*This a Readme file complementing the retrievals of geospatial variables as part of the ABoVE Fire Synthesis workshop*

***Brendan Rogers July 25, 2017 (updated on January 9, 2018)***

***Liz Hoy added additional variables and updated the readme file and combustion\_table.txt file : September 2017***

**Permafrost variables** from Gruber, S. (2012), Derivation and analysis of a high-resolution estimate of global permafrost zonation, *Cryosphere*, *6*(1), 221–233, doi:10.5194/tc-6-221-2012.

Permafrost zonation index (PFI, 0-1). Areas outside the permafrost zone were assigned 0.

Ruggedness

**Soil properties** from Hengl, T., J. M. de Jesus, G. B. M. Heuvelink, M. R. Gonzalez, M. Kilibarda, A. Blagotic, W. Shangguan, M. N. Wright, X. Geng, B. Bauer-Marschallinger, M. A. Guevara, R. Vargas, R. A. MacMillan, N. H. Batjes, J. G. B. Leenaars, E. Ribeiro, I. Wheeler, S. Mantel, and B. Kempen (2017), SoilGrids250m: Global gridded soil information based on machine learning, *PLoS One*, *12*(2), e0169748, doi:10.1371/journal.pone.0169748.

Integrated to 30 and 100 cm depth in the soil profile.

Bulk density (g/cm3, BD\_30 and BD\_100)

pH in water (pH\_30 and pH\_100)

Sand (%, Sand\_30 and Sand\_100)

Silt (%, Silt\_30 and Silt\_100)

Clay (%, Clay\_30 and Clay\_100)

Soil organic carbon stock (g/cm2, SOC\_30 and SOC\_100)

**Long-term mean climate (1970-2000)** from Fick, S. E., and R. J. Hijmans (2017), WorldClim 2: new 1-km spatial resolution climate surfaces for global land areas, *Int. J. Climatol*, doi:10.1002/joc.5086.

Mean temperature during May-August (degrees C, tavg\_5\_8)

Average daily maximum temperature during May-August (degrees C, tmax\_5\_8)

Average daily minimum temperature during May-August (degrees C, tmin\_5\_8)

Mean monthly precipitation during May-August (mm month-1, prec\_5\_8)

Mean annual temperature (degrees C, bio1\_MAT)

Mean diurnal range (degress C, bio2\_MDR)

Maximum temperature of warmest month (degrees C, bio5\_tmax\_warm)

Mean annual precipitation (mm/year, bio12\_MAP)

**Pre-fire vegetation**, derived from a combination of

Ottmar, R. D., D. V. Sandberg, C. L. Riccardi, and S. J. Prichard (2007), An overview of the Fuel Characteristic Classification System - Quantifying, classifying, and creating fuelbeds for resource planning, *Can. J. For. Res.*, *37*(12), 2383–2393, doi:10.1139/X07-077.

And

Beaudoin, A., P. Y. Bernier, L. Guindon, P. Villemaire, X. J. Guo, G. Stinson, T. Bergeron, S. Magnussen, and R. J. Hall (2014), Mapping attributes of Canada’s forests at moderate resolution through kNN and MODIS imagery, *Can. J. For. Res.*, *44*(5), 521–532, doi:10.1139/cjfr-2013-0401.

Non-vegetated (%, NV)

Grass and shrubs (%, GRSH)

Deciduous trees (%, DEC)

Black spruce (%, BS)

White spruce (%, WS)

Jack pine (%, JP)

Other conifers (%, OCON)

**Long-term mean climate (1981-2010)** from ClimateNA: Wang, T., Hamann, A., Spittlehouse, D. and Carroll, C.: Locally Downscaled and Spatially Customizable Climate Data for Historical and Future Periods for North America, PLoS One, 11(6), e0156720, doi:[10.1371/journal.pone.0156720](https://doi.org/10.1371/journal.pone.0156720), 2016.

*Mean monthly conditions between May and August*

Mean temperature during May-August (degrees C, CNA\_Tave\_5\_8)

Maximum temperature during May-August (degrees C, CNA\_Tmax\_5\_8)

Minimum temperature during May-August (degrees C, CNA\_Tmin\_5\_8)

Precipitation during May-August (mm month-1 , CNA\_PPT\_5\_8)

Mean solar radiation during May-August (MJ M-2 d-1, CNA\_TRad\_5\_8)

Mean relative humidity during May-August (%, CNA\_RH\_5\_8)

Mean Hargreaves climate moisture deficit during May-August (mm month-1, CNA\_CMD\_5\_8)

*Annual*

Mean annual temperature (degrees C, CNA\_MAT)

Mean annual precipitation (mm, CNA\_MAP)

Mean warmest month temperature (degrees C, CNA\_MWMT)

Continentality (difference b/n mean warmest and coldest month temperatures, degrees C, CNA\_TD)

Degree-days above 5 degrees C, growing degree-days (degree-days, CNA\_DD5)

Degree-days above 18 degrees C, cooling degree-days (degree-days, CNA\_DD18)

Number of frost-free days (days, CNA\_NFFD)

Frost-free period (days, CNA\_FFP)

Precipitation as snow between August in previous year and July in current year (mm, CNA\_PAS)

Hargreaves climate moisture deficit (mm year-1, CNA\_CMD)

Mean annual solar radiation (MJ M-2 d-1, CNA\_MAR)

Mean annual relative humidity (%, CNA\_RH)

Summer heat-moisture index (mean warmest month temperature/mean summer precipitation, CNA\_SHM)

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***Sander Veraverbeke July 3, 2017***

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Day of burning (DOB) (local solar time)

DOB is assigned from the nearest active fire location in the MCD14ML active fire dataset.

NaN values were assigned if no active fire occurred within 5000 m.

Precipitation (mm)

Temperature (degree C)

Relative humidity (%)

Wind speed (m/s)

Drought code (DC)

Duff moisture code (DMC)

Fine fuel moisture code (FFMC)

Initial spread index (ISI)

Buildup Index (BUI)

Daily severity rating (DSR)

From Field, R. D., et al. "Development of a global fire weather database." *Natural Hazards and Earth System Sciences* 15.6 (2015): 1407-1423.

Peat

True-false value based on Yu, Zicheng, et al. "Global peatland dynamics since the Last Glacial Maximum." *Geophysical Research Letters* 37.13 (2010).

Tree cover (%)

From Hansen, Matthew C., et al. "High-resolution global maps of 21st-century forest cover change." *science* 342.6160 (2013): 850-853.

Distance to unburned (m)

Only for Alaska, Yukon and Northwest Territories (plots in other regions have been assigned NaN values). Based on burned area maps from Veraverbeke, Sander, et al. "Lightning as a major driver of recent large fire years in North American boreal forests." *Nature Climate Change* 7 (2017): 529-534.

differenced Normalized Burn Ratio (dNBR)

Derived from the Google Earth Engine.

Based on mean summer composite images of the year before and after the fire. Summer was defined as between July 1 and August 31.

Tasseled cap brightness (TCB)

Derived from the Google Earth Engine.

Based on mean spring composite images of the year after the fire. Spring was defined as between May 16 and June 15 (following recommendations by Tatiana Loboda).

Elevation (m)

Slope (degree)

Aspect (degree)

From Tachikawa, Tetushi, et al. *ASTER global digital elevation model version 2-summary of validation results*. NASA, 2011.

Topographic wetness index (TWI)

Calculated from the ASTER GDEM using the TopoToolbox 2

Schwanghart, Wolfgang, and Dirk Scherler. "TopoToolbox 2-MATLAB-based software for topographic analysis and modeling in Earth surface sciences." *Earth Surface Dynamics* 2.1 (2014): 1.