The Flights of the ARA Cessna 404 *'Investigator 2'* during NAURU'99

APPENDIX 3: Fluxes and Fluctuations for Individual Flight Legs

Jörg M. Hacker and David Pethick

October 1999

ARA Technical Report No. 9/1999

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* Report available from: Dr. J.M. Hacker, ARA-Airborne Research Australia, Flinders University, PO Box 335, Salisbury South, 5106, Australia.

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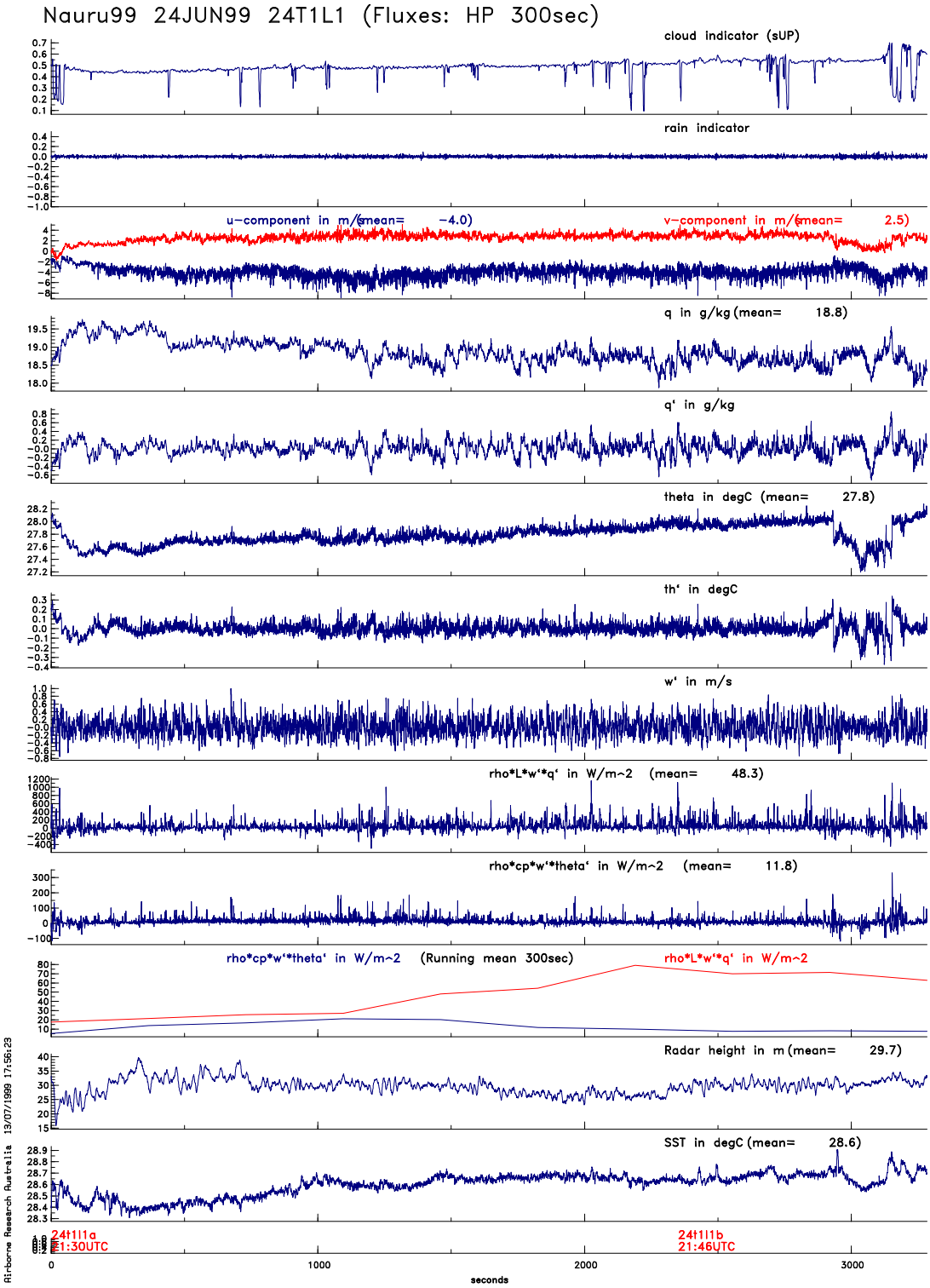
1 Fluxes and fluctuations for individual flight legs

The following figures show plots of the following parameters (top to bottom) for each flight leg of the *Big Triangle* pattern:

Parameter	**Explanation**
clouds	Cloud indicator
rain	Rain indicator
uair, vair	Horizontal wind components
q	Specific humidity
q’	Fluctuations of specific humidity
th	Potential temperature
th’	Fluctuations of potential temperature
w’	Fluctuations of vertical wind component
ñ L w’ q’	“Instantaneous flux” of latent heat
ñ c_p w’ th’	“Instantaneous flux” of sensible heat
H, E	Running averages of sensible and latent heat flux, averaged over 300 seconds (approximately 20km)
zRAD	Aircraft flying altitude in meters above land or water from radar altimeter
SST	Sea surface temperature from Heimann KT15


Nauru99 24JUN99 24T1L1 (Fluxes: HP 300sec)
cloud indicator (sUP)
rain indicator
u-component in m/s(mean= -4.0)
v-component in m/s(mean= 2.5)
q in g/kg (mean= 18.8)
q' in g/kg
theta in degC (mean= 27.8)
th' in degC
w' in m/s
rho*L*w'*q' in W/m~2 (mean= 48.3)
rho*cp*w'*theta' in W/m~2 (mean= 11.8)
rho*cp*w'*theta' in W/m~2 (Running mean 300sec)
rho*L*w'*q' in W/m~2
Radar height in m (mean= 29.7)
SST in degC (mean= 28.6)
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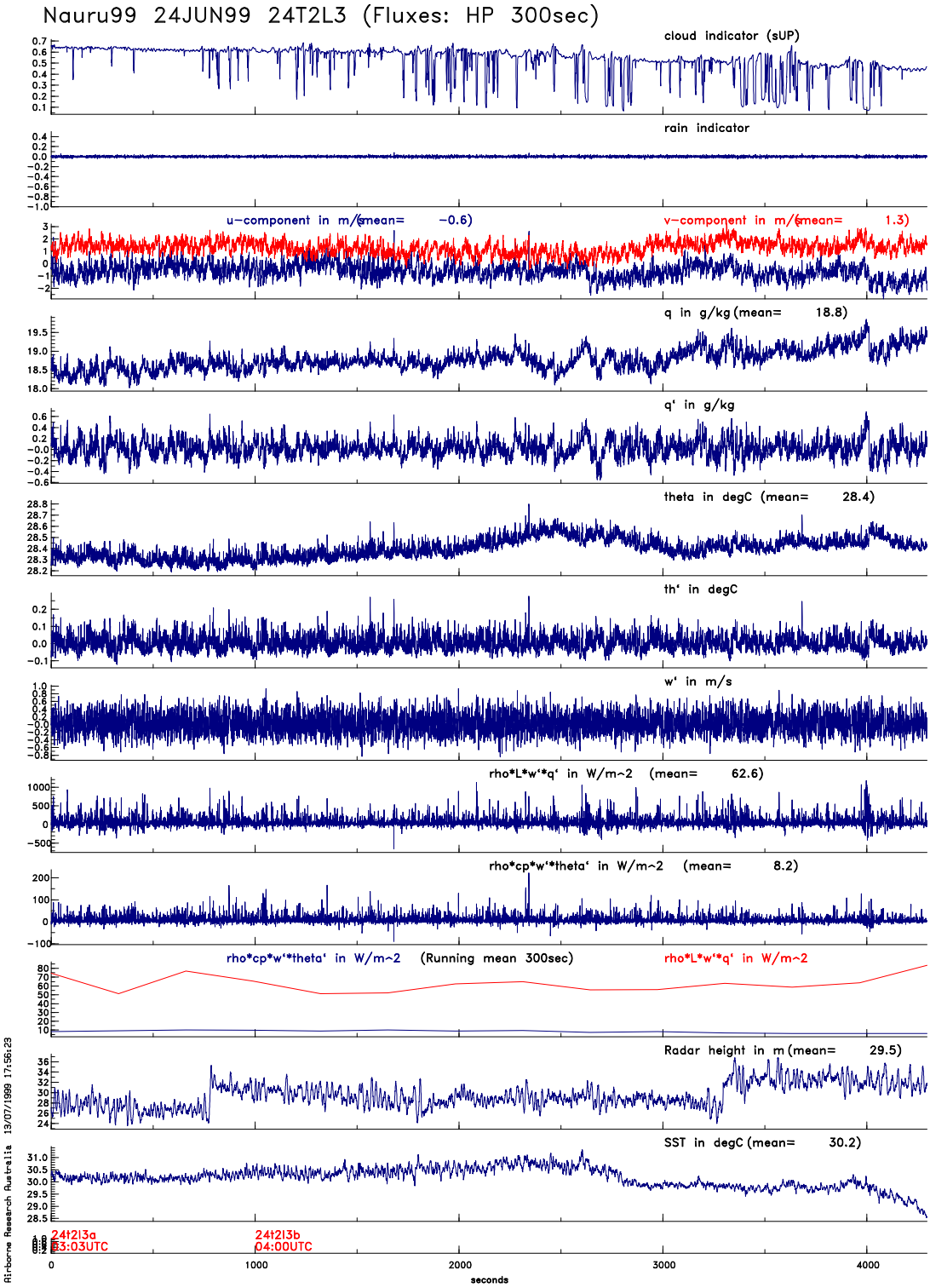
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rain indicator
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v-component in m/s(mean= 1.3)
q in g/kg (mean= 18.8)
q' in g/kg
theta in degC (mean= 28.4)
th' in degC
w' in m/s
rho*L*w'*q' in W/m^2 (mean= 62.6)
rho*cp*w'*theta' in W/m^2 (mean= 8.2)
rho*cp*w'*theta' in W/m^2 (Running mean 300sec)
rho*L*w'*q' in W/m^2
Radar height in m (mean= 29.5)
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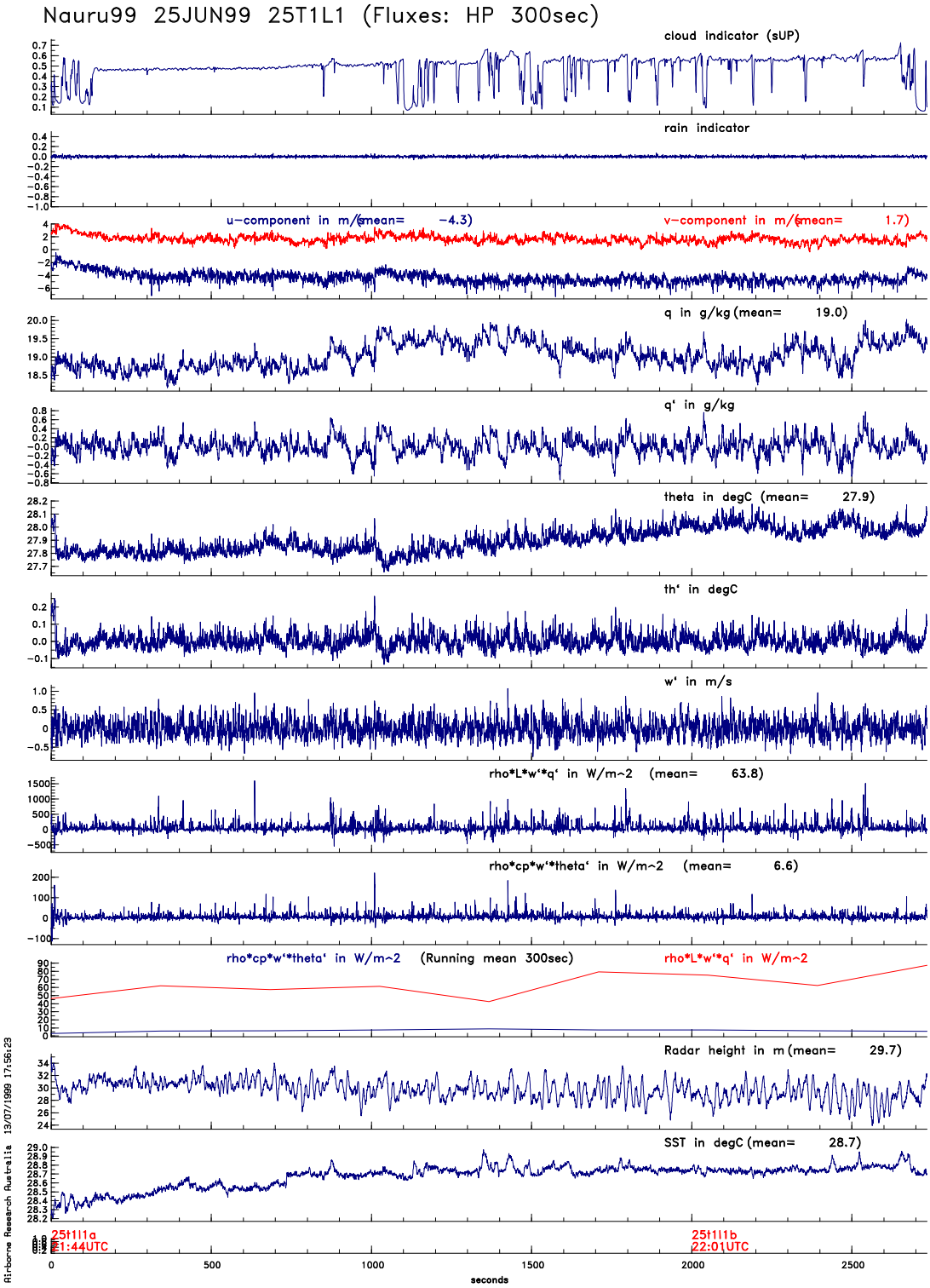
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rain indicator
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v-component in m/s(mean= 1.7)
q in g/kg (mean= 19.0)
q' in g/kg
theta in degC (mean= 27.9)
th' in degC
w' in m/s
rho*L*w'*q' in W/m~2 (mean= 63.8)
rho*cp*w'*theta' in W/m~2 (mean= 6.6)
rho*cp*w'*theta' in W/m~2 (Running mean 300sec)
rho*L*w'*q' in W/m~2
Radar height in m (mean= 29.7)
SST in degC (mean= 28.7)
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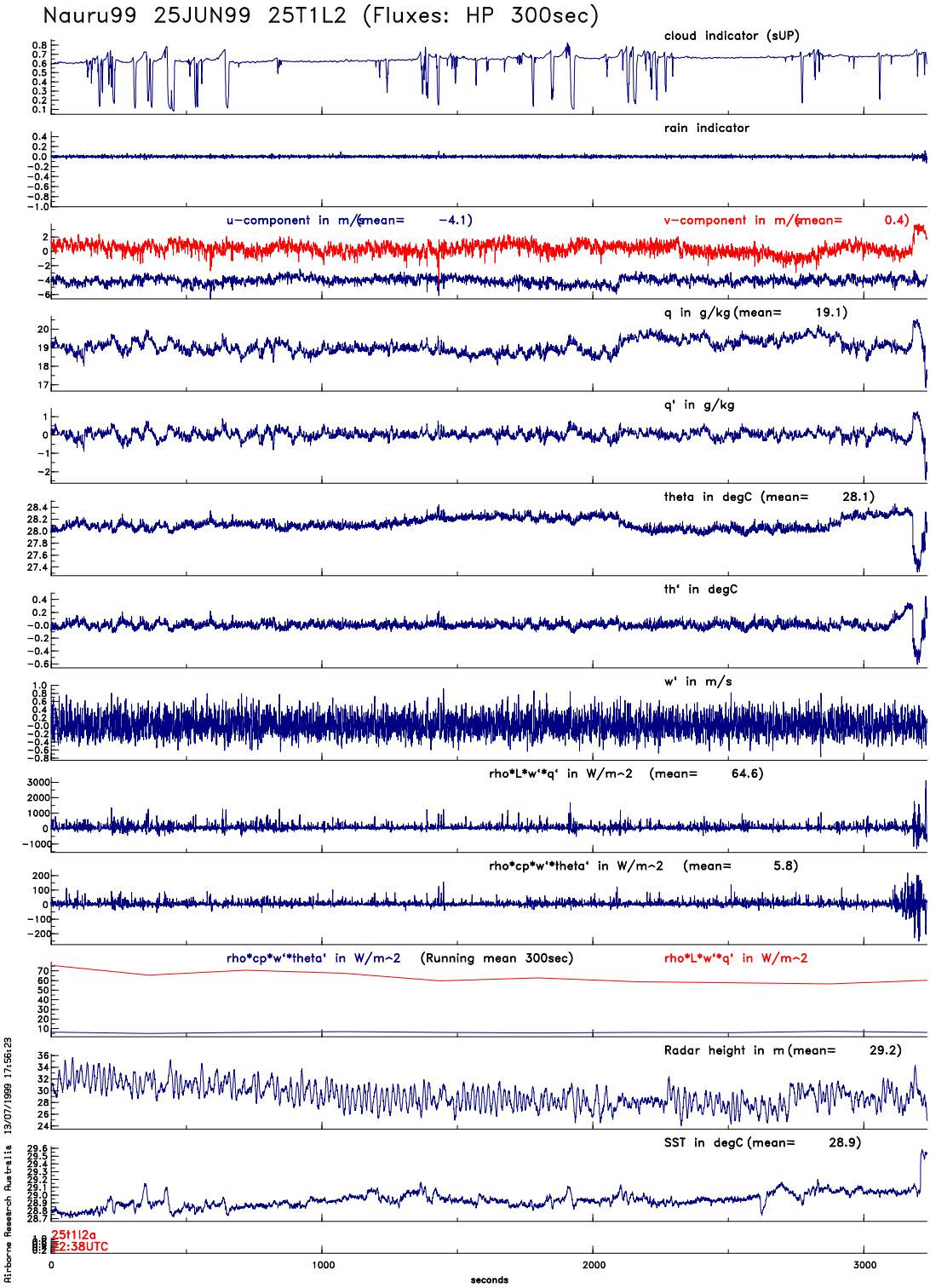
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q' in g/kg
theta in degC (mean= 28.1)
th' in degC
w' in m/s
rho*L*w'*q' in W/m^2 (mean= 64.6)
rho*cp*w'*theta' in W/m^2 (mean= 5.8)
rho*cp*w'*theta' in W/m^2 (Running mean 300sec)
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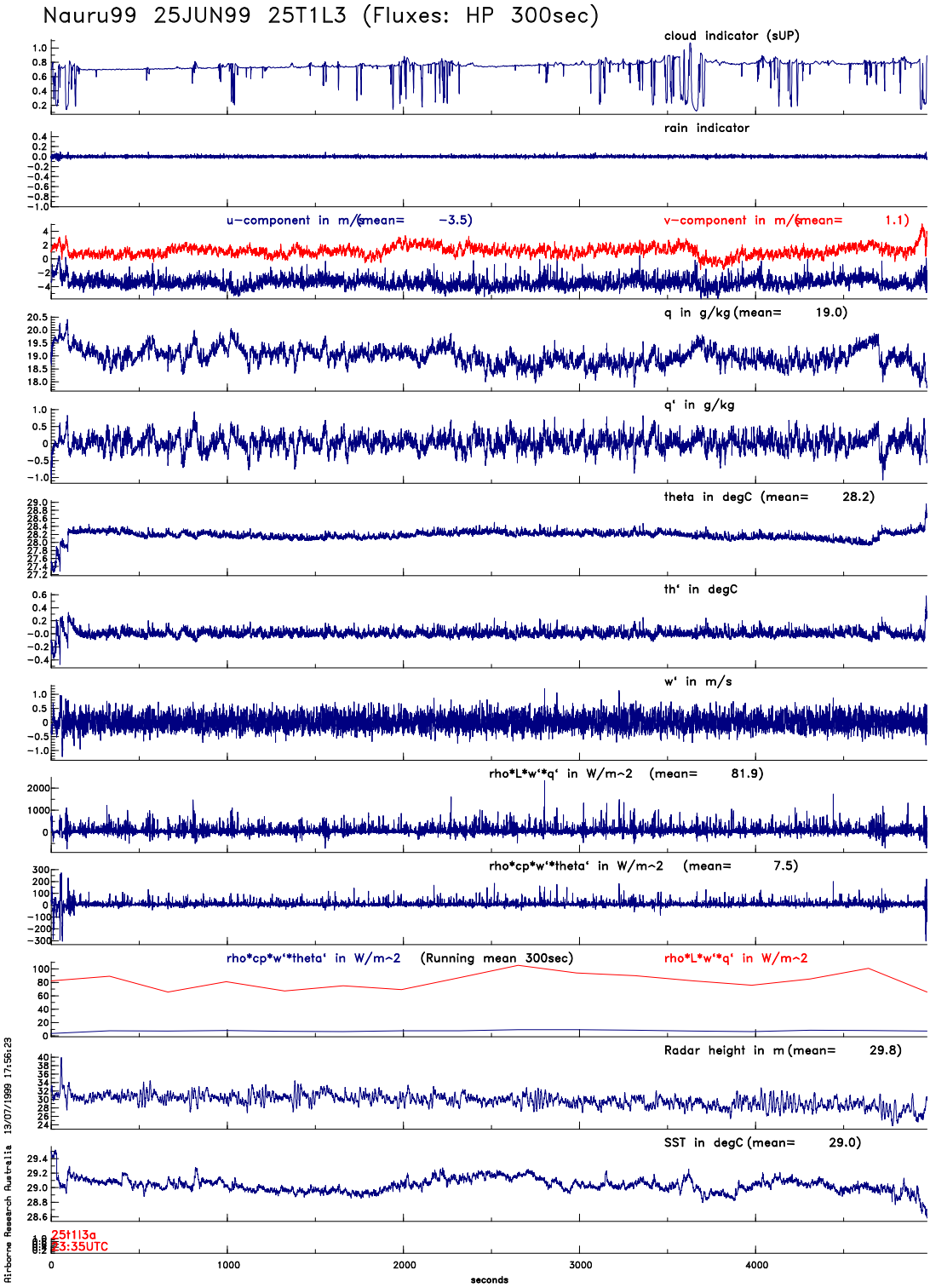
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cloud indicator (sUP)
rain indicator
u-component in m/s(mean= -3.5)
v-component in m/s(mean= 1.1)
q in g/kg (mean= 19.0)
q' in g/kg
theta in degC (mean= 28.2)
th' in degC
w' in m/s
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rho*cp*w'*theta' in W/m^2 (Running mean 300sec)
rho*L*w'*q' in W/m^2
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SST in degC (mean= 29.0)
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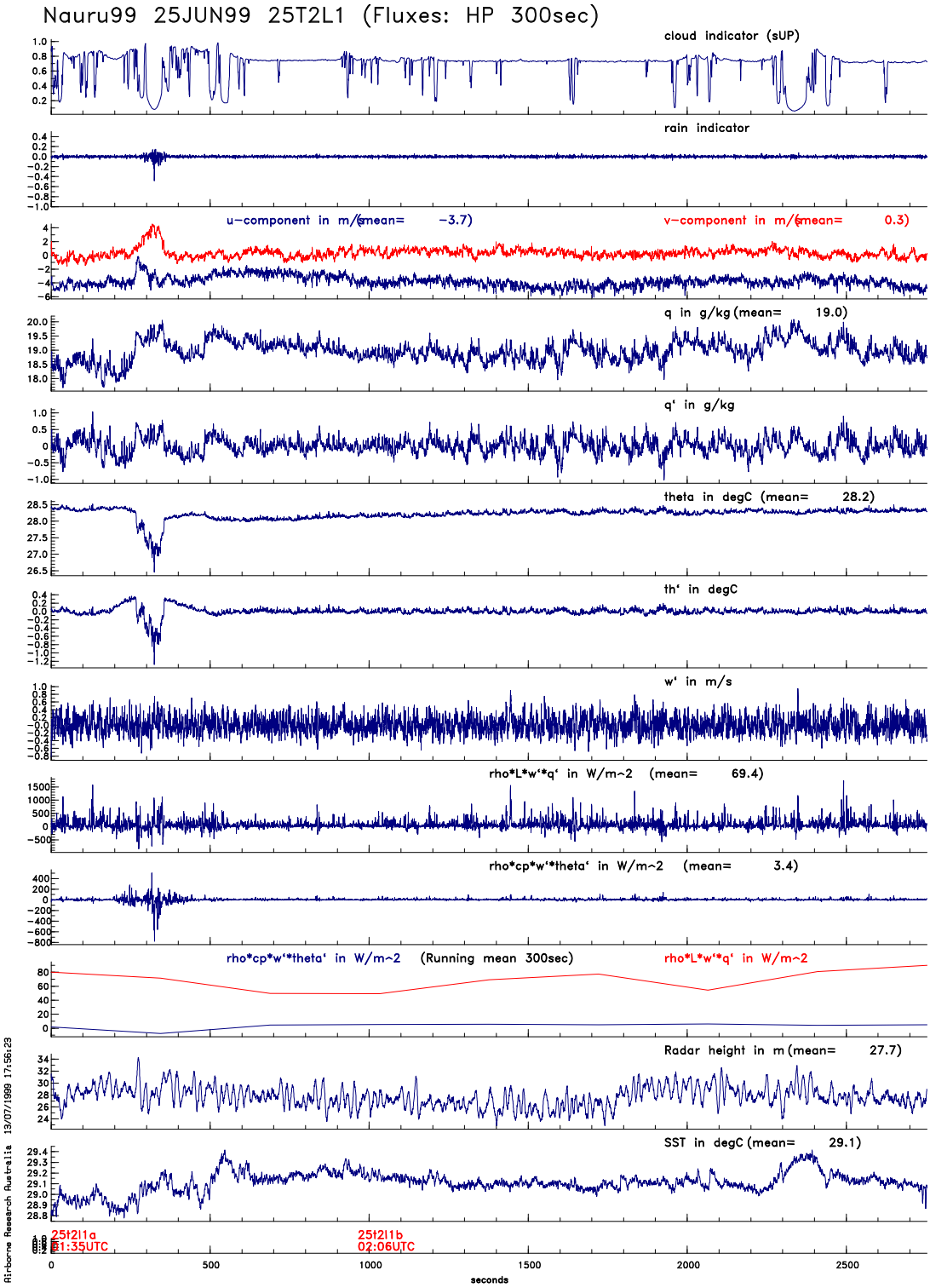
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rain indicator
u-component in m/s(mean= -3.7)
v-component in m/s(mean= 0.3)
q in g/kg (mean= 19.0)
q' in g/kg
theta in degC (mean= 28.2)
th' in degC
w' in m/s
rho*L*w'*q' in W/m^2 (mean= 69.4)
rho*cp*w'*theta' in W/m^2 (mean= 3.4)
rho*cp*w'*theta' in W/m^2 (Running mean 300sec)
rho*L*w'*q' in W/m^2
Radar height in m (mean= 27.7)
SST in degC (mean= 29.1)
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seconds
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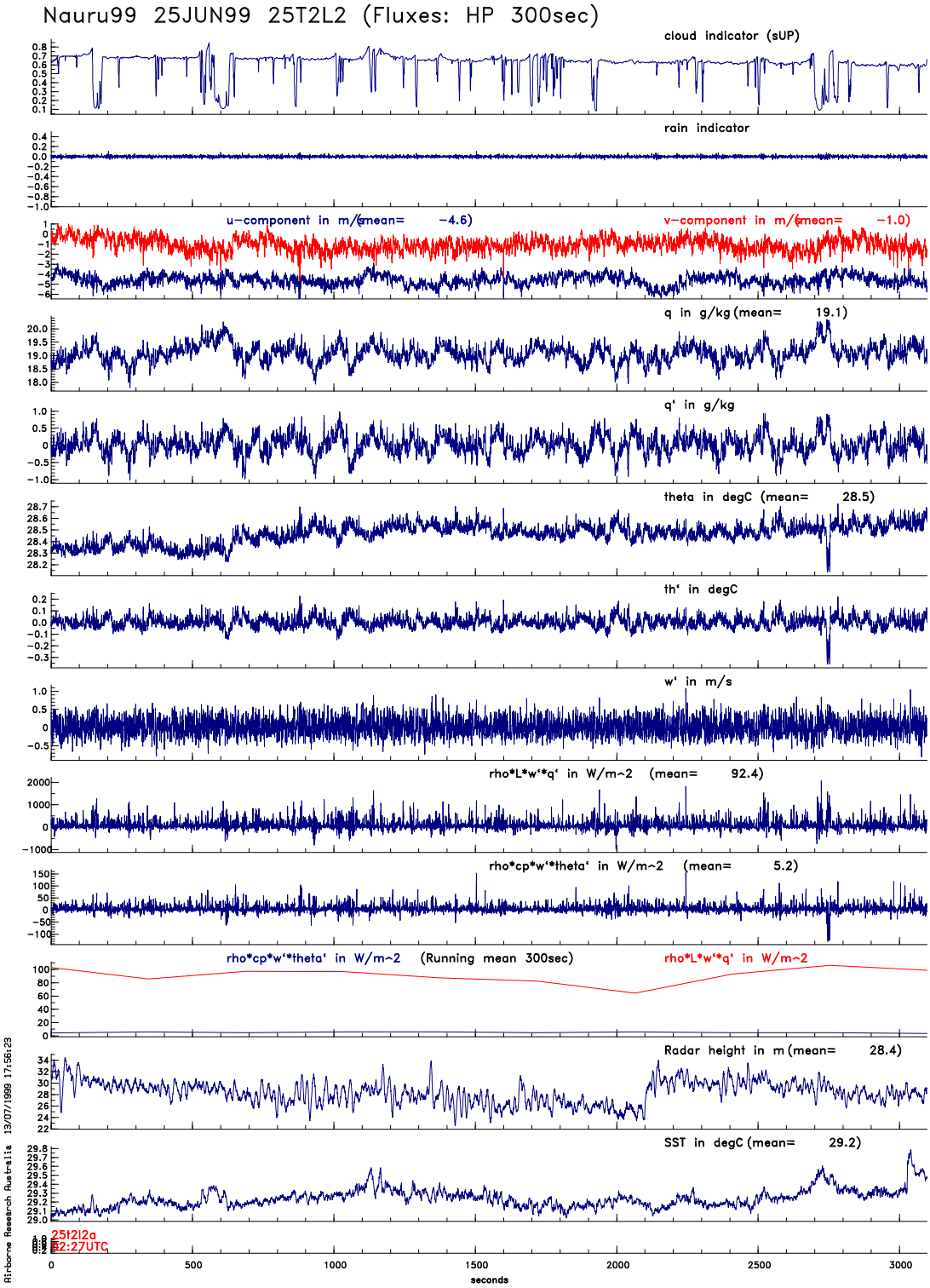
Nauru99 25JUN99 25T2L2 (Fluxes: HP 300sec)
cloud indicator (sUP)
rain indicator
u-component in m/s(mean= -4.6)
v-component in m/s(mean= -1.0)
q in g/kg (mean= 19.1)
q' in g/kg
theta in degC (mean= 28.5)
th' in degC
w' in m/s
rho*L*w'*q' in W/m^2 (mean= 92.4)
rho*cp*w'*theta' in W/m^2 (mean= 5.2)
rho*cp*w'*theta' in W/m^2 (Running mean 300sec)
rho*L*w'*q' in W/m^2
Radar height in m (mean= 28.4)
SST in degC (mean= 29.2)
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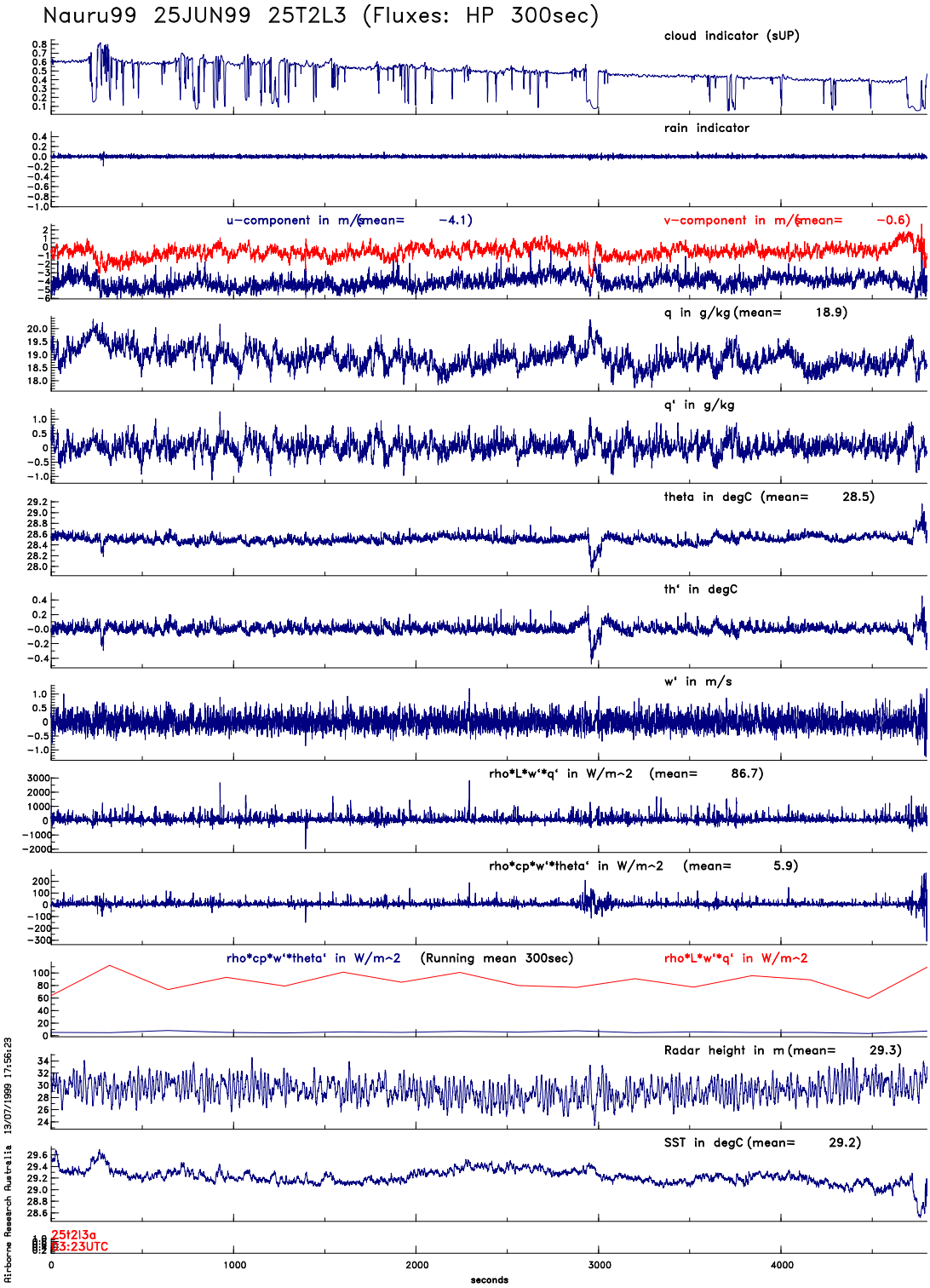
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cloud indicator (sUP)
rain indicator
u-component in m/s(mean= -4.1)
v-component in m/s(mean= -0.6)
q in g/kg (mean= 18.9)
q' in g/kg
theta in degC (mean= 28.5)
th' in degC
w' in m/s
rho*L*w'*q' in W/m^2 (mean= 86.7)
rho*cp*w'*theta' in W/m^2 (mean= 5.9)
rho*cp*w'*theta' in W/m^2 (Running mean 300sec)
rho*L*w'*q' in W/m^2
Radar height in m (mean= 29.3)
SST in degC (mean= 29.2)
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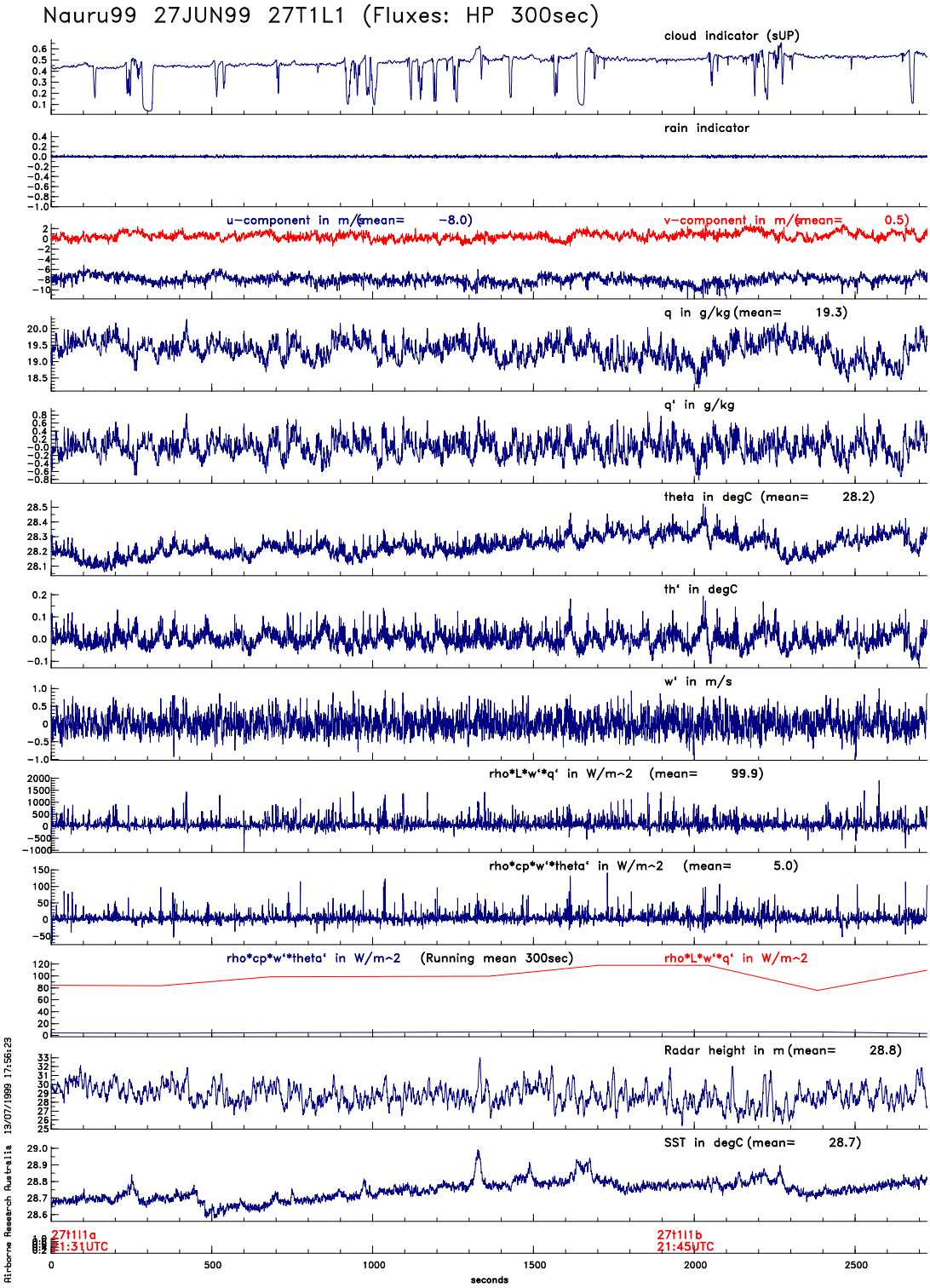
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cloud indicator (sUP)
rain indicator
u-component in m/s(mean= -8.0)
v-component in m/s(mean= 0.5)
q in g/kg (mean= 19.3)
q' in g/kg
theta in degC (mean= 28.2)
th' in degC
w' in m/s
rho*L*w'*q' in W/m^2 (mean= 99.9)
rho*cp*w'*theta' in W/m^2 (mean= 5.0)
rho*cp*w'*theta' in W/m^2 (Running mean 300sec)
rho*L*w'*q' in W/m^2
Radar height in m (mean= 28.8)
SST in degC (mean= 28.7)
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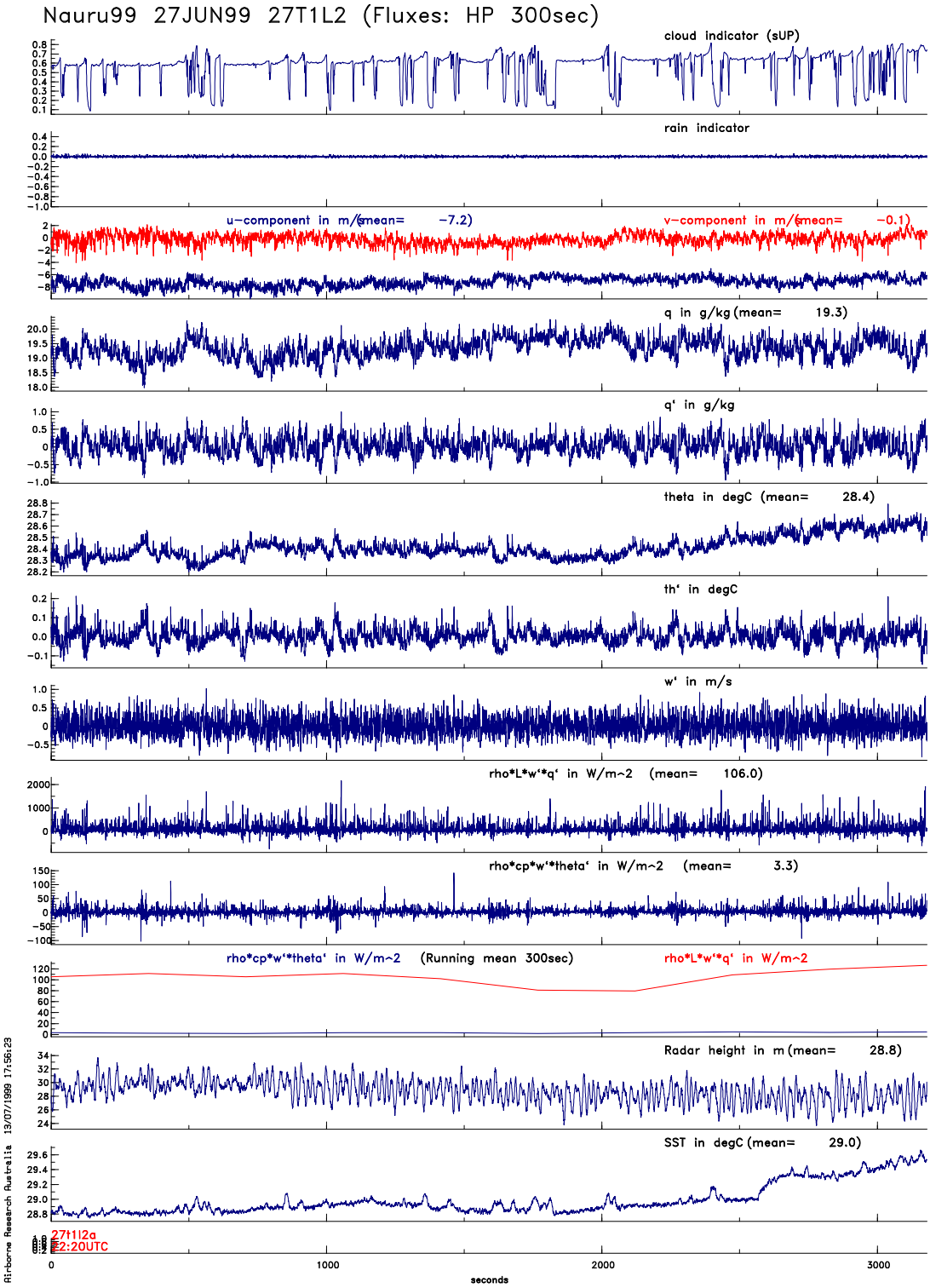
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cloud indicator (sUP)
rain indicator
u-component in m/s(mean= -7.2)
v-component in m/s(mean= -0.1)
q in g/kg (mean= 19.3)
q' in g/kg
theta in degC (mean= 28.4)
th' in degC
w' in m/s
rho*L*w'*q' in W/m^2 (mean= 106.0)
rho*cp*w'*theta' in W/m^2 (mean= 3.3)
rho*cp*w'*theta' in W/m^2 (Running mean 300sec)
rho*L*w'*q' in W/m^2
Radar height in m (mean= 28.8)
SST in degC (mean= 29.0)
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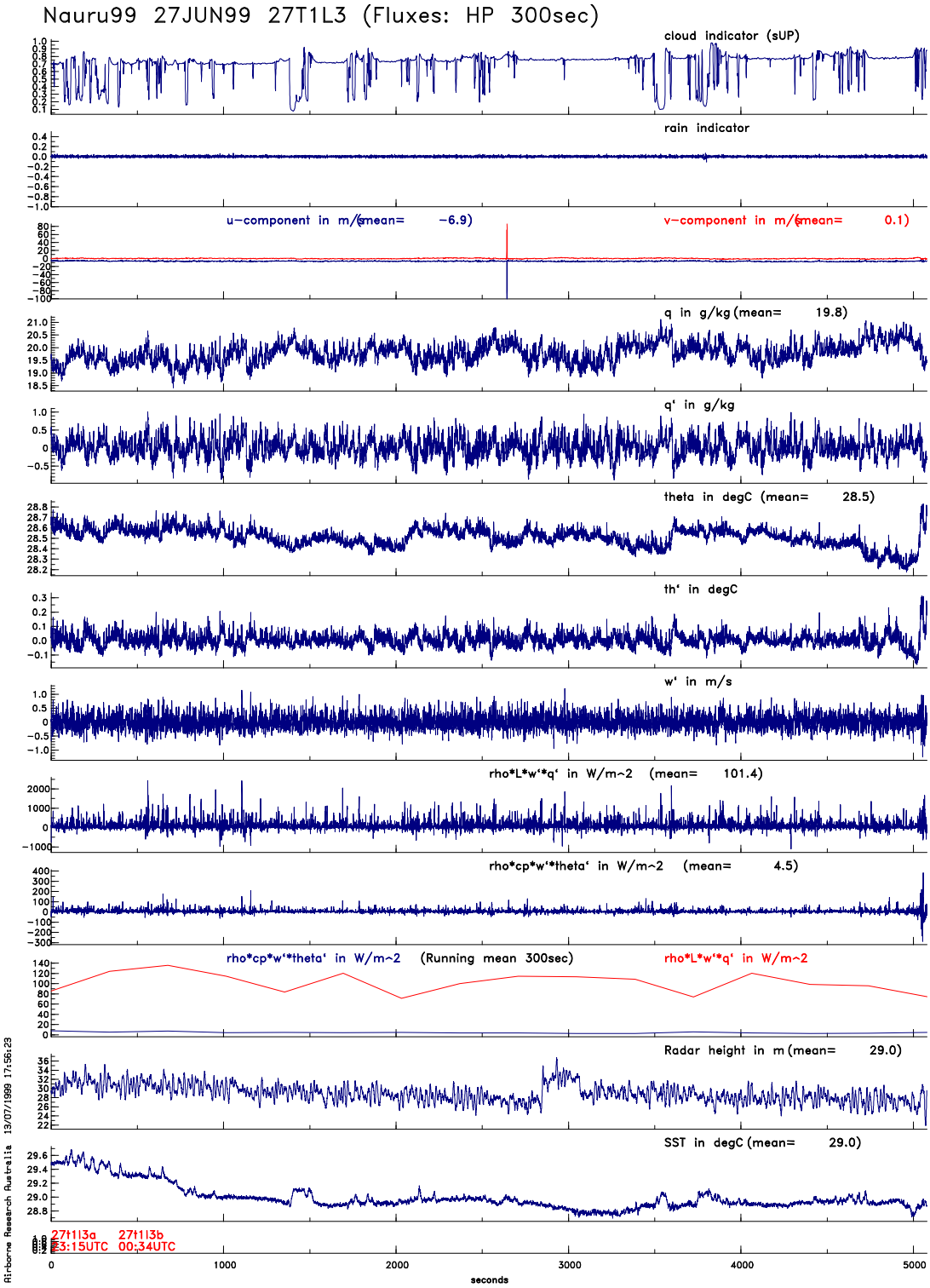
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cloud indicator (sUP)
rain indicator
u-component in m/s(mean= -6.9)
v-component in m/s(mean= 0.1)
q in g/kg (mean= 19.8)
q' in g/kg
theta in degC (mean= 28.5)
th' in degC
w' in m/s
rho*L*w'*q' in W/m^2 (mean= 101.4)
rho*cp*w'*theta' in W/m^2 (mean= 4.5)
rho*cp*w'*theta' in W/m^2 (Running mean 300sec)
rho*L*w'*q' in W/m^2
Radar height in m (mean= 29.0)
SST in degC (mean= 29.0)
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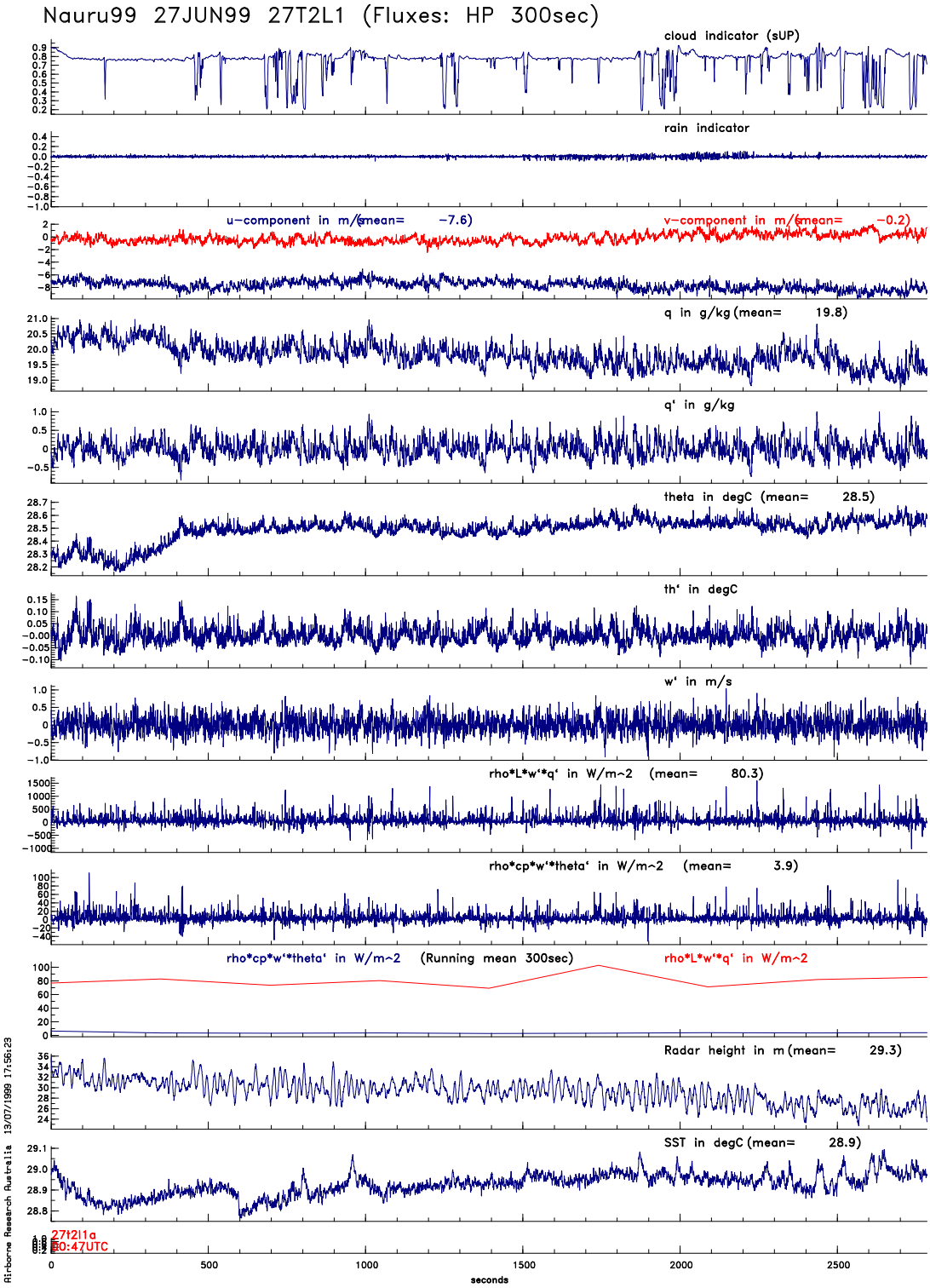
Nauru99 27JUN99 27T2L1 (Fluxes: HP 300sec)
cloud indicator (sUP)
rain indicator
u-component in m/s(mean= -7.6)
v-component in m/s(mean= -0.2)
q in g/kg (mean= 19.8)
q' in g/kg
theta in degC (mean= 28.5)
th' in degC
w' in m/s
rho*L*w'*q' in W/m~2 (mean= 80.3)
rho*cp*w'*theta' in W/m~2 (mean= 3.9)
rho*cp*w'*theta' in W/m~2 (Running mean 300sec)
rho*L*w'*q' in W/m~2
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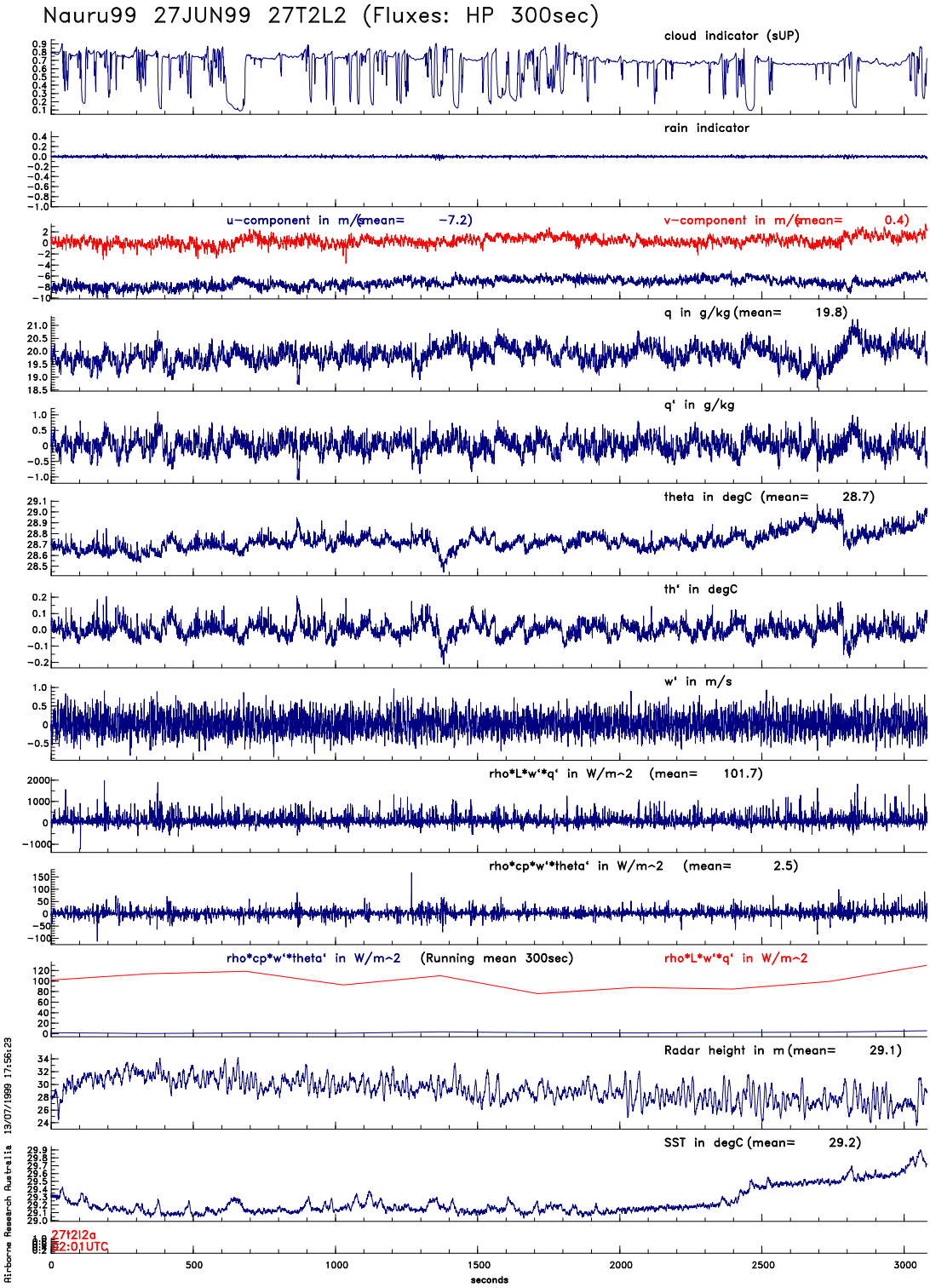
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cloud indicator (sUP)
rain indicator
u-component in m/s(mean= -7.2)
v-component in m/s(mean= 0.4)
q in g/kg (mean= 19.8)
q' in g/kg
theta in degC (mean= 28.7)
th' in degC
w' in m/s
rho*L*w'*q' in W/m^2 (mean= 101.7)
rho*cp*w'*theta' in W/m^2 (mean= 2.5)
rho*cp*w'*theta' in W/m^2 (Running mean 300sec)
rho*L*w'*q' in W/m^2
Radar height in m (mean= 29.1)
SST in degC (mean= 29.2)
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seconds
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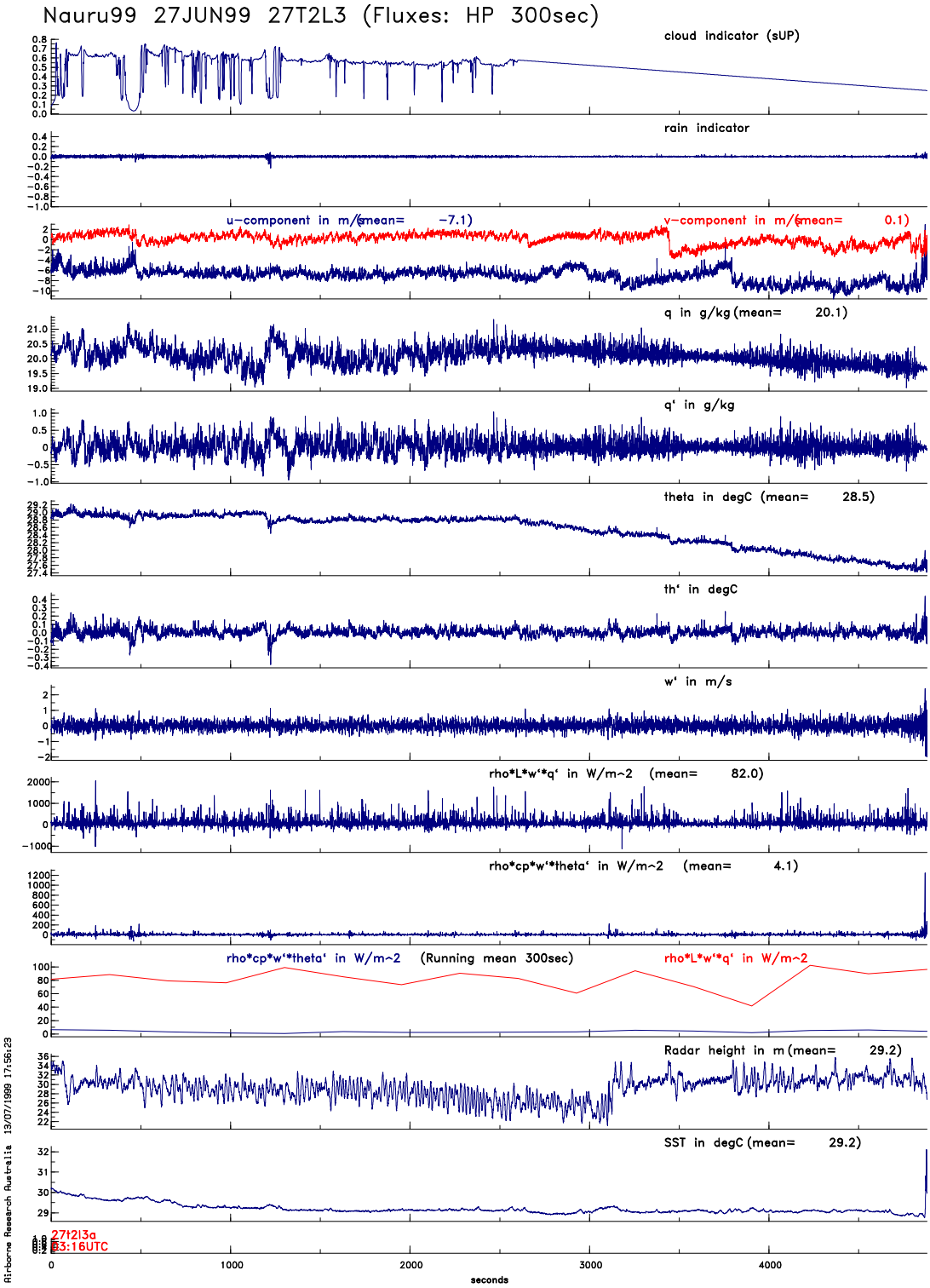
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cloud indicator (sUP)
rain indicator
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q in g/kg (mean= 20.1)
q' in g/kg
theta in degC (mean= 28.5)
th' in degC
w' in m/s
rho*L*w'*q' in W/m~2 (mean= 82.0)
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rho*L*w'*q' in W/m~2
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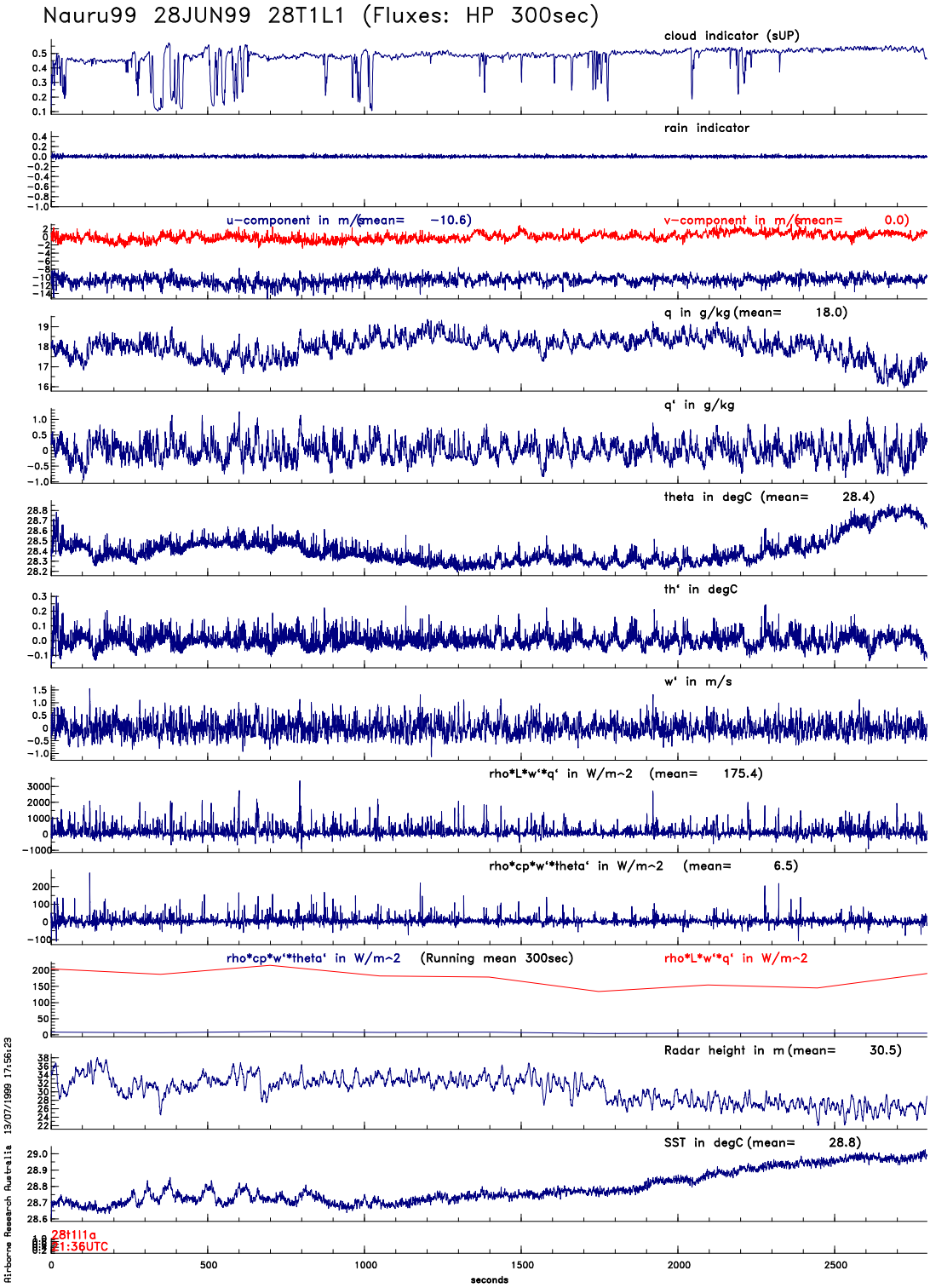
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cloud indicator (sUP)
rain indicator
u-component in m/s(mean= -10.6)
v-component in m/s(mean= 0.0)
q in g/kg (mean= 18.0)
q' in g/kg
theta in degC (mean= 28.4)
th' in degC
w' in m/s
rho*L*w'*q' in W/m~2 (mean= 175.4)
rho*cp*w'*theta' in W/m~2 (mean= 6.5)
rho*cp*w'*theta' in W/m~2 (Running mean 300sec)
rho*L*w'*q' in W/m~2
Radar height in m (mean= 30.5)
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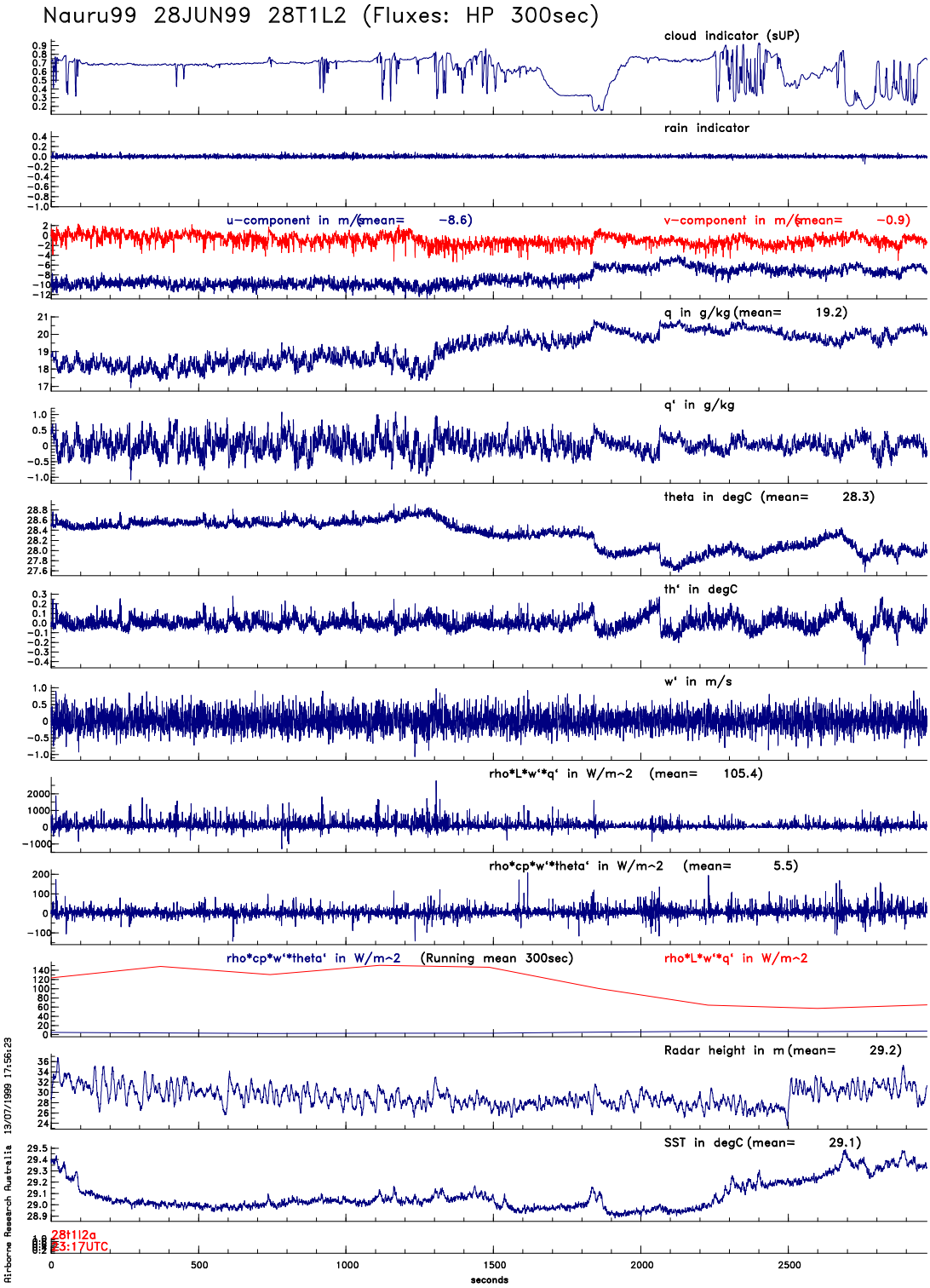
seconds


Nauru99 28JUN99 28T1L2 (Fluxes: HP 300sec)
cloud indicator (sUP)
rain indicator
u-component in m/s(mean= -8.6)
v-component in m/s(mean= -0.9)
q in g/kg (mean= 19.2)
q' in g/kg
theta in degC (mean= 28.3)
th' in degC
w' in m/s
rho*L*w'*q' in W/m~2 (mean= 105.4)
rho*cp*w'*theta' in W/m~2 (mean= 5.5)
rho*cp*w'*theta' in W/m~2 (Running mean 300sec)
rho*L*w'*q' in W/m~2
Radar height in m (mean= 29.2)
SST in degC (mean= 29.1)
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seconds
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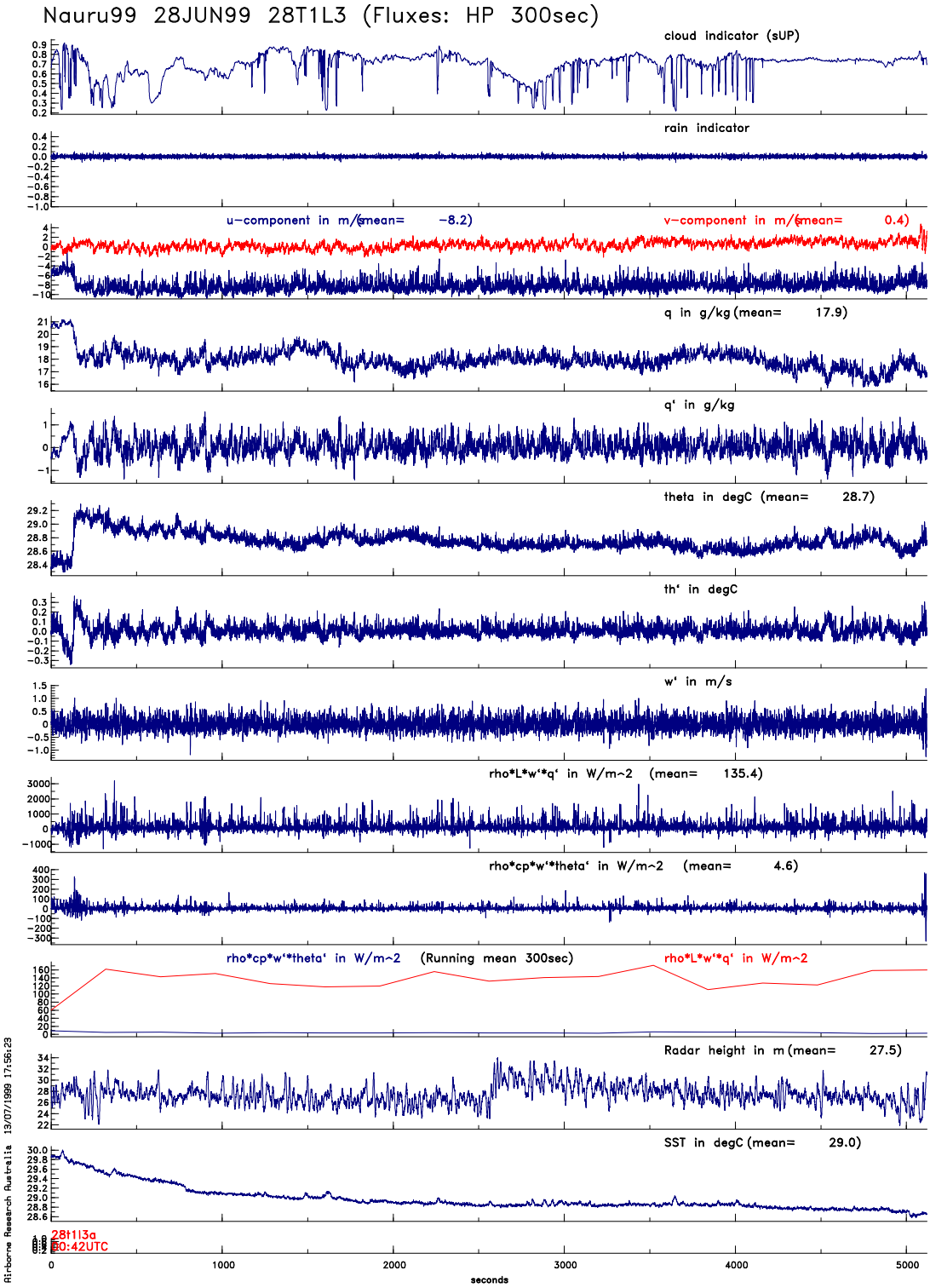
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cloud indicator (sUP)
rain indicator
u-component in m/s(mean= -8.2)
v-component in m/s(mean= 0.4)
q in g/kg (mean= 17.9)
q' in g/kg
theta in degC (mean= 28.7)
th' in degC
w' in m/s
rho*L*w'*q' in W/m~2 (mean= 135.4)
rho*cp*w'*theta' in W/m~2 (mean= 4.6)
rho*cp*w'*theta' in W/m~2 (Running mean 300sec)
rho*L*w'*q' in W/m~2
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SST in degC (mean= 29.0)
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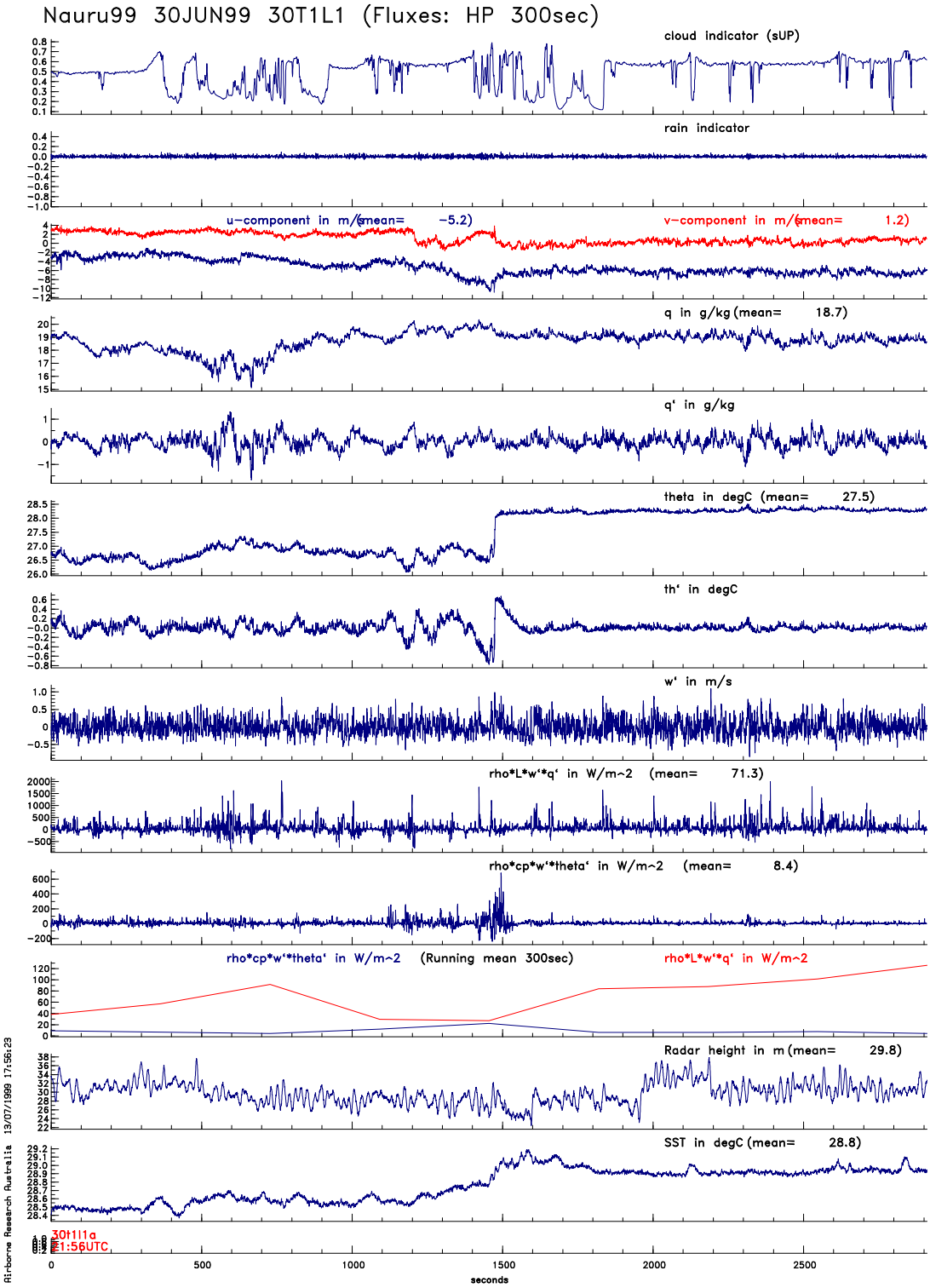
Nauru99 30JUN99 30T1L1 (Fluxes: HP 300sec)
cloud indicator (sUP)
rain indicator
u-component in m/s(mean= -5.2)
v-component in m/s(mean= 1.2)
q in g/kg (mean= 18.7)
q' in g/kg
theta in degC (mean= 27.5)
th' in degC
w' in m/s
rho*L*w'*q' in W/m^2 (mean= 71.3)
rho*cp*w'*theta' in W/m^2 (mean= 8.4)
rho*cp*w'*theta' in W/m^2 (Running mean 300sec)
rho*L*w'*q' in W/m^2
Radar height in m (mean= 29.8)
SST in degC (mean= 28.8)
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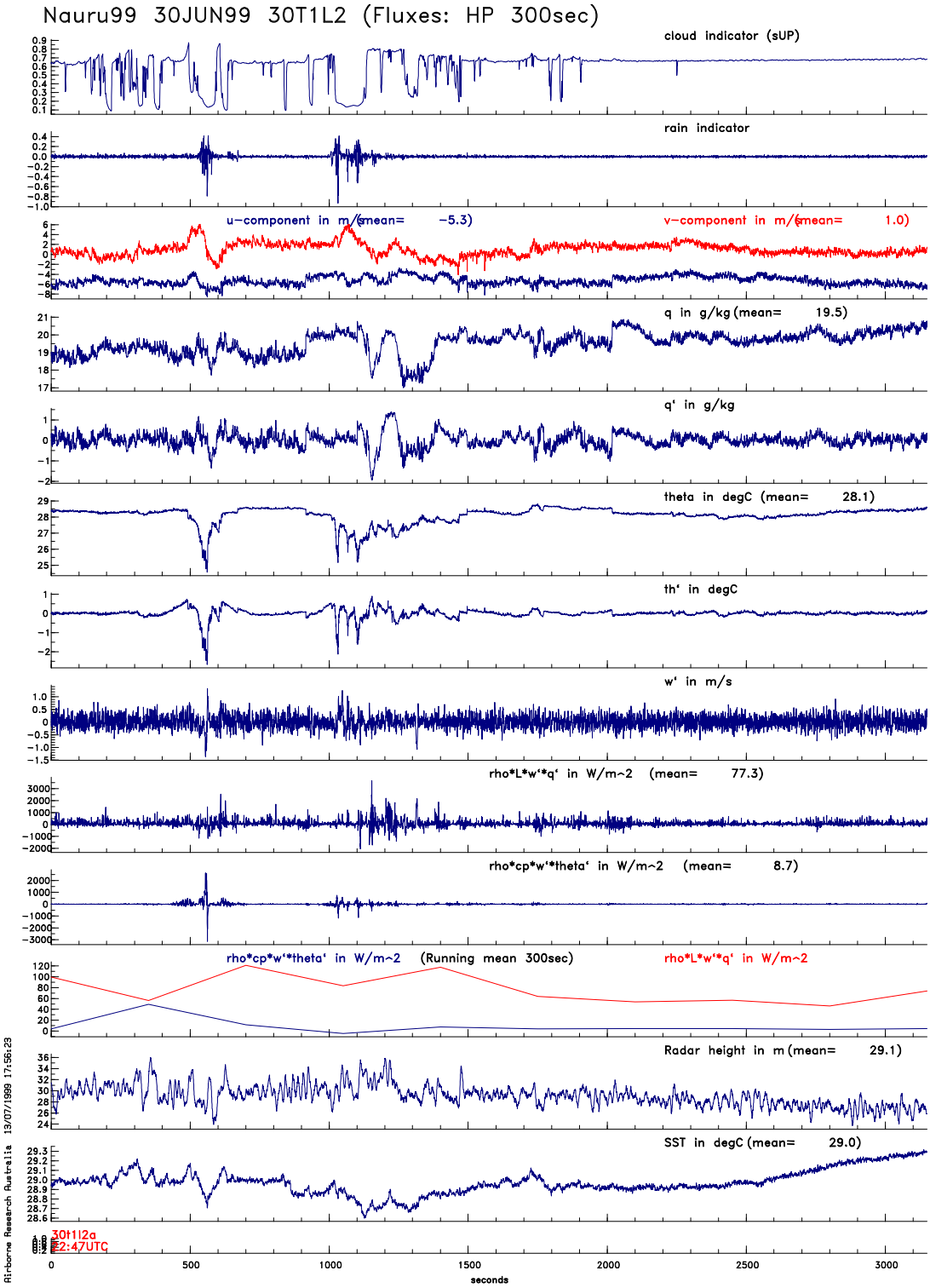
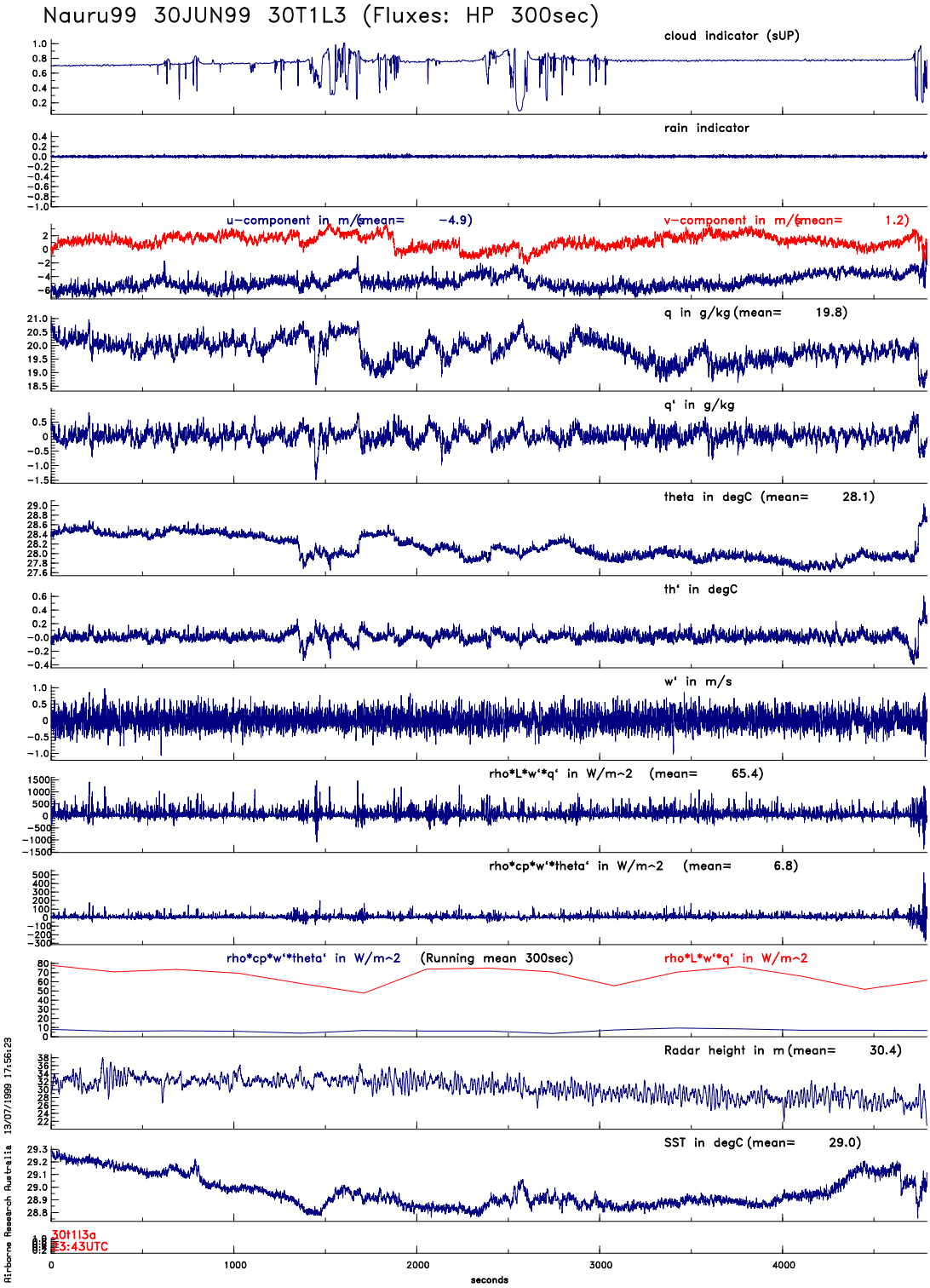
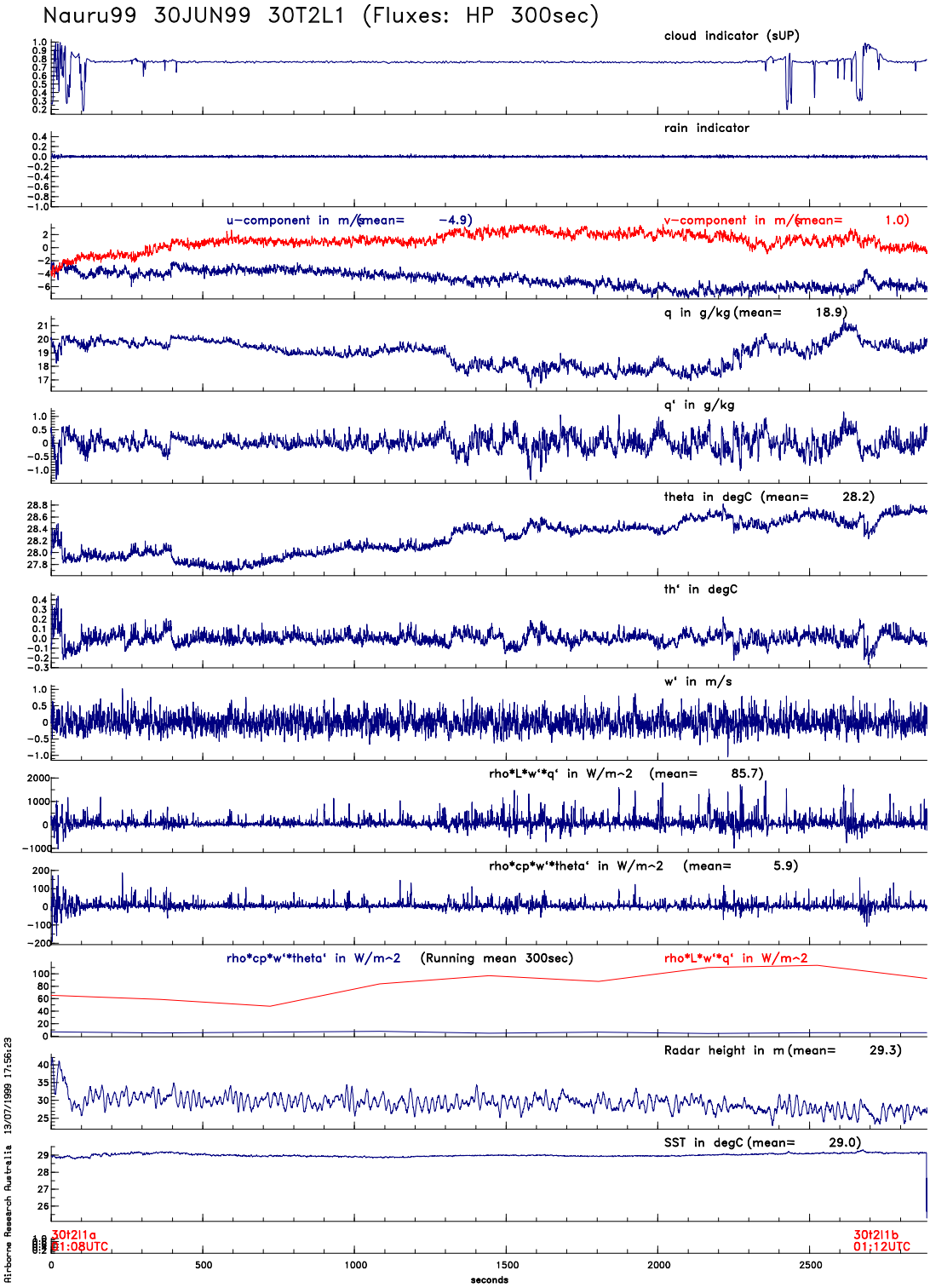
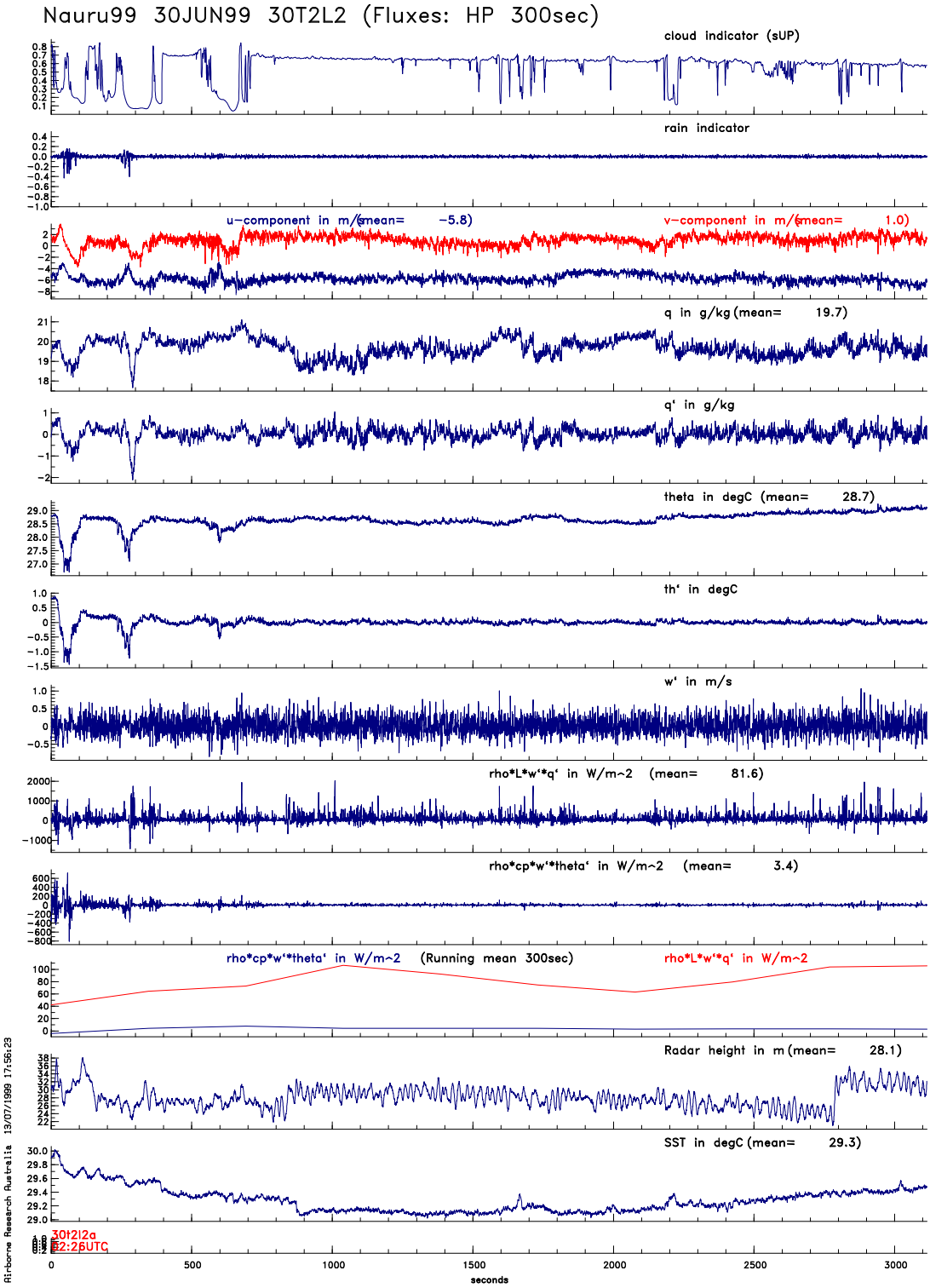
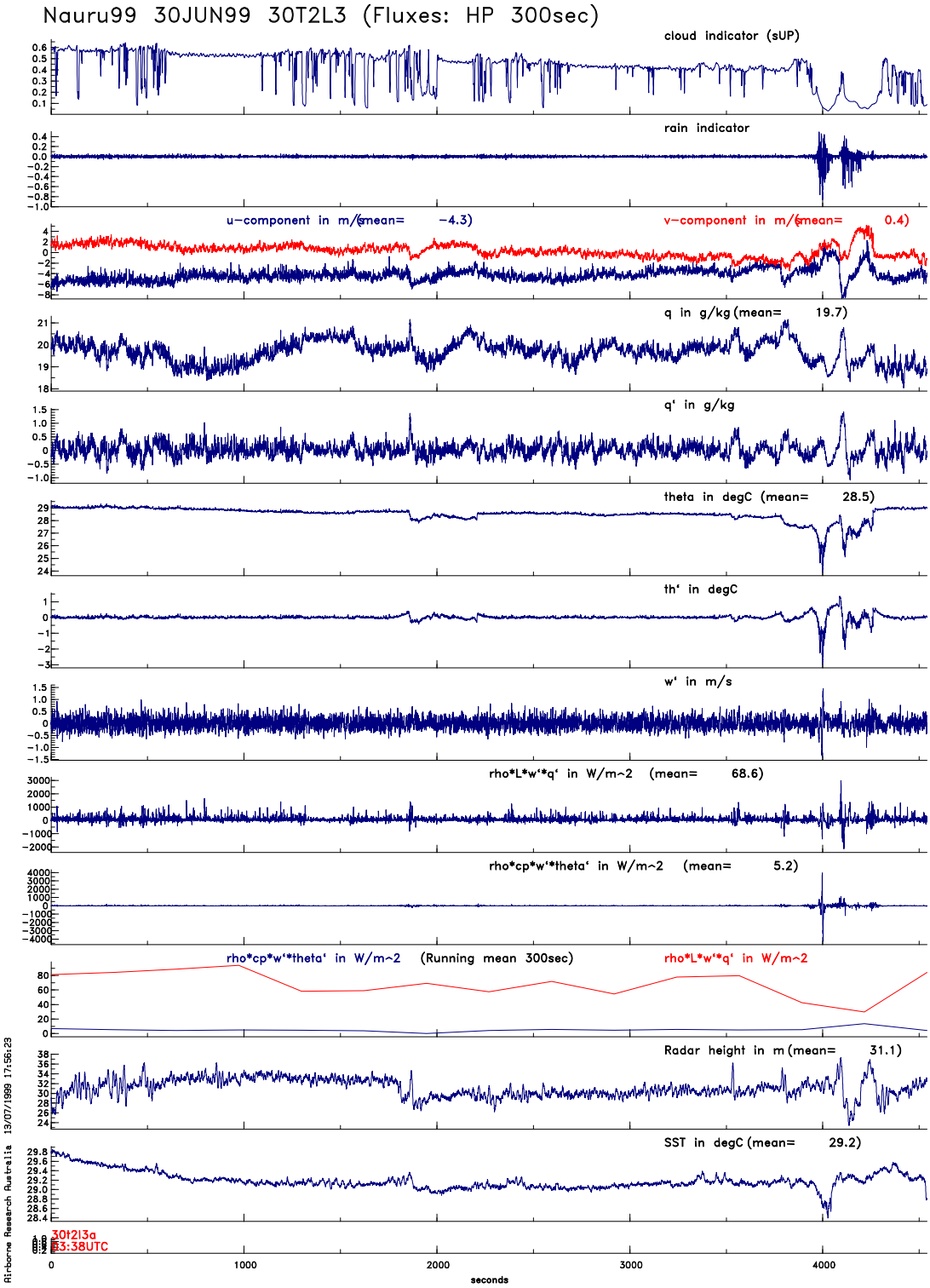

Nauru99 30JUN99 30T1L2 (Fluxes: HP 300sec)
cloud indicator (sUP)
rain indicator
u-component in m/s(mean= -5.3)
v-component in m/s(mean= 1.0)
q in g/kg (mean= 19.5)
q' in g/kg
theta in degC (mean= 28.1)
th' in degC
w' in m/s
rho*L*w'*q' in W/m~2 (mean= 77.3)
rho*cp*w'*theta' in W/m~2 (mean= 8.7)
rho*cp*w'*theta' in W/m~2 (Running mean 300sec)
rho*L*w'*q' in W/m~2
Radar height in m (mean= 29.1)
SST in degC (mean= 29.0)
30t1l2a
22:47UTC
seconds
Airborne Research Australia 13/07/1999 17:56:23


Nauru99 30JUN99 30T1L3 (Fluxes: HP 300sec)
cloud indicator (sUP)
rain indicator
u-component in m/s(mean= -4.9)
v-component in m/s(mean= 1.2)
q in g/kg (mean= 19.8)
q' in g/kg
theta in degC (mean= 28.1)
th' in degC
w' in m/s
rho*L*w'*q' in W/m~2 (mean= 65.4)
rho*cp*w'*theta' in W/m~2 (mean= 6.8)
rho*cp*w'*theta' in W/m~2 (Running mean 300sec)
rho*L*w'*q' in W/m~2
Radar height in m (mean= 30.4)
SST in degC (mean= 29.0)
30t1l3a
23:43UTC
seconds
Airborne Research Australia 13/07/1999 17:56:23


Nauru99 30JUN99 30T2L1 (Fluxes: HP 300sec)
cloud indicator (sUP)
rain indicator
u-component in m/s(mean= -4.9)
v-component in m/s(mean= 1.0)
q in g/kg (mean= 18.9)
q' in g/kg
theta in degC (mean= 28.2)
th' in degC
w' in m/s
rho*L*w'*q' in W/m^2 (mean= 85.7)
rho*cp*w'*theta' in W/m^2 (mean= 5.9)
rho*cp*w'*theta' in W/m^2 (Running mean 300sec)
rho*L*w'*q' in W/m^2
Radar height in m (mean= 29.3)
SST in degC (mean= 29.0)
30t2l1a
01:08UTC
30t2l1b
01:12UTC
seconds
Airborne Research Australia 13/07/1999 17:56:23


Nauru99 30JUN99 30T2L2 (Fluxes: HP 300sec)
cloud indicator (sUP)
rain indicator
u-component in m/s(mean= -5.8)
v-component in m/s(mean= 1.0)
q in g/kg (mean= 19.7)
q' in g/kg
theta in degC (mean= 28.7)
th' in degC
w' in m/s
rho*L*w'*q' in W/m~2 (mean= 81.6)
rho*cp*w'*theta' in W/m~2 (mean= 3.4)
rho*cp*w'*theta' in W/m~2 (Running mean 300sec)
rho*L*w'*q' in W/m~2
Radar height in m (mean= 28.1)
SST in degC (mean= 29.3)
30t2l2a
22:26UTC
seconds
Airborne Research Australia 13/07/1999 17:56:23


Nauru99 30JUN99 30T2L3 (Fluxes: HP 300sec)
cloud indicator (sUP)
rain indicator
u-component in m/s(mean= -4.3)
v-component in m/s(mean= 0.4)
q in g/kg (mean= 19.7)
q' in g/kg
theta in degC (mean= 28.5)
th' in degC
w' in m/s
rho*L*w'*q' in W/m~2 (mean= 68.6)
rho*cp*w'*theta' in W/m~2 (mean= 5.2)
rho*cp*w'*theta' in W/m~2 (Running mean 300sec)
rho*L*w'*q' in W/m~2
Radar height in m (mean= 31.1)
SST in degC (mean= 29.2)
30t2l3a
03:38UTC
seconds
Airborne Research Australia 13/07/1999 17:56:23