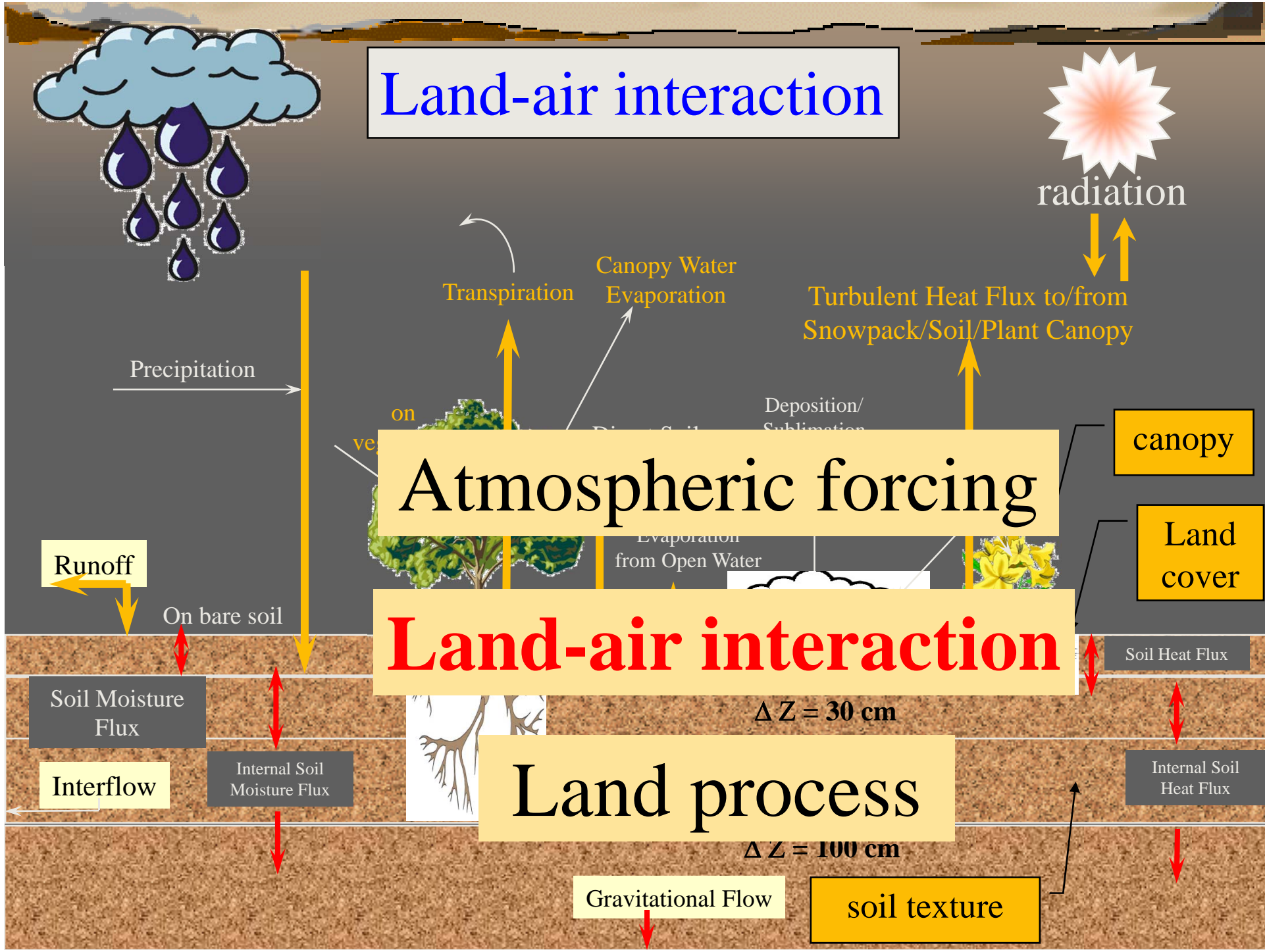
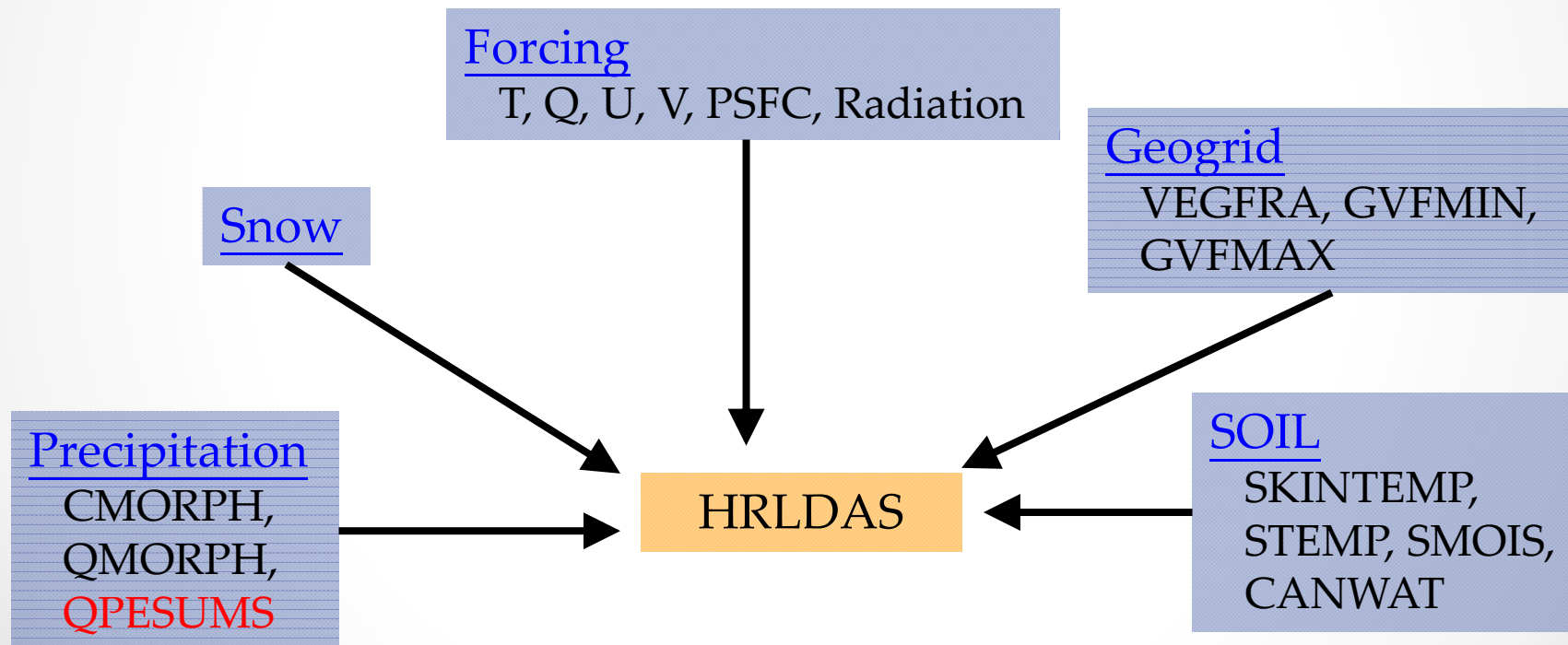


改進土壤溫度、濕度分析場 對模式預報之影響

林伯勳，洪景山，洪于郡
中央氣象局



High Resolution Land Data Assimilation System (HRLDAS)



Soil Temperature (°C) @ Taichung

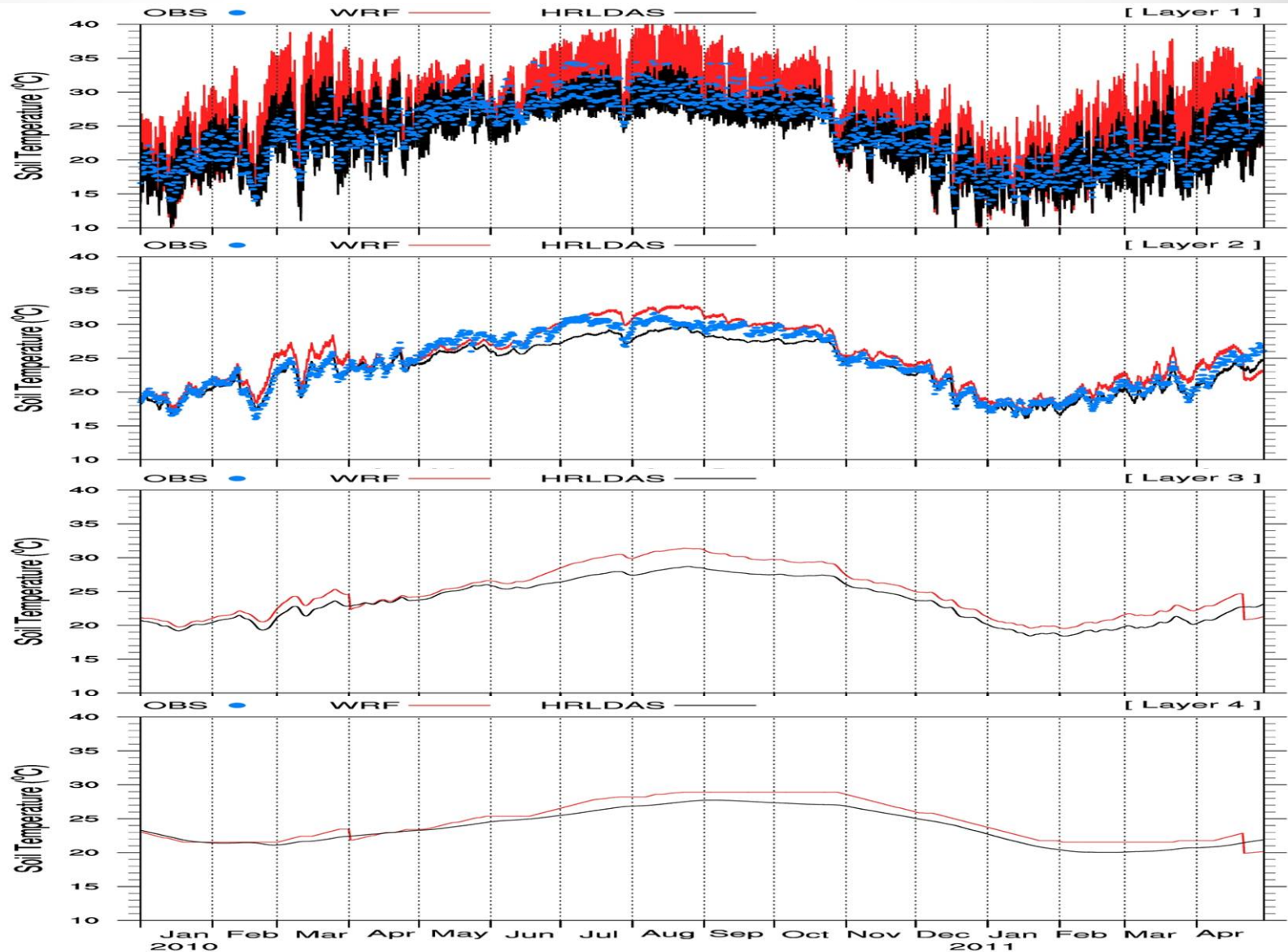
【2010.1.1-2011.4.30】 5,14,21 LST (人工)

Layer 1
(5 cm)

Layer 2
(25 cm)

Layer 3
(70 cm)

Layer 4
(150 cm)



Soil Temperature (°C) @ Taichung

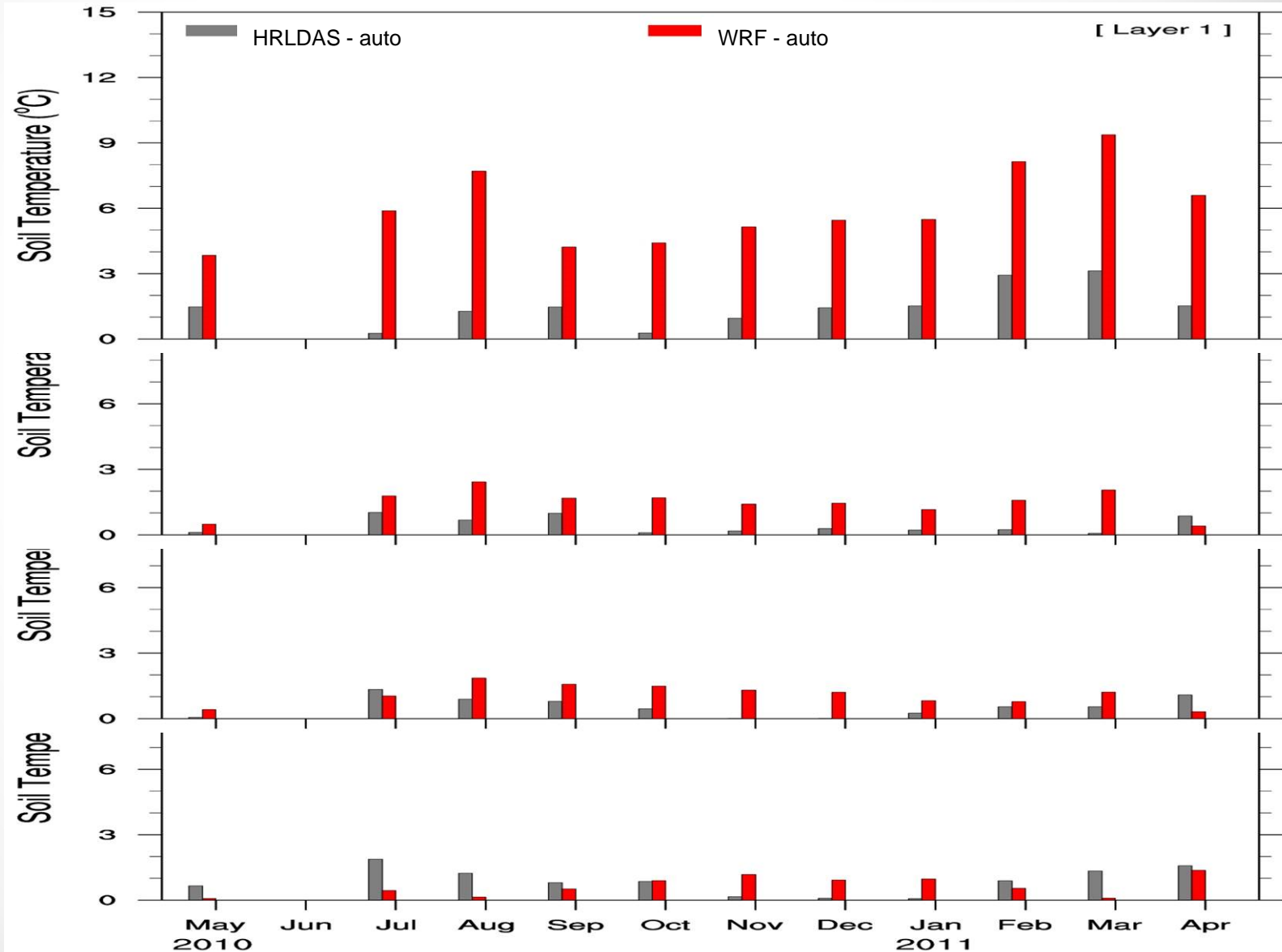
[2010.5.1-2011.4.30] 14LST monthly average absolute error(auto)

Layer 1
(5 cm)

Layer 2
(25 cm)

Layer 3
(70 cm)

Layer 4
(150 cm)



Soil Temperature (°C) @ Hengchun

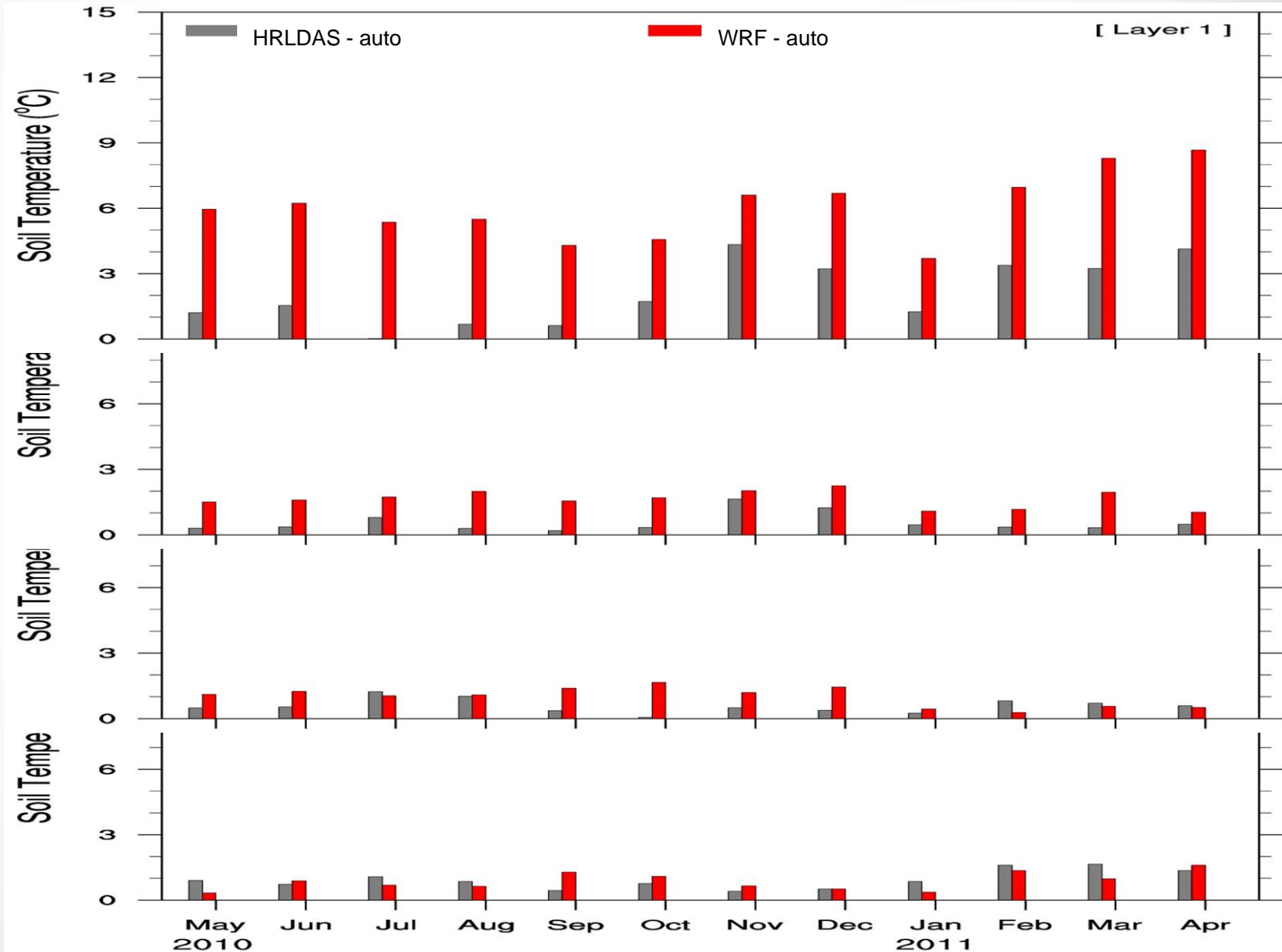
[2010.5.1-2011.4.30] 14LST monthly average absolute error(auto)

Layer 1
(5 cm)

Layer 2
(25 cm)

Layer 3
(70 cm)

Layer 4
(150 cm)



Soil Temperature (°C) @ Yilan

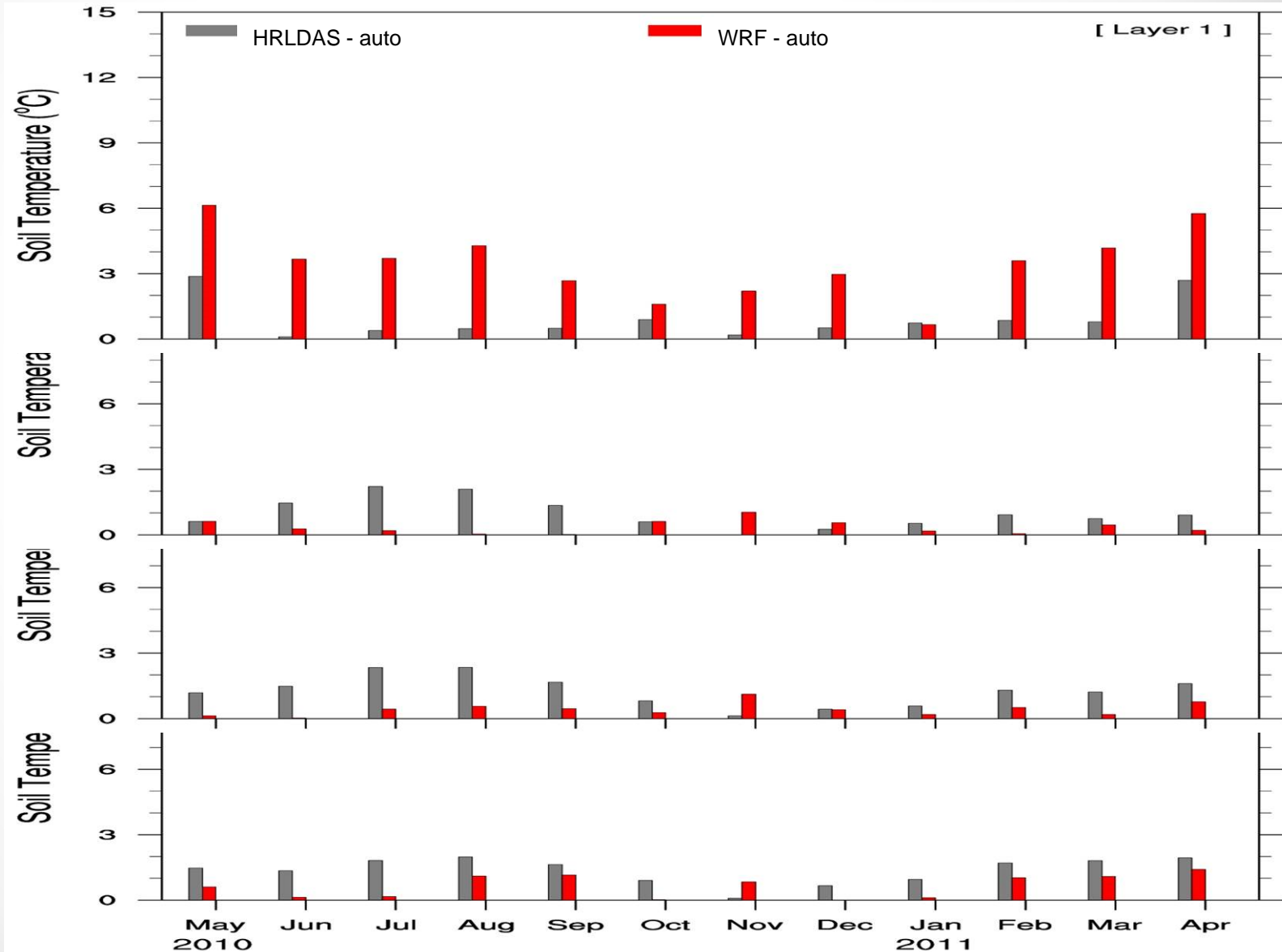
[2010.5.1-2011.4.30] 14LST monthly average absolute error(auto)

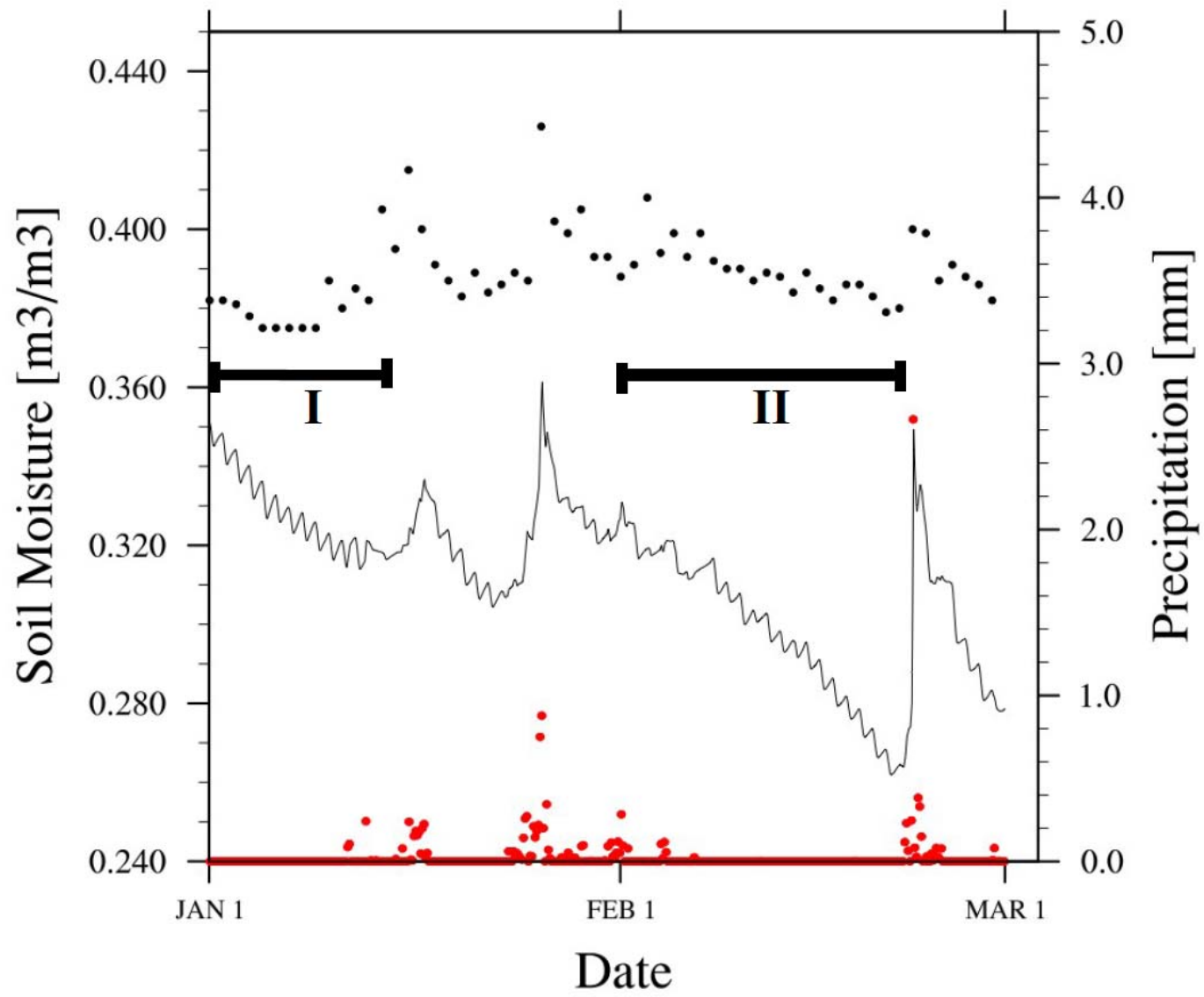
Layer 1
(5 cm)

Layer 2
(25 cm)

Layer 3
(70 cm)

Layer 4
(150 cm)





實驗設計

- **OP26G**

- Cold Start , No DA , No Blending
- I.C. & B.C. : NCEP GFS Forecast
- Resolution : Horizontal: 45 / 15 / 5 km, Vertical: 45 Layers
- 2013/05/28 18Z , Forcast 72 hr

- **OP26H**

- The same with OP26G , replace by **HRLDAS**
- HRLDAS spin up since 2009

置換之變數

[HRLDAS / WRFinput]

SOIL_T / TSLB

soil temperature

SOIL_M / SMOIS

(volumetric) soil moisture

SOIL_W / SH2O

liquid volumetric soil moisture / soil liquid water

SKINTEMP / TSK

skin temperature / surface skin temperature

SNODEP / SNOWH

physical snow depth / physical snow depth

WEASD / SNOW

water equivalent accumulated snow depth (m) /

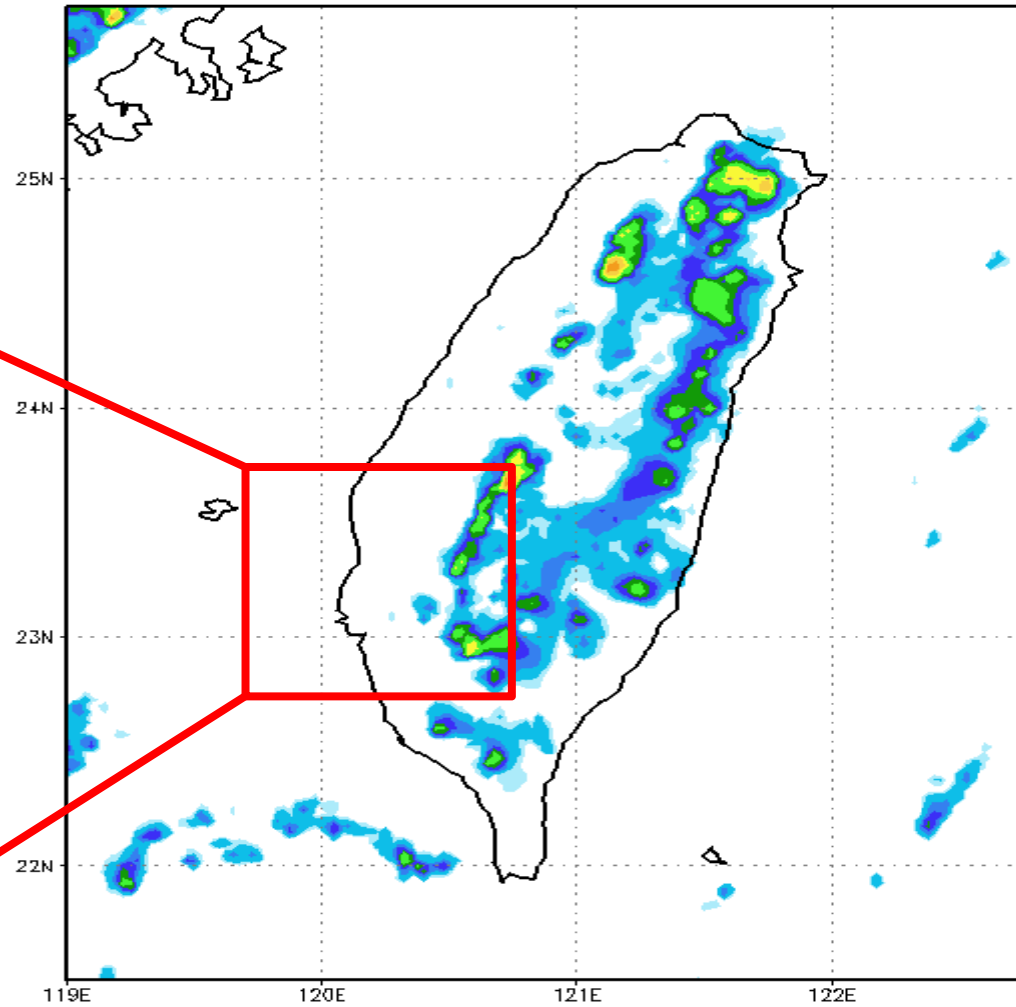
snow water equilibrium (kg m^{-2}) **

SNOW=WEASD*1000.

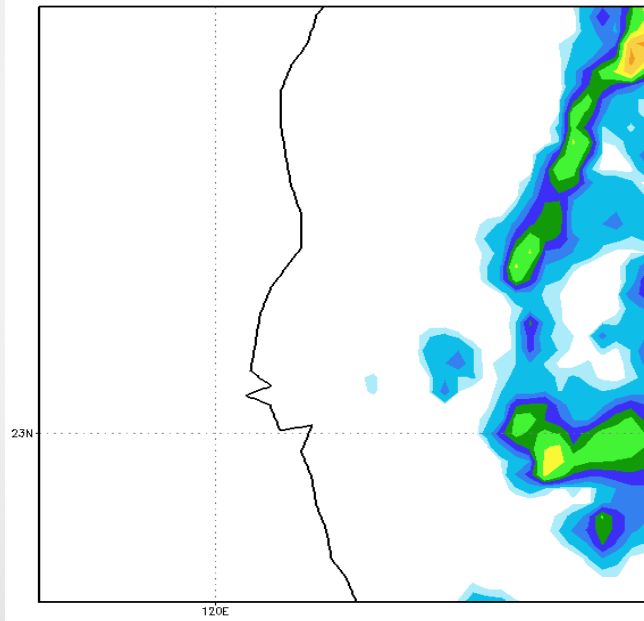
CANWAT / CANWAT

canopy water content (mm) / canopy water (kg m^{-2})

RAINNC @ 2013052900-2013052912

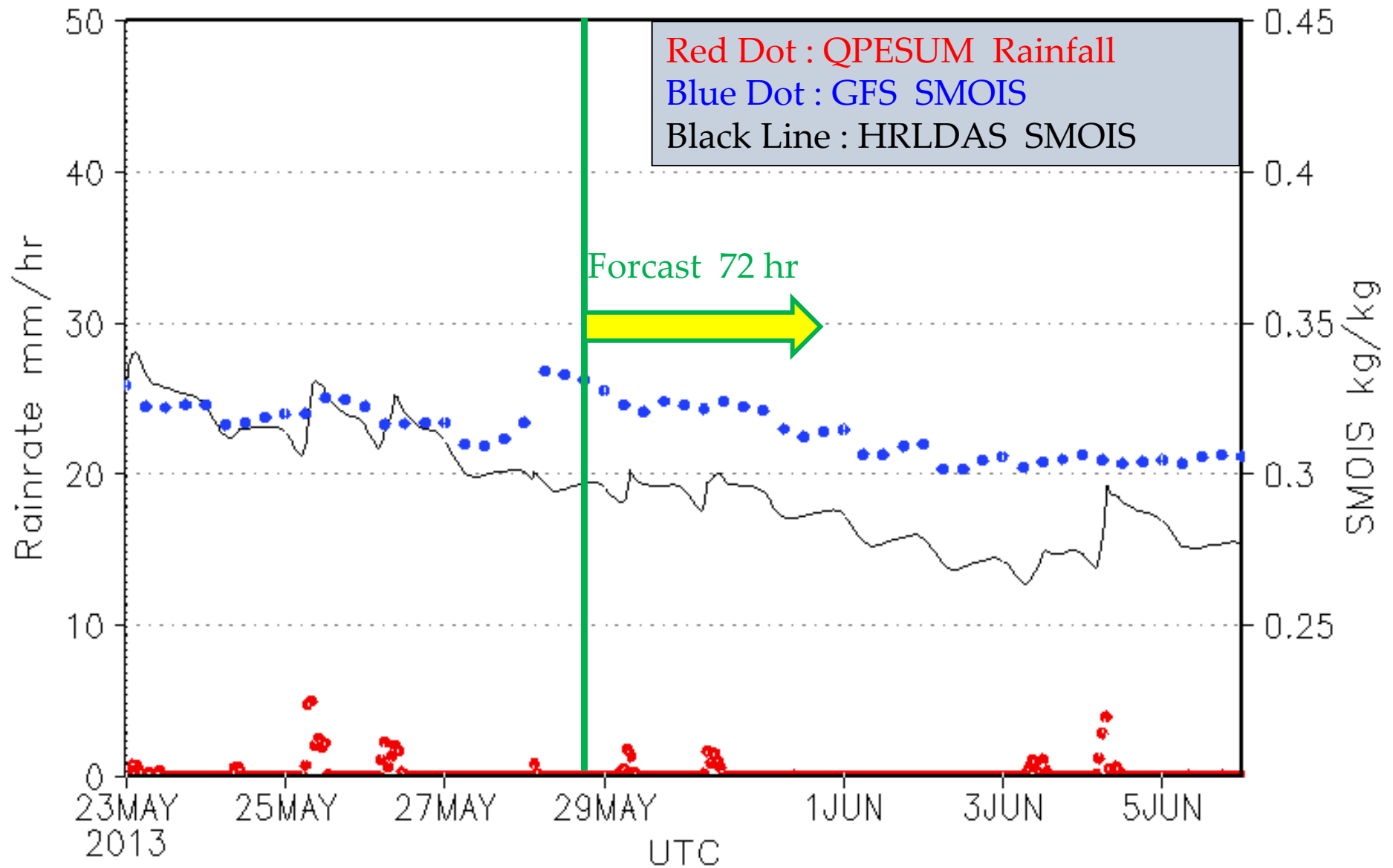


RAINNC @ 2013052900-2013052912



Rainrate & SMOIS(HRLDAS & GFS)

MAY



改變土壤初始條件...

--> 對WRF 土壤預報的影響

SMOIS at Layer 1

Initial time :
2013/05/28 18 UTC

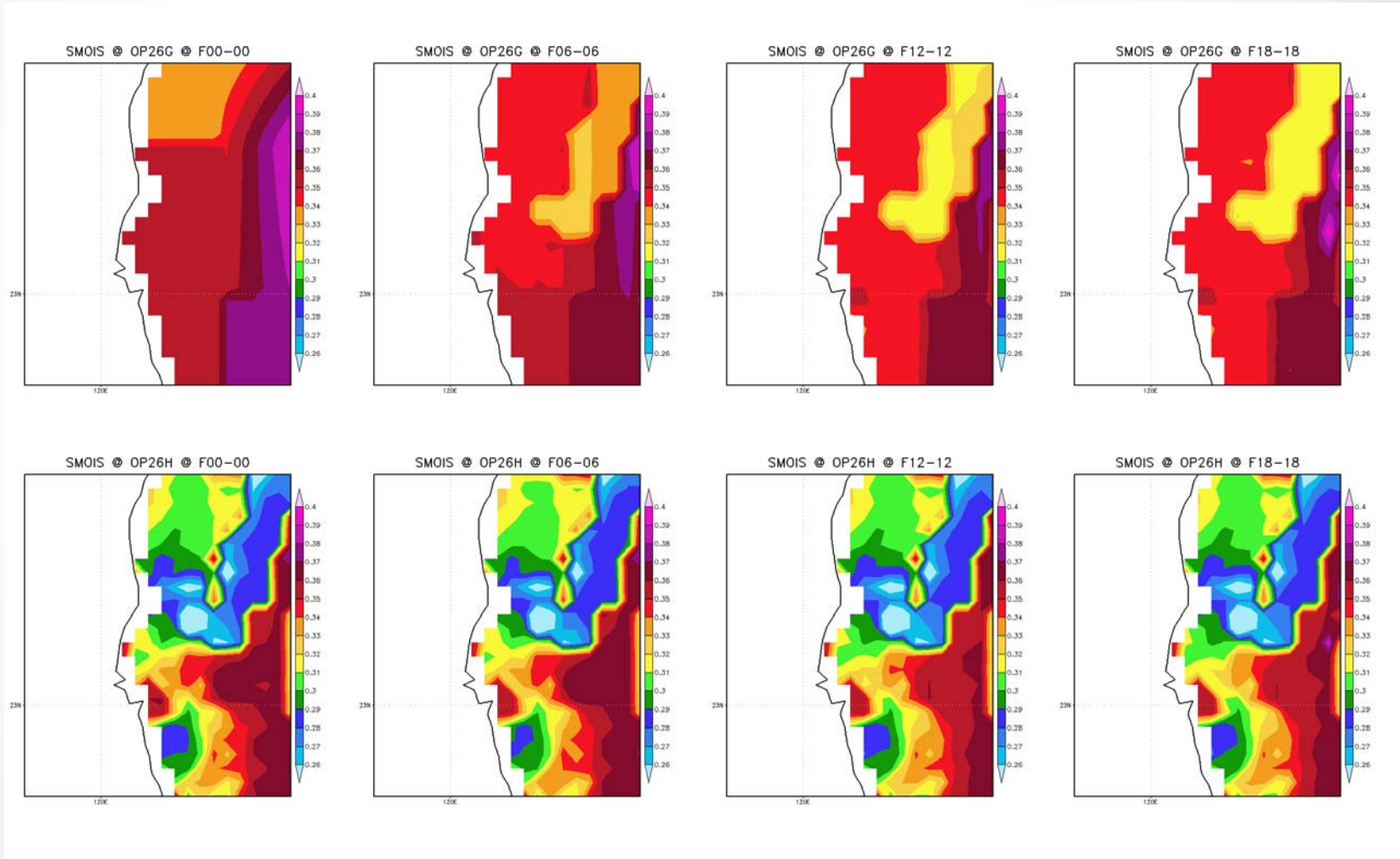
F00

F06

F12

F18

OP26G



OP26H

TSLB at Layer 1

Initial time :
2013/05/28 18 UTC

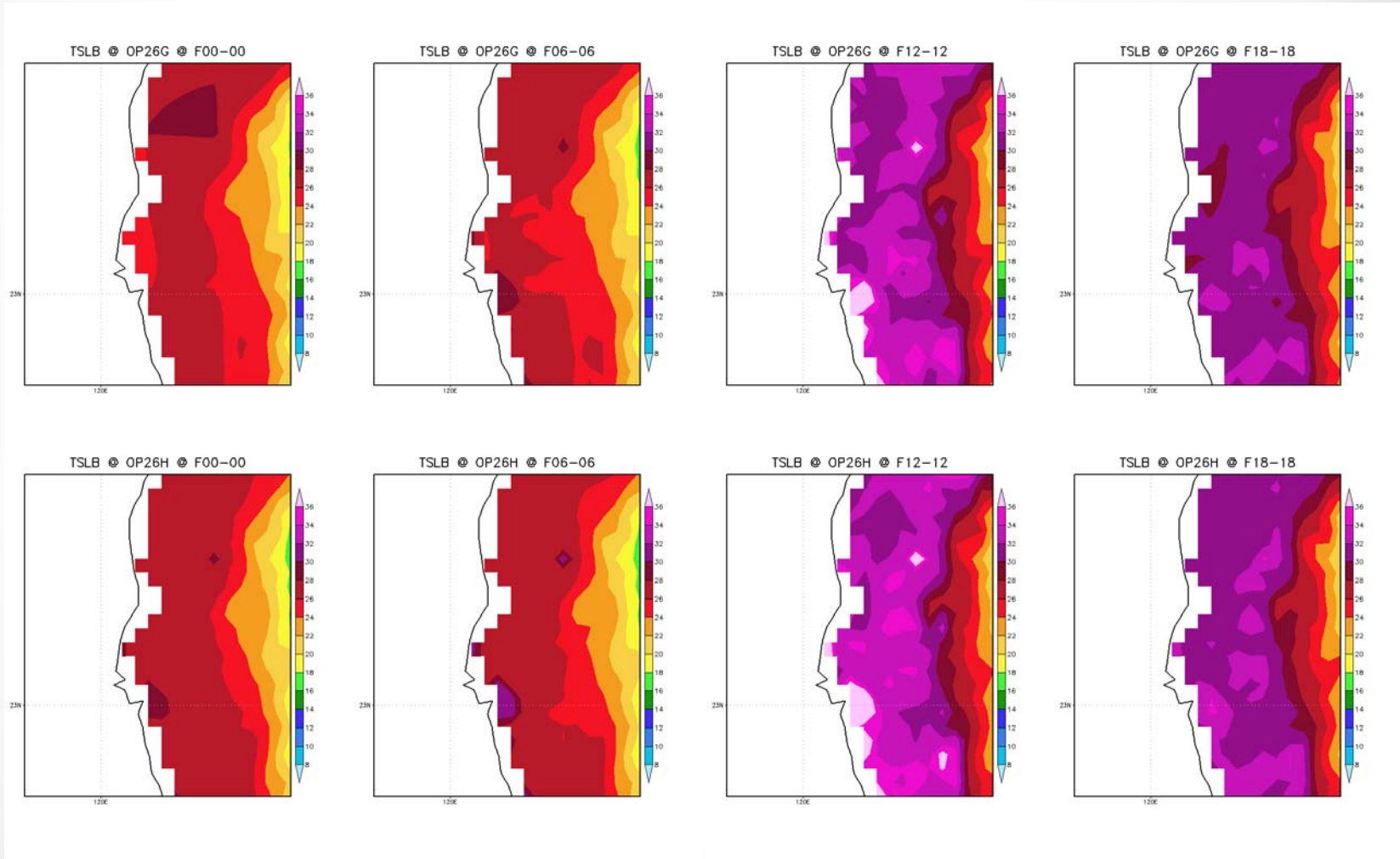
F00

F06

F12

F18

OP26G



OP26H

OP26H-OP26G

Initial time :
2013/05/28 18 UTC

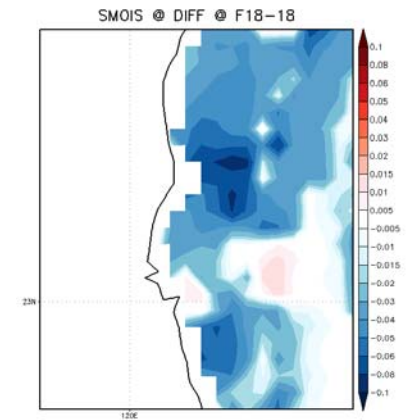
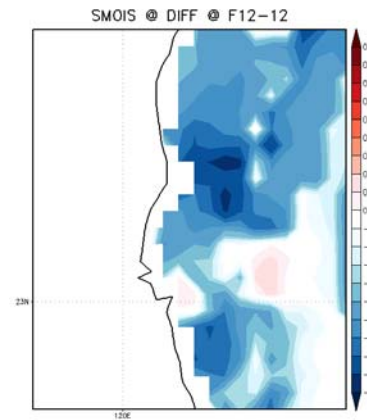
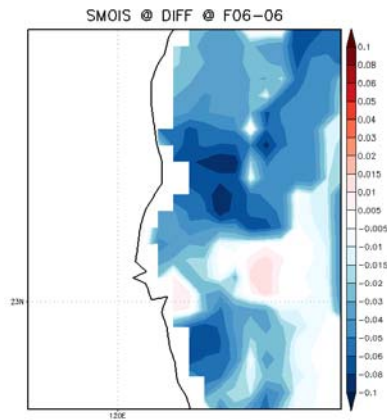
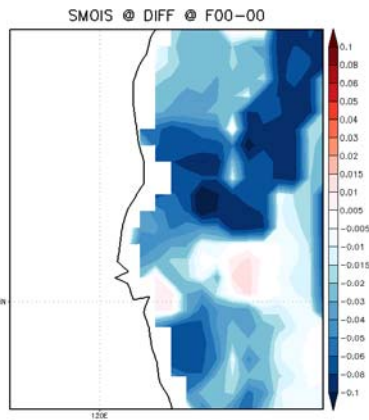
F00

F06

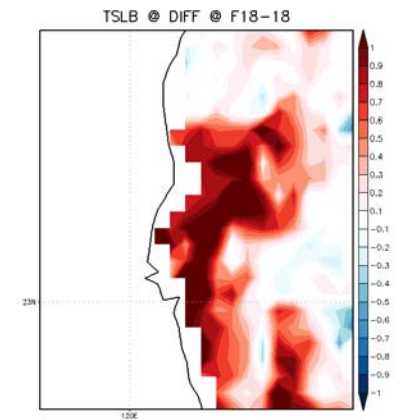
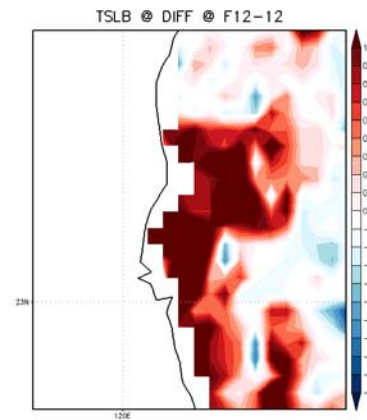
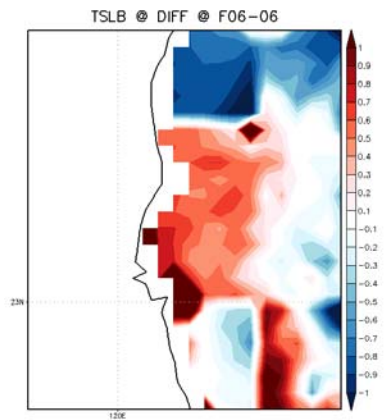
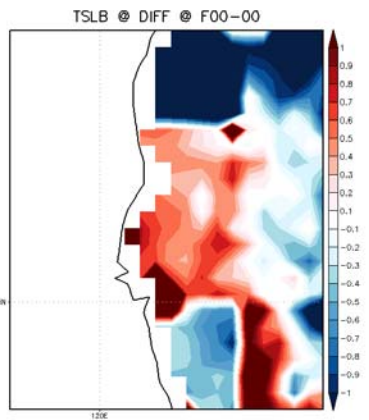
F12

F18

SMOIS
at
Layer 1



TSLB
at
Layer 1



改變土壤初始條件...

--> 對WRF 土壤預報的影響

--> 影響可感熱及潛熱通量

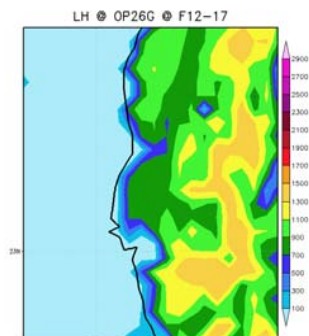
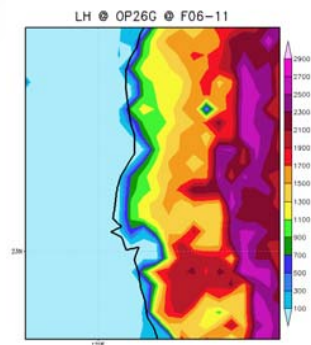
LH

Initial time :
2013/05/28 18 UTC

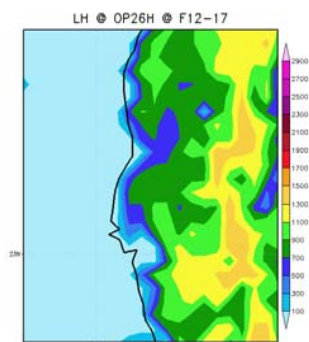
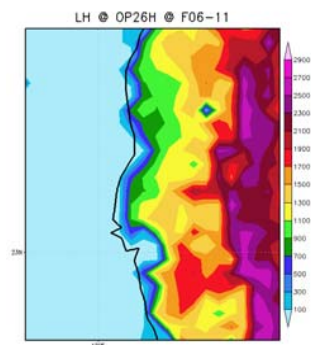
F06~11

F12~17

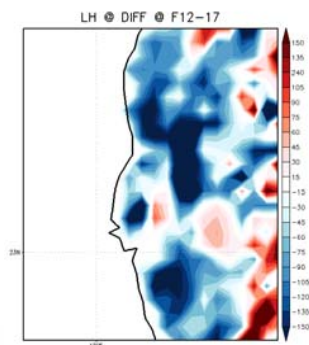
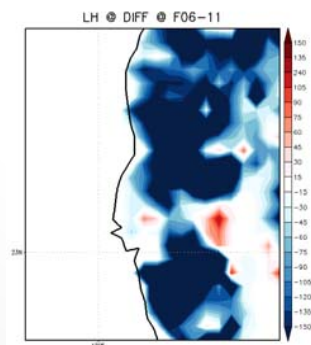
OP26G



OP26H



OP26H-
OP26G



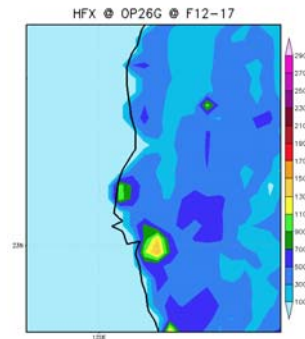
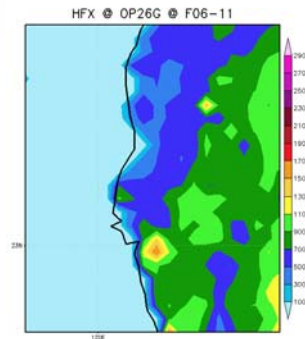
HFX

Initial time :
2013/05/28 18 UTC

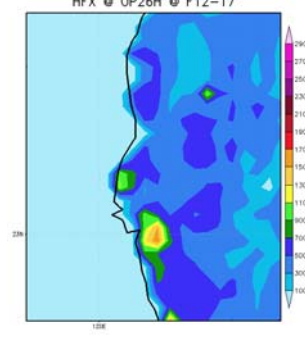
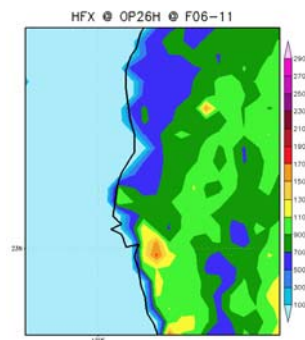
F06~11

F12~17

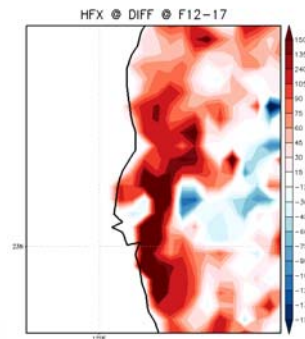
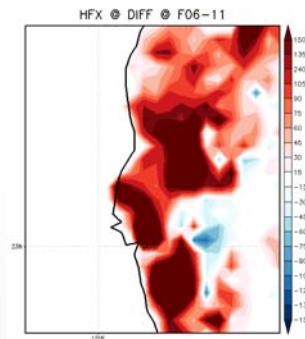
OP26G



OP26H



OP26H-
OP26G



改變土壤初始條件...

--> 對WRF 土壤預報的影響

--> 影響可感熱及潛熱通量

--> 影響近地表溫度及濕度

Q2

Initial time :
2013/05/28 18 UTC

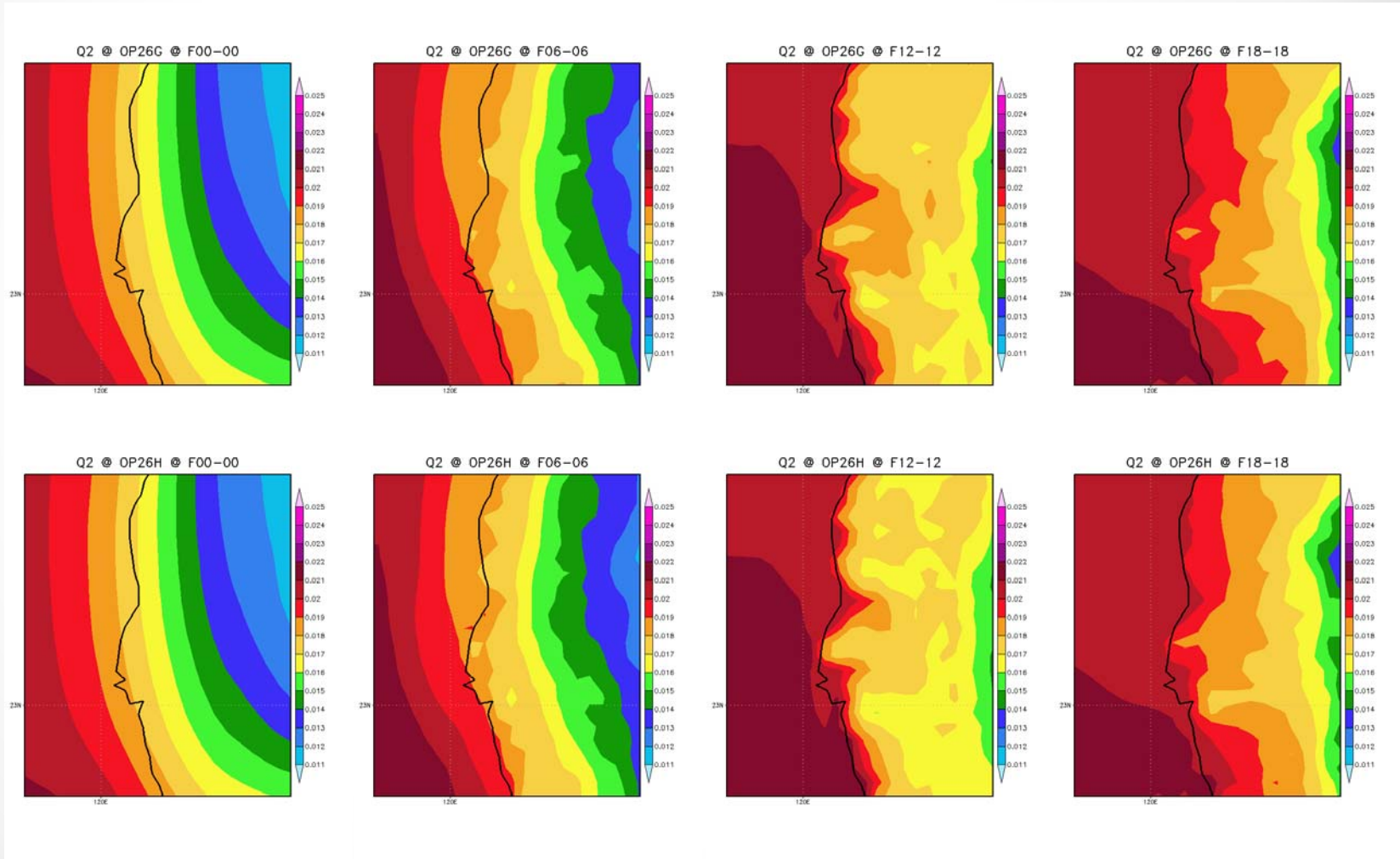
F00

F06

F12

F18

OP26G



T2

Initial time :
2013/05/28 18 UTC

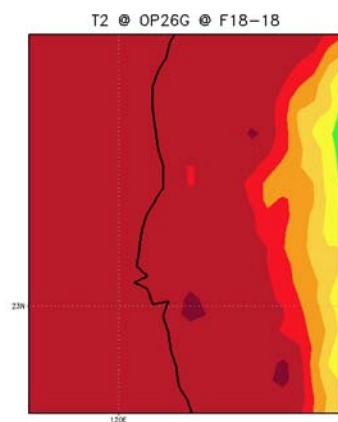
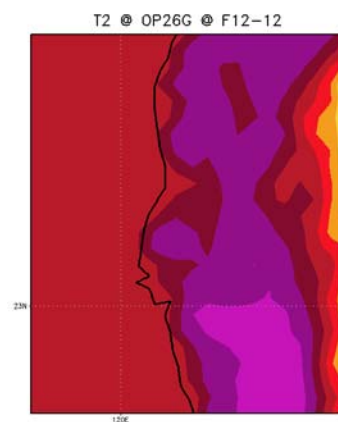
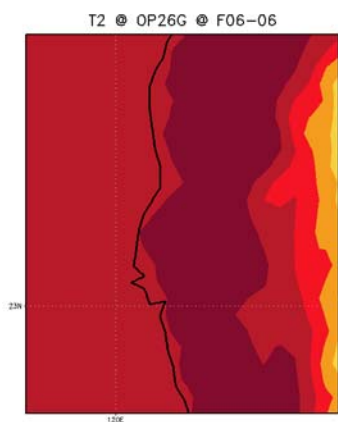
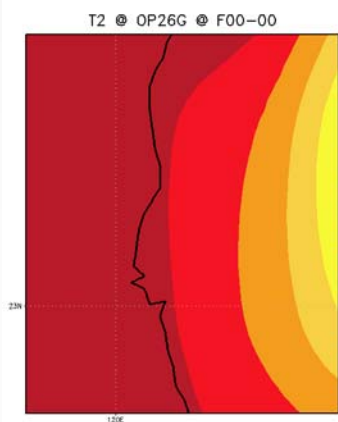
F00

F06

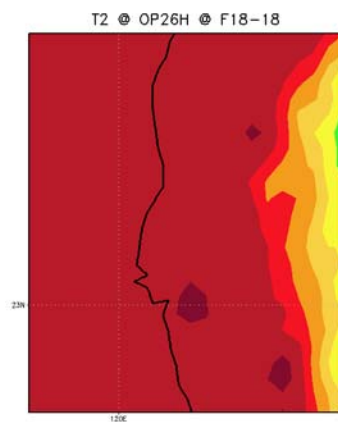
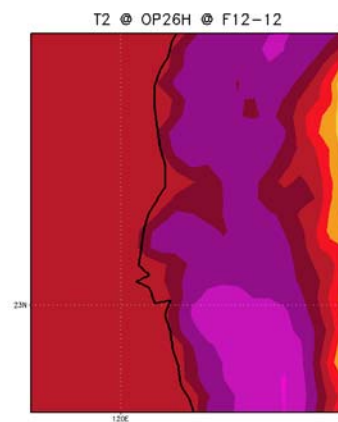
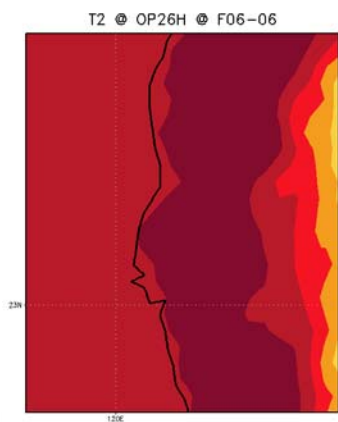
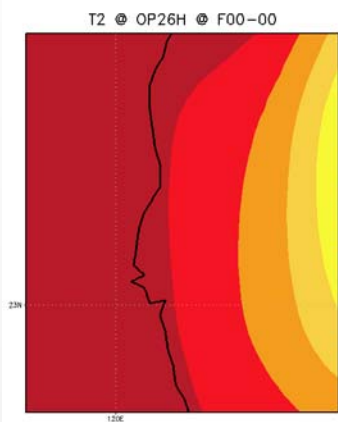
F12

F18

OP26G



OP26H



OP26H-OP26G

Initial time :
2013/05/28 18 UTC

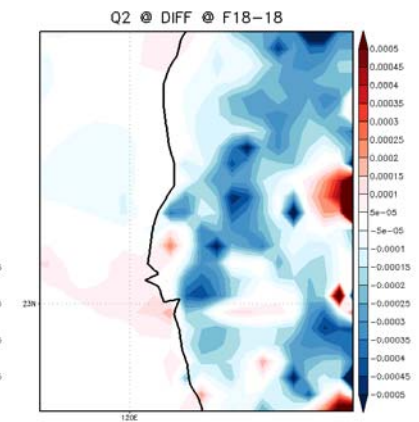
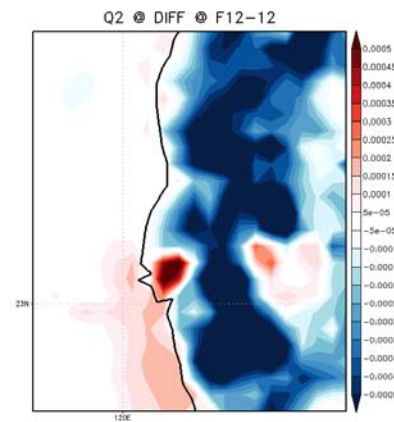
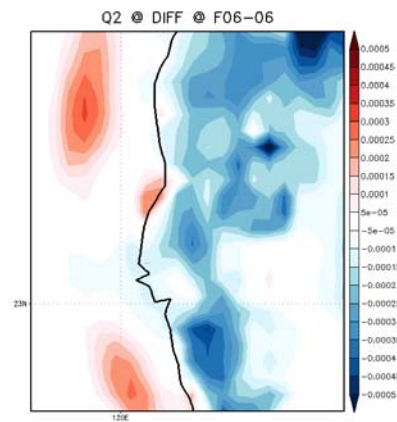
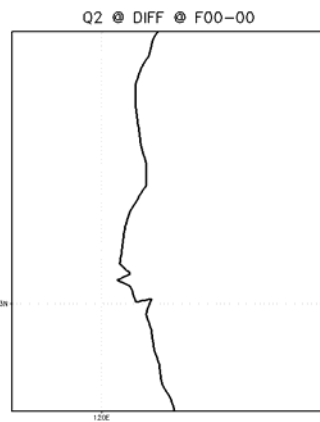
F00

F06

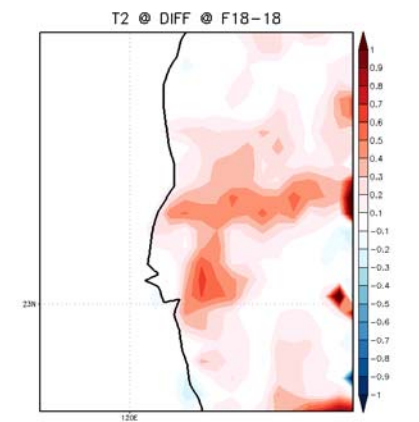
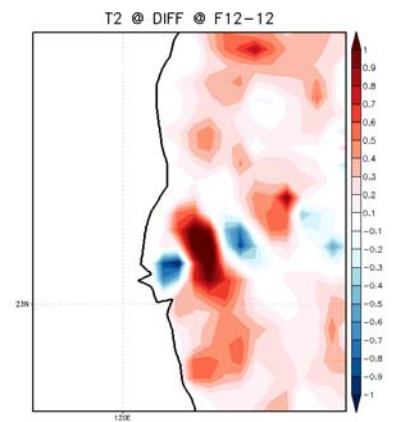
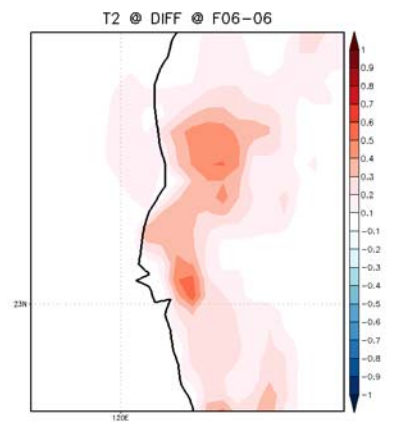
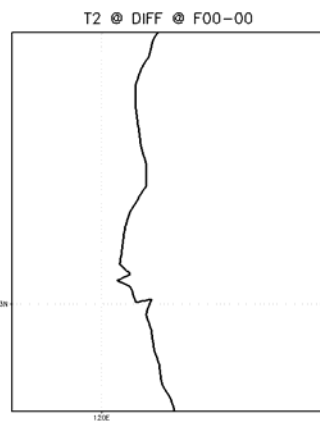
F12

F18

Q2



T2



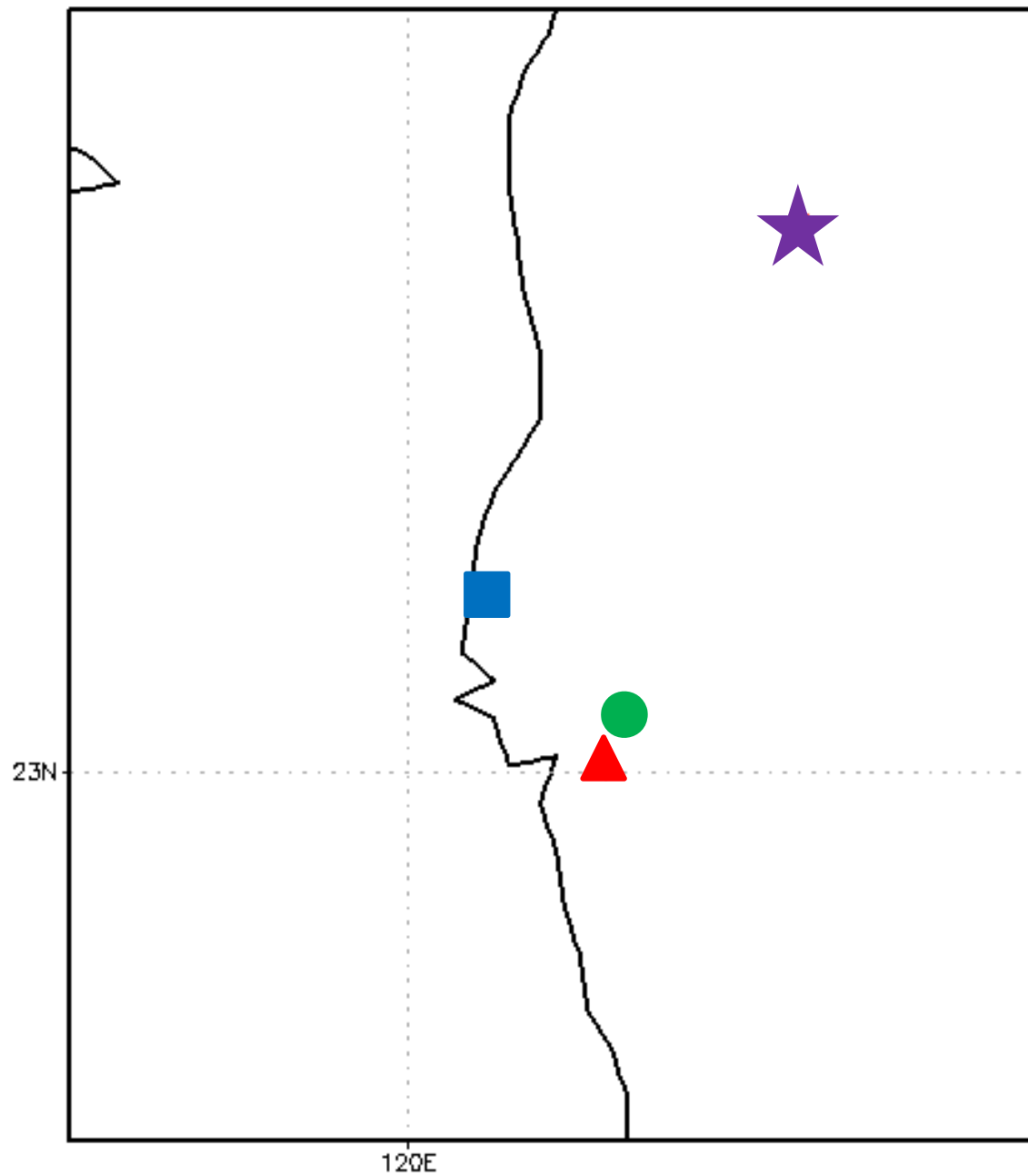
改變土壤初始條件...

--> 對WRF 土壤預報的影響

--> 影響可感熱及潛熱通量

--> 影響近地表溫度及濕度

--> 影響局部環流



★ 嘉義測站 (467480)

■ 七股測站 (467780)

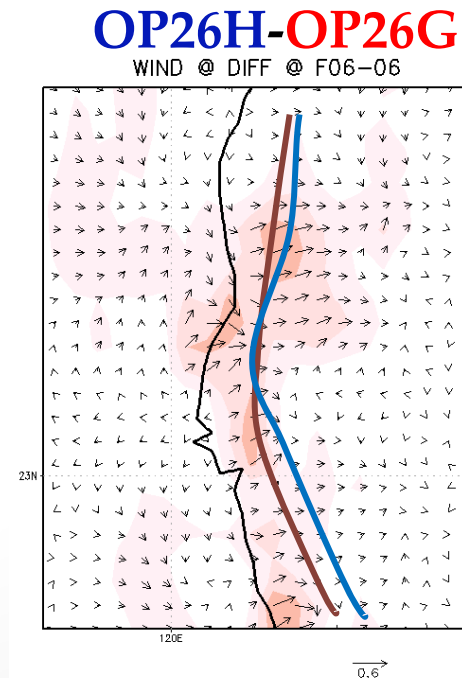
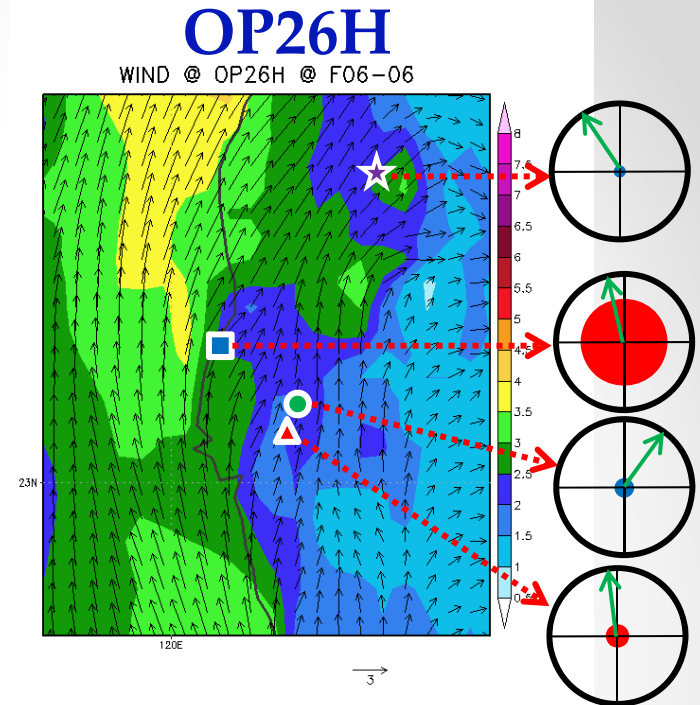
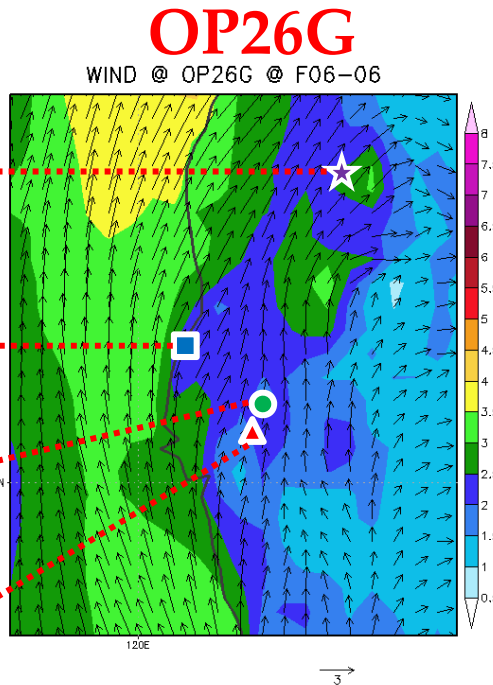
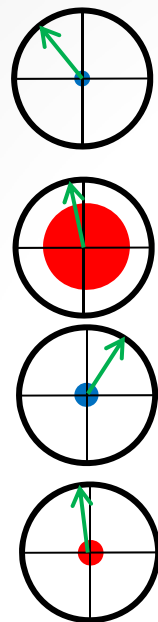
● 永康測站 (467420)

▲ 台南測站 (467410)

Wind

Initial time :
2013/05/28
18 UTC

F06



風速

	嘉義	七股	永康	台南
OP26G	-0.26	2.13	-0.48	0.52
OP26H	-0.15	2.14	-0.35	0.46

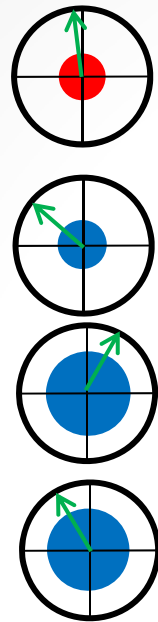
風向

	嘉義	七股	永康	台南
OP26G	-39	-12	33	-7
OP26H	-34	-13	36	-7

Wind

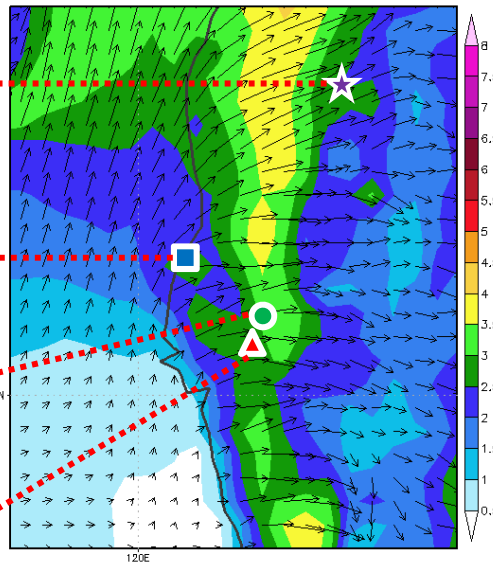
Initial
time :
2013/05/28
18 UTC

F09



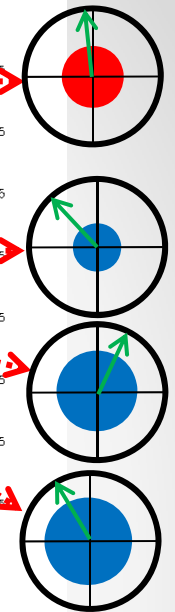
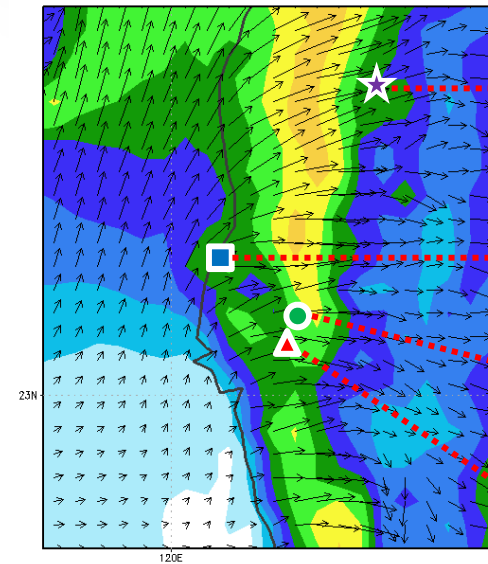
OP26G

WIND @ OP26G @ F09-09



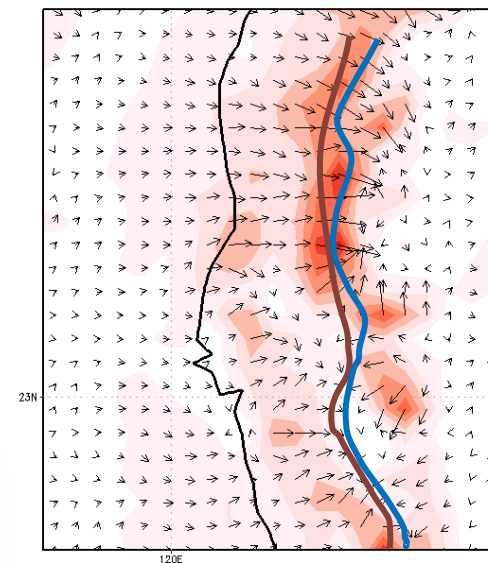
OP26H

WIND @ OP26H @ F09-09



OP26H-OP26G

WIND @ DIFF @ F09-09



風速

	嘉義	七股	永康	台南
OP26G	1.07	-1.14	-2.08	-2.02
OP26H	1.47	-1.12	-1.97	-2.16

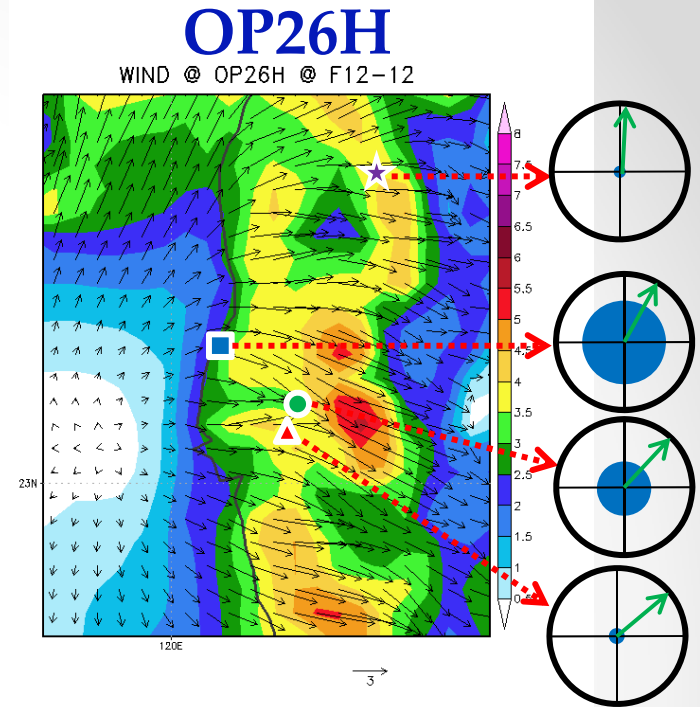
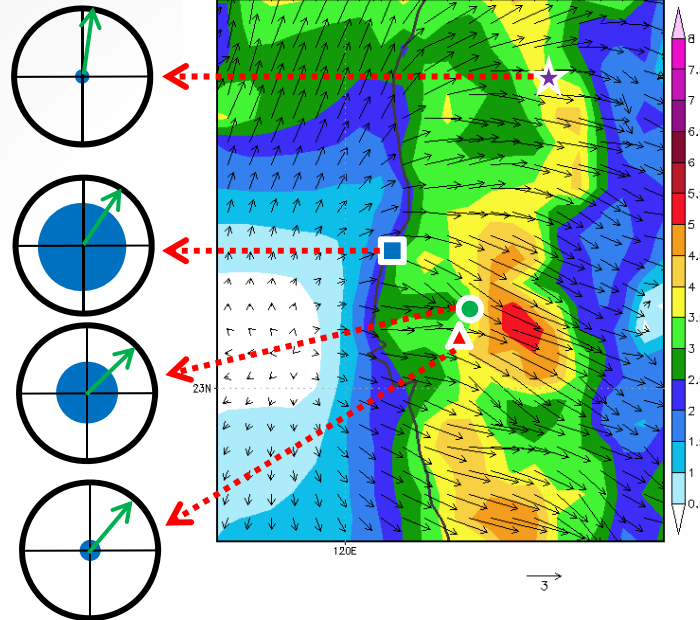
風向

	嘉義	七股	永康	台南
OP26G	-7	-49	30	-31
OP26H	-6	-43	25	-31

Wind

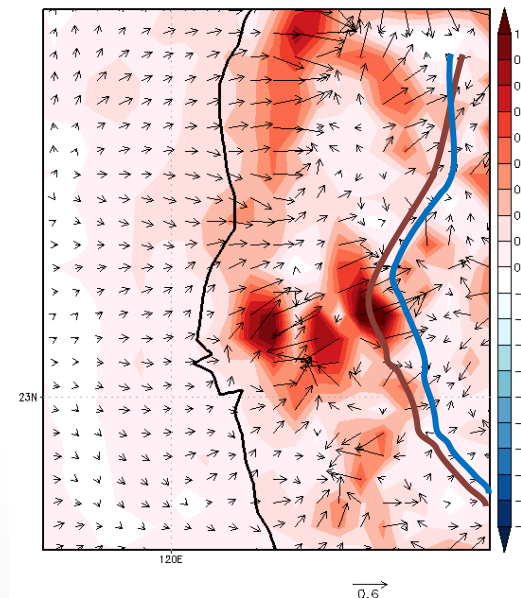
Initial time :
2013/05/28
18 UTC

F12



OP26H-OP26G

WIND @ DIFF @ F12-12



風速

	嘉義	七股	永康	台南
OP26G	-0.21	-2.18	-1.47	-0.40
OP26H	-0.16	-2.05	-1.28	-0.25

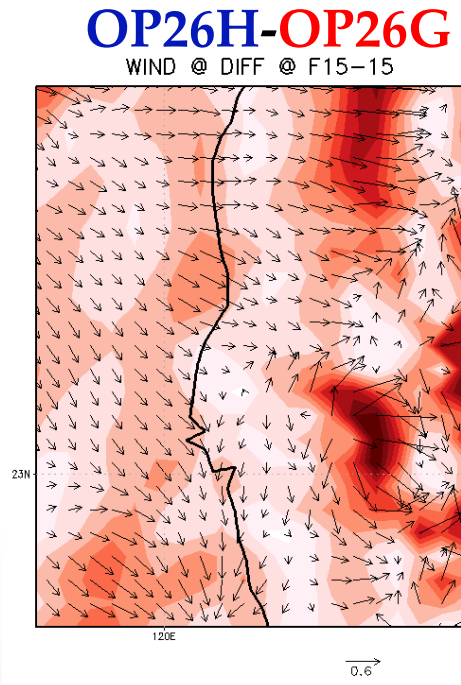
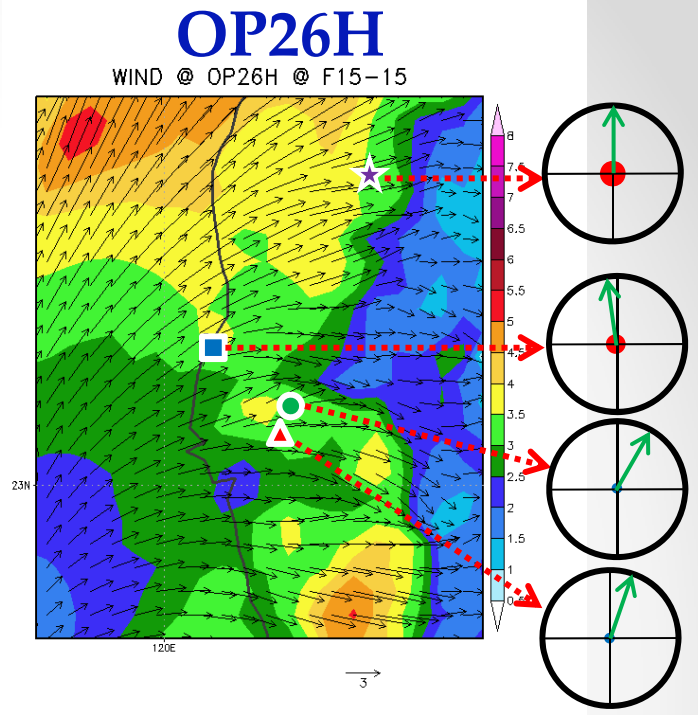
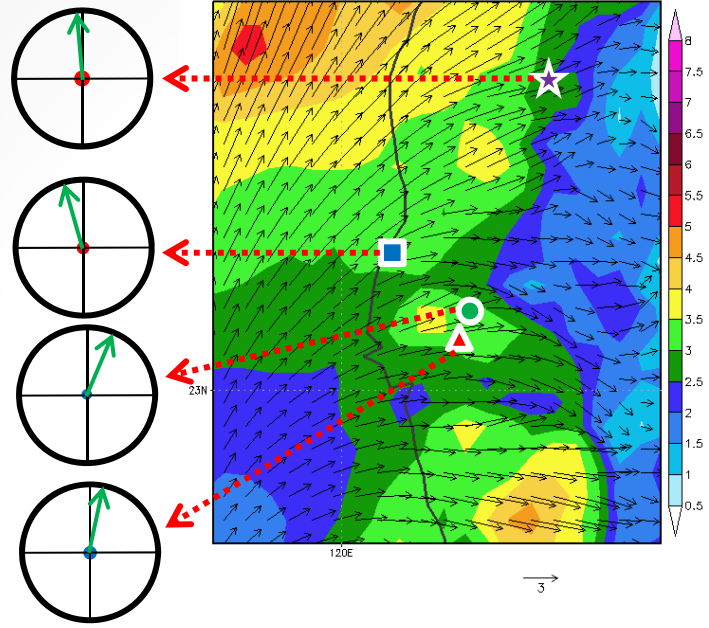
風向

	嘉義	七股	永康	台南
OP26G	8	34	46	40
OP26H	3	29	43	50

Wind

Initial time :
2013/05/28
18 UTC

F15



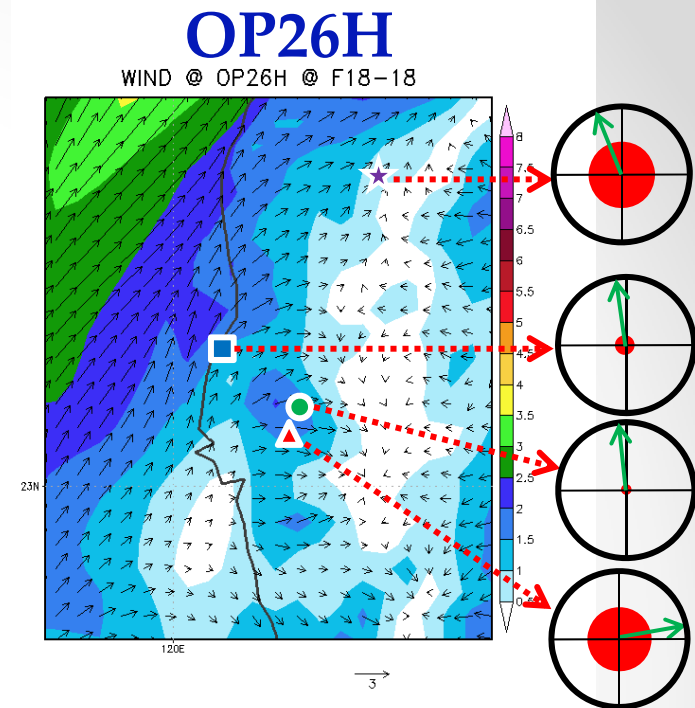
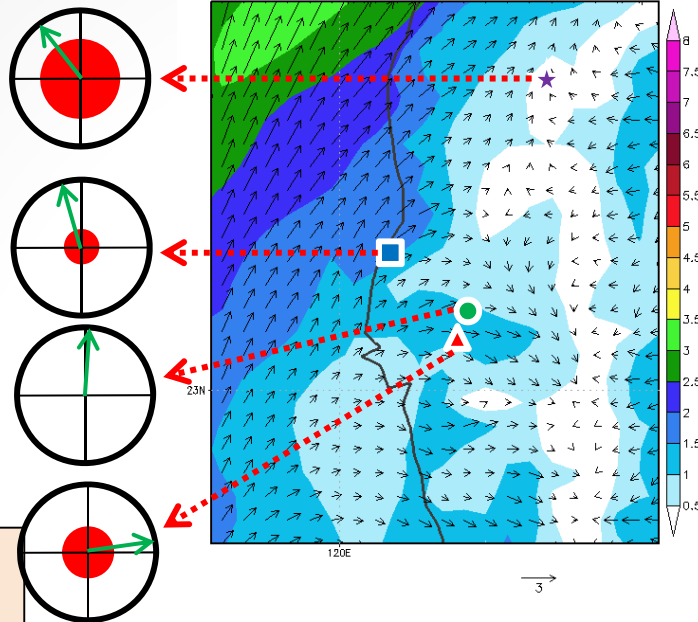
		嘉義	七股	永康	台南
風速	OP26G	0.26	0.17	-0.11	-0.19
	OP26H	0.52	0.35	-0.12	-0.11
		嘉義	七股	永康	台南
風向	OP26G	-5	-16	23	12
	OP26H	0	-8	30	19

Wind

Initial time :
2013/05/28
18 UTC

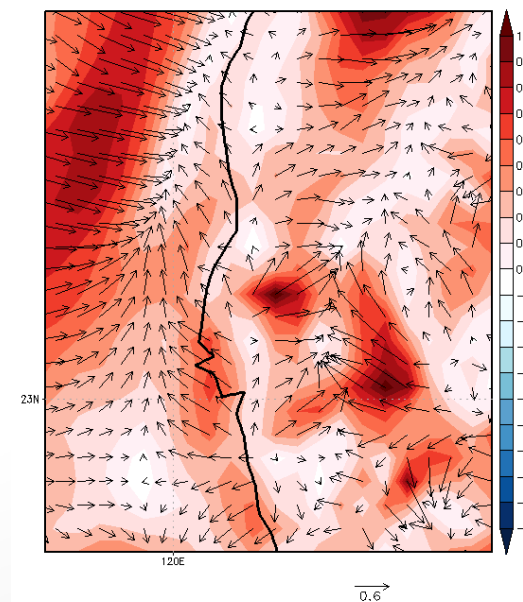
F18

5/29 20 LST



OP26H-OP26G

WIND @ DIFF @ F18-18



風速

	嘉義	七股	永康	台南
OP26G	-1.95	-0.77	0.00	-1.21
OP26H	-1.59	-0.64	0.12	-1.53

風向

	嘉義	七股	永康	台南
OP26G	-38	-16	4	82
OP26H	-22	-48	-6	80

Summary

- HRLDAS土壤分析場之土壤濕度較乾，而土壤溫度則較高。
- OP26G vs OP26H
 - > 預報的土壤濕度變乾，土壤溫度變高
 - > 潛熱通量減少，可感熱通量增加
 - > 近地面濕度降低，溫度提高
 - > 影響局部環流(海陸風)
- 與測站觀測比較，白天(尤其是接近中午) OP26H在局部環流有較好的表現，但夜晚則較不明顯。