## Dataset Description

| | |
|---|---|
| **Dataset Name*** | Eddy Covariance Wetland Dataset 2019 |
| **Dataset Description*** | 30-minute averaged eddy covariance data from combination of open and closed path systems |
| **Project Name** | Keeyask Greenhouse Gas Monitoring Project |
| **Dataset Keywords*** | Eddy covariance, carbon, greenhouse gas, wetland, carbon fluxes, freshwater fluxes, peatland, fluxes, boreal |
| **Dataset keyword Vocabulary** | Polar Data Catalogue |
| **Dataset Status*** | Complete |
| **Dataset Version*** | 1.0 |
| **Dataset Research Area*** | Northern Manitoba, Nelson River, Gillam, MB |
| **Dataset Maintenance and Update Frequency*** | As Needed |
| **Resource Type*** | Dataset |
| **Dataset Collection Start Date*** | 2019-05-09 |
| **Dataset Collection End Date** | 2019-09-24 |
| **Date Last Revision*** | 2020-04-20 |
| **Dataset DOI** | |
| **Dataset Citation** | How user would like dataset cited. Default for citing an entire **Project dataset** is:<br>**Papakyriakou, Tim; Gill, Robert; Soloway, Ashley, 2020, "Dataset Title", DOI, CanWIN, 1.0**<br>For citing **one file** within a Project dataset is:<br>**Papakyriakou, Tim; Gill, Robert; Soloway, Ashley, 2020, "Dataset name", *Keeyask Greenhouse Gas Monitoring Project,* DOI, CanWin, 1.0** |

## Dataset Contributors

| | |
|---|---|
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| **Data Curator Affiliation*** | CEOS/University of Manitoba |
| **Metadata Creation Date*** | 05-22-2020 |

## Deployment Information

| Platform Name | Platform Type | Start Date | End Date | Deployment | Coordinated (Dataset) Platform Deployment |
|---|---|---|---|---|---|
| Eddy Covariance Tower | Tripod | 2019-05-09 | 2019-09-24 | Wetland stemming from the Nelson River (future site of the Keeyask Resrvoir) | |

## Site Information

| Site ID* | Site Description | Site Latitude* | Site Longitude* | Site Type* | Site Location Country |
|---|---|---|---|---|---|
| Channel Site | Old Permanent Channel Site – Bank of Nelson River allowing measurement of river GHG exchange | 56.298061 | -95.471228 | Aquatic GHG Measurement Site | Canada |

## Collection and Analysis Procedures

| | |
|---|---|
| **Sample Collection Method Name*** | Eddy Covariance |
| **Method Link** | |
| **Method Summary** | |
| **Analytical Method Name*** | N/A |
| **Analytical Method Link** | |
| **Analytical Method Summary** | |
| **Analytical Laboratory Name** | |

## Processing Description

- See readme file

## CanWIN Data Cleaning Notes

If Data was cleaned using CanWIN, please either provide link to detailed cleaning methods or a summary of what was done to the data. CanWIN Data Manager usually fills in.

## Variable Detection Limits

| Variable Name | Units | Detection Limit Value and units |
|---|---|---|
| U | m/s | [± 30] |
| W | m/s | [± 5] |
| $T_s$ | °C | [-40, 50] |
| $CO_2$ | µmol/mol | [200, 900] |
| $CH_4$ | µmol/mol | [0.17, 1000] |
| $H_2O$ | mmol/mol | [0, 40] |

**Table 1. CanWIN & User defined Detection Limit Codes**

| CanWIN Description | User Code | Method |
|---|---|---|
| Above detection limit | | |
| Below detection limit | | |

## Instruments

| CanWin Instrument Name | Common Instrument Description | Activity Collection Type | Variable Measured with Units |
|---|---|---|---|
| $CO_2$/$H_2O$ Gas Analyzer | LI-7500 | Field Measurements - Continuous atmospheric $CO_2$ and $H_2O$ measurements | $CO_2$ and $H_2O$ concentration (molar density - mmol/$m^3$) |
| $CH_4$ Gas Analyzer | LI-7700 | Field Measurements - Continuous atmospheric $CH_4$ measurements | $CH_4$ concentration (molar density - mmol/$m^3$) |
| Wind Anemometer | Gill WindMaster Pro Anemometer | Field Measurements - Continuous 3D wind | Wind speed (m/s)<br>Wind direction (degrees)<br>Sonic Temperature (K)<br>Vertical and Horizontal wind Speed (U, V, W - m/s) |

## Instrument/Result Data Parameters*

- Error code = NaN
    - "Not a Number" – occurs when data were missing for the time period in question of if data were removed based on data processing/analysis
- For details on processing and calculations, please refer to eddypro manual https://www.licor.com/env/support/EddyPro/menu.html and/or eddypro project file

| Table 1. **Shorthand for variables in output files from EddyPro.** | | | | |
|---|---|---|---|---|
| **Label** | **Units, Format, or Range** | **Description** | **Result Value Type** | **Formula or Script** |
| **filename** | - | Name of the raw file (or the first of a set) from which the dataset for the current averaging interval was extracted | Actual | |
| **date** | yyyy-mm-dd | Date of the end of the averaging period | Actual | |
| **time** | HH:MM | Time of the end of the averaging period | Actual | |
| **file_records** | # | Number of valid records found in the raw file (or set of raw files) | Actual | |
| **used_records** | # | Number of valid records used for current the averaging period | Actual | |
| **Tau** | kg m-1 s-2 | Corrected momentum flux | Calculated | |
| **qc_Tau** | # | Quality flag for momentum flux | Calculated | |
| **rand_err_Tau** | kg m-1 s-2 | Random error for momentum flux, if selected | Calculated | |
| **H** | W m-2 | Corrected sensible heat flux | Calculated | |
| **qc_H** | # | Quality flag for sensible heat flux | Calculated | |
| **rand_err_H** | W m-2 | Random error for momentum flux, if selected | Calculated | |
| **LE** | W m-2 | Corrected latent heat flux | Calculated | |
| **qc_LE** | # | Quality flag latent heat flux | Calculated | |
| **rand_err_LE** | W m-2 | Random error for latent heat flux, if selected | Calculated | |
| **gas_flux** | µmol m-2 s-1(†) | Corrected gas flux | Calculated | |
| **qc_ gas_flux** | # | Quality flag for gas flux | Calculated | |
| **rand_err_ gas_flux** | µmol s-1 m-2(†) | Random error for gas flux, if selected | Calculated | |
| **H_strg** | W m-2 | Estimate of storage sensible heat flux | Calculated | |
| **LE_strg** | W m-2 | Estimate of storage latent heat flux | Calculated | |
| **gas_strg** | µmol s-1 m-2(†) | Estimate of storage gas flux | Calculated | |
| **gas_v-adv** | µmol s-1 m-2(†) | Estimate of vertical advection flux | Calculated | |
| **gas_molar_density** | mmol m-3 | Measured or estimated molar density of gas | Actual | |

| | | | | |
|---|---|---|---|---|
| **gas_mole_fraction** | µmol mol-1(†) | Measured or estimated mole fraction of gas | Actual | |
| **gas_mixing_ratio** | µmol mol-1(†) | Measured or estimated mixing ratio of gas | | |
| **gas_time_lag** | s | Time lag used to synchronize gas time series | | |
| **gas_def_timelag** | T/F | Flag: whether the reported time lag is the default (T) or calculated (F) | | |
| **sonic_temperature** | K | Mean temperature of ambient air as measured by the anemometer | Actual | |
| **air_temperature** | K | Mean temperature of ambient air, either calculated from high frequency air temperature readings, or estimated from sonic temperature | Calculated | |
| **air_pressure** | Pa | Mean pressure of ambient air, either calculated from high frequency air pressure readings, or estimated based on site altitude (barometric pressure) | Calculated | |
| **air_density** | kg m-3 | Density of ambient air | Calculated | |
| **air_heat_capactiy** | J K-1 kg-1 | Specific heat at constant pressure of ambient air | Calculated | |
| **air_molar_volume** | m3 mol-1 | Molar volume of ambient air | Calculated | |
| **ET** | mm hour-1 | Evapotranspiration flux | Calculated | |
| **water_vapor_density** | kg m-3 | Ambient mass density of water vapor | Calculated | |
| **e** | Pa | Ambient water vapor partial pressure | Calculated | |
| **es** | Pa | Ambient water vapor partial pressure at saturation | Calculated | |
| **specific_humidity** | kg kg-1 | Ambient specific humidity on a mass basis | Measured | |
| **RH** | % | Ambient relative humidity | Calculated | |
| **VPD** | Pa | Ambient water vapor pressure deficit | Calculated | |
| **Tdew** | K | Ambient dew point temperature | Calculated | |
| **u_unrot** | m s-1 | Wind component along the u anemometer axis | Actual | |
| **v_unrot** | m s-1 | Wind component along the v anemometer axis | Actual | |
| **w_unrot** | m s-1 | Wind component along the w anemometer axis | Actual | |
| **u_rot** | m s-1 | Rotated u wind component (mean wind speed) | Calculated | |
| **v_rot** | m s-1 | Rotated v wind component (should be zero) | Calculated | |
| **w_rot** | m s-1 | Rotated w wind component (should be zero) | Calculated | |
| **wind_speed** | m s-1 | Mean wind speed | Calculated | |
| **max_wind_speed** | m s-1 | Maximum instantaneous wind speed | Calculated | |

| | | | | |
|---|---|---|---|---|
| **wind_dir** | ° (degrees) | Direction from which the wind blows, with respect to Geographic or Magnetic north | Actual | |
| **yaw** | ° (degrees) | First rotation angle | Calculated | |
| **pitch** | ° (degrees) | Second rotation angle | Calculated | |
| **u*** | m s-1 | Friction velocity | Calculated | |
| **TKE** | m2 s-2 | Turbulent kinetic energy | Calculated | |
| **L** | M | Monin-Obukhov length | Calculated | |
| **(z-d)/L** | # | Monin-Obukhov stability parameter | Calculated | |
| **bowen_ratio** | # | Sensible heat flux to latent heat flux ratio | Calculated | |
| **T*** | K | Scaling temperature | Calculated | |
| **(footprint) model** | - | Model for footprint estimation | Calculated | |
| **x_offset** | m | Along-wind distance providing <1% contribution to turbulent fluxes | Calculated | |
| **x_peak** | m | Along-wind distance providing the highest (peak) contribution to turbulent fluxes | Calculated | |
| **x_10%** | m | Along-wind distance providing 10% (cumulative) contribution to turbulent fluxes | Calculated | |
| **x_30%** | m | Along-wind distance providing 30% (cumulative) contribution to turbulent fluxes | Calculated | |
| **x_50%** | m | Along-wind distance providing 50% (cumulative) contribution to turbulent fluxes | Calculated | |
| **x_70%** | m | Along-wind distance providing 70% (cumulative) contribution to turbulent fluxes | Calculated | |
| **x_90%** | m | Along-wind distance providing 90% (cumulative) contribution to turbulent fluxes | Calculated | |
| **un_Tau** | kg m-1 s-2 | Uncorrected momentum flux | Calculated | |
| **Tau_scf** | # | Spectral correction factor for momentum flux | Calculated | |
| **un_H** | W m-2 | Uncorrected sensible heat flux | Calculated | |
| **H_scf** | # | Spectral correction factor for sensible heat flux | Calculated | |
| **un_LE** | W m-2 | Uncorrected latent heat flux | Calculated | |
| **LE_scf** | # | Spectral correction factor for latent heat flux | Calculated | |
| **un_gas_flux** | µmol s-1 m-2(†) | Uncorrected gas flux | Calculated | |
| **gas_scf** | # | Spectral correction factor for gas flux | Calculated | |

| | | | | |
|---|---|---|---|---|
| **spikes** | 8u/v/w/ts/co2 /h2o/ch4/none | Hard flags for individual variables for spike test | Calculated | |
| **amp_res** | 8u/v/w/ts/co2 /h2o/ch4/none | Hard flags for individual variables for amplitude resolution | Calculated | |
| **drop_out** | 8u/v/w/ts/co2 /h2o/ch4/none | Hard flags for individual variables for drop-out test | Calculated | |
| **abs_lim** | 8u/v/w/ts/co2 /h2o/ch4/none | Hard flags for individual variables for absolute limits | Calculated | |
| **skw_kur** | 8u/v/w/ts/co2 /h2o/ch4/none | Hard flags for individual variables for skewness and kurtosis | Calculated | |
| **skw_kur** | 8u/v/w/ts/co2 /h2o/ch4/none | Soft flags for individual variables for skewness and kurtosis test | Calculated | |
| **discontinuities** | 8u/v/w/ts/co2 /h2o/ch4/none | Hard flags for individual variables for discontinuities test | Calculated | |
| **discontinuities** | 8u/v/w/ts/co2 /h2o/ch4/none | Soft flags for individual variables for discontinuities test | Calculated | |
| **time_lag** | 8u/v/w/ts/co2 /h2o/ch4/none | Hard flags for gas concentration for time lag test | Calculated | |
| **time_lag** | 8u/v/w/ts/co2 /h2o/ch4/none | Soft flags for gas concentration for time lag test | Calculated | |
| **attack_angle** | 8u/v/w/ts/co2 /h2o/ch4/none | Hard flag for attack angle test | Calculated | |
| **non_steady_wind** | 8u/v/w/ts/co2 /h2o/ch4/none | Hard flag for non-steady horizontal test | Calculated | |
| **var_spikes** | # | Number of spikes detected and eliminated for variable var | Calculated | |
| **AGC** | # | Mean value of AGC for LI-7500RS or LI-7200RS | Calculated | |
| **RSSI** | # | Mean value of RSSI for LI-7700, if present | Calculated | |
| **var_var** | -(‡) | Variance of variable var | Calculated | |
| **w/var_cov** | -(‡) | Covariance between w and variable var | Calculated | |
| **extravar_mean** | (‡) | Mean value of extravar | Calculated | |
| ** **Error Code = NaN.** Occurs if no measurement was taken during the period, data did not meet quality control/processing measures.<br>*** PPFD and AirT/RH were measured at channel site, in close enough proximity to extrapolate to the wetland site (see related datasets) | | | | |

Data2019_processed_subset_backbay.csv

| Table 1**. Shorthand for variables in output files from EddyPro.** | | | | |
|---|---|---|---|---|
| **Label** | **Units, Format, or Range** | **Description** | **Result Value Type** | **Formula or Script** |
| **Date_1** | # | Year | | |
| **Date_2** | # | Mont | | |
| **Date_3** | # | Day | | |
| **time** | HH:MM | Time of the end of the averaging period | Actual | |
| **DOY** | # | Day of year | Actual | |
| **Wind_sp** | m/s | Wind speed | Actual | |
| **Winddir_bb** | Degrees | Wind direction | Actual | |
| **Ustar** | m/s | Friction velocity | calculated | |
| **RH_bb** | % | Relative humidity | Actual | |
| **Airt_bb** | K | Air temperature | Actual | |
| **Tau** | kg m-1 s-2 | Corrected momentum flux | Calculated | |
| **Fco2_bbn** | µmol/$m^2$/s | Corrected Co2 flux from desired north wind | calculated | |
| **Fco2_bbs** | µmol/$m^2$/s | Corrected Co2 flux from desired south wind | calculated | |
| **Fco2 _day_bbn** | µmol/$m^2$/s | Daytime Corrected Co2 flux from north wind | calculated | |
| **Fco2_night_bbn** | µmol/$m^2$/s | Nighttime Corrected Co2 flux from desired north wind | calculated | |
| **Fco2 _day_bbs** | µmol/$m^2$/s | Daytime Corrected Co2 flux from desired south wind | calculated | |
| **Fco2_night_bbs** | µmol/$m^2$/s | Nighttime Corrected Co2 flux from desired south wind | calculated | |
| **Fch4_bbn** | µmol/$m^2$/s | Corrected Ch4 flux from desired north wind | calculated | |
| **Fch4_bbs** | µmol/$m^2$/s | Corrected Ch4 flux from desired south wind | calculated | |
| **Fch4 _day_bbn** | µmol/$m^2$/s | Daytime Corrected Ch4 flux from north wind | calculated | |
| **Fch4_night_bbn** | µmol/$m^2$/s | Nighttime Corrected Ch4 flux from desired north wind | calculated | |
| **Fch4 _day_bbs** | µmol/$m^2$/s | Daytime Corrected Ch4 flux from desired south wind | calculated | |
| **Fch4_night_bbs** | µmol/$m^2$/s | Nighttime Corrected Ch4 flux from desired south wind | calculated | |
| **H_bbn** | W m-2 | Corrected sensible heat flux north wind | Calculated | |
| **H_day_bbn** | W m-2 | Daytime Corrected sensible heat flux north wind | Calculated | |
| **H_night_bbn** | W m-2 | Nighttime Corrected sensible heat flux north wind | Calculated | |
| **H_bbs** | W m-2 | Corrected sensible heat flux south wind | Calculated | |
| **H_day_bbs** | W m-2 | Daytime Corrected sensible heat flux south wind | Calculated | |

| | | | | |
|---|---|---|---|---|
| **H_night_bbs** | W m-2 | Nighttime Corrected sensible heat flux south wind | Calculated | |
| **LE_bbn** | W m-2 | Corrected latent heat flux north wind | Calculated | |
| **LE_day_bbn** | W m-2 | Daytime Corrected latent heat flux north wind | Calculated | |
| **LE_night_bbn** | W m-2 | Nighttime Corrected latent heat flux north wind | Calculated | |
| **LE_bbs** | W m-2 | Corrected latent heat flux south wind | Calculated | |
| **LE_day_bbs** | W m-2 | Daytime Corrected latent heat flux south wind | Calculated | |
| **LE_night_bbs** | W m-2 | Nighttime Corrected latent heat flux south wind | Calculated | |
| **Bow_rat_bbn** | # | Sensible heat flux to latent heat flux ratio north wind | Calculated | |
| **Bow_rat_bbs** | # | Sensible heat flux to latent heat flux ratio south wind | Calculated | |
| **Rssi_75** | # | Mean value of RSSI for LI-7500, if present (signal strength) | Calculated | |
| **Rssi_77** | # | Mean value of RSSI for LI-7700, if present (signal strength) | Calculated | |
| **X_10** | m | Along-wind distance providing 10% (cumulative) contribution to turbulent fluxes | Calculated | |
| **X_30** | m | Along-wind distance providing 30% (cumulative) contribution to turbulent fluxes | Calculated | |
| **X_50** | m | Along-wind distance providing 50% (cumulative) contribution to turbulent fluxes | Calculated | |
| **X_70** | m | Along-wind distance providing 70% (cumulative) contribution to turbulent fluxes | Calculated | |
| **X_90** | m | Along-wind distance providing 90% (cumulative) contribution to turbulent fluxes | Calculated | |
| **X_peak** | m | Along-wind distance providing the highest (peak) contribution to turbulent fluxes | Calculated | |

| CanWIN Short Code | Definition | User Code |
|---|---|---|
| $ | Incorrect sample container | |
| EFAI | Equipment failure, sample lost | |
| FEQ | Field Equipment Questionable | |
| FFB | Failed. Field blank not acceptable | NaN |

| | | |
|---|---|---|
| FFD | Field Duplicate, failed | |
| FFS | Failed. Field spike not acceptable | |
| H | Holding time exceeded | |
| ISP | Improper Sample Preservation | |
| ITNA | Incubation time not attained | |
| ITNM | Incubation temperature not maintained | |
| JCW | Sample Container Damaged, sample lost | |
| NC | Not Collected | NaN |
| ND | Not detected | |
| NS | Sample collected but not submitted | |

**Table 2. Statistics applied options**

| Statistics Applied | Description |
|---|---|
| 30DADMean | Thirty day average daily mean |
| 7DADM | Seven Day Average Daily Maximum |
| 7DADMean | Seven day average daily mean |
| 7DADMin | Seven day average daily minimum |
| Coefficient of variation | |
| Daily Geometric Mean | Calculating a geometric mean (a daily period) provides a number that is more representative of the median and helps reduce the effect of a few extreme values. |
| Daily Maximum | The largest value of a set, each period of a day cycle |
| Daily Minimum | The smallest value of a set, each period of a day cycle |
| Hourly Maximum | The largest value of a set, each period of a hour cycle |
| Hourly Minimum | The smallest value of a set, each period of a hour cycle |
| MatLab script | Provide MatLab script or link to script |
| Mean | mean is the sum of all the numbers in the set divided by the amount of numbers in the set |

| | |
|---|---|
| Median | median is the middle point of a number set, in which half the numbers are above the median and half are below. |
| None | None |
| R script | Provide R script or link to script |
| Standard Deviation | This describes the spread of values in the sample |
| Standard Error | This is the standard deviation of the sample mean, xBar, and describes its accuracy as an estimate of the population mean, mu. |

## Terms of Use

| | |
|---|---|
| **License Type*** | Open |
| **Dataset License *** | **CC BY-NC-SA 4.0** |
| **Terms of Use** | Terms of Use for data. Restrictions and legal prerequisites for using the data set after access is granted. Default TOU is CanWIN's. |

## Terms of Access

| | |
|---|---|
| **Access Level*** | Allowed Users only |
| **Allowed Users** | Select users from CanWIN user list |
| **Embargo Date** | |
| **Embargo Time** | |
| **Embargo Time zone** | |
| **Access Constraints** | |

## Related

Example: a dataset in the series

| | |
|---|---|
| **Related Identifier ID** | Identifier also related to the dataset. Must be globally unique |
| **Identifier Type** | The type of Identifier<br>**Options:** ARK, bibcode, DOI, Handle, ISBN, ISSN, ISTC, PMID, PURL, UPC, URL, URN |
| **Relationship** | Description of the relationship of the dataset (A) and the related resource (B)<br>**Options:** Is Cited By, Cites, Is Supplement To, Is Supplemented By, Is Described By, Describes, Has Metadata, Is Metadata For, Has Version, Is Version Of, Is Part Of, Is Referenced By, References, Is Documented By, Documents, Is Identical To, Is Derived From, Is Required By |
| **Resource Type** | **Options:** Patent, Project deliverable, Project milestone, dataset, image, photo, poster, presentation, software, other |
| **If part of a series, name series** | |

## Related Publications

Cite any publications related to this dataset

**Ex.:** Book, Book Section, Conference Paper, Data Management Plan, Journal Article, Patent, Preprint, Proposal, Report, Software documentation, Technical note, Thesis, Working Paper

**Example Citation:** Lukovich, J. V., Babb, D. G., and Barber, D. G. ( 2011), On the scaling laws derived from ice beacon trajectories in the southern Beaufort Sea during the International Polar Year - Circumpolar Flaw Lead study, 2007–2008, J. Geophys. Res., 116, C00G07, doi: 10.1029/2011JC007049