

LIST OF TABLES

Sl no	Table Legends	Page nos
3.1	List of dominant plant species around the tower.	93
4.2.1	Monthly variation of leaf area index.	124
4.4.1	Percentage of soil organic carbon present in soil samples collected during winter season.	138
4.4.2	Percentage of soil organic carbon present in soil samples collected during pre-monsoon season.	138
4.4.3	Percentage of soil organic carbon present in soil samples collected during monsoon season.	139
4.4.4	Percentage of soil organic carbon present in soil samples collected during post-monsoon season.	139
4.4.5	Average bulk density of soil samples collected during winter season.	139
4.4.6	Average bulk density of soil samples collected during pre-monsoon season.	139
4.4.7	Average bulk density of soil samples collected during monsoon season.	140
4.4.8	Average bulk density of soil samples collected during post-monsoon season.	140

LIST OF FIGURES

Fig no	Figure legends	Page nos
3.1	Location map of study area.	92
4.1.1	Diurnal variations of CO ₂ concentration at 2 m, 4 m, 6 m and 8 m height.	104
4.1.2	Diurnal variations of CO ₂ concentration at 12 m, 16 m, 20 m and 37 m height.	105
4.1.3	Monthly variation of average CO ₂ concentration.	105
4.1.4	Monthly mean diurnal variations of half hourly CO ₂ flux	106
4.2.1	(a) Diurnal variations of air temperature (monthly mean); (b) Diurnal variations of relative humidity (monthly mean); (c) Diurnal variations in wind speed (monthly mean); (d) Monthly total rainfall recorded in the study area.	114
4.2.2	Diurnal variations (monthly mean) of soil temperature.	115
4.2.3	Diurnal variations (monthly mean) of incoming solar radiation.	115
4.2.4	Diurnal variations (monthly mean) of net radiation and photosynthetically active radiation.	116
4.2.5	Diurnal variations (monthly mean) of CO ₂ flux and vapour pressure deficit.	116
4.2.6	(a) Occurrence of friction velocity (u^*) in different bin limits during whole period and in different seasons; (b) Occurrence of standard deviations of vertical velocity fluctuations (σ_w) in different bin limits during whole period and in different seasons; (c) Occurrence of friction velocity (u^*) in different bin limits during whole period and in different seasons during day time; (d) Occurrence of friction velocity (u^*) in different bin limits during whole period and in different seasons during night time; (e) Occurrence of standard deviations of vertical velocity fluctuations (σ_w) in different bin limits during whole period and in different seasons during day time; (f) Occurrence of standard deviations of vertical velocity fluctuations (σ_w) in different bin limits during whole period and in different seasons during night time.	117

4.2.7	(a) Occurrence of stability parameter ($z-d/L$) in different bin limits during whole period and in different seasons. (b) Occurrence of stability parameter ($z-d/L$) in different bin limits during whole period and in different seasons during day time. (c) Occurrence of stability parameter ($z-d/L$) in different bin limits during whole period and in different seasons during night time.	118
4.2.8	Diurnal variations (monthly mean) of latent heat and sensible heat fluxes.	119
4.2.9	Diurnal variation (monthly mean) of evapotranspiration.	119
4.2.10	(a) Energy balance closure of the whole study period considering half hourly average of data; (b) Energy balance closure of the whole study period considering daily average of data.	120
4.2.11	Energy balance closure in different friction velocity (u^*) classes (a) 0 to 0.2 m s ⁻¹ (b) 0.2 to 0.4 m s ⁻¹ (c) 0.4 to 0.8 m s ⁻¹ (d) above 0.8 m s ⁻¹ .	121
4.2.12	Energy balance closure in different classes of standard deviations of vertical velocity ($\bar{\sigma}_w$) (a) 0 to 0.2 m s ⁻¹ ,(b) 0.2 to 0.4 m s ⁻¹ (c) 0.4 to 0.8 m s ⁻¹ (d) above 0.8 m s ⁻¹ .	122
4.2.13	Energy balance closure in different stability ($z-d/L$) classes (a) less than -1 ; (b) -1 to -0.05; (c) -0.05 to 0.05; (d) 0.05 to 1 and (e) greater than 1.	123
4.2.14	Relationship between monthly averaged LAI and maximum monthly value of negative CO ₂ flux.	124
4.3.1	(a) Daily average of gross primary productivity; (b) daily average of ecosystem respiration.	126
4.3.2	(a) Daily averages of net ecosystem productivity; (b) monthly total of gross primary productivity, ecosystem respiration and net ecosystem productivity.	127
4.3.3	Relationship between day time average of PAR vs CO ₂ flux during different months of study (a) March–April, 2016 (b)	128

	May-June, 2016 (c) July- August, 2016 (d) September- November, 2016.	
4.3.4	Relationship between daily averaged GPP and PAR during different months, (a) February (b) March (c) April (d) May (e) June.	129
4.3.5	Relationship between air temperature and ecosystem respiration for the whole period of study.	130
4.4.1	Seasonal variation of soil organic carbon (SOC).	132
4.4.2	Seasonal variation of soil bulk density.	133
4.4.3	Relationship between bulk density and soil organic carbon.	133
4.4.4	Variation of soil temperature at (a) 5 cm depth ; (b) 15 cm depth and (c) 40 cm depth.	134
4.4.5	Relationship between soil temperature and soil organic carbon.	134
4.4.6	Seasonal variation of ecosystem respiration.	135
4.4.7	Relationship between soil organic carbon content and ecosystem respiration.	135
4.4.8	Seasonal average of soil bulk density vs seasonal average of ecosystem respiration.	136
4.4.9	Relationship between soil temperature and ecosystem respiration.	136
4.4.10	Seasonal variation of C/N ratio at two different depths of soil.	137
4.4.11	Relationship between C/N ratio and ecosystem respiration.	137
4.4.12	Seasonal variation in SOC in terms of mass (Mg ha^{-1}) at 0-15 cm depth.	138

LIST OF PHOTOGRAPHS

Photograph no	Description	Page nos
3.1	Photograph of the tower	94
3.2	Solar panels around the tower	94
3.3	Batteries inside the cabin	94
3.4	Electric fence around the tower	94
3.5	Installation of sensors on the tower during 2014	95
3.6	Eddy covariance system; (a) Sonic anemometer (b) LI-7200 closed path analyzer.	95
3.7	Road to the tower site during monsoon -a challenge.	95

LIST OF ABBREVIATIONS AND UNITS

Abbreviations	Full forms
C	Carbon
CH ₄	Methane
CO ₂	Carbon dioxide
C _p	Specific heat of air at constant pressure
C/N	Carbon nitrogen ratio
d	zero plane displacement
EC	Eddy covariance
ET	Evapotranspiration flux
G	Soil heat flux
g	Gram
GPP	Gross primary productivity
Gt	Gigaton
H	Sensible heat flux
ha	Hectare
HCl	Hydrochloric acid
Hz	Hertz
H ₂ O	Water vapour
H ₂ SO ₄	Sulphuric acid
H ₂ O ₂	Hydrogen peroxide
IPCC	Intergovernmental Panel on Climate Change
KCL	Potassium chloride
kg	Kilogram
km	Kilometer
KMno ₄	Potassium permanganate
KNP	Kaziranga national park
Kpa	Kilopascal
<i>L</i>	Obukhov length
LAI	Leaf area index
LE	Latent heat flux
lpm	Litre per minute
mg	Milligram

Mg	Megagram
mm	Millimeter
m_w	Molar mass of water
m_{air}	Molar mass of air
N	Nitrogen
NaOH	Sodium hydroxide
NEE	Net ecosystem exchange
NEP	Net ecosystem productivity
nm	Nanometer
N ₂ O	Nitrous oxide
PAR	Photosynthetically active radiation
Pg	Petagram
ppb	Parts per billion
ppm	Parts per million
Re	Ecosystem respiration
RH	Relative humidity
RMSE	Root mean square error
Rn	Net radiation
s	Dry mole fraction
sec	Second
SOC	Soil organic carbon
SOM	Soil organic matter
t	Ton
Tg	Teragram
u^*	Friction velocity
VPD	Vapour pressure deficit
w	Vertical component of wind speed
W	Watt
yr	Year
z	Height of flux measurement
σ_w	Standard deviation of vertical velocity
%	Percentage
°C	Degree Celsius
ρ	Air density
