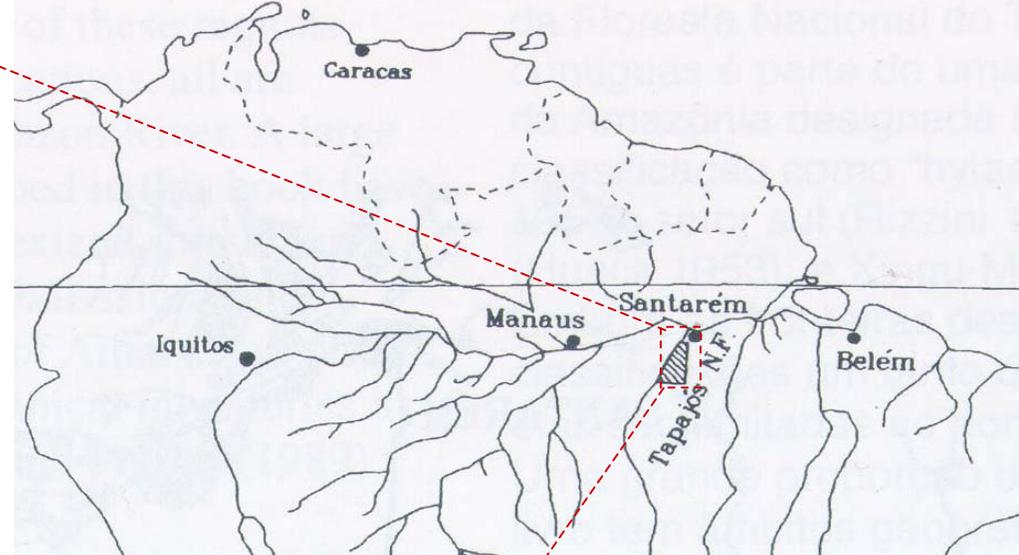


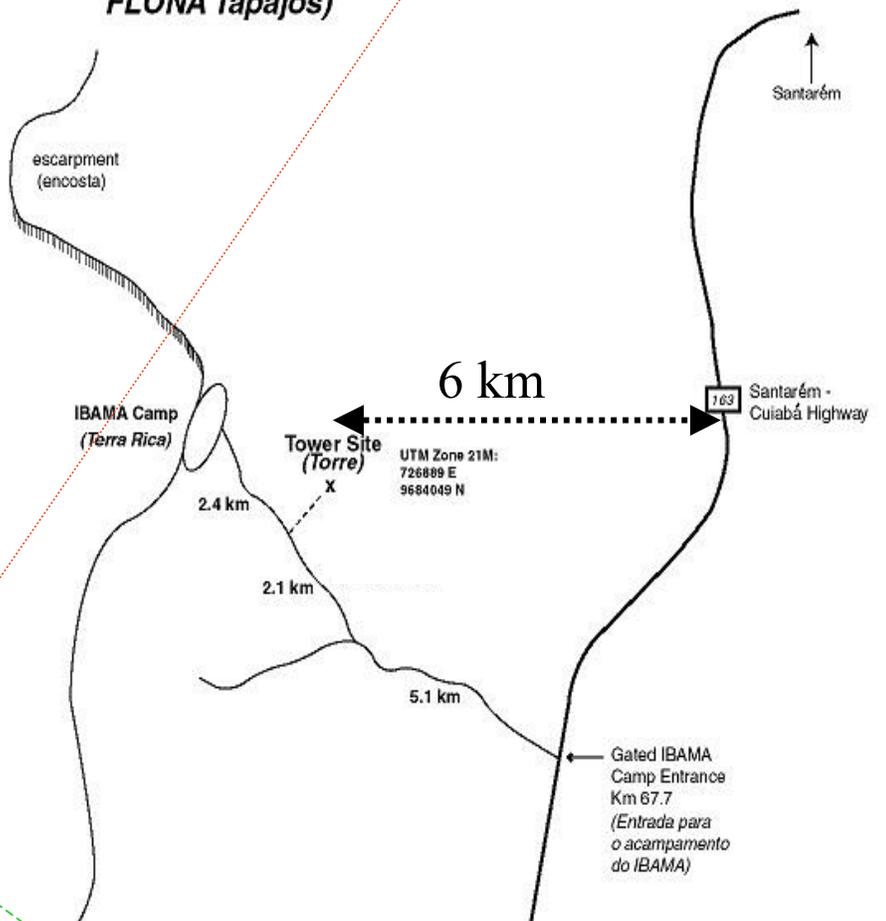
**TEMPORAL AND SPATIAL VARIABILITY IN  
RADON-222 FLUXES AND INVENTORIES IN  
THE FLONA TAPAJOS, PARA, BRASIL**

# CONCLUSIONS

- SYSTEMATIC ANNUAL VARIABILITY IN CANOPY RADON INVENTORIES AND SOIL FLUXES ARE CONTROLLED BY SOIL MOISTURE VARIABILITY
- 30 TO 90 DAY VARIABILITY IN CANOPY RADON INVENTORY MAY BE IN PHASE WITH THE MADDEN-JULIAN OSCILLATION
- LARGE GAS INVENTORY INCREASES NEAR GROUND DURING THE EARLY EVENING TRANSITION ARE CONTROLLED BY PHYSICAL STRATIFICATION
- AVAILABLE RADON DATA WILL ALLOW  $<$  HOURLY ASSESSMENT OF CANOPY AND CANOPY-ATMOSPHERE EXCHANGE PROCESSES FOR APPROXIMATELY 80% OF THE 2000 TO 2004 CAMPAIGN AT KM67
- COHERENCE BETWEEN KM67 AND KM83 CANOPY INVENTORY AND SOIL FLUX RADON RESULTS SUGGEST THAT KM67 RESULTS CAN BE DIRECTLY SCALED TO PRIMARY FOREST AREAS OF THE FLONA TAPAJOS

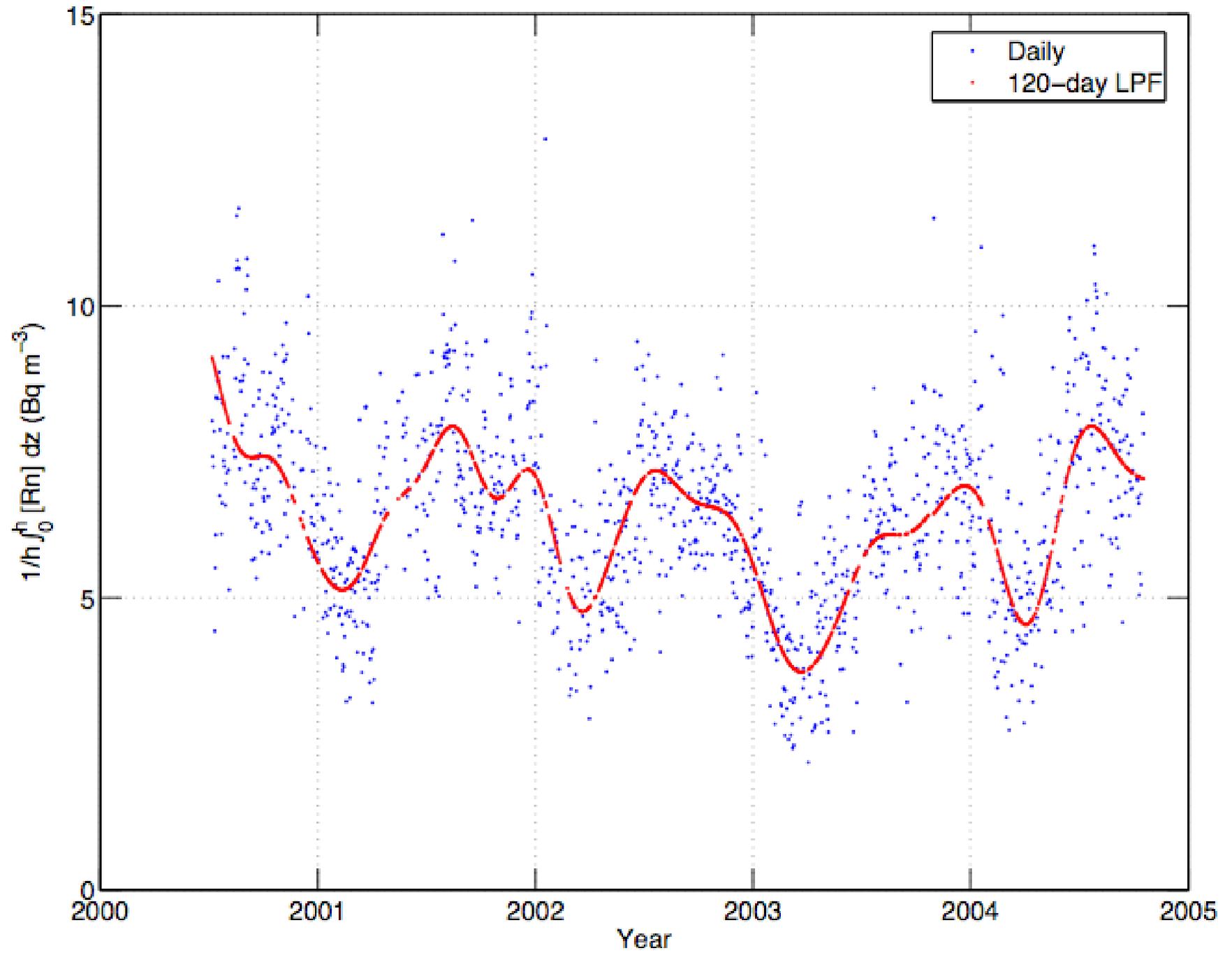


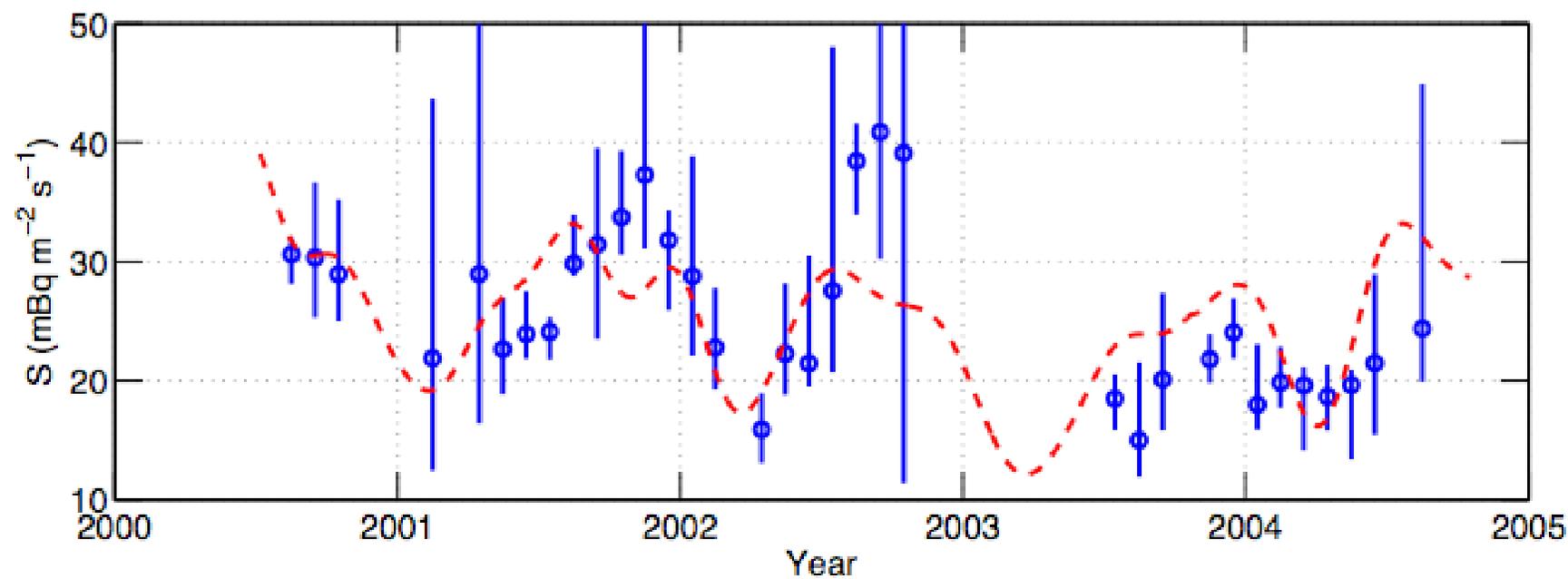
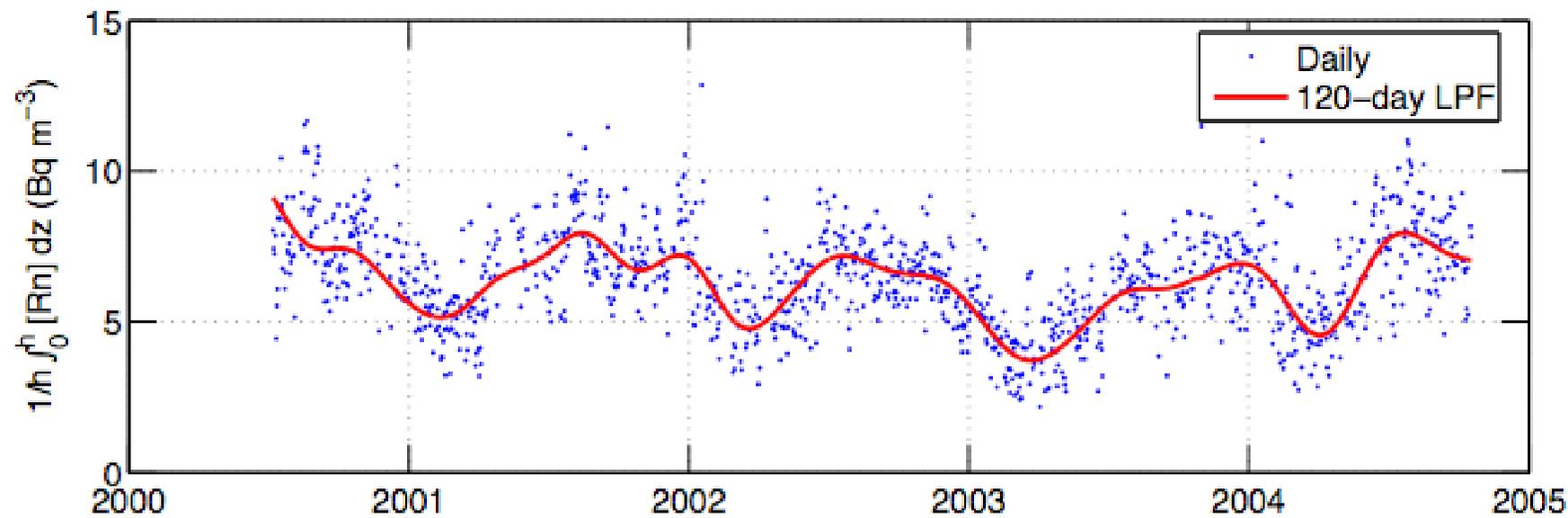
**Primary Forest Site Location**  
*(Localização da Torre Floresta Primária - FLONA Tapajós)*

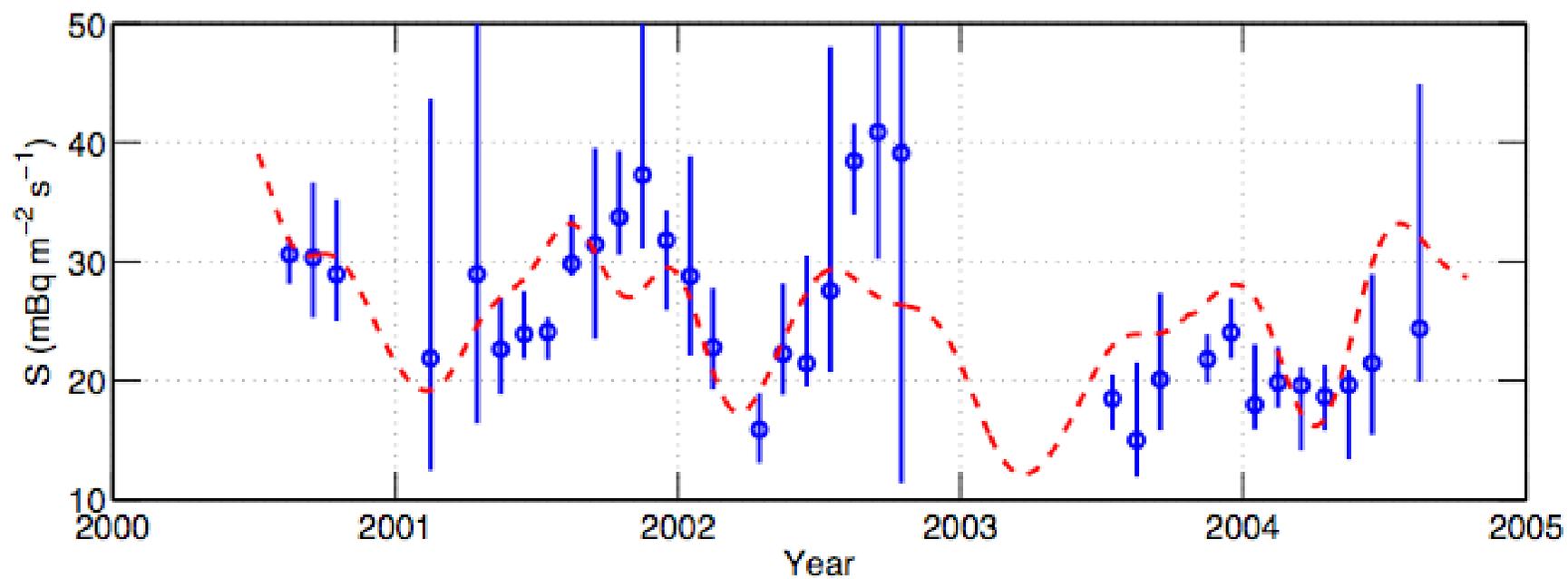
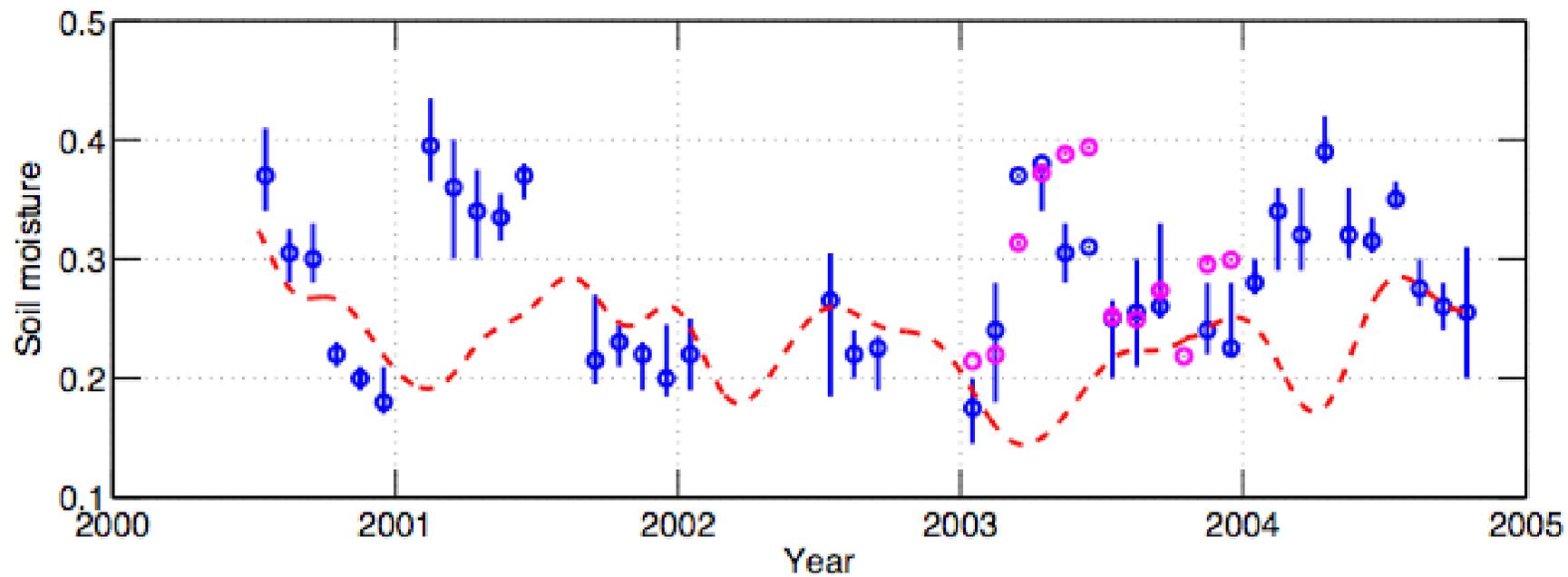




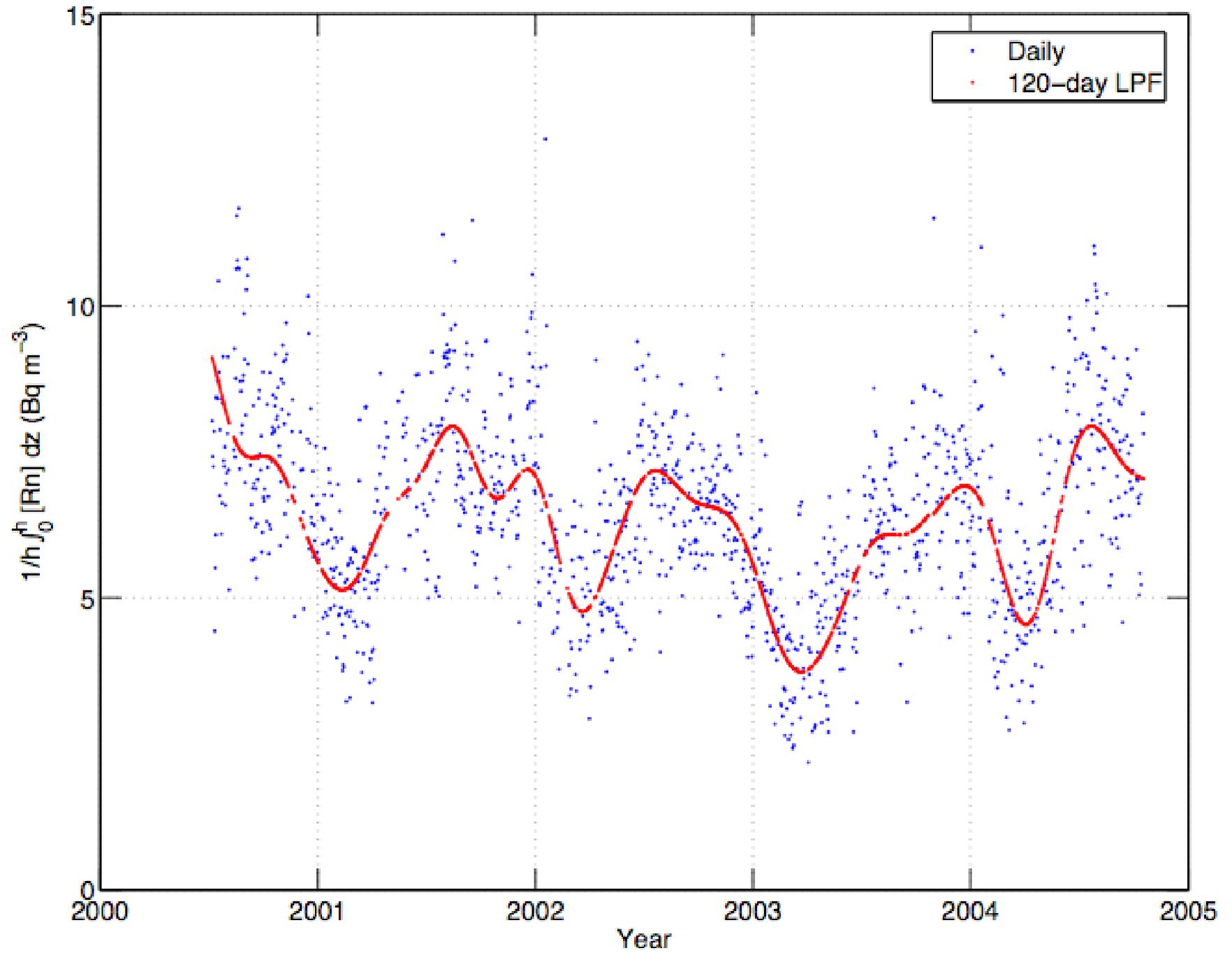
LBA 67km



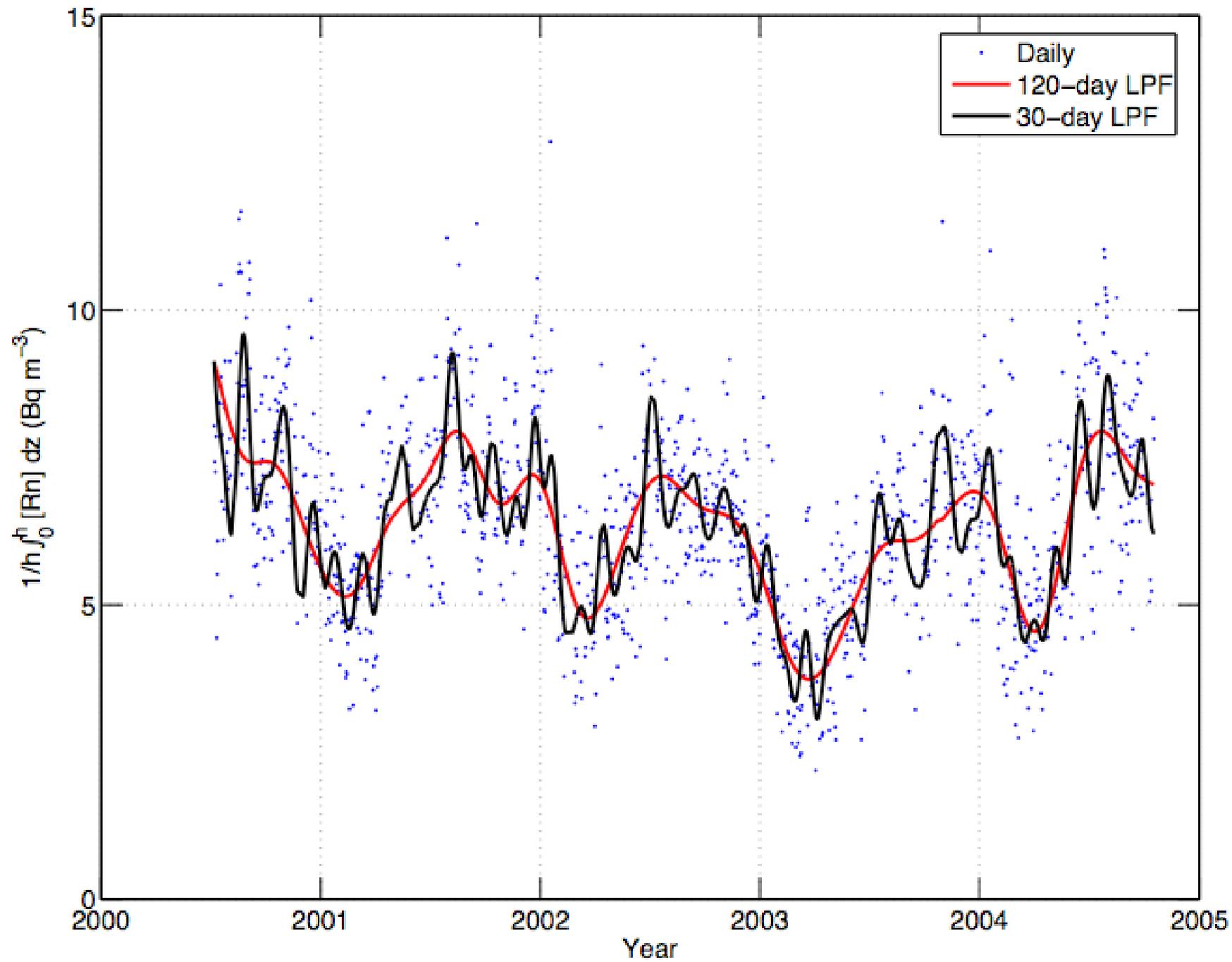




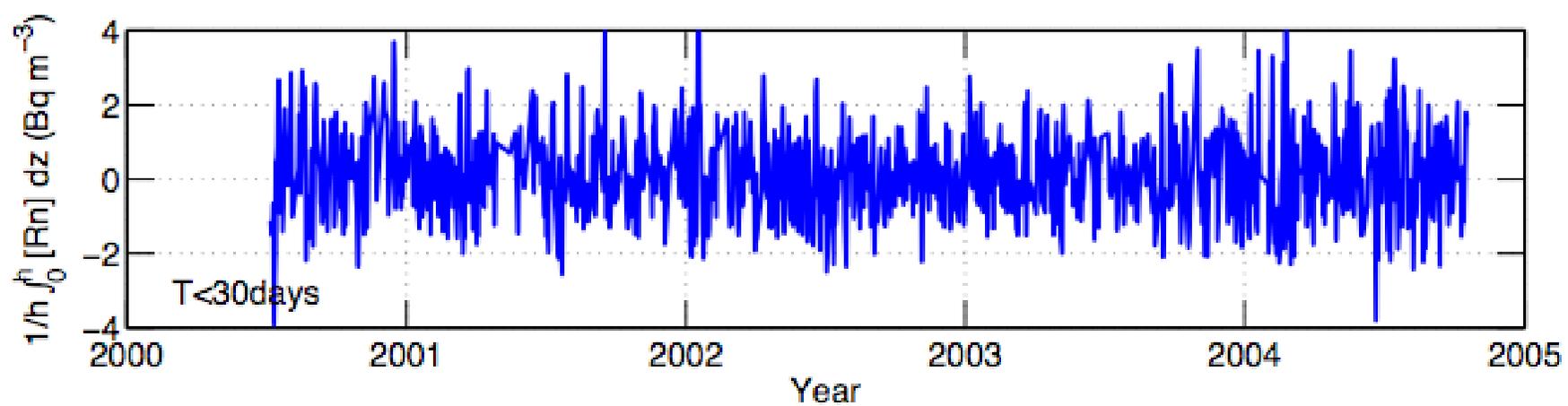
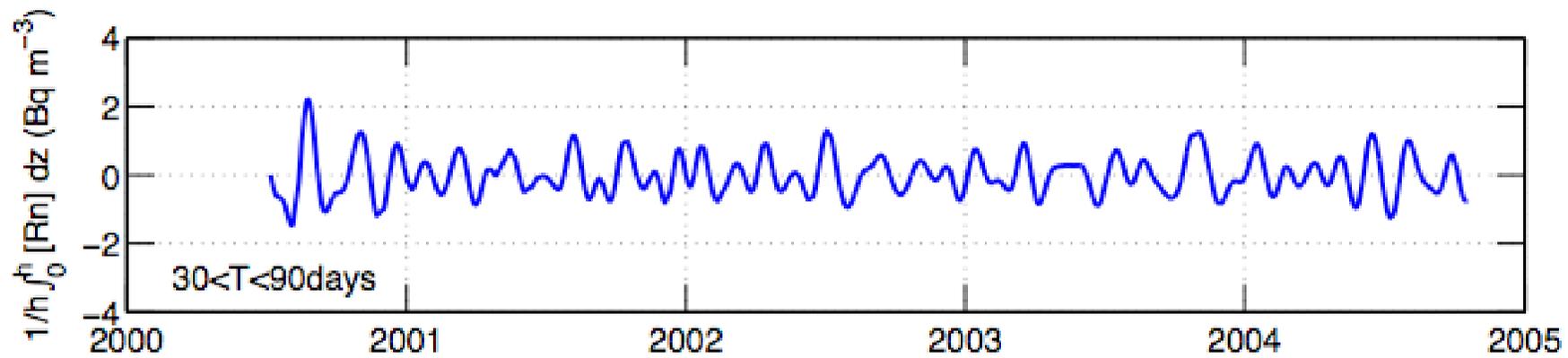
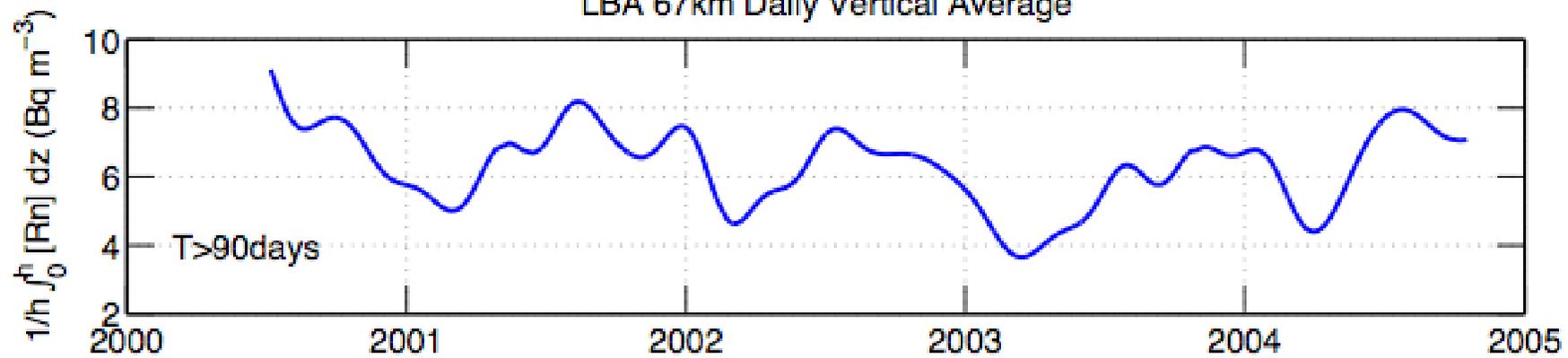
LBA 67km



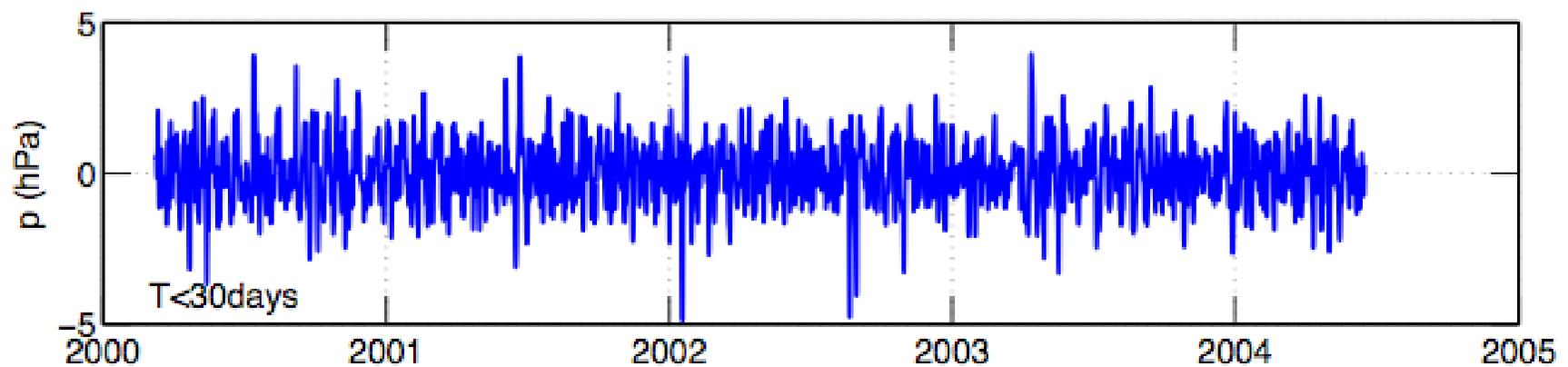
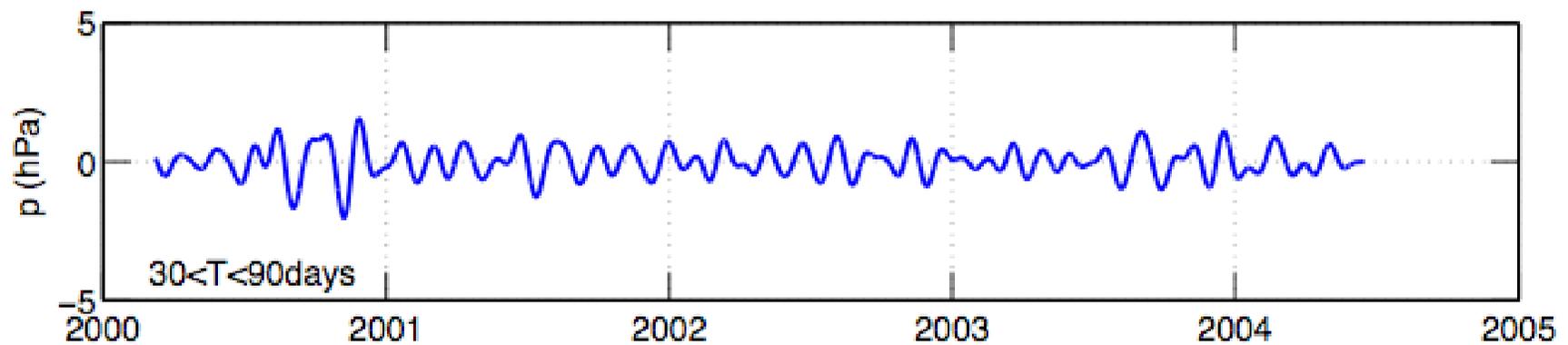
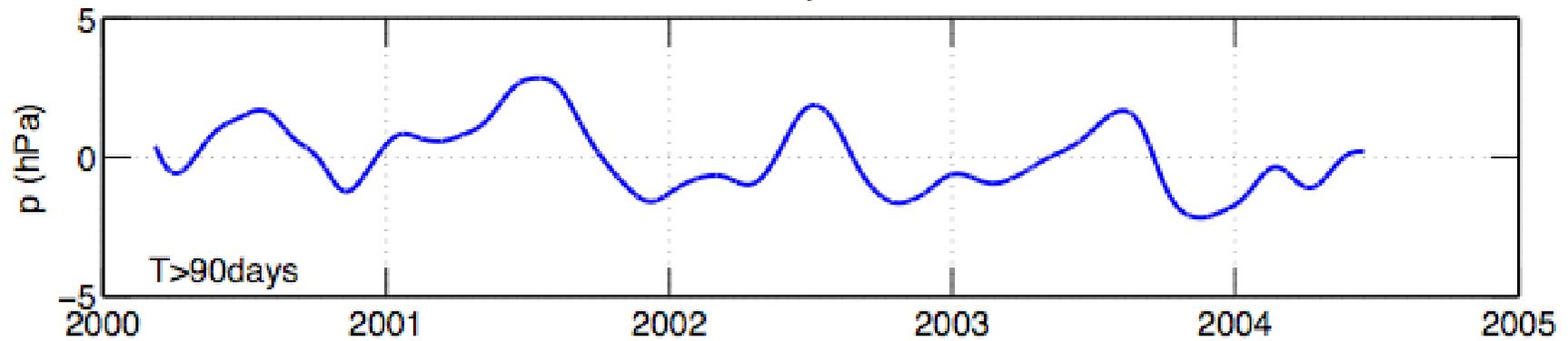
# LBA 67km

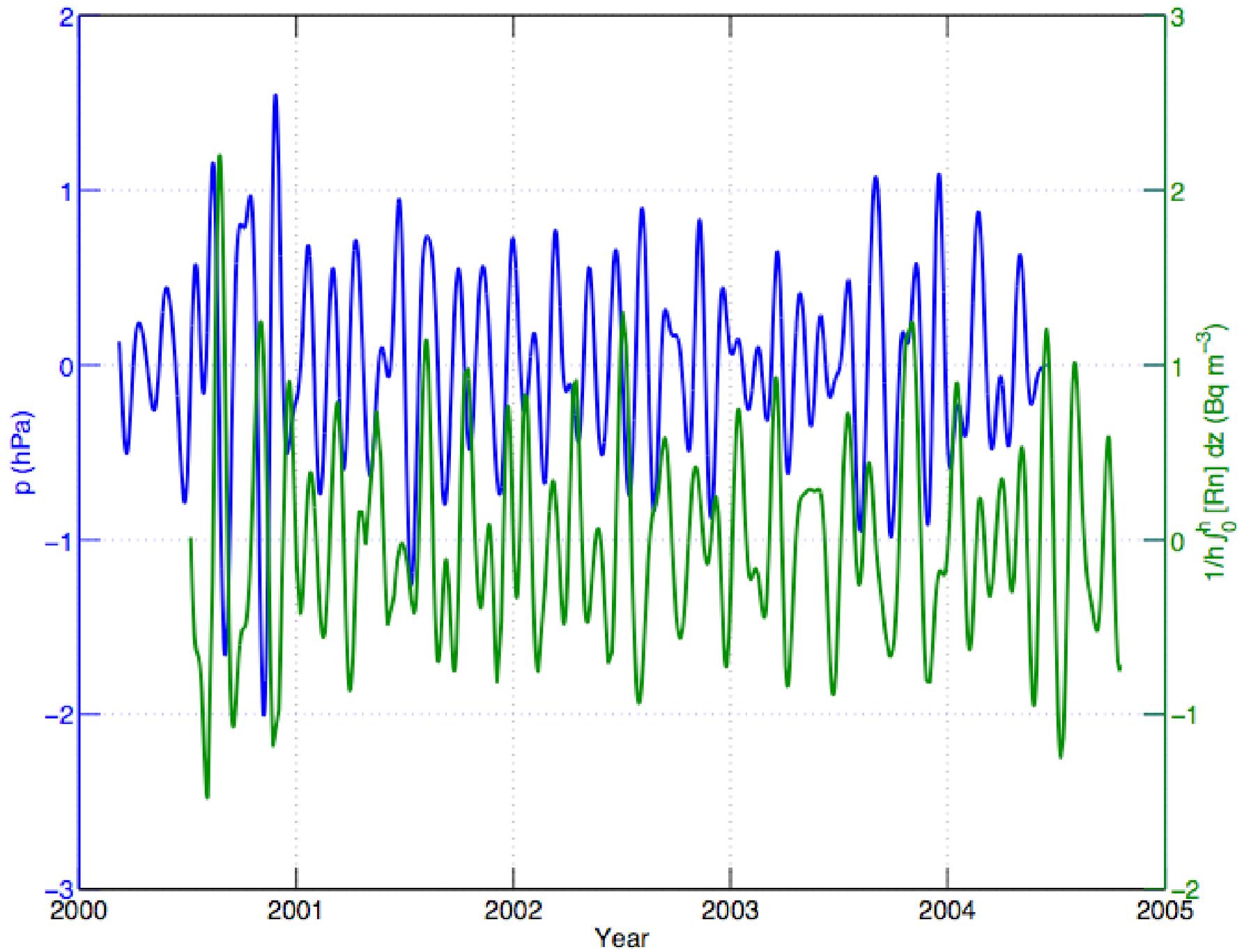


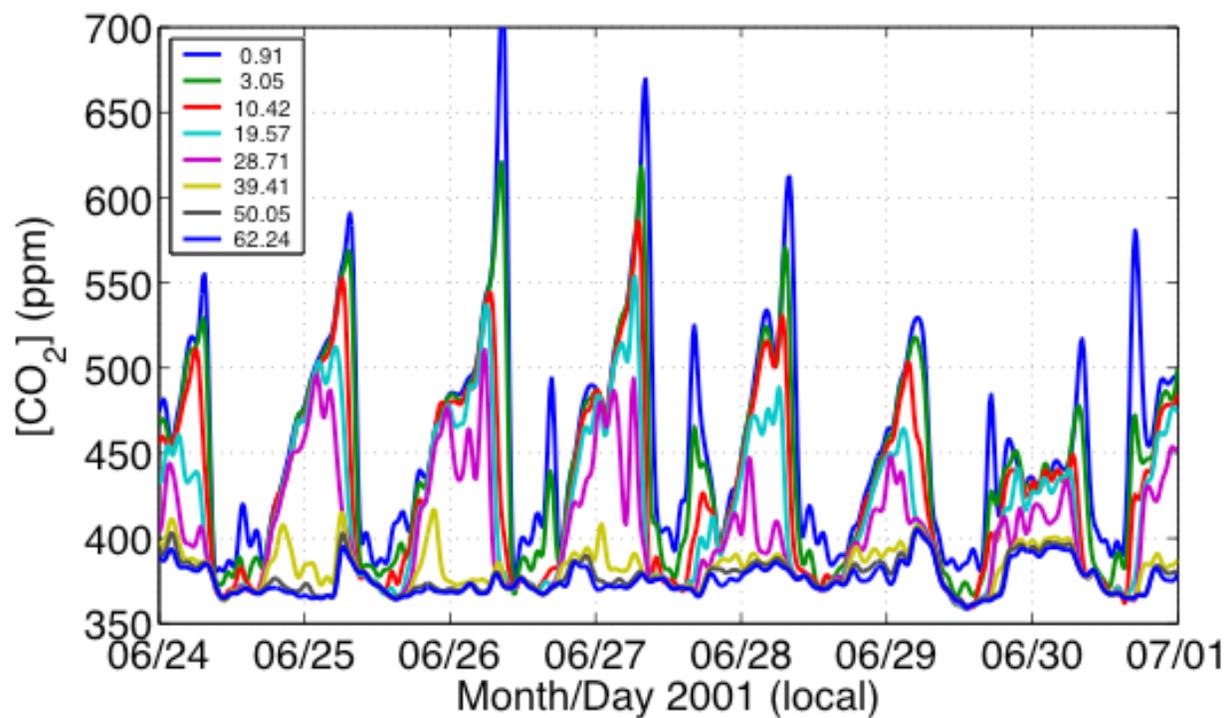
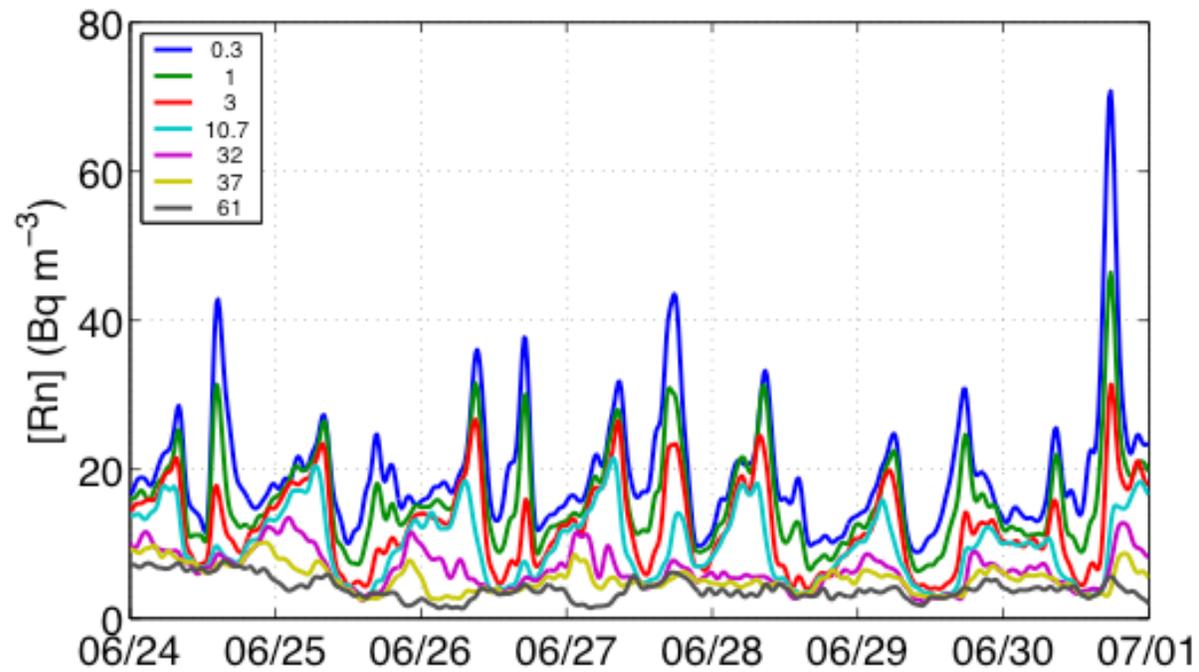
### LBA 67km Daily Vertical Average



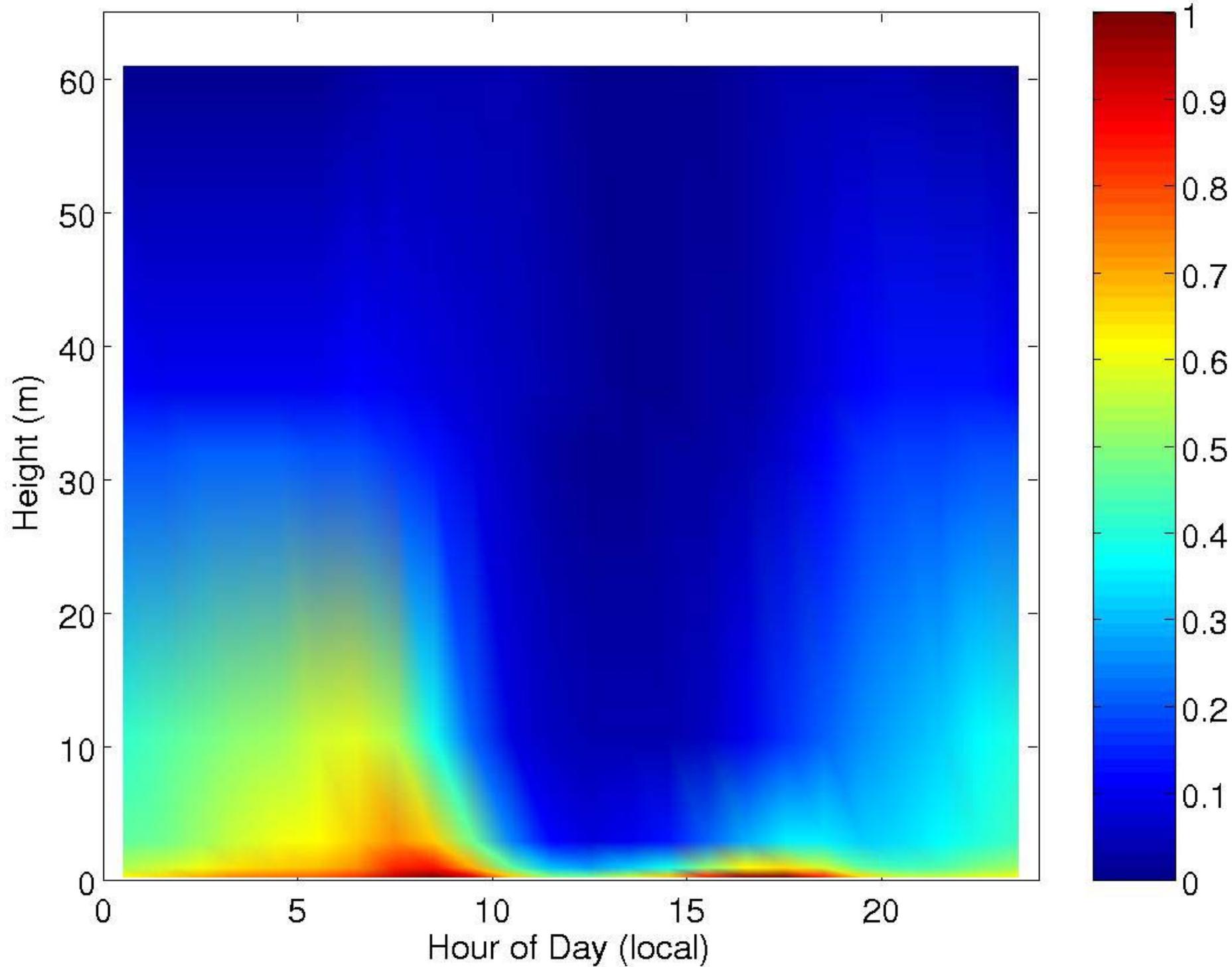
# Manaus Atmospheric Pressure

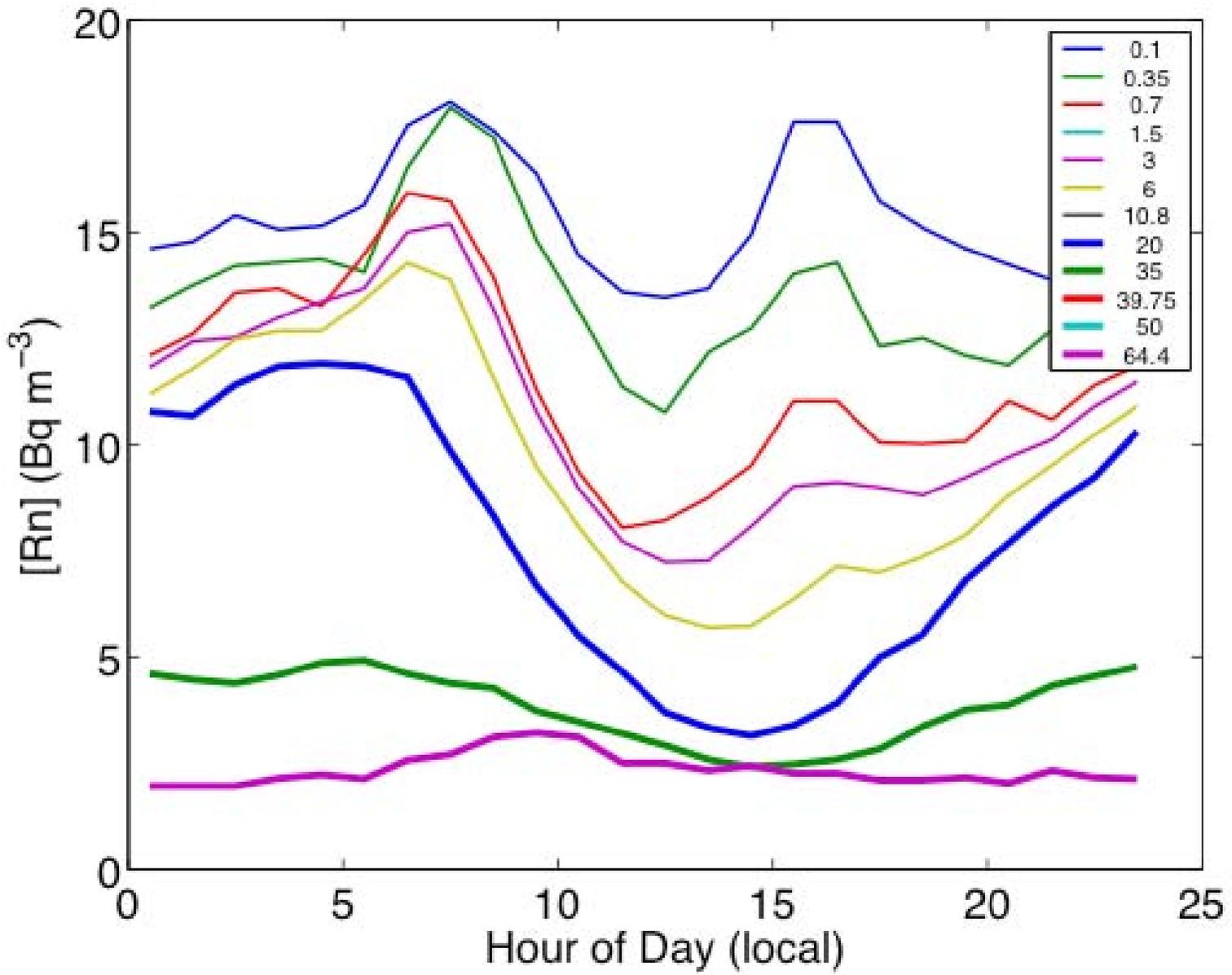


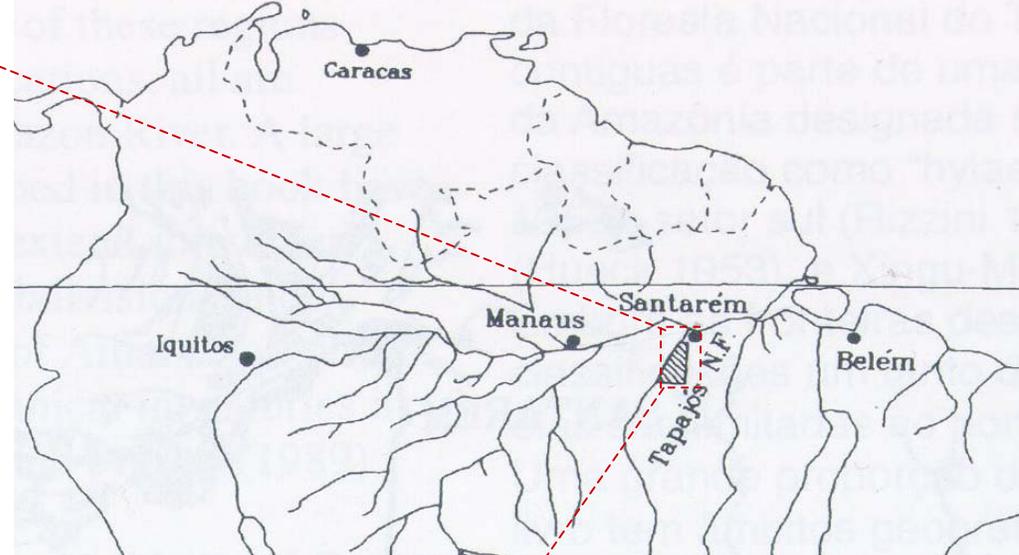




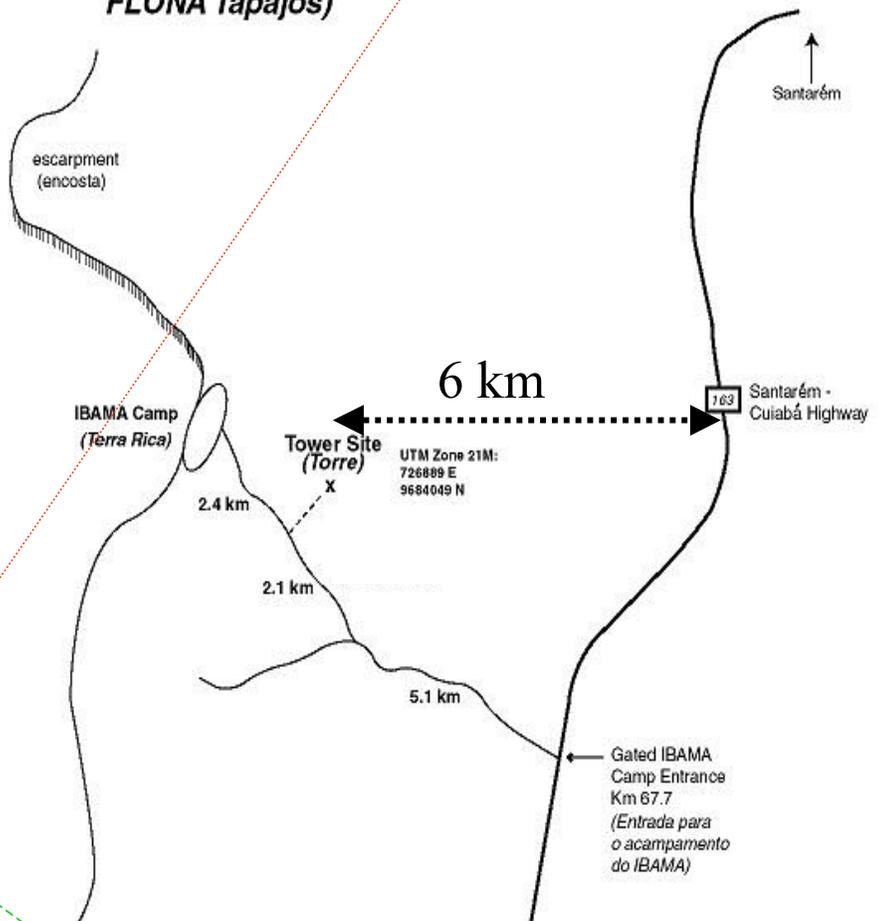
Wet Period Average NormalizedRn



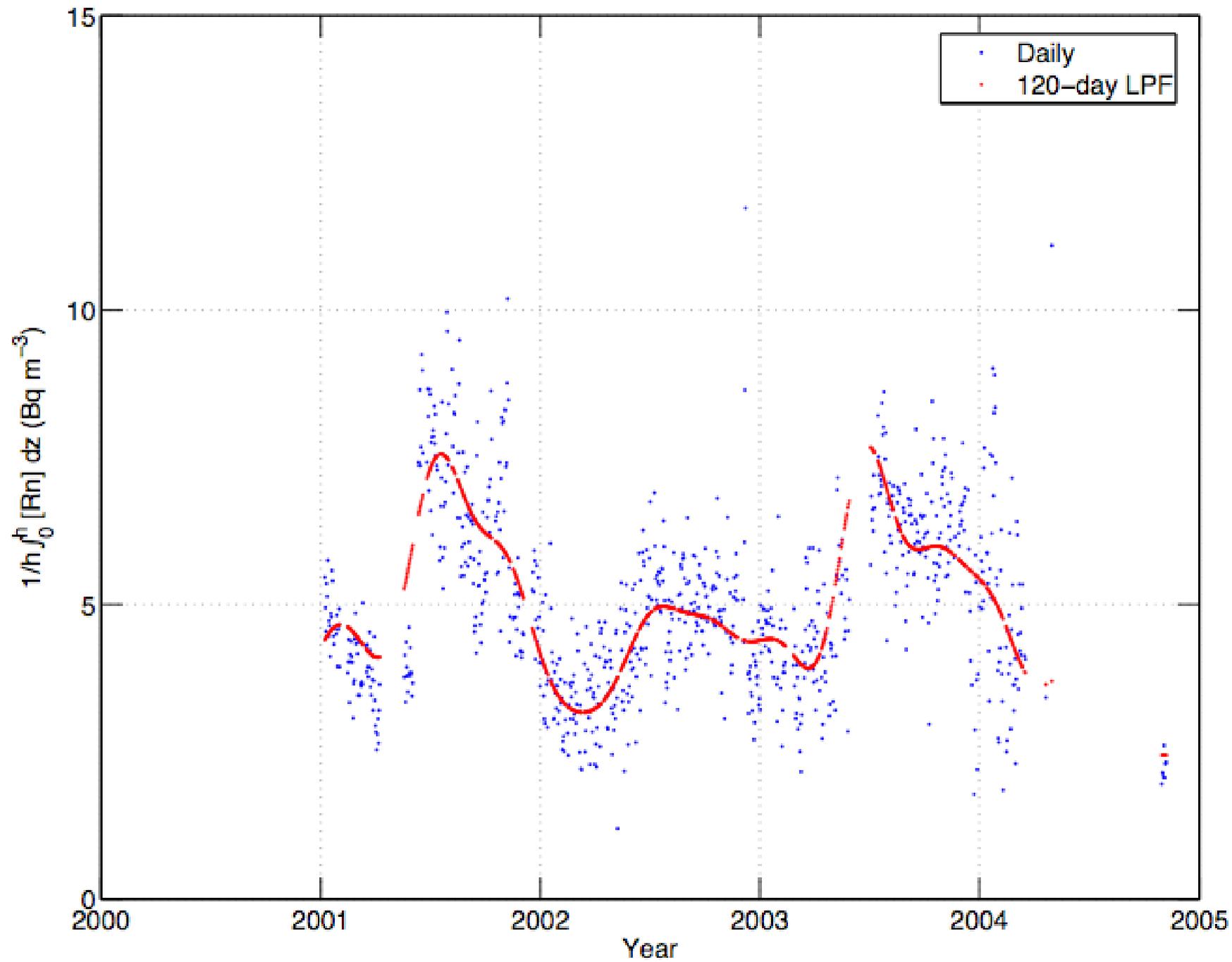


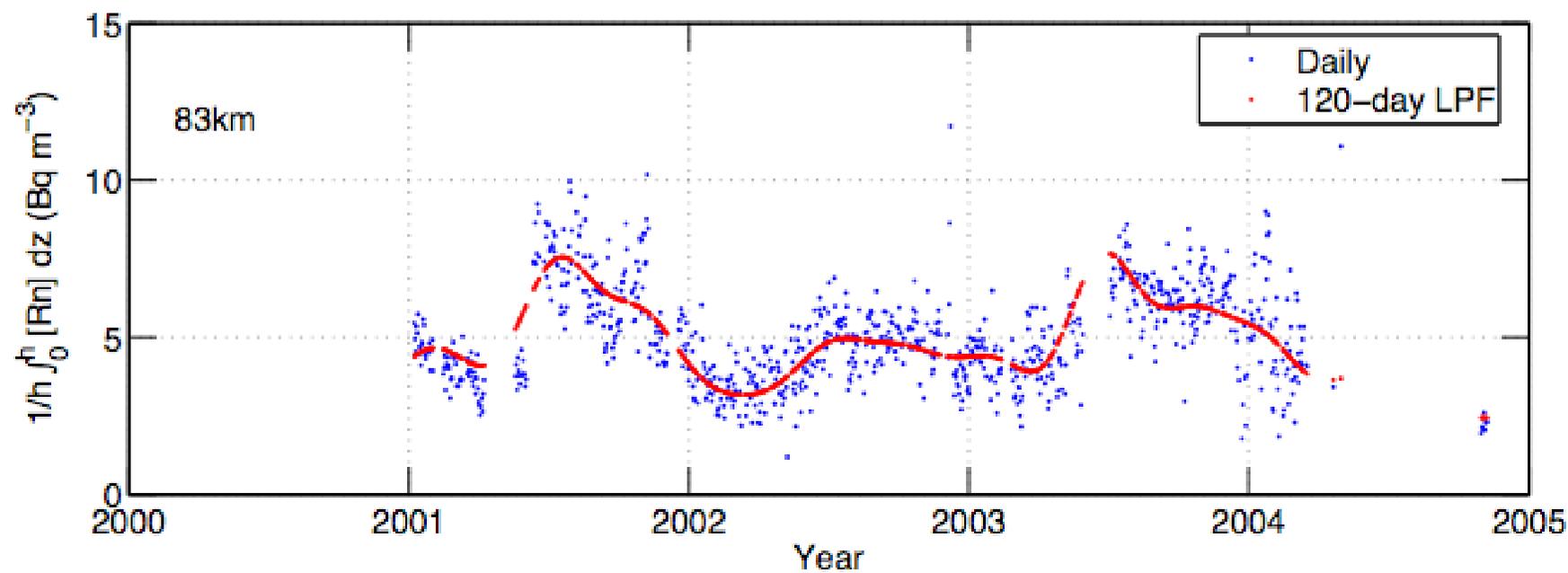
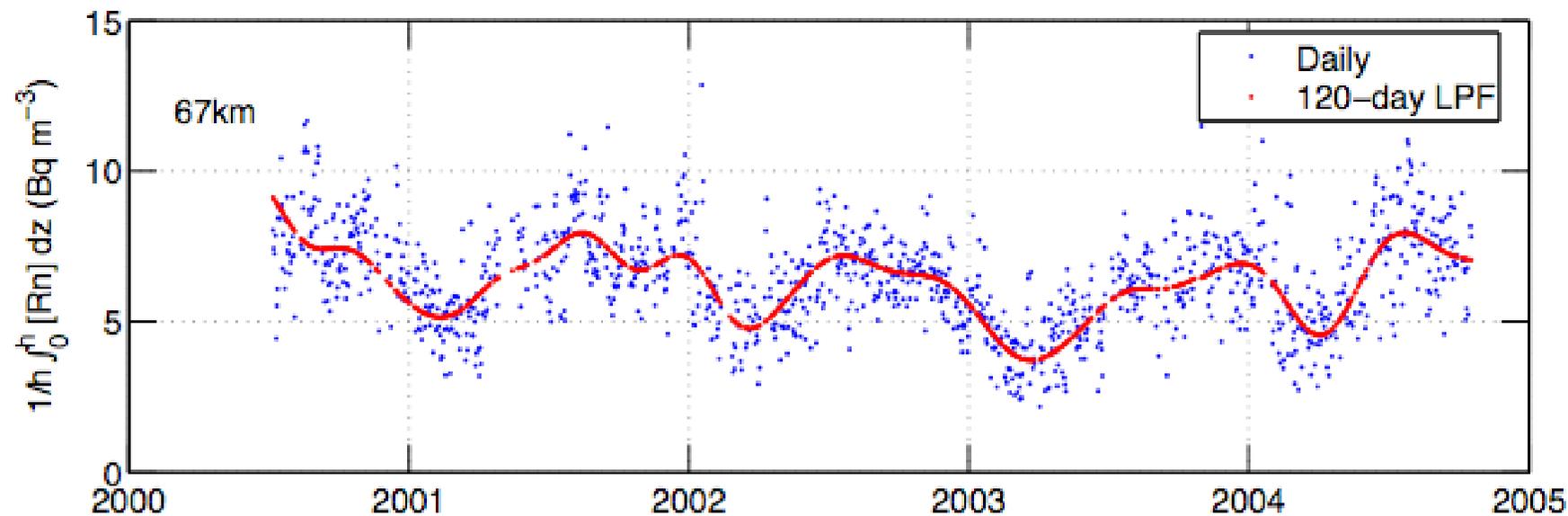


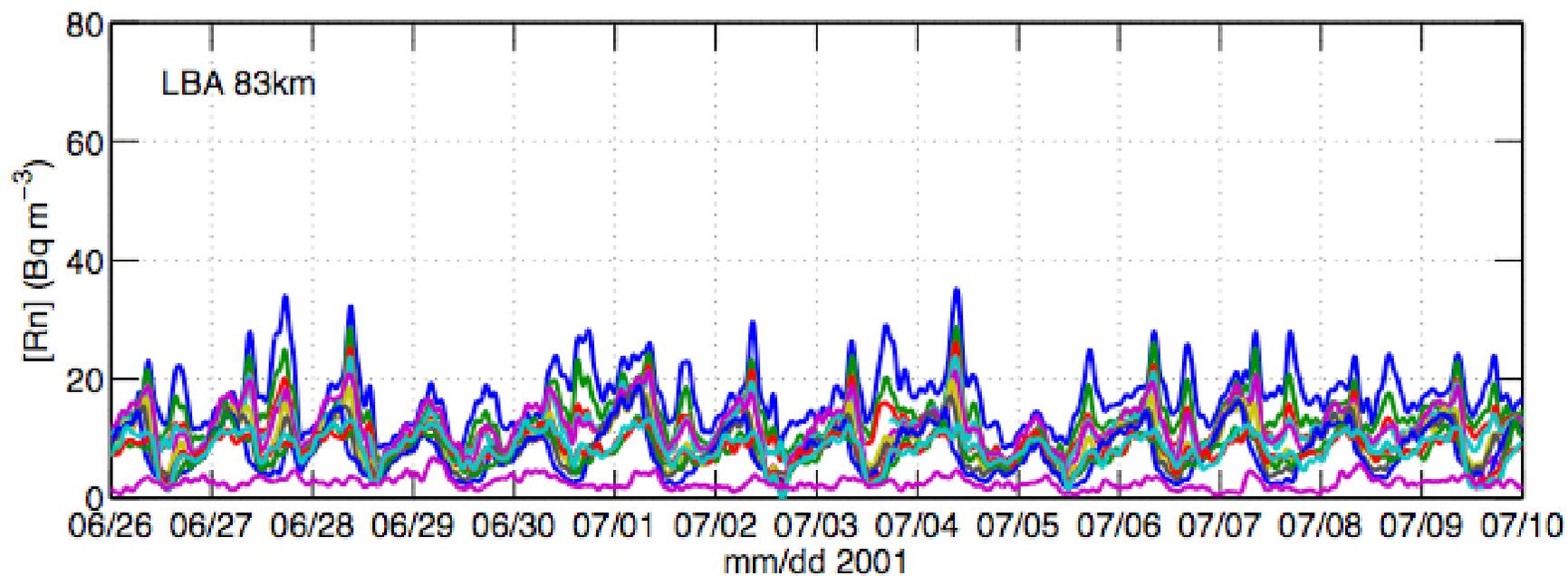
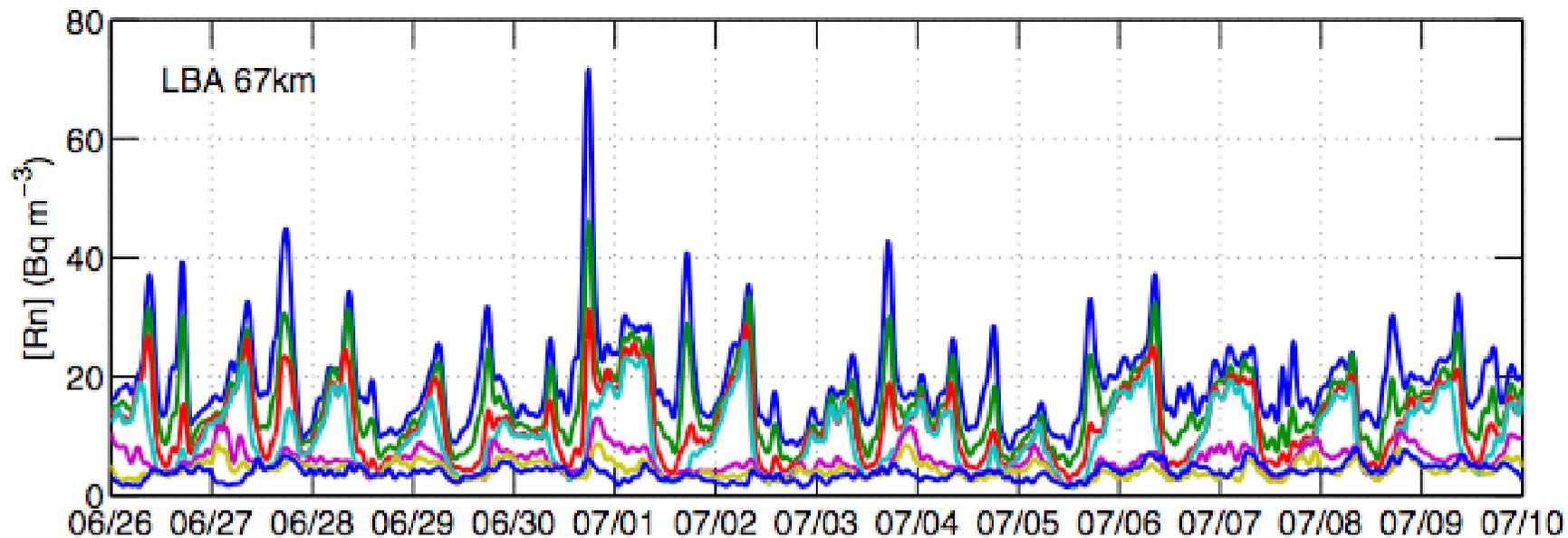
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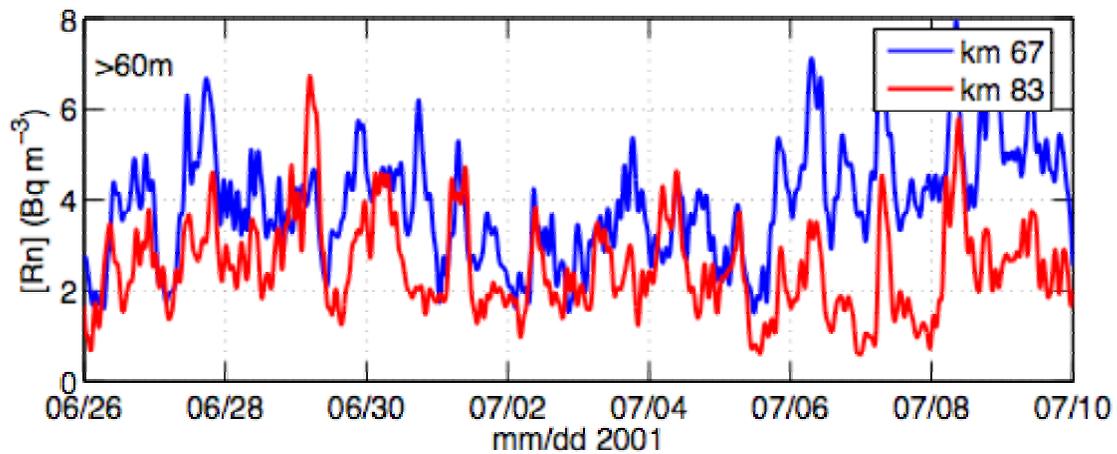
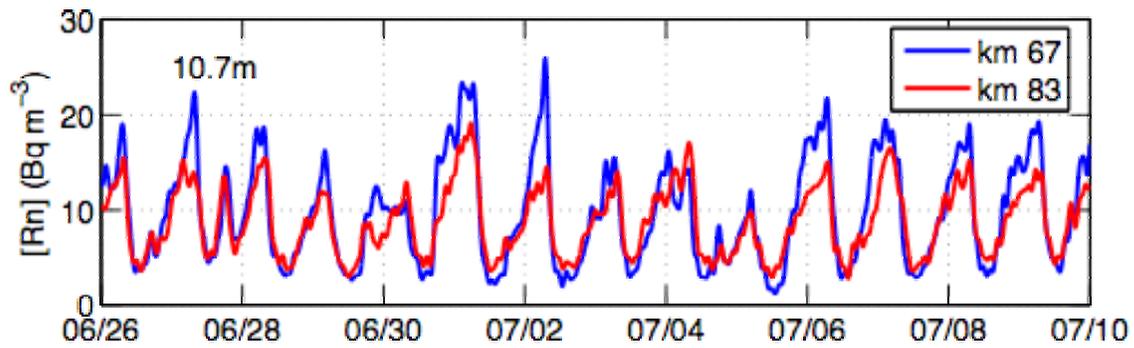
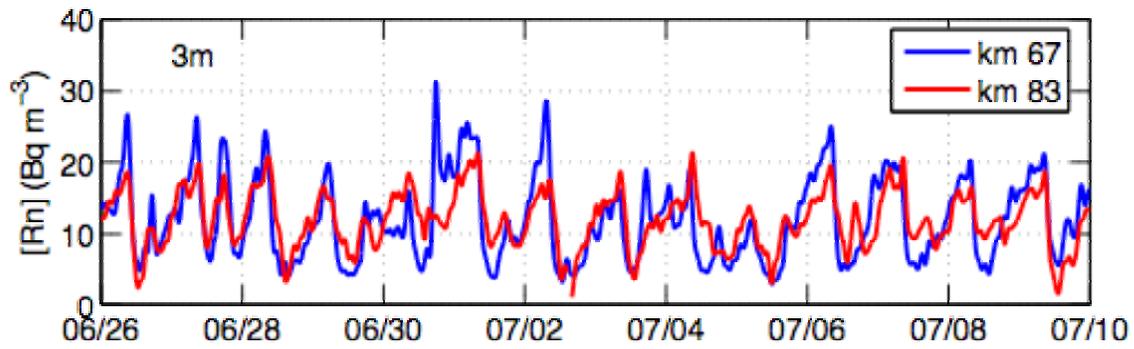
LBA 83km





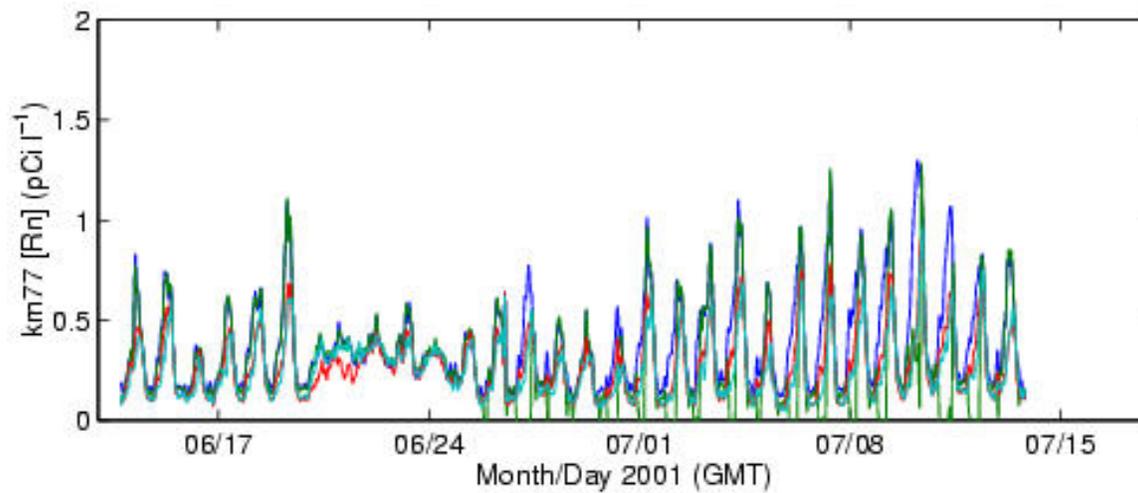
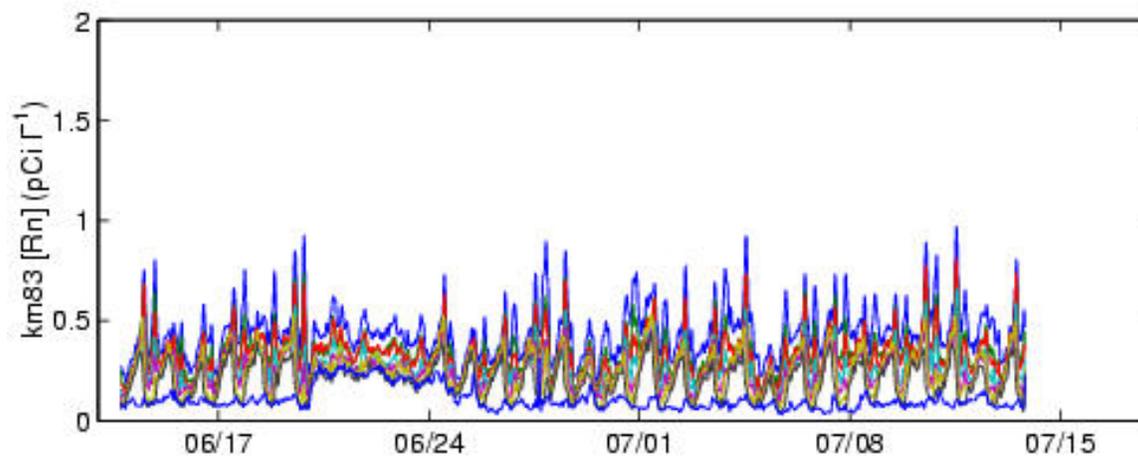
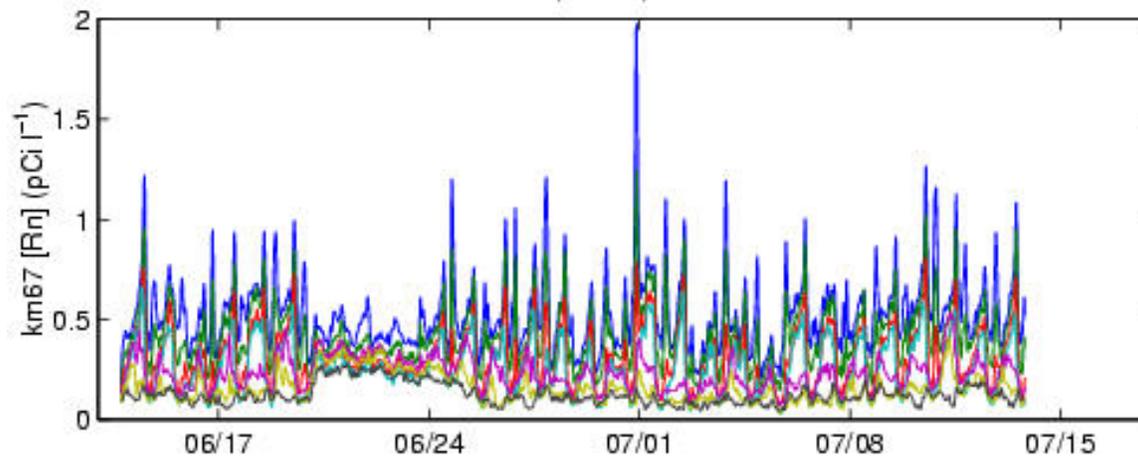


LBA 67km

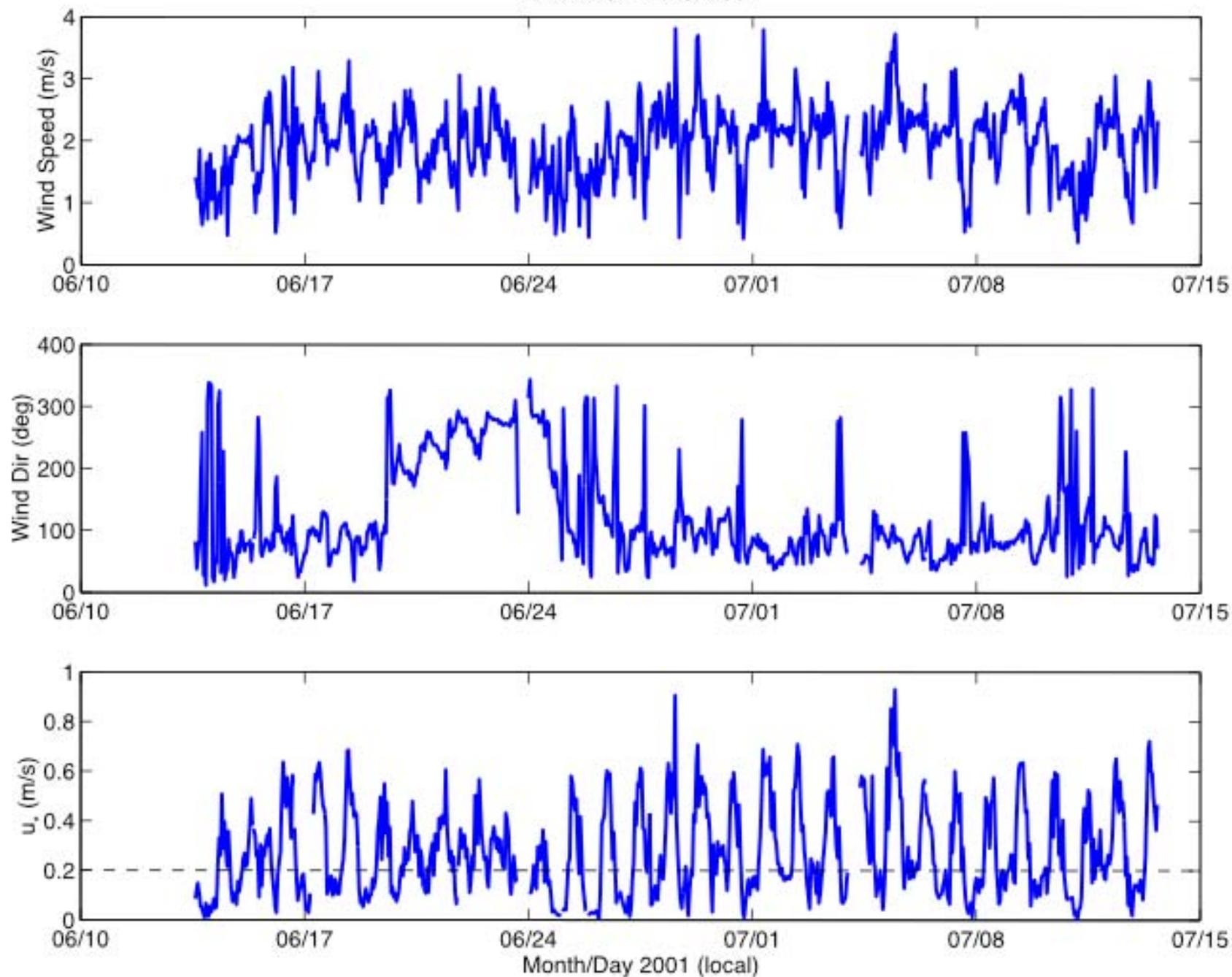




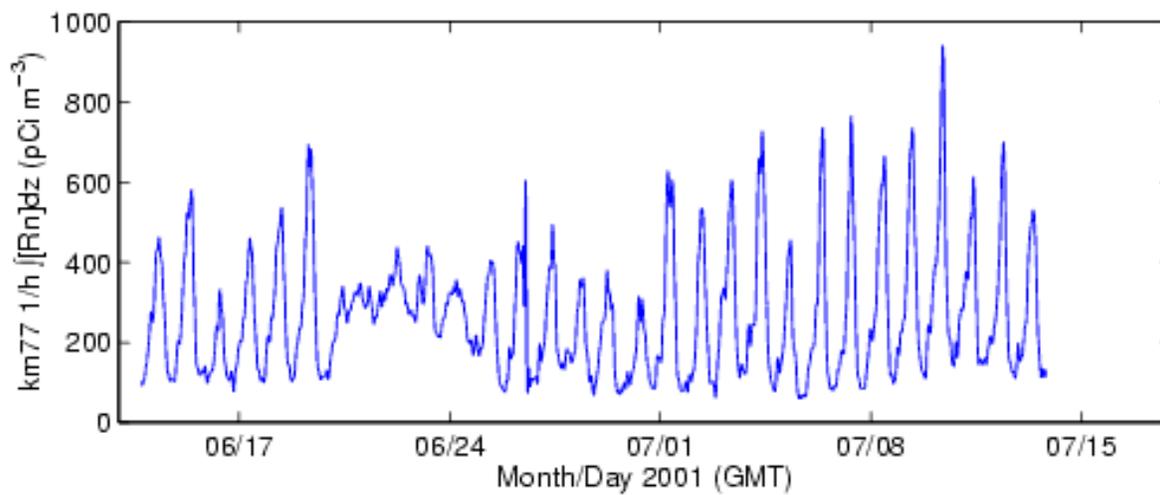
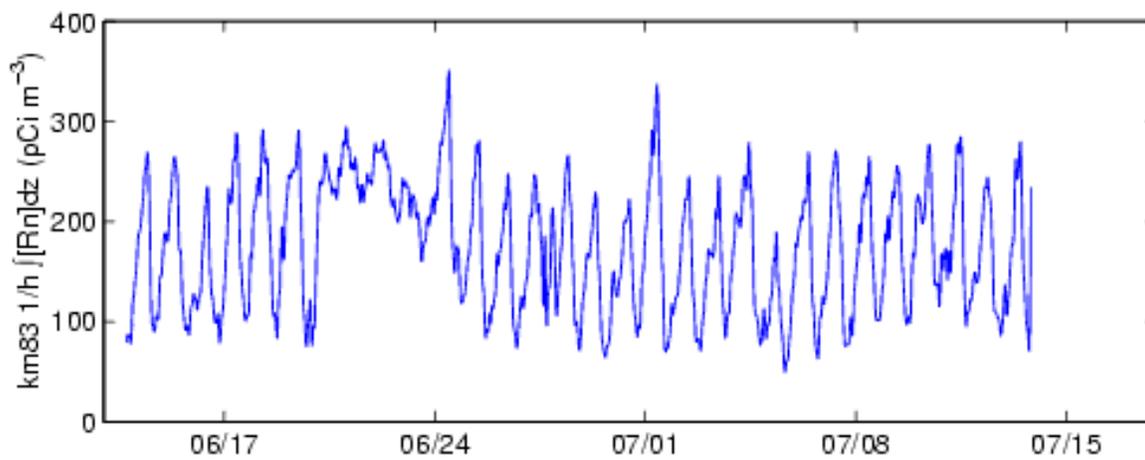
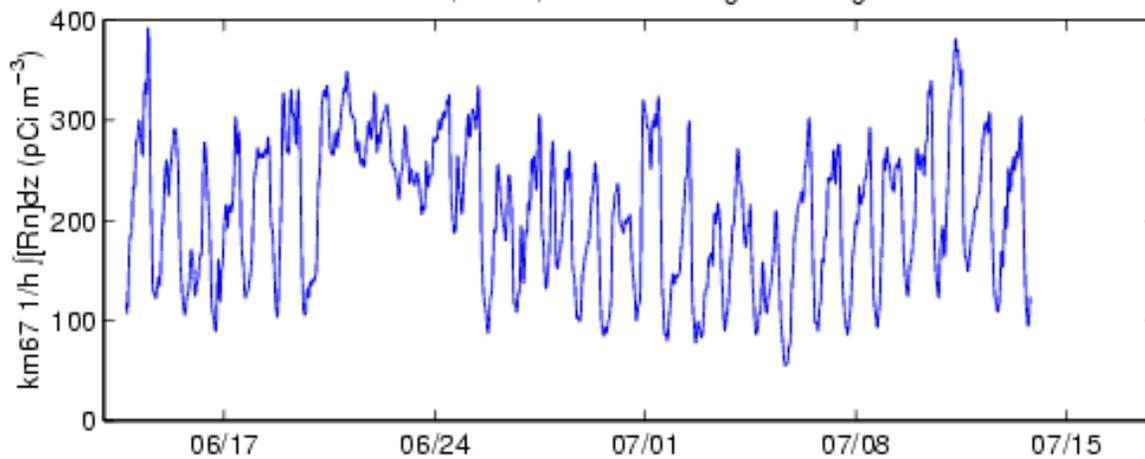
LBA km67, km83, and km77 Rn



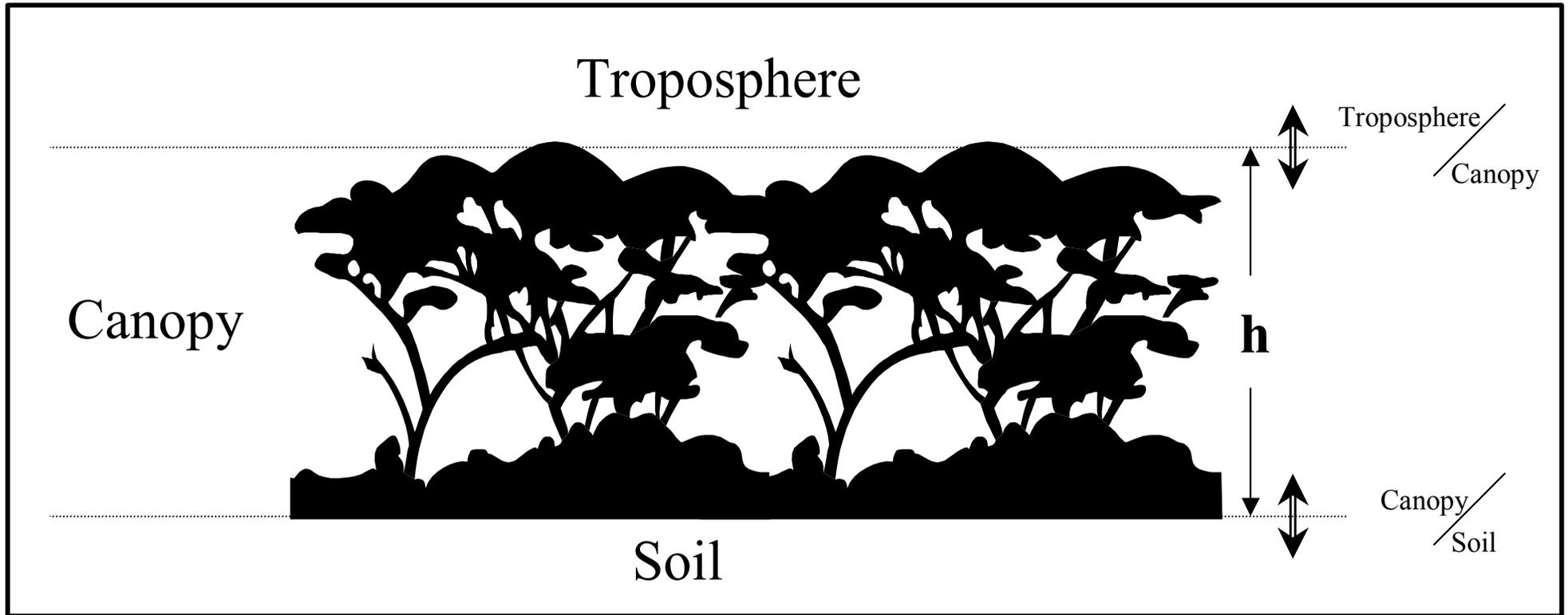
LBA km67 Winter 2001



LBA km67, km83, and km77 Height-averaged Rn



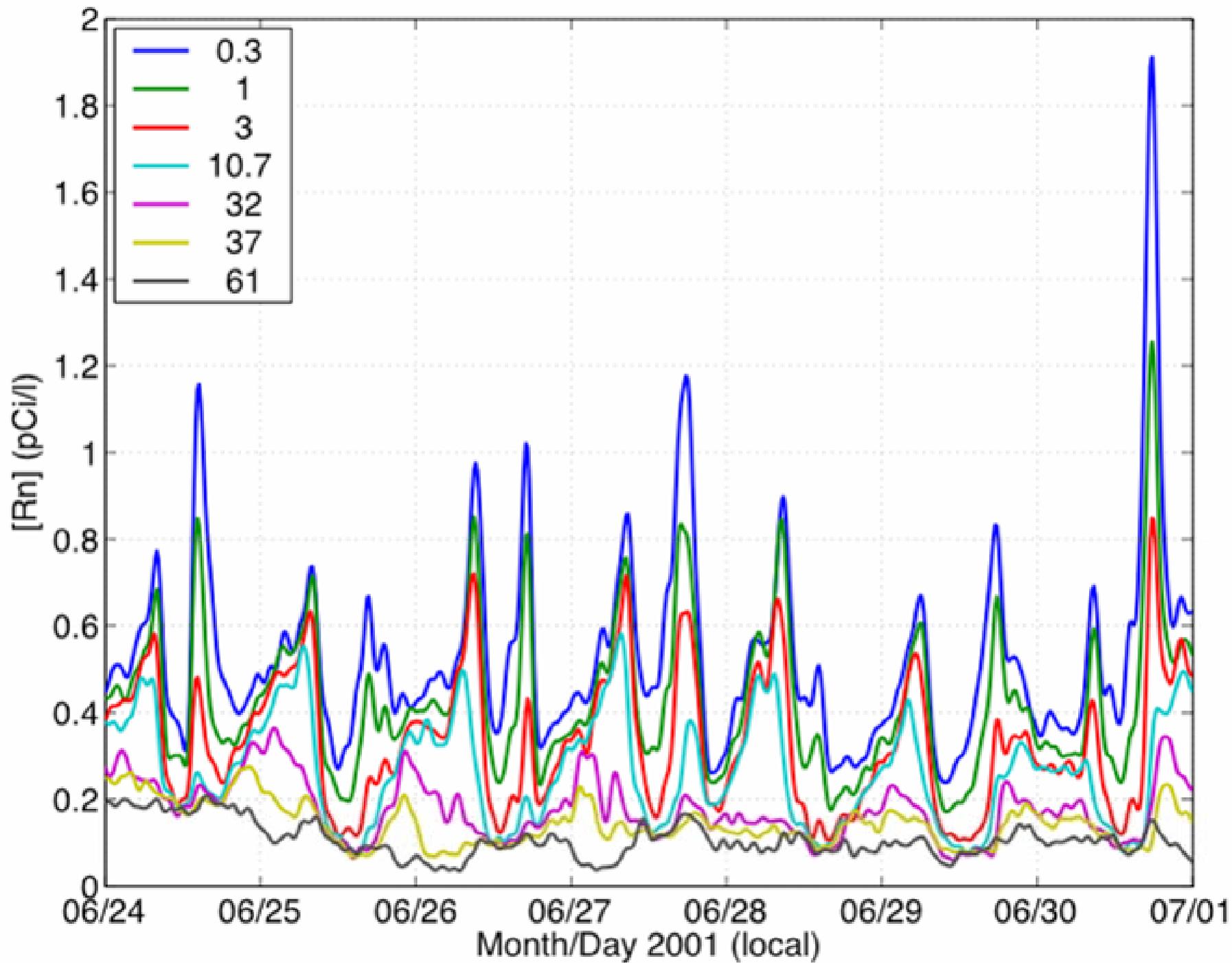
# Experimental Measurements



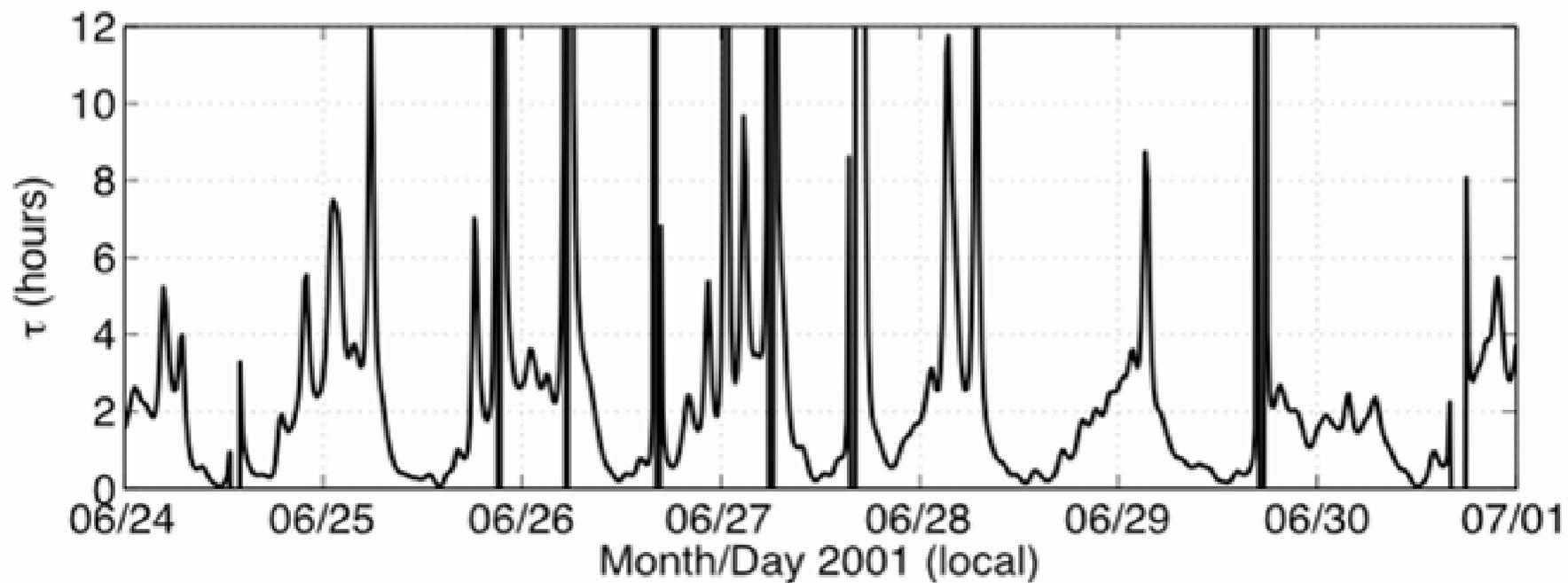
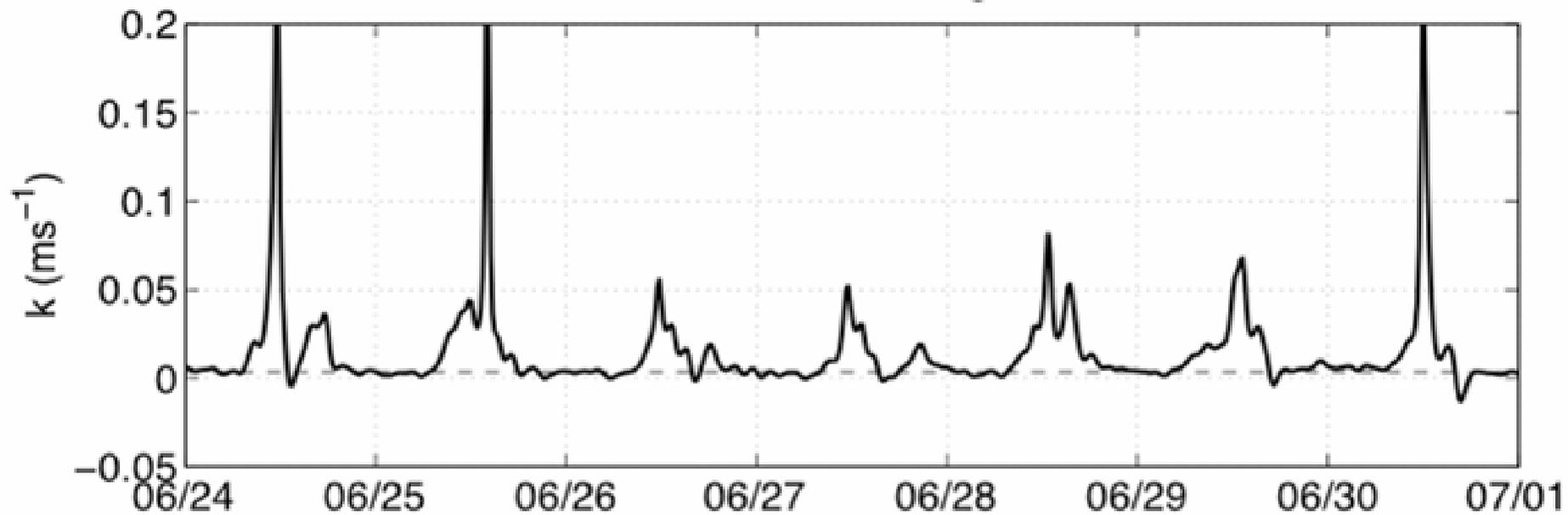
Determine gas exchange rate constant  $K$  using Radon-222 soil flux  $S$  and canopy inventory ( $dc/dt$ ) measurements

$$k = \frac{S - h(dC/dt)}{\bar{C}_{\text{Canopy}} - \bar{C}_{\text{Troposphere}}}$$

# LBA 67 km Radon



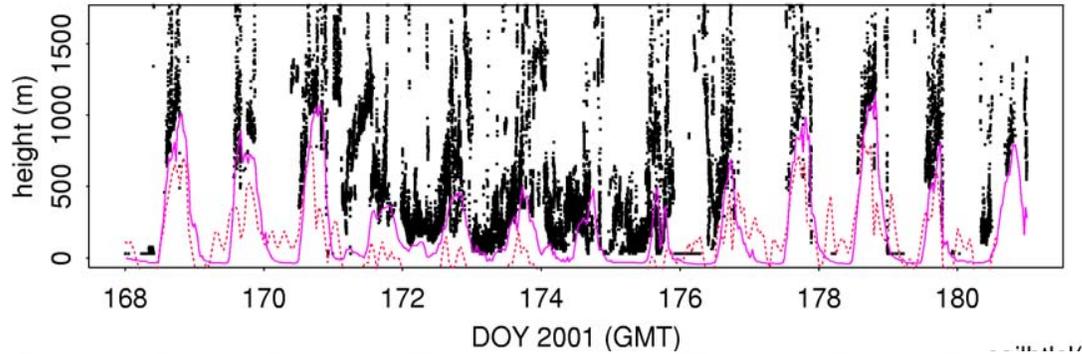
# LBA 67 km Radon Exchange Coefficient



# CONCLUSIONS

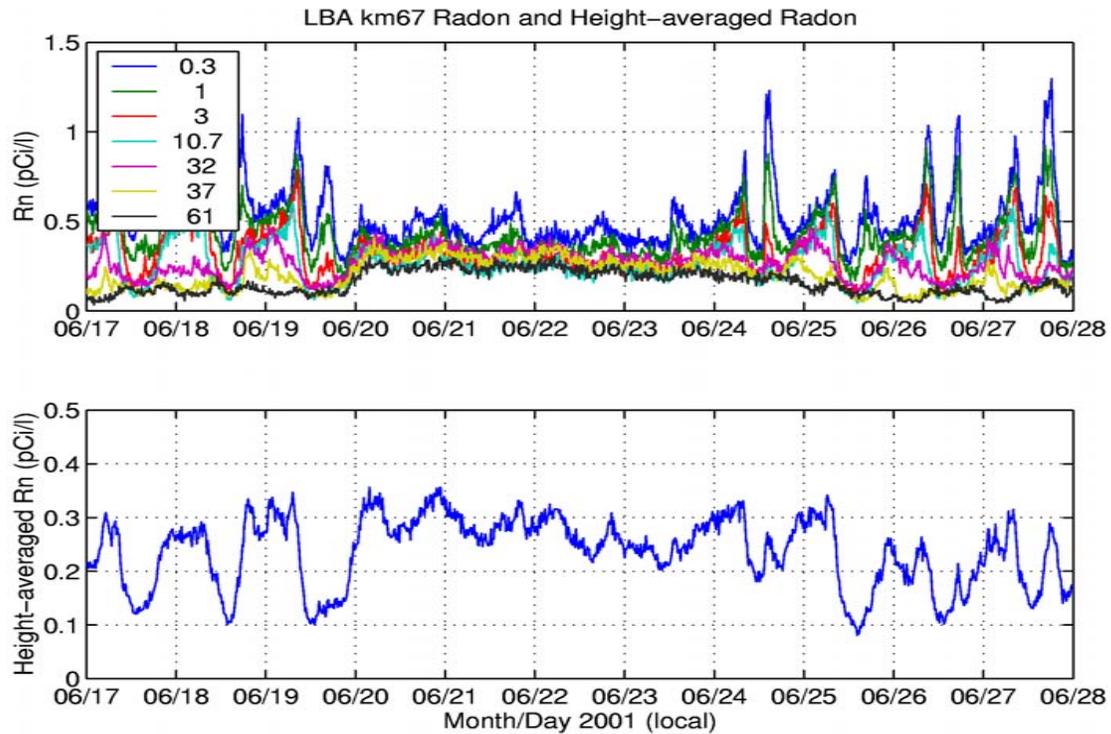
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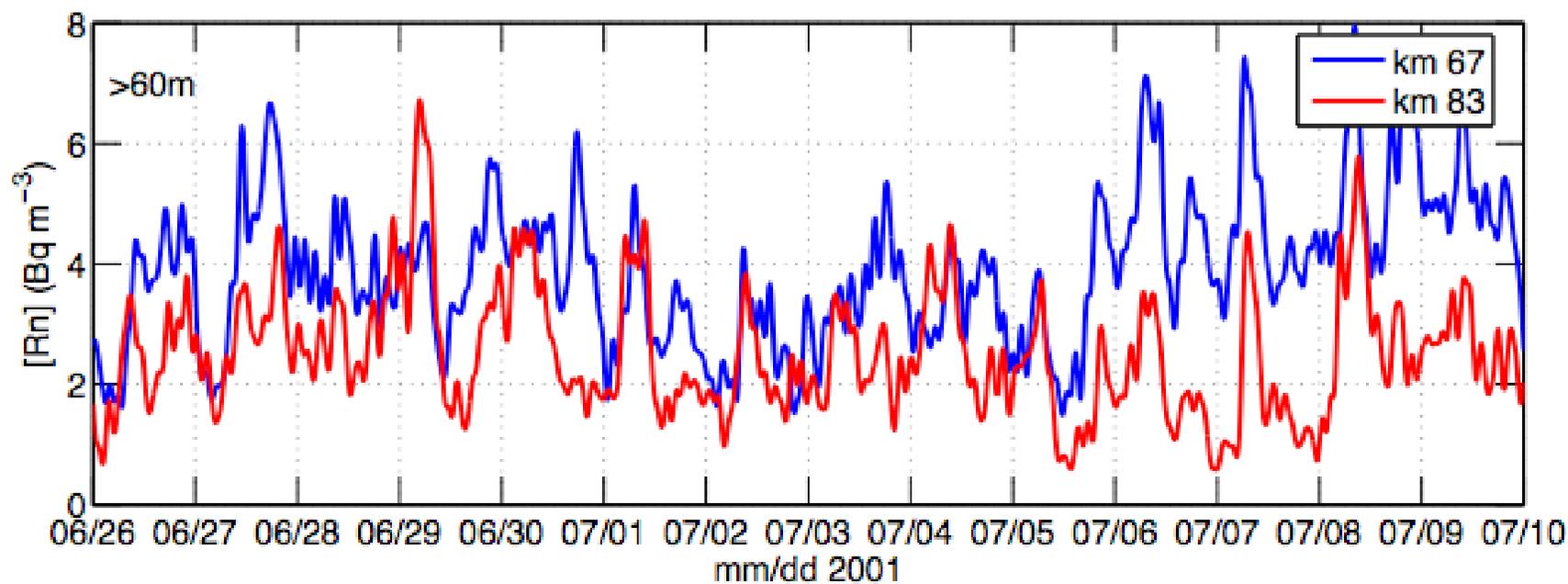
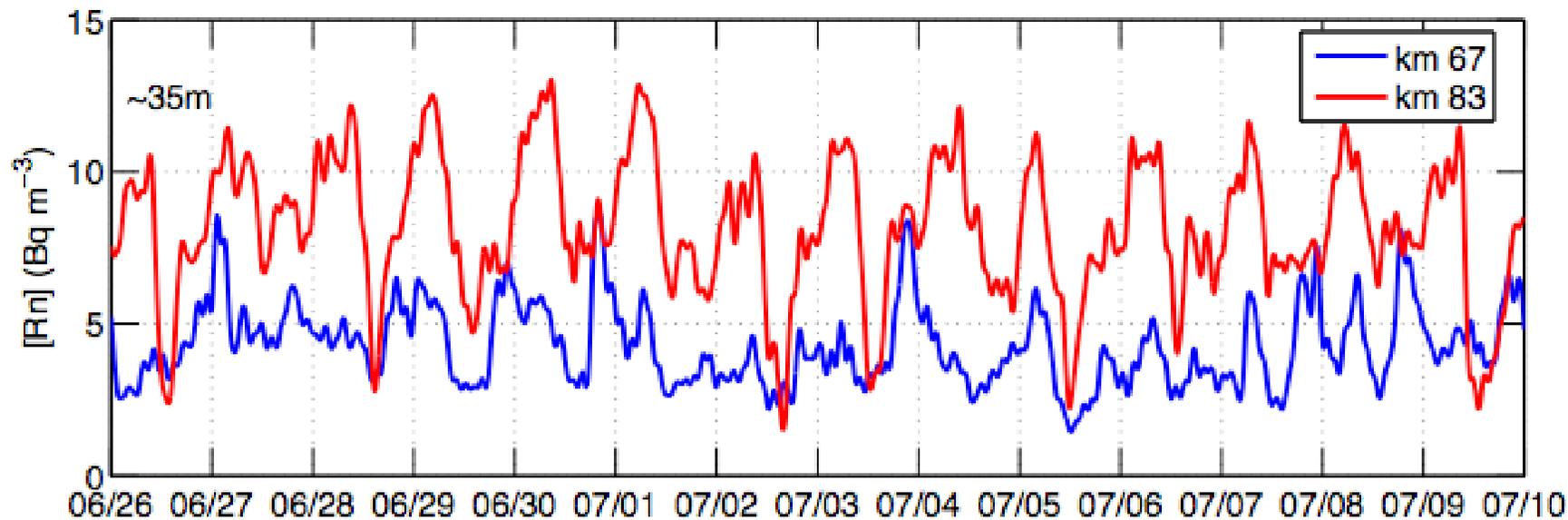
# Ceilometer, LCL



## Elevated radon concentrations 172-176, 2001

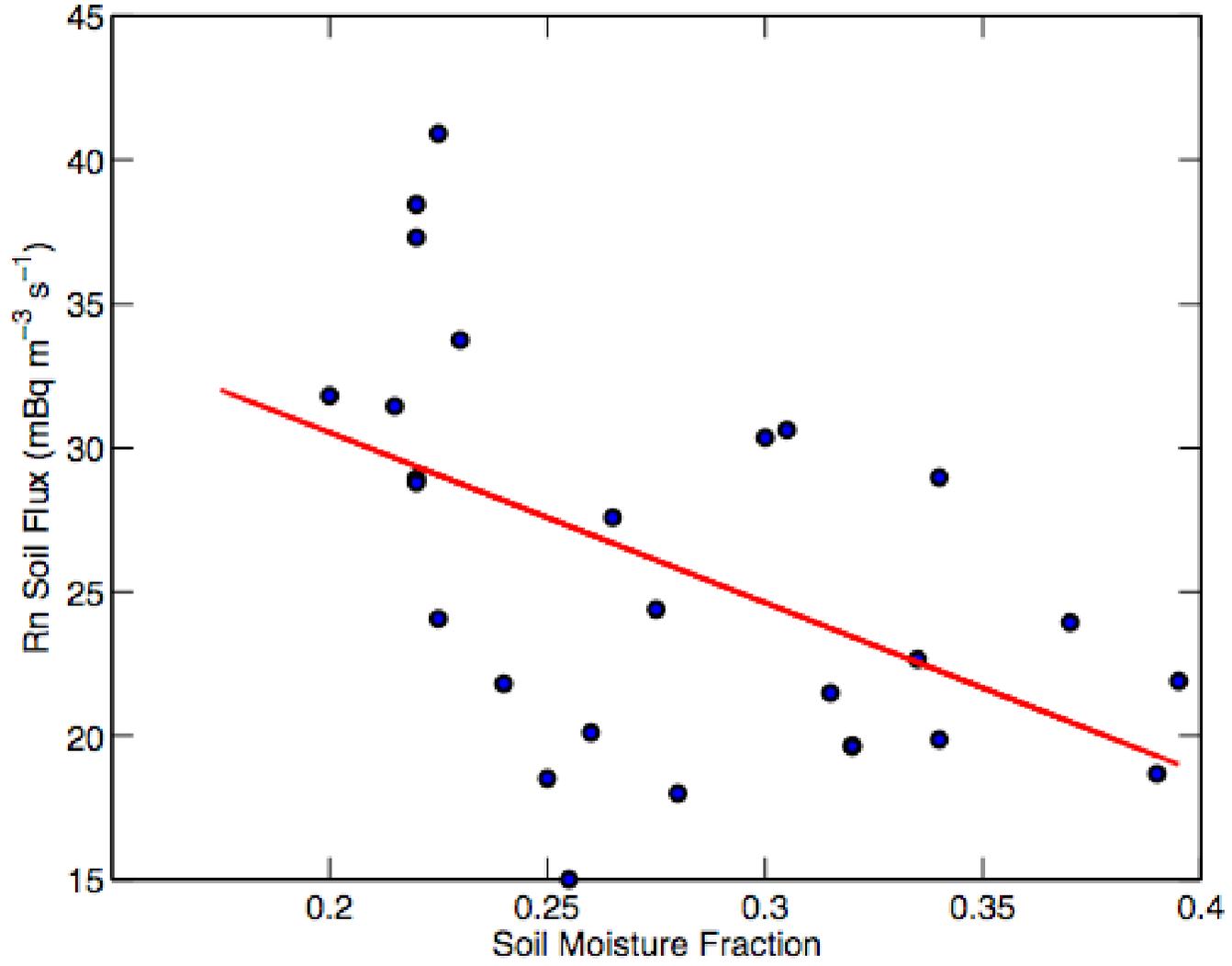
### Radon at km67

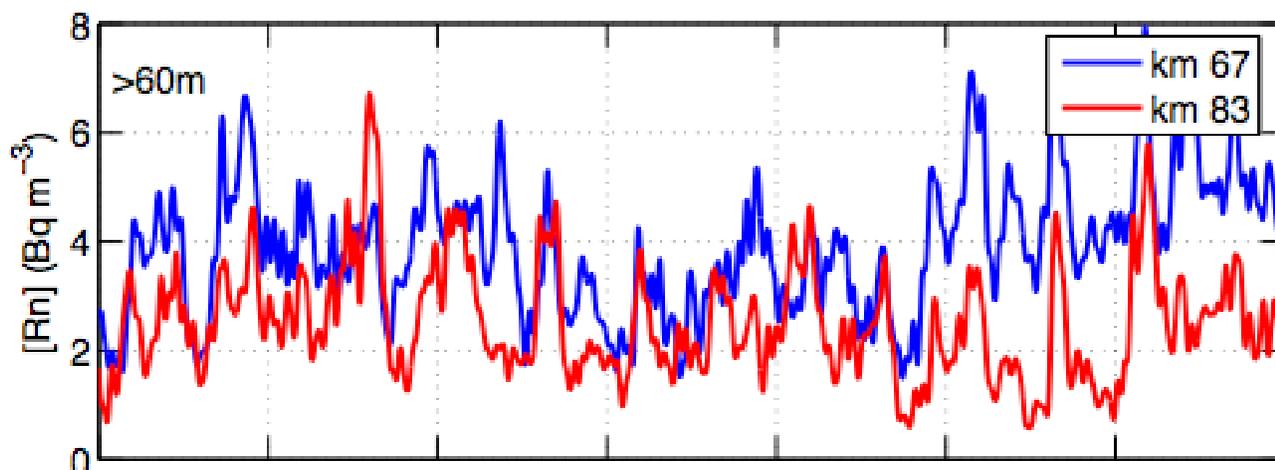
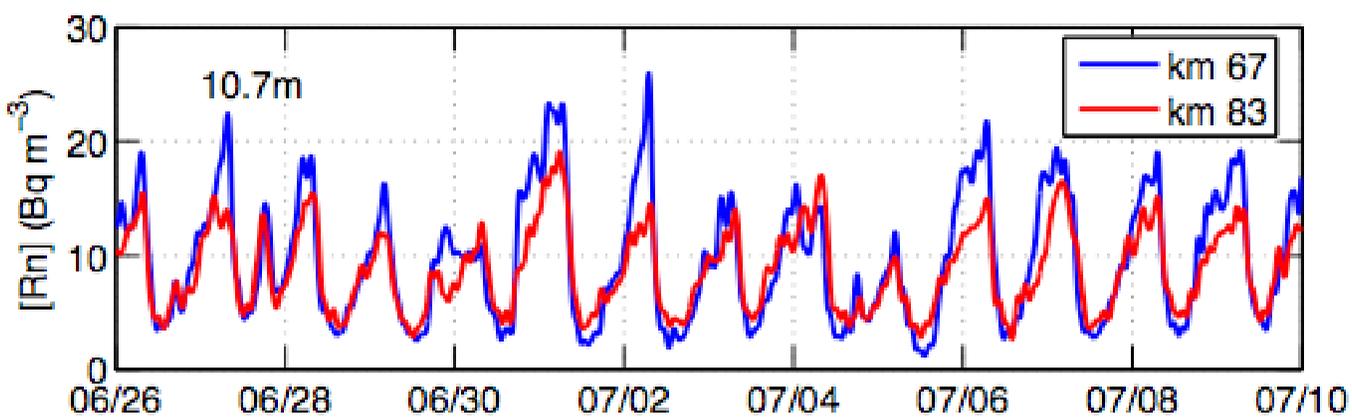
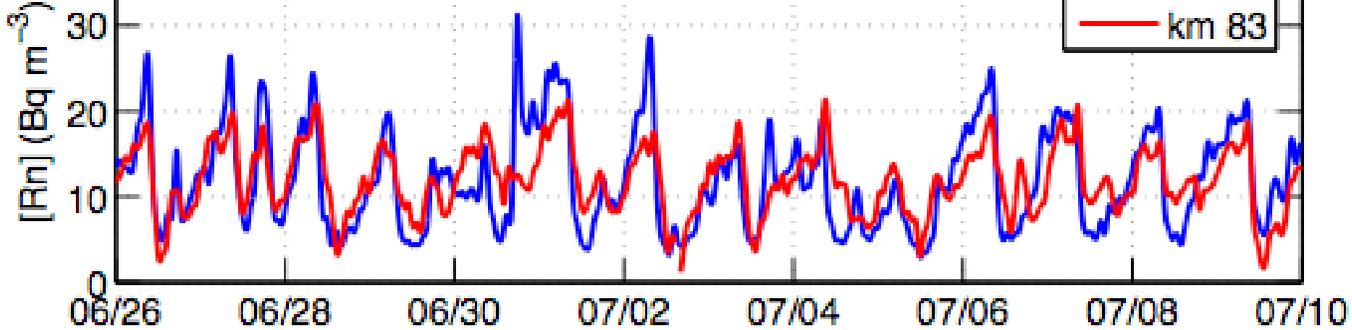




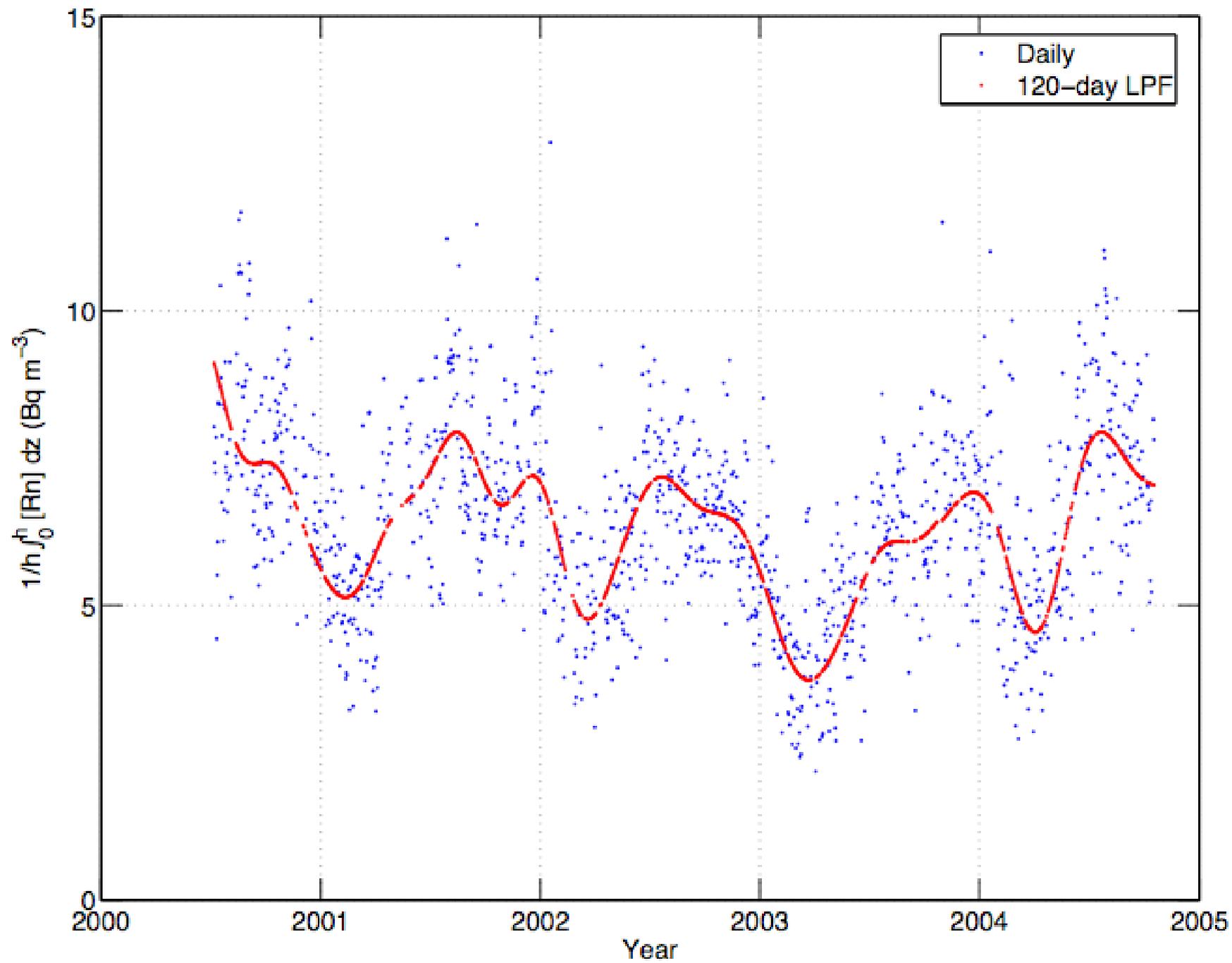


LBA 67km



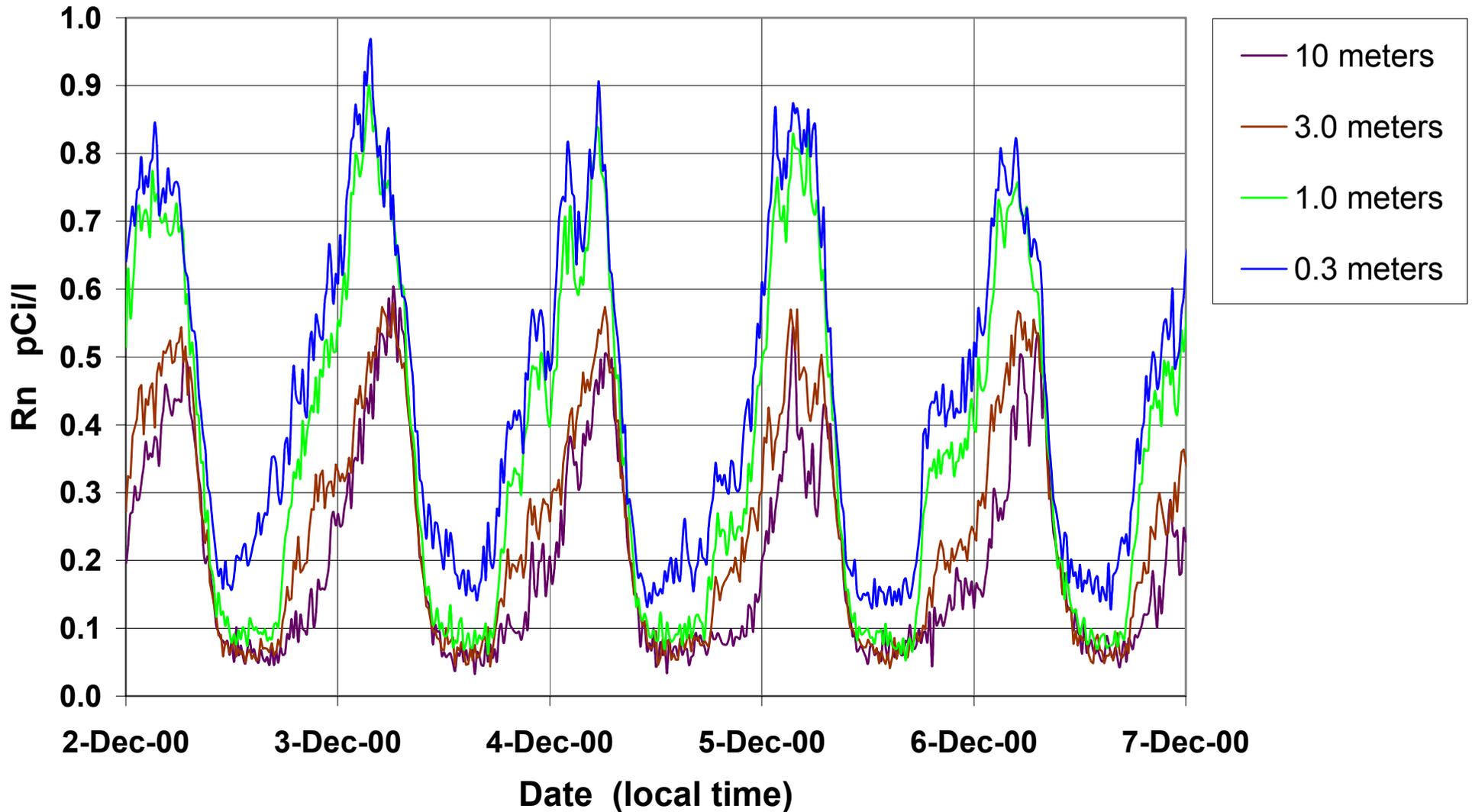


# LBA 67km



# Pasture Site 77 km FLONA Tapajos, Brazil

December 2, 2000 - December 6, 2000



## Mass Balance Equation

$$h \frac{dC}{dt} = S - k [\bar{C}_{\text{can}} - C_t] + \int_0^h [P - L] dz \quad (1)$$

where:

$C$  = gas concentration

$S$  = soil flux

$k$  = canopy-troposphere exchange coefficient

$P$  = gas production in canopy

$L$  = gas loss in canopy

$\bar{C}_{\text{can}}$  and  $C_t$  denote mean canopy concentration and concentration in troposphere immediately above canopy, respectively.

## Radon Mass Balance

$P = 0$ , decay loss ( $L$ ) is negligible, Equation (1) reduces to

$$k_{\text{Rn}} = - \frac{h \left( \frac{d\bar{C}_{\text{can}}}{dt} \right) - S}{\left[ \bar{C}_{\text{can}} - C_t \right]} \quad (2)$$

## Total Canopy Resistance

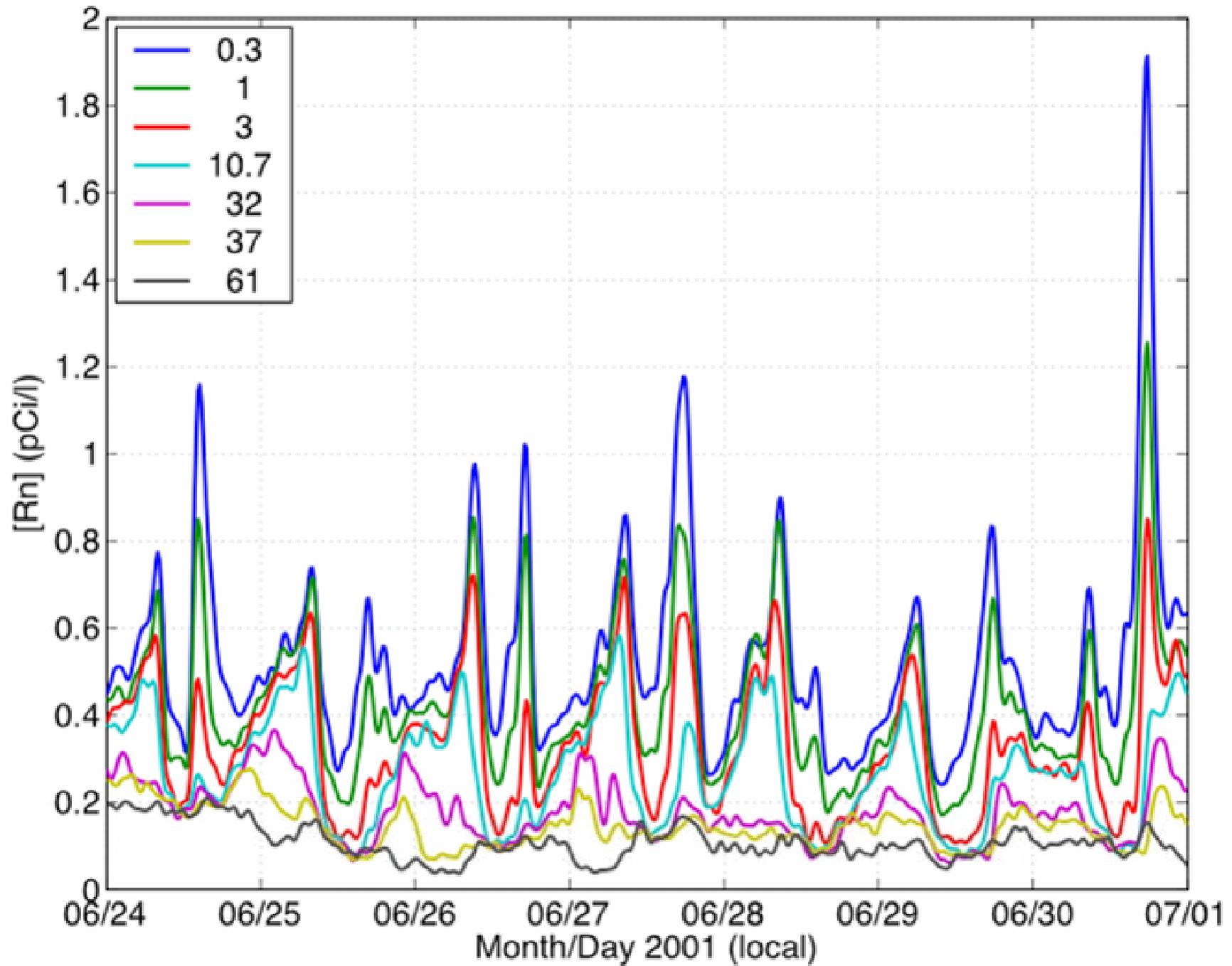
$$k = \frac{1}{R_t}$$

where  $R_t$  is total canopy resistance to bidirectional exchange between canopy and overlying troposphere.

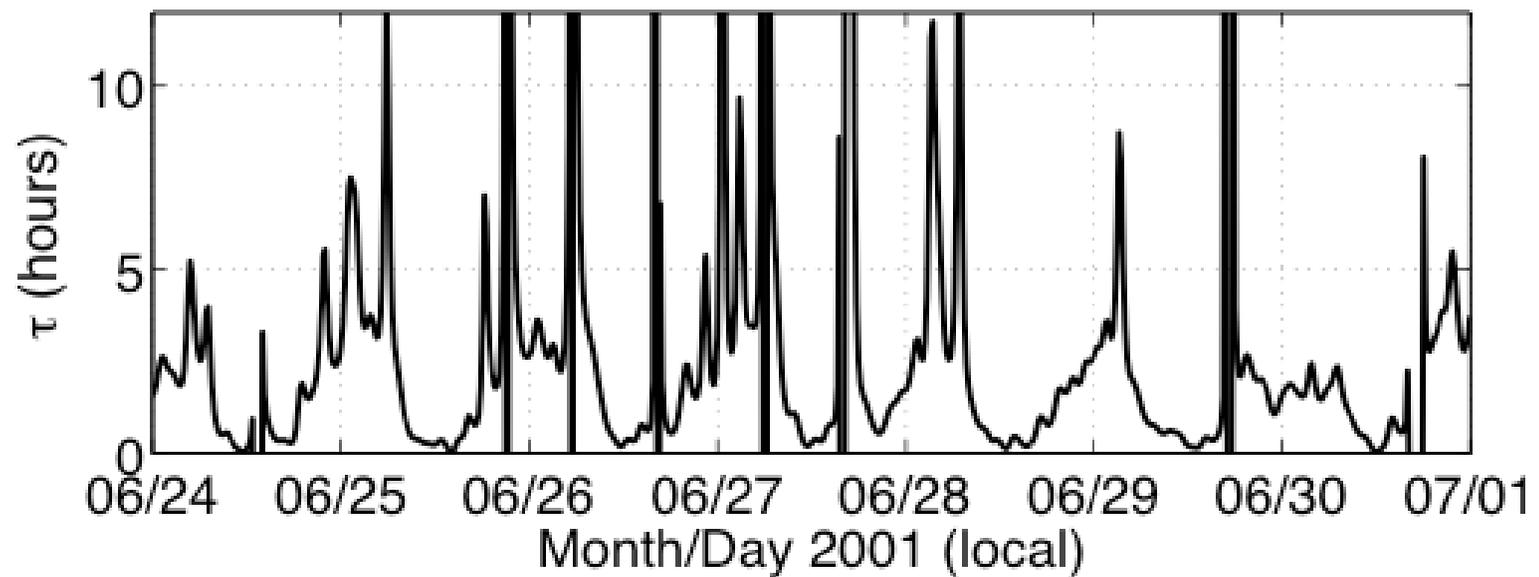
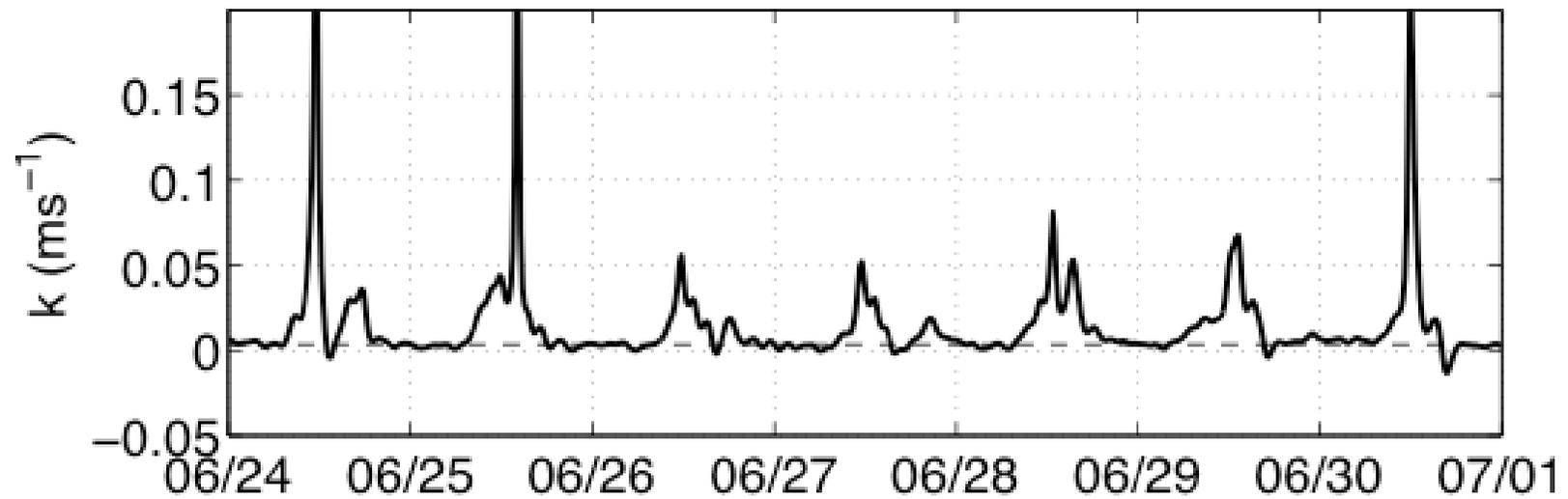
## Canopy Gas Flushing Time

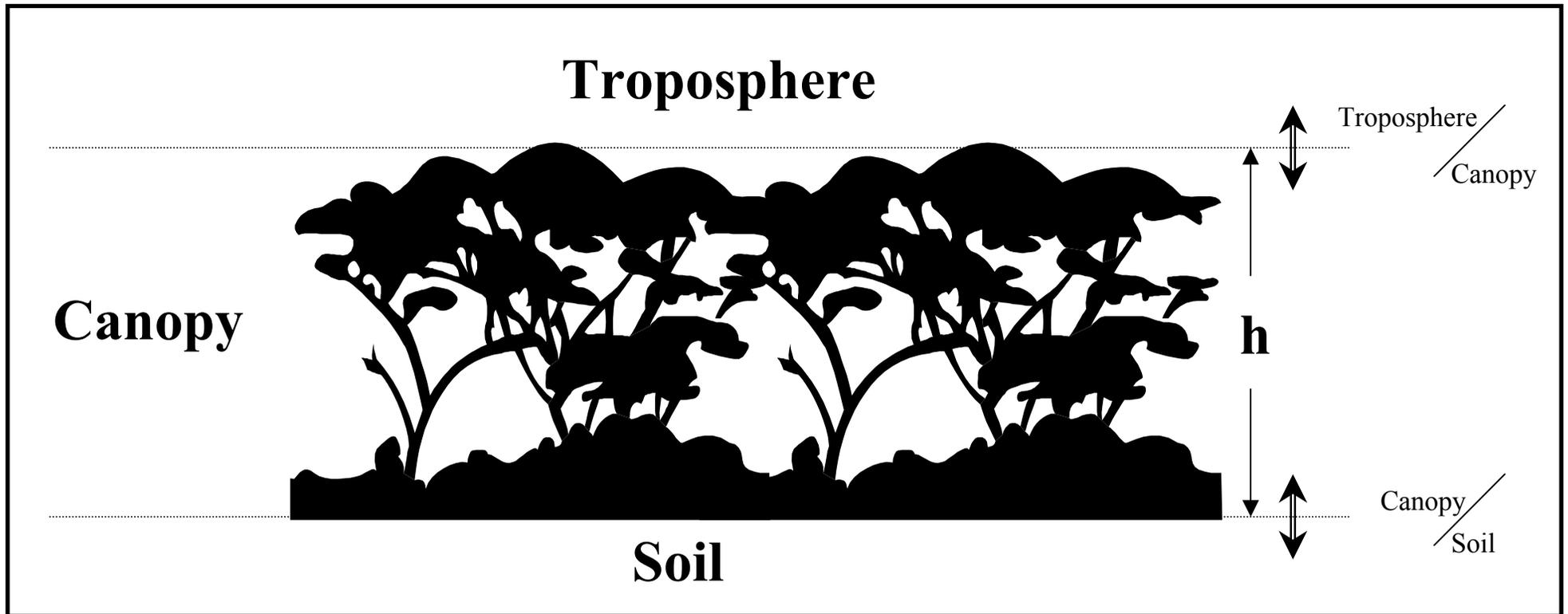
$$t_{\text{flush}} = R_t \cdot h$$

# LBA 67 km Radon



### LBA 67 km Radon Exchange Coefficient





Determine gas exchange rate constant  $k$  using Radon-222 soil flux  $S$  and canopy inventory  $(dC/dt)$  measurements

$$k = \frac{h (dC/dt) - S}{\bar{C}_{\text{Canopy}} - \bar{C}_{\text{Troposphere}}}$$









