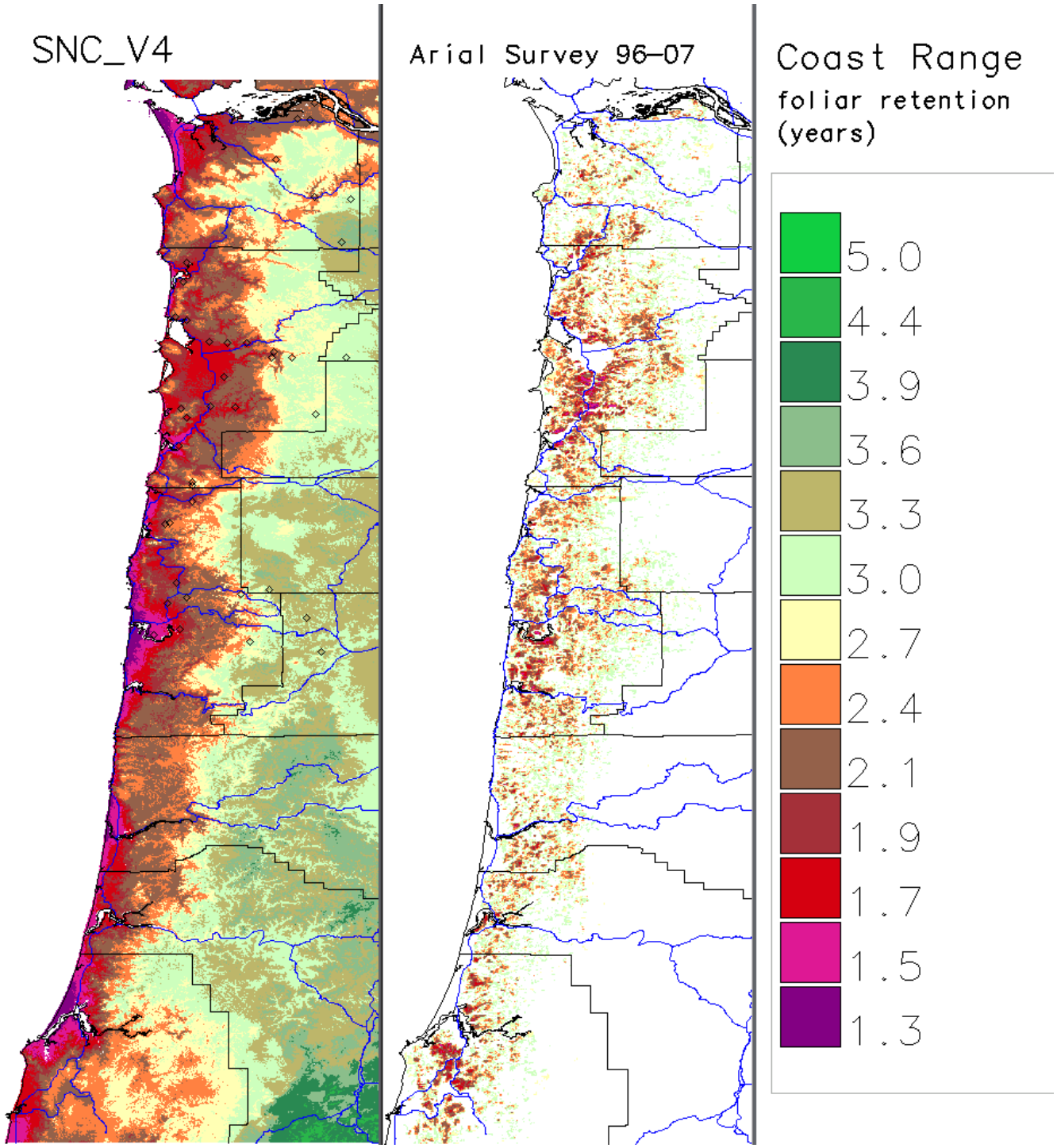
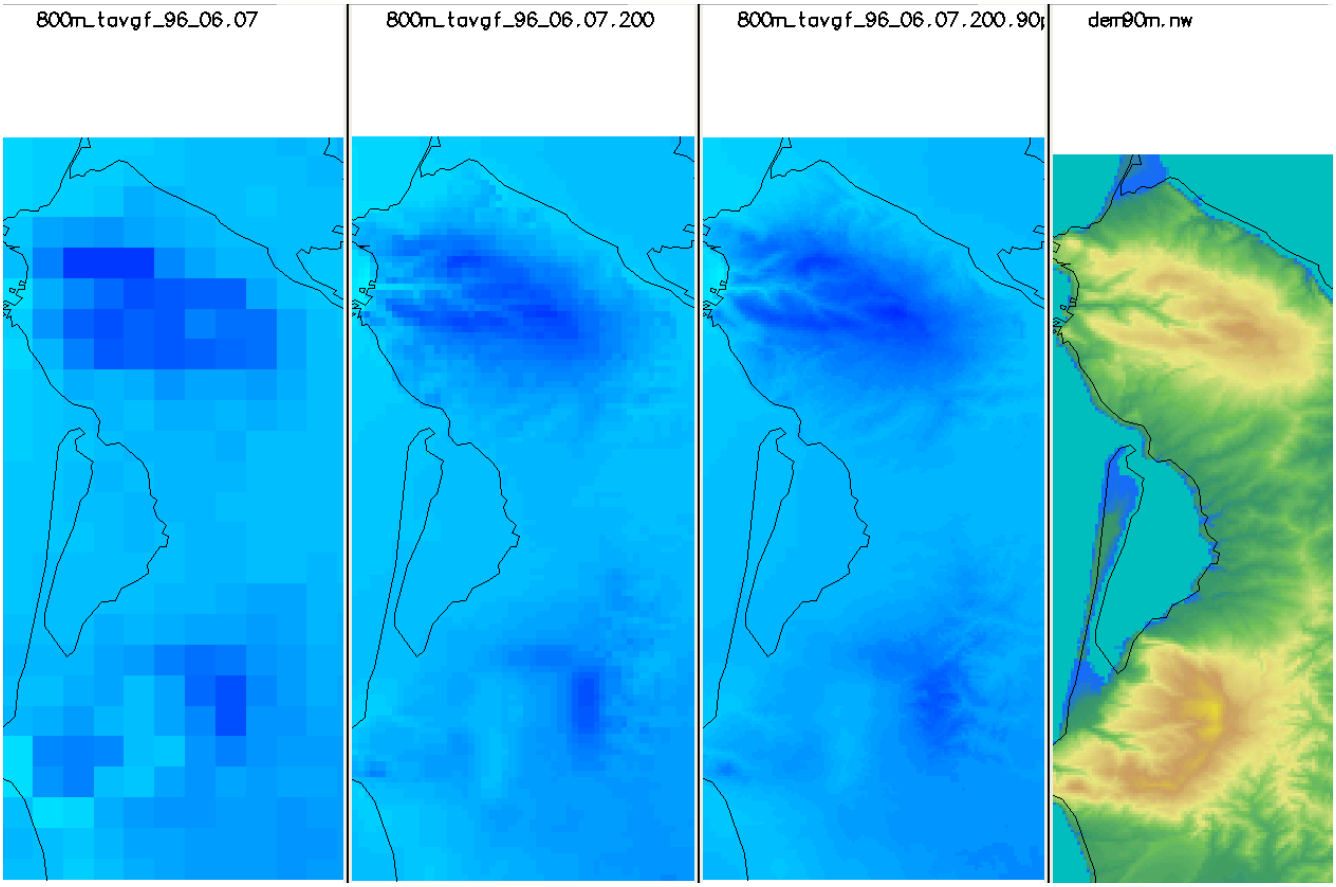
Explanation of variables used in the model:
SNC_V4 - predicted foliar retention in years
DPD90.06 - the PRISM climate map based 1996-2006 avg. June dew pt deficit (temperature minus dew point, both downscaled from PRISM data [800m starting resolution, temperature and 2.4km starting resolution, dewpoint])
T90.w - the PRISM based winter average temperature, 1996-2006, also downscaled from 800m to 90m using GWR
asp36 - recoded ASPECT dependent on elevation (90 meter resolution)
beginning with ASPECT coded as: 2.00=SW 1.00=NE,SE or neutral and 0=NE,
the following rules were applied:
if elev>700 then asp36=0.2+ASPECT/7
else if elev>350 then asp36=0.6+ASPECT/3
else if elev<200 then asp36=3.2+ASPECT/3
else asp36=1.6+ASPECT/3

these rules were derived through correlation analysis.

The model in comparison to the cumulative 1996-2007 arial survey data for most of the SNC affected areas of the Oregon Coast range is shown (Fig. 1):



Example of GWR downscaling 1996-2006 avg. July PRISM climate maps for temperature from 800m->200m->90m using digital elevation data (Fig. 2):



At the recent SNC Cooperative field trip, for the 3 sites visited, the DPD06, and predicted old vs new foliage retention values were:

Site	DPD06	SNC_V4	SNC_V2
Boone Island	3.64	1.55	2.33
Alder/Conifer	4.42	2.24	2.85
Nashville	5.7	3.38	4.64

We see that the lower the avg. June dewpt deficit, the lower the foliar retention. The older model was more conservative than the new model, and over predicted foliar retention relative to the new model. This is probably due to differences in sampling and measurement techniques, and to the life table approach used for the Manter et al. data used to develop the SNC_V2 model.

The model scatter plot for each independent variable, fitted model, and residual plots are shown (Fig. 3):