



板橋、花蓮探空氣球軌跡分析

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花落誰家？



中華民國 102 年 9 月 2 日 08 時

聯絡電話：(02) 2968 3884

中央氣象局
臺北氣象站
臺北氣象探測儀
高空氣象物
非爆裂物



Cambridge University Spaceflight Landing Predictor

<http://predict.habhub.org/>

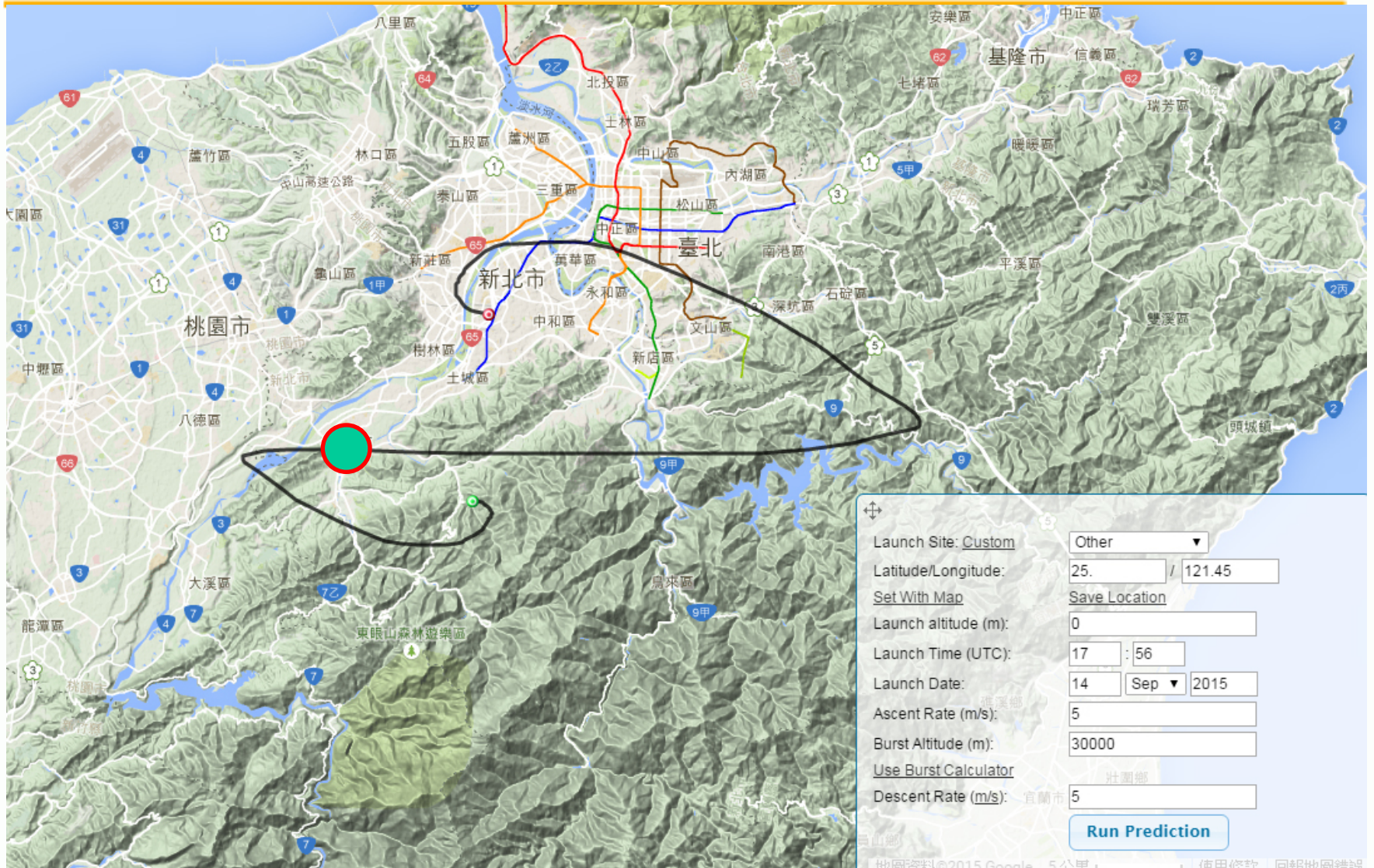
↕ 輸入 :

Launch Site: <u>Custom</u>	Other ▼
Latitude/Longitude:	25. / 121.45
<u>Set With Map</u>	<u>Save Location</u>
Launch altitude (m):	0
Launch Time (UTC):	17 : 56
Launch Date:	14 Sep ▼ 2015
Ascent Rate (m/s):	5
Burst Altitude (m):	30000
<u>Use Burst Calculator</u>	
Descent Rate (m/s):	5

Run Prediction

地圖資料 ©2015 Google 5公里 佈置條款 回報地圖錯誤





Launch Site: Custom Other

Latitude/Longitude: 25. / 121.45

Set With Map Save Location

Launch altitude (m):

Launch Time (UTC): 17 : 56

Launch Date: 14 Sep 2015

Ascent Rate (m/s):

Burst Altitude (m):

Use Burst Calculator

Descent Rate (m/s):



實際需要考慮的問題：

1. 氣球上升、下降速度非等速
2. 上升(氣球爆破)高度無法預知
3. 軌跡計算使用模式風場與實際風場有別



1. 資料：

2011/01~2014/12 板橋、花蓮 每日00,12探空(2 sec. data)

2. 上升軌跡計算：

- a. 利用連續兩筆資料之高度差除以時間差計算上升速度($w=dZ/dt$)
- b. 利用探空測得的水平風(u,v)、上升速度(w)及時間(dt)計算氣球之位移
- c. 由地面開始積分到球破時之所有位移即可求得3-D之軌跡



一般作業當球破時，氣球、探空儀開始墜落，同時降落傘會打開，終止資料接收。高度較高時墜落之終端速度較快。

3. 下降軌跡計算：

- 利用上升時所測得之水平風場(u, v)
- 垂直落速利用'擬合垂直速度(*curve fitting*)'
- 從球破點開始做軌跡路徑積分，積到地面

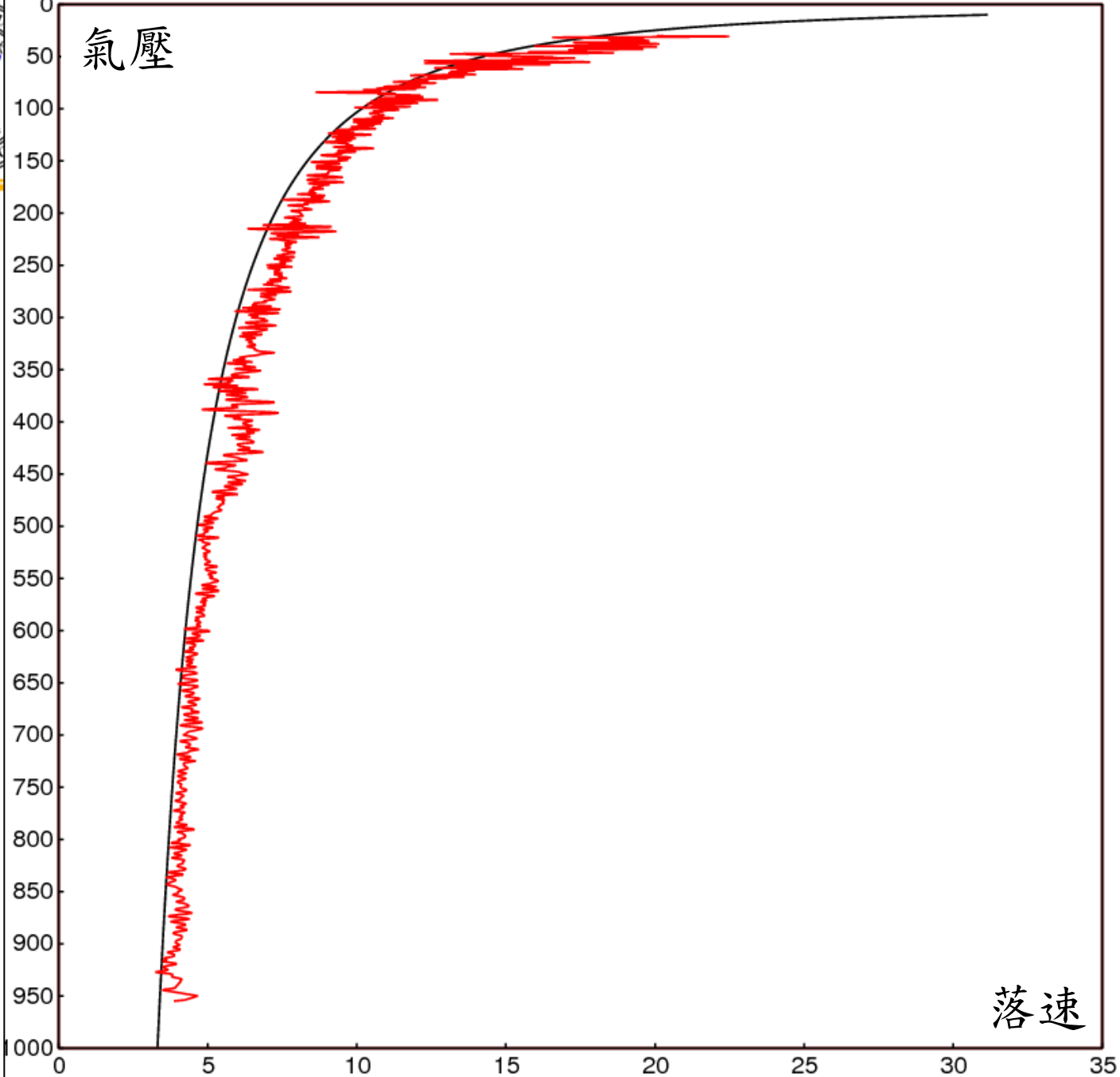
擬合垂直速度(*curve fitting*):

利用2012/09/15~30於恆春做之探空實驗(使用與板橋、花蓮相同之探空儀、氣球、降落傘)，接收探空儀上升及墜落之氣象資料，利用所有合理之墜落速度，求取落速與氣壓之關係式。



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氣壓



VERE Lab.
RM

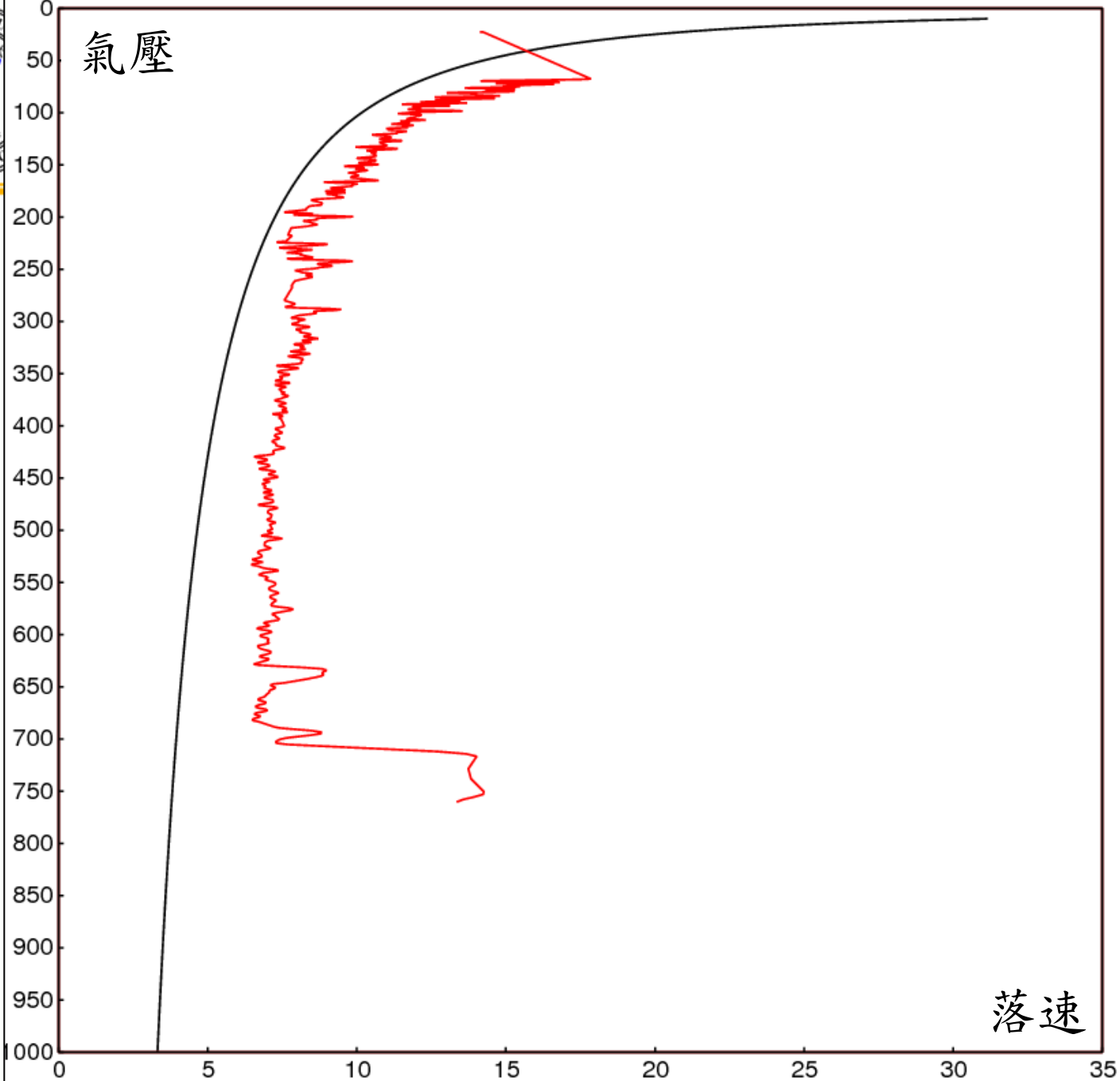
落速





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氣壓



VERE Lab.
RM

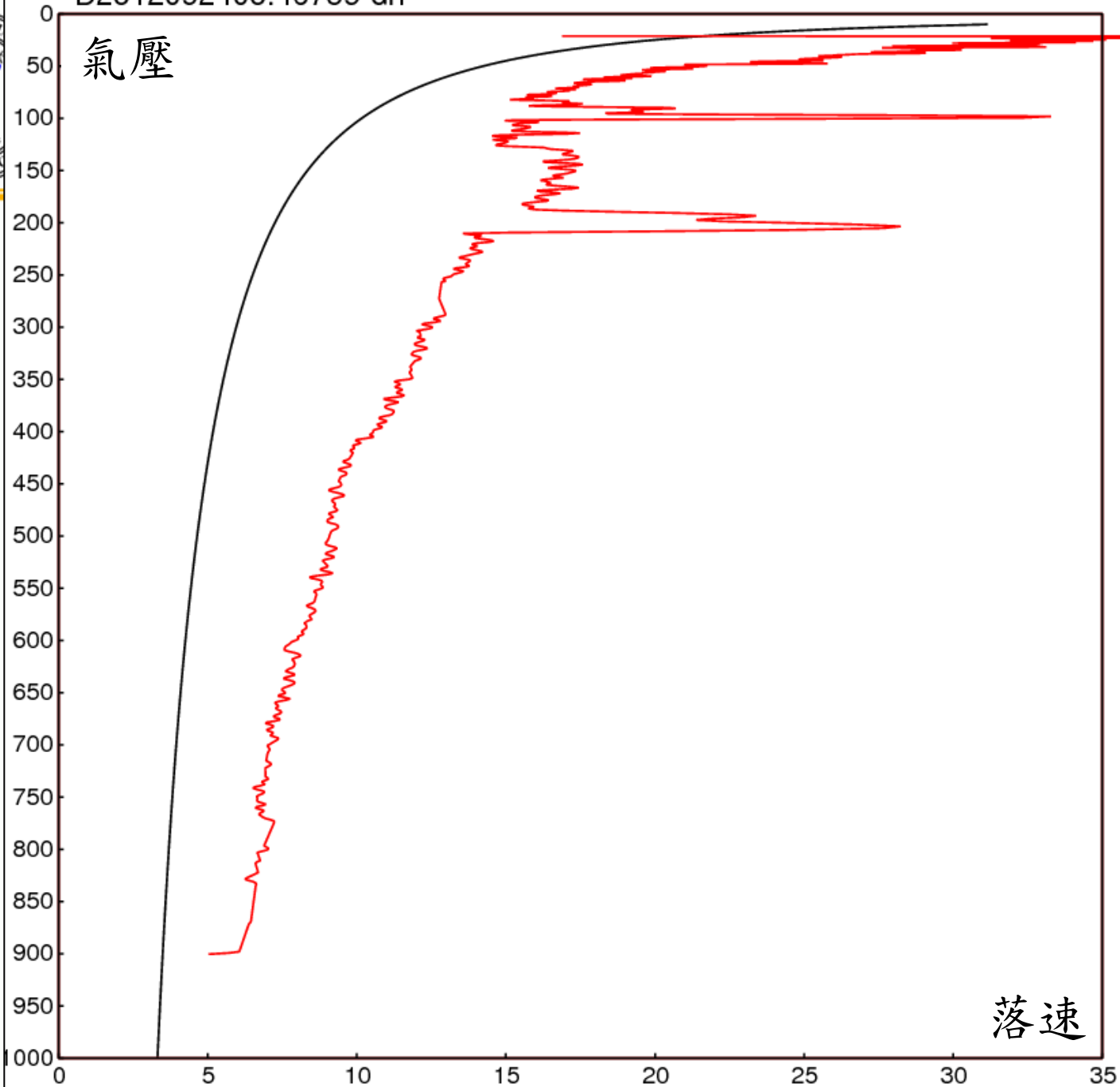
落速





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氣壓



VERE Lab.

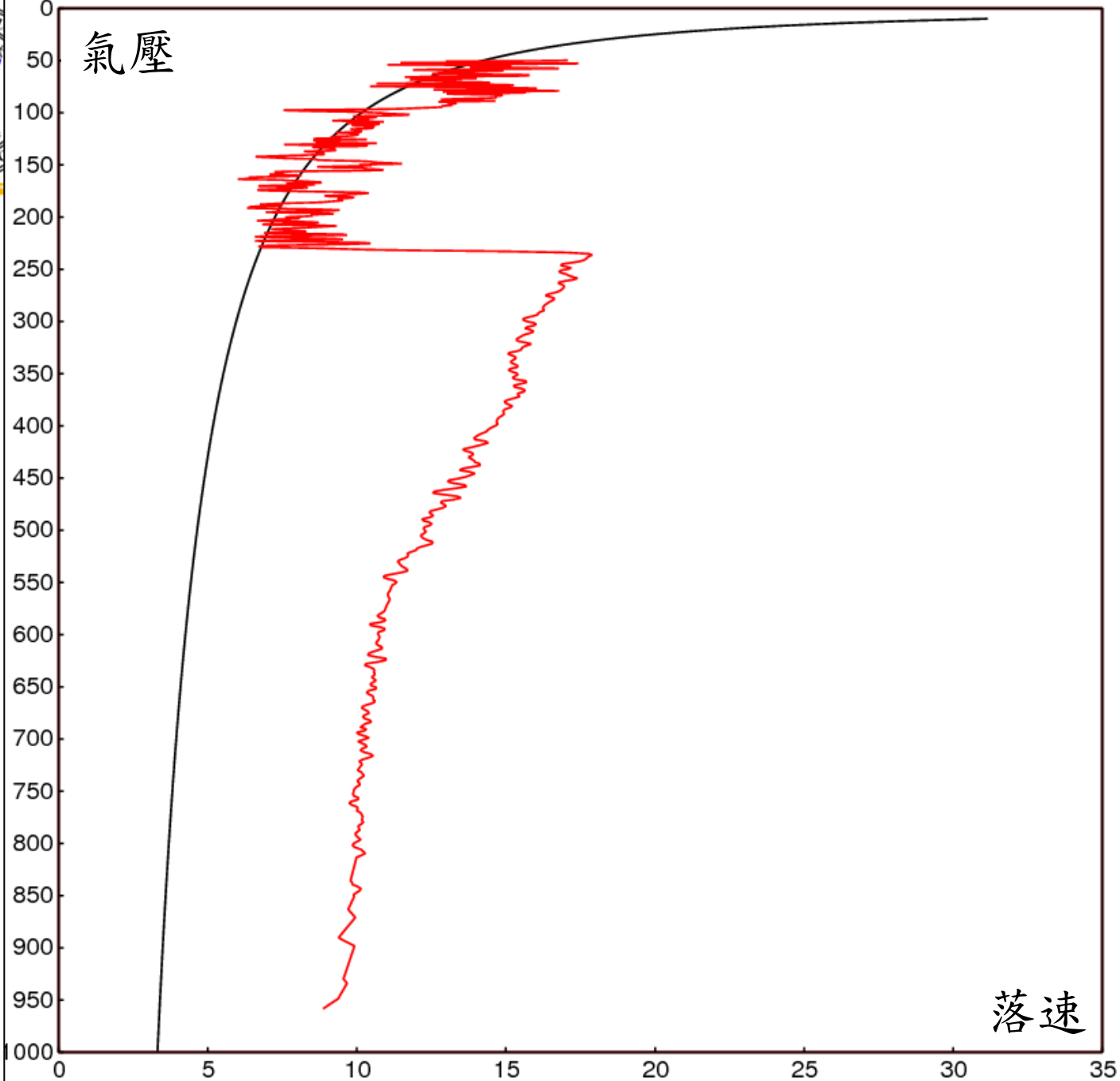
落速





D2012092806.46759-dn

氣壓



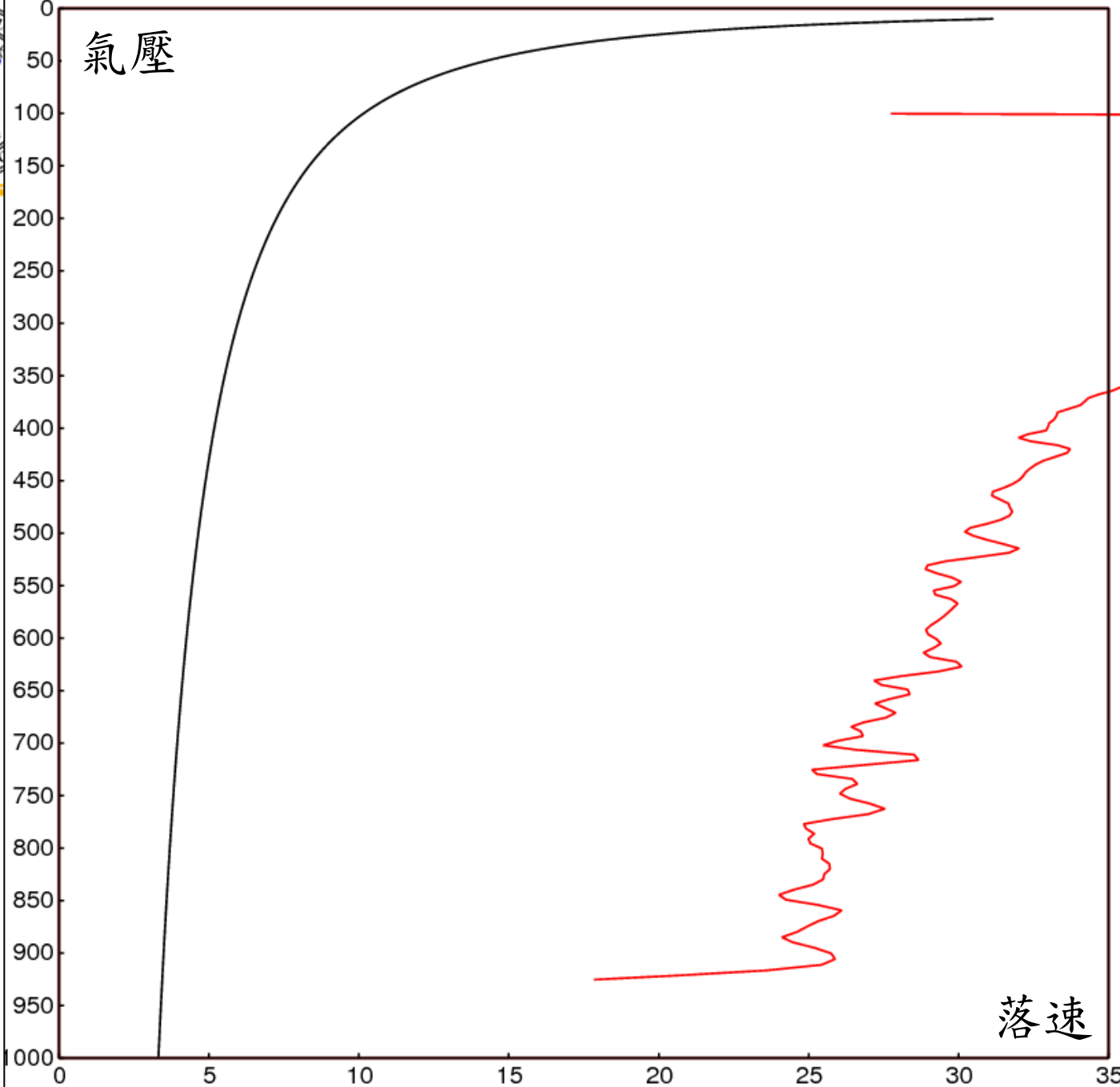
VERE Lab.
RM





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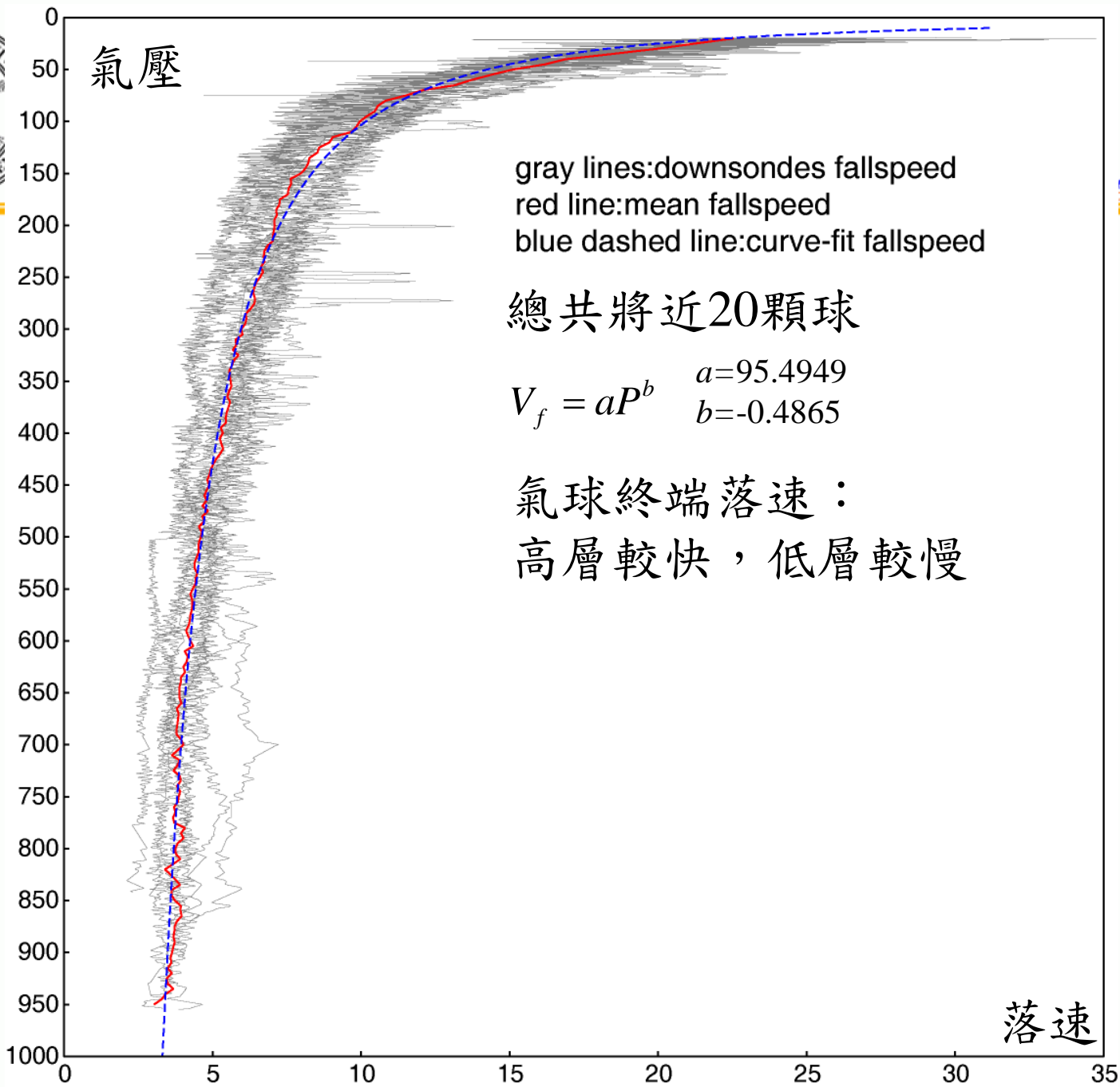
氣壓



VERE Lab.
RM

落速

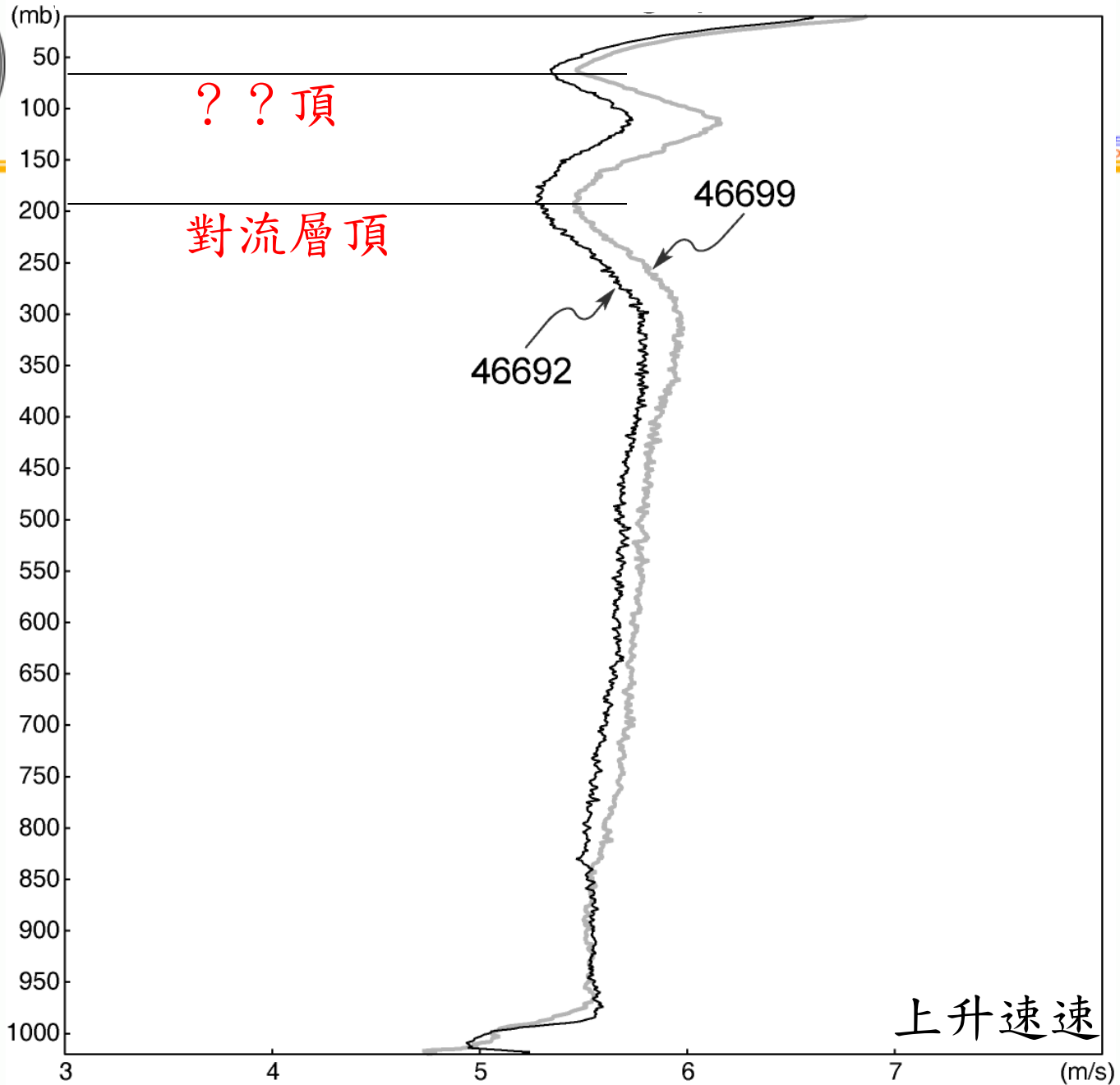






氣壓

2011-2014 平均上升速度

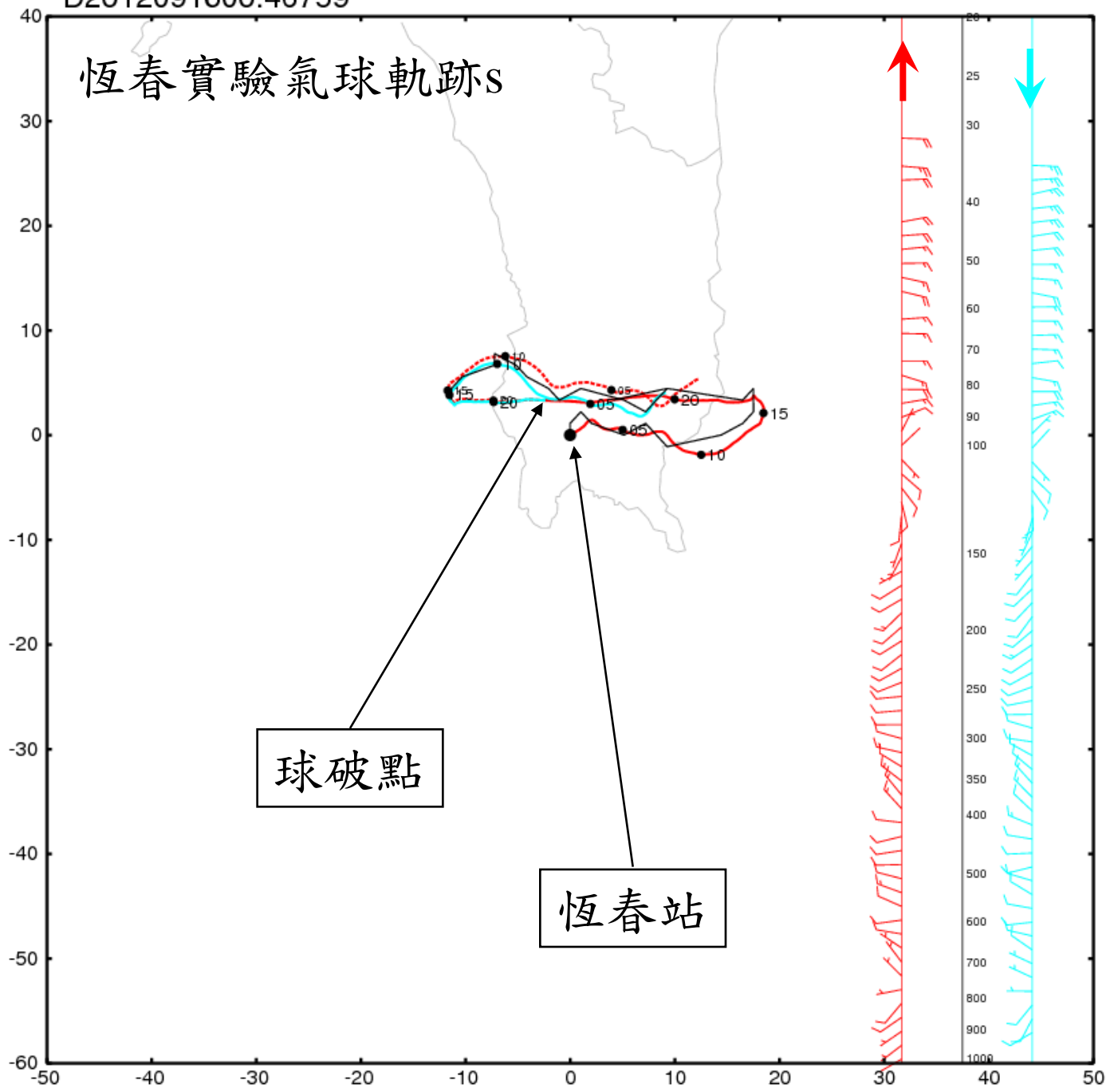


上升速度

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恆春實驗氣球軌跡s



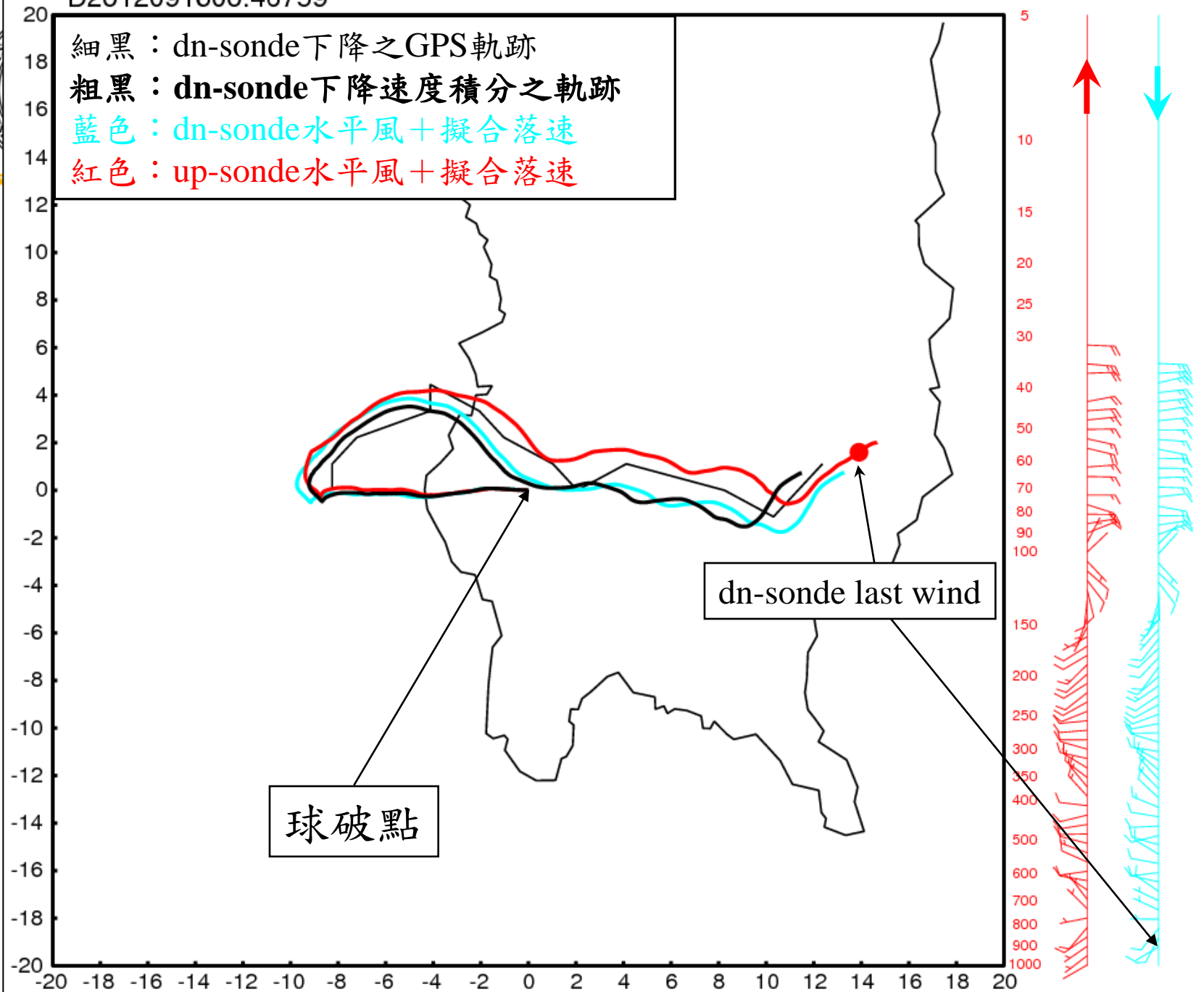
球破點

恆春站



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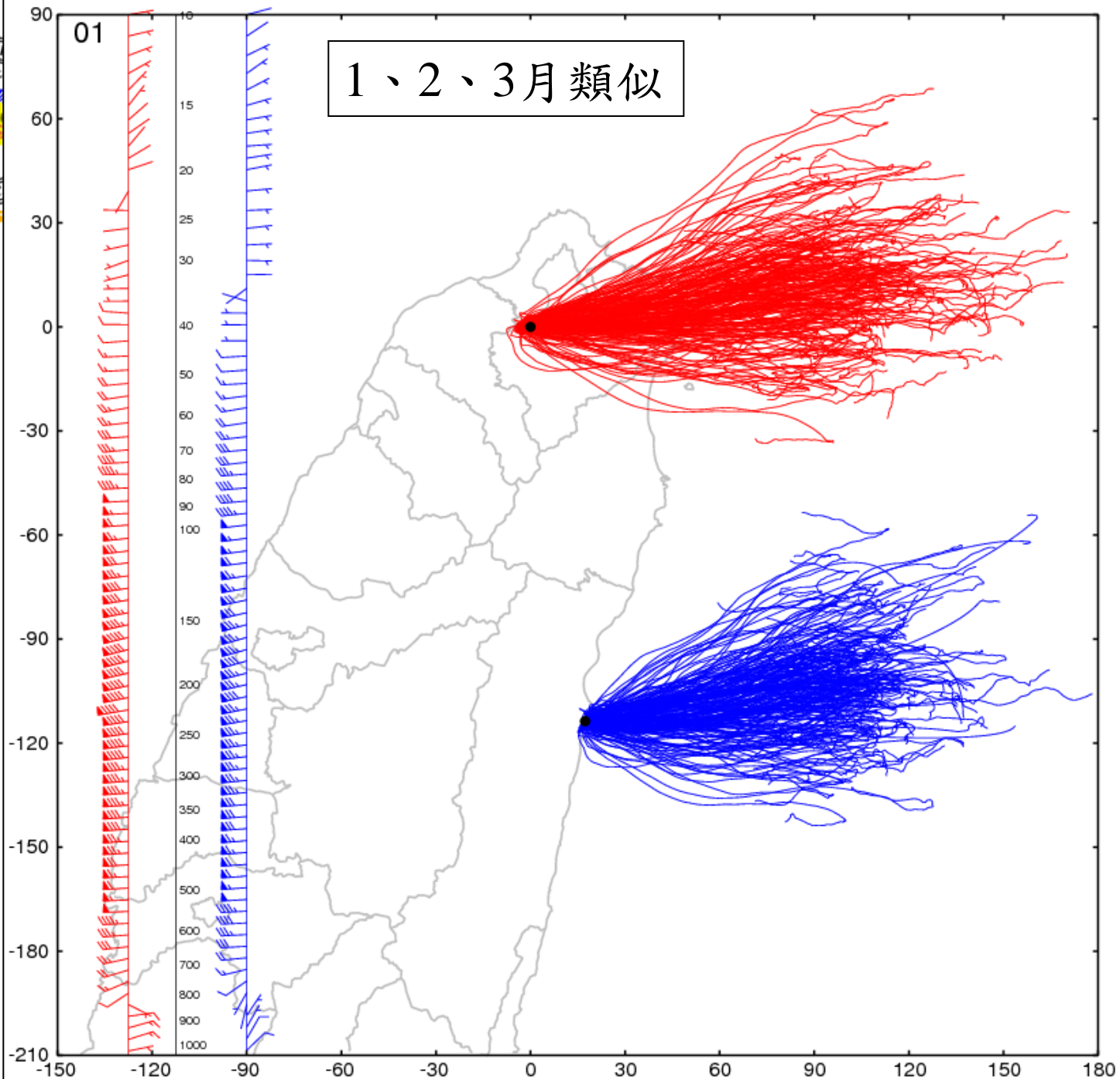
細黑：dn-sonde下降之GPS軌跡
粗黑：dn-sonde下降速度積分之軌跡
藍色：dn-sonde水平風+擬合落速
紅色：up-sonde水平風+擬合落速

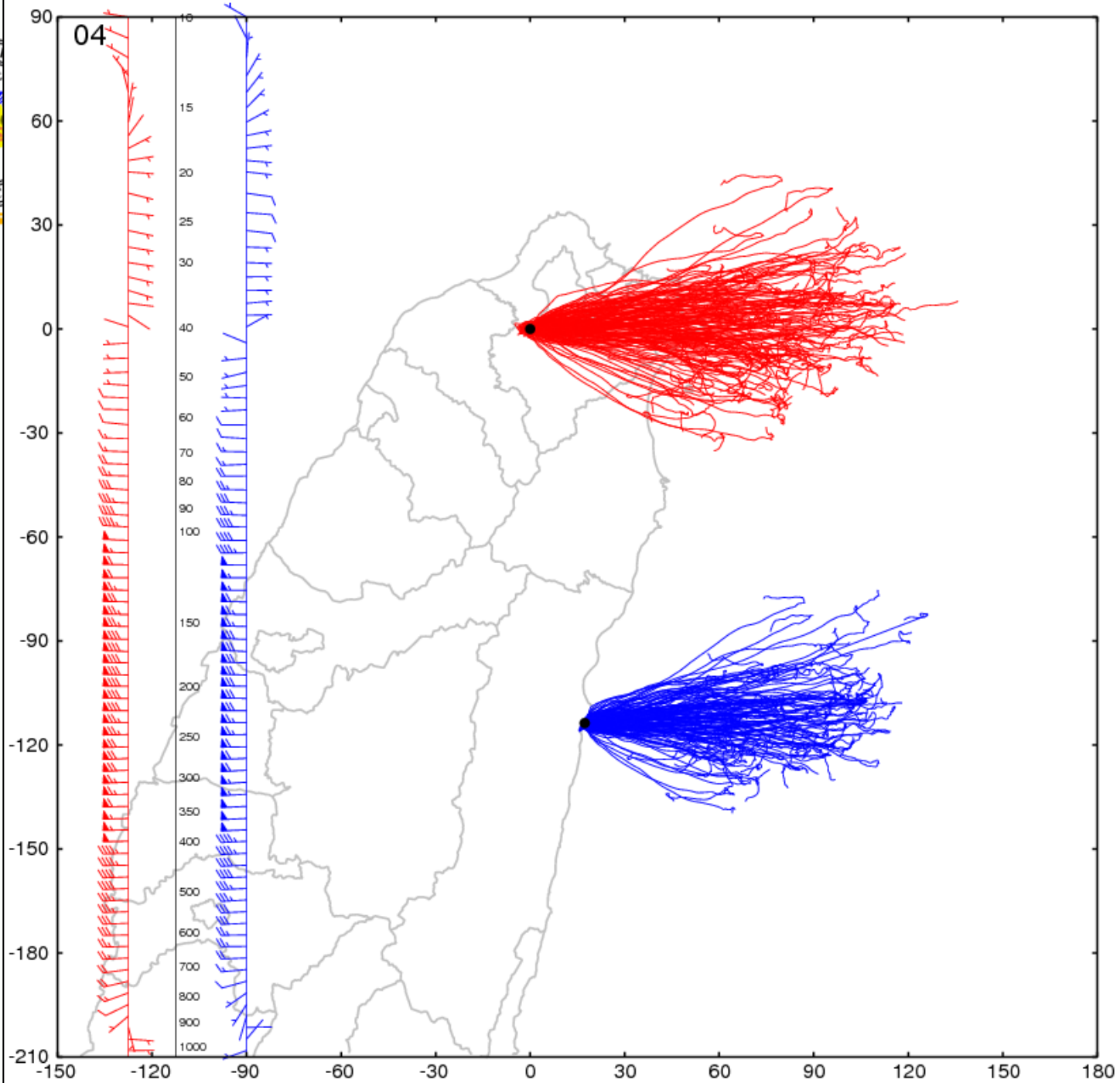


dn-sonde last wind

球破點

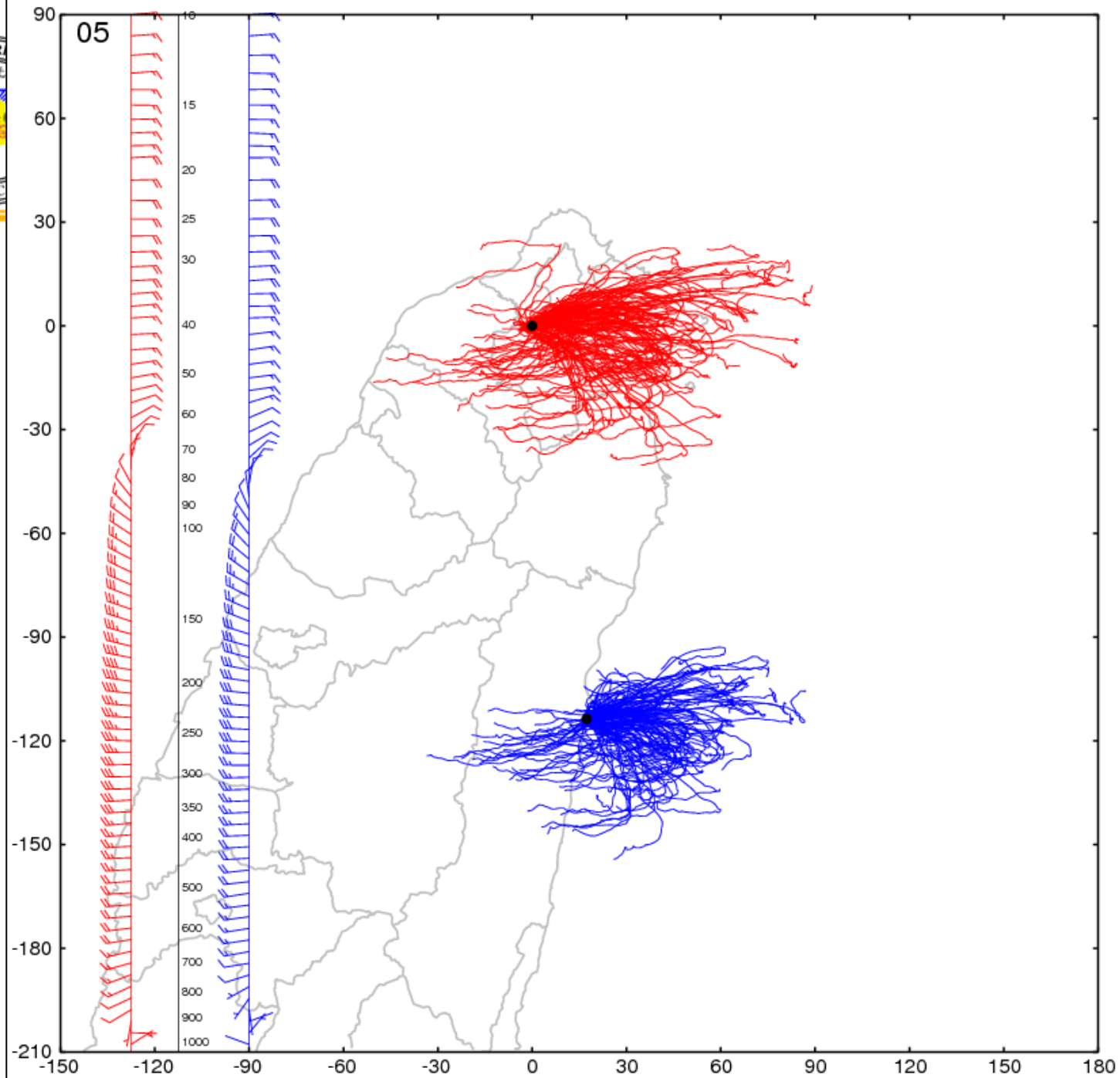
b.

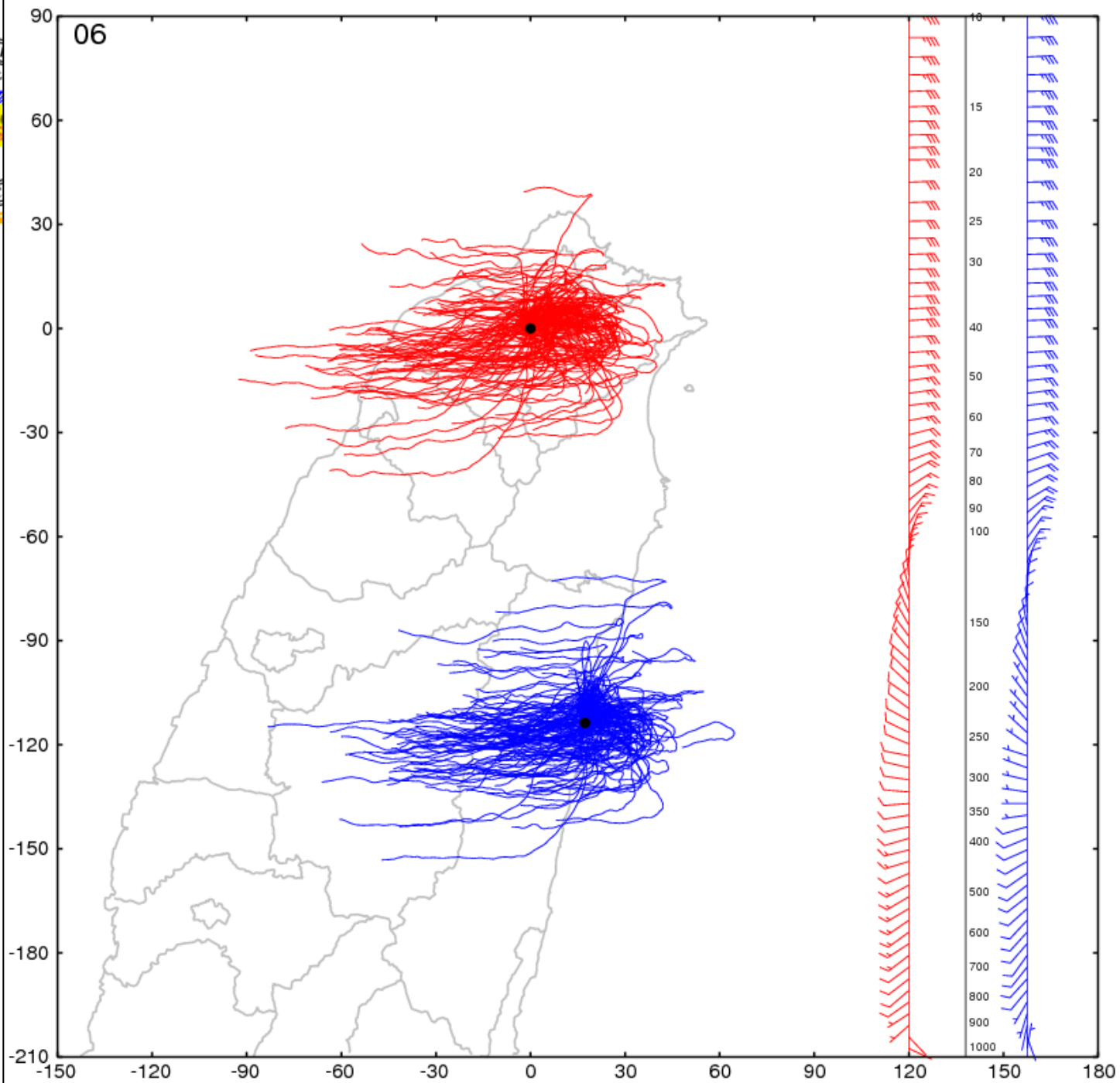




ERE Lab.

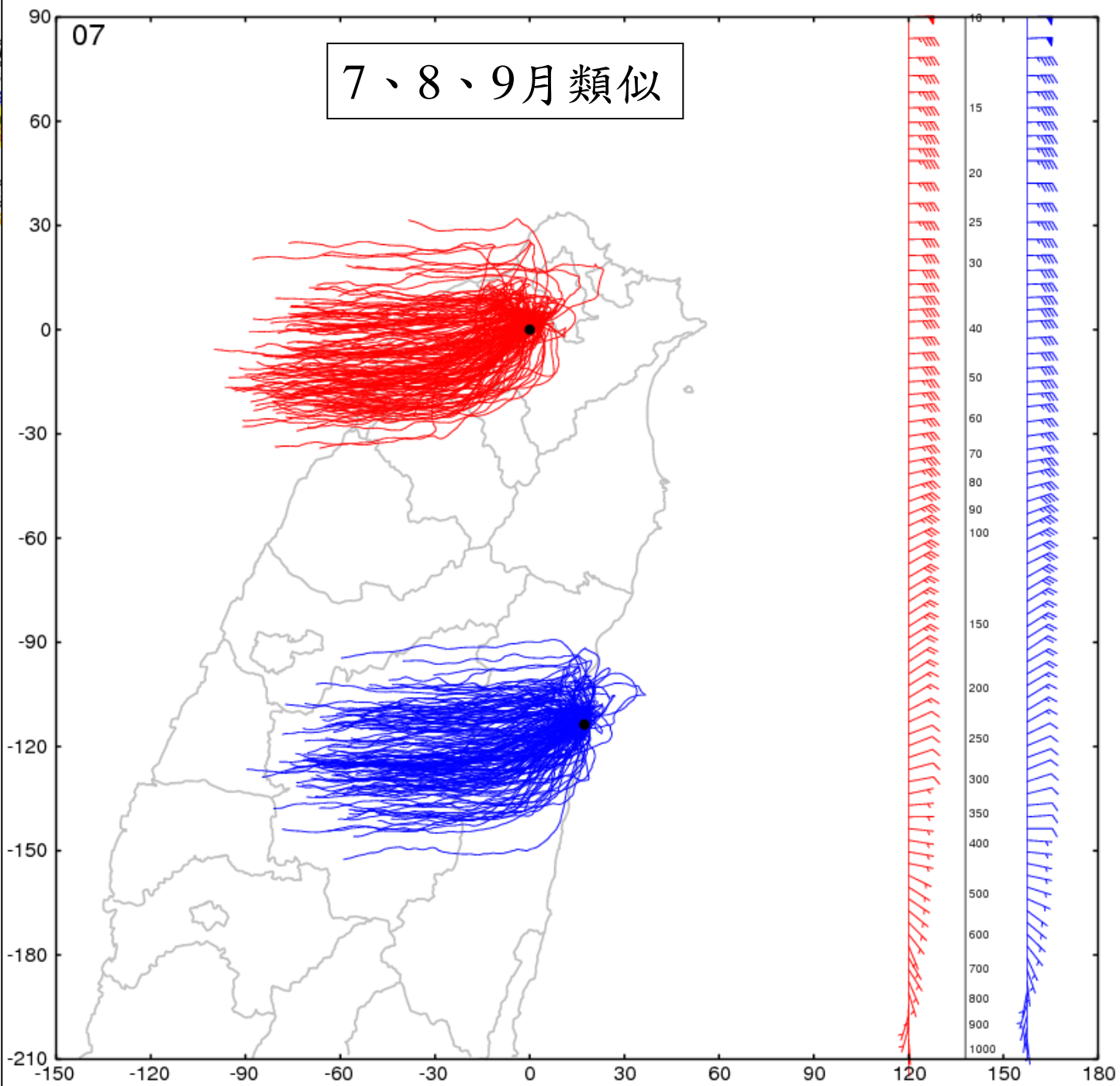


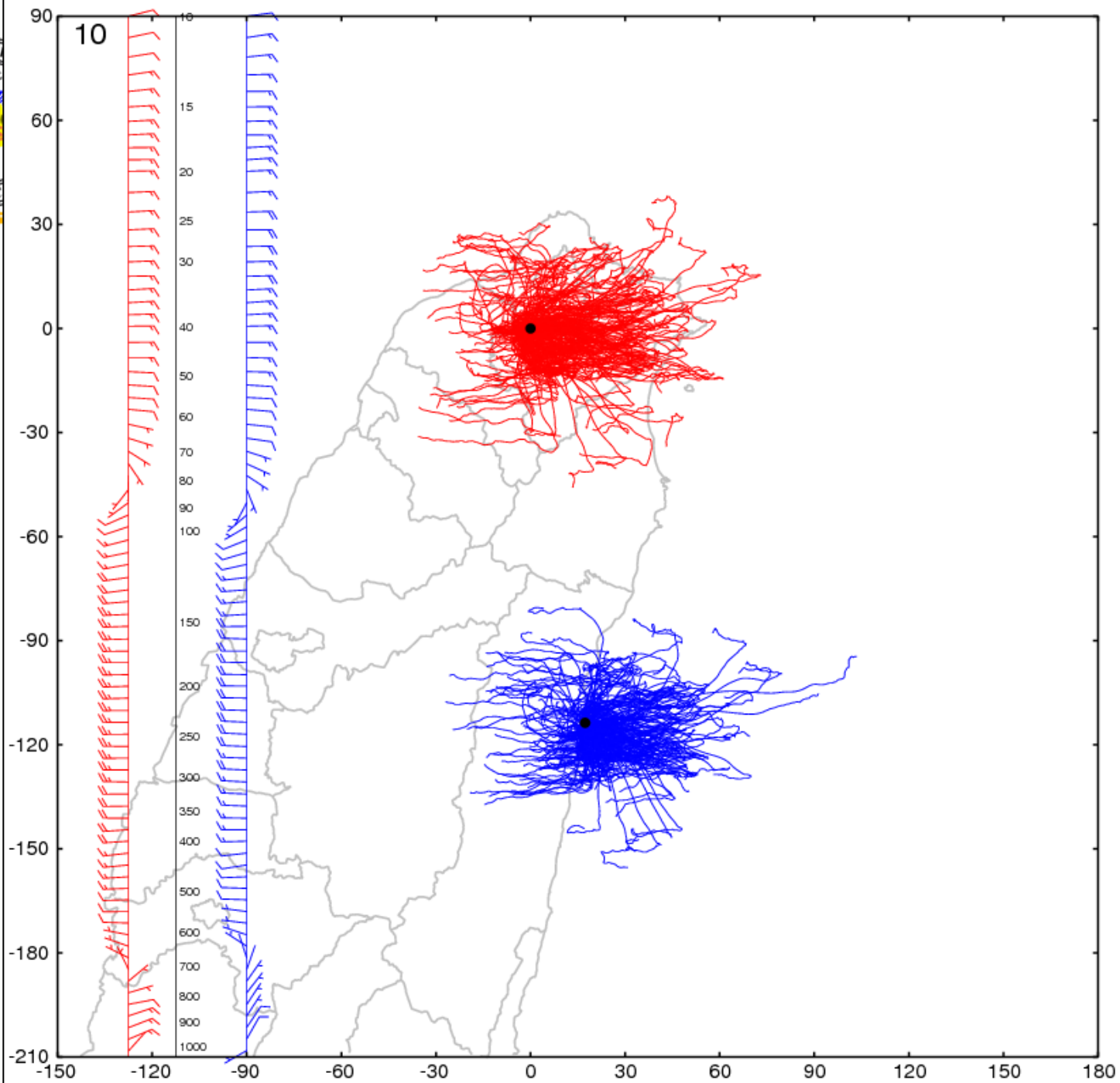


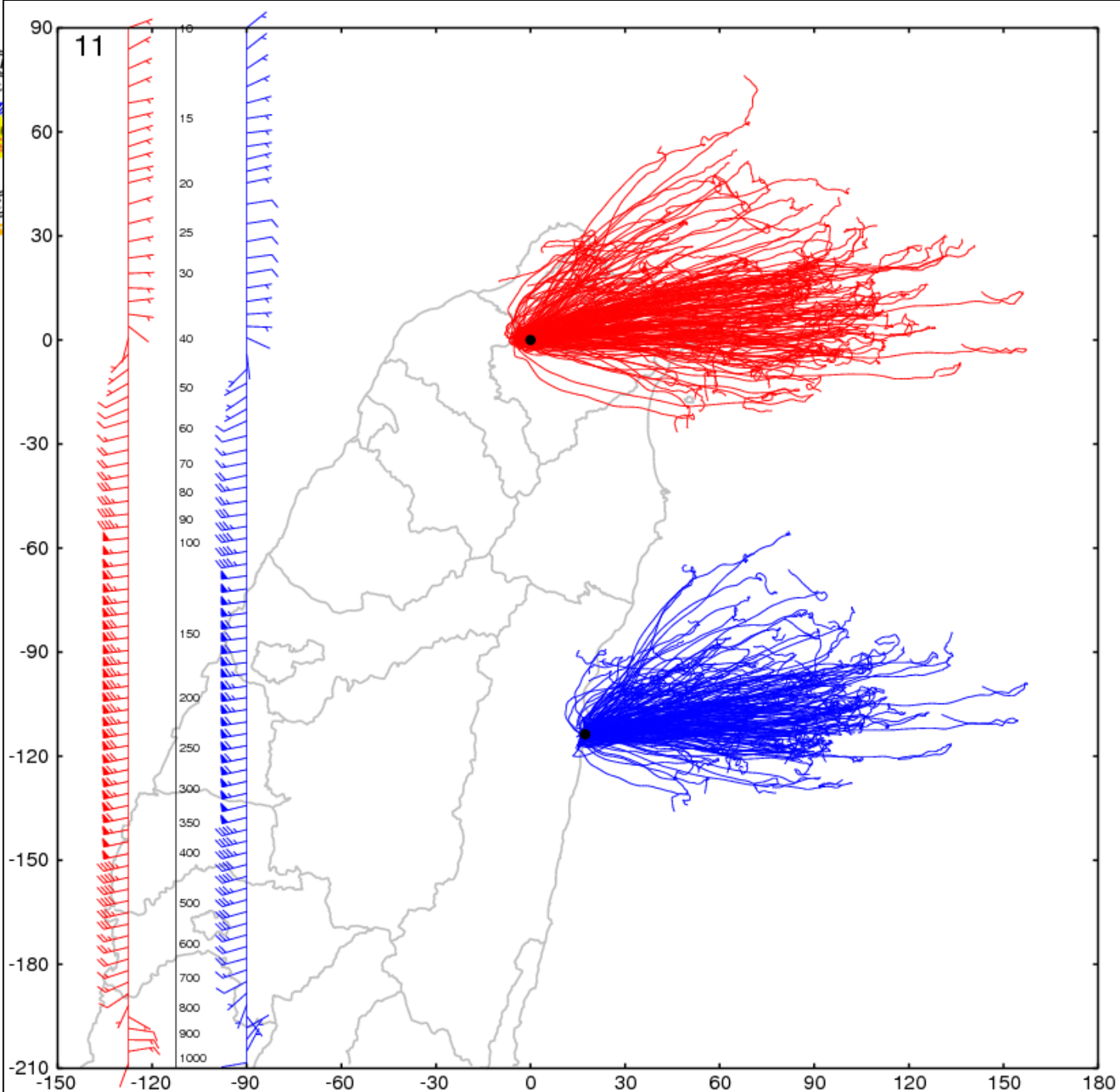


ERE Lab.



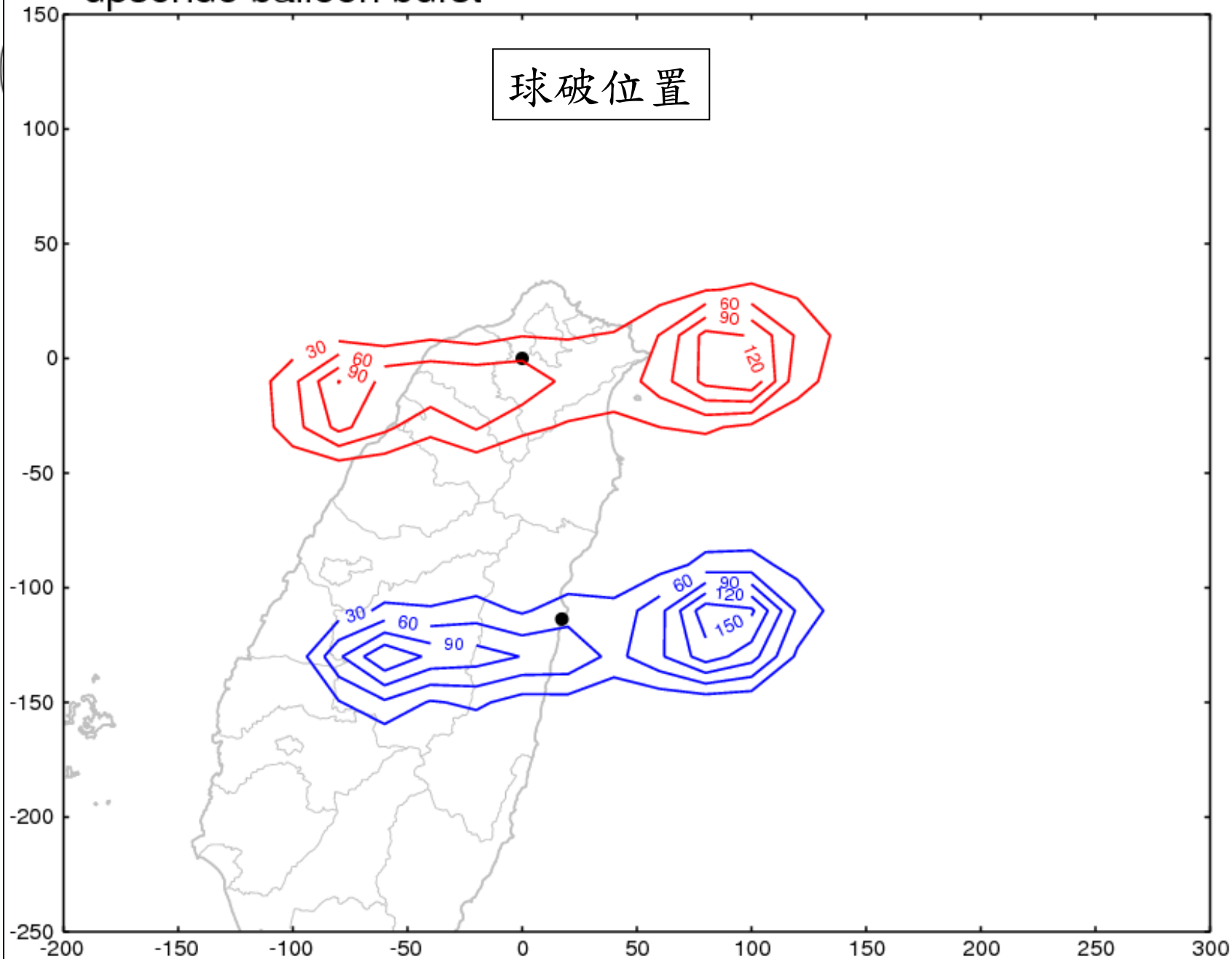






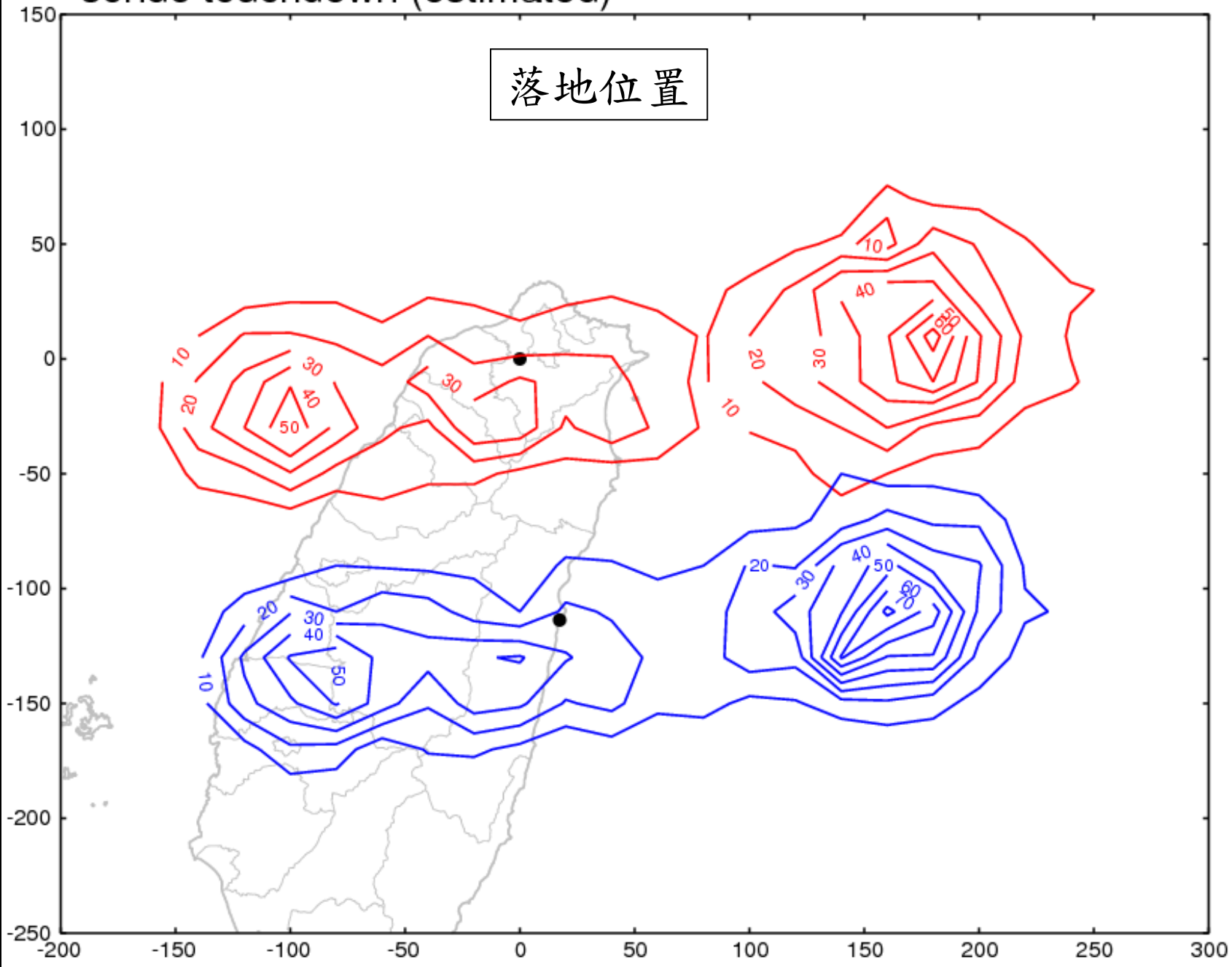
upsonde balloon burst

球破位置



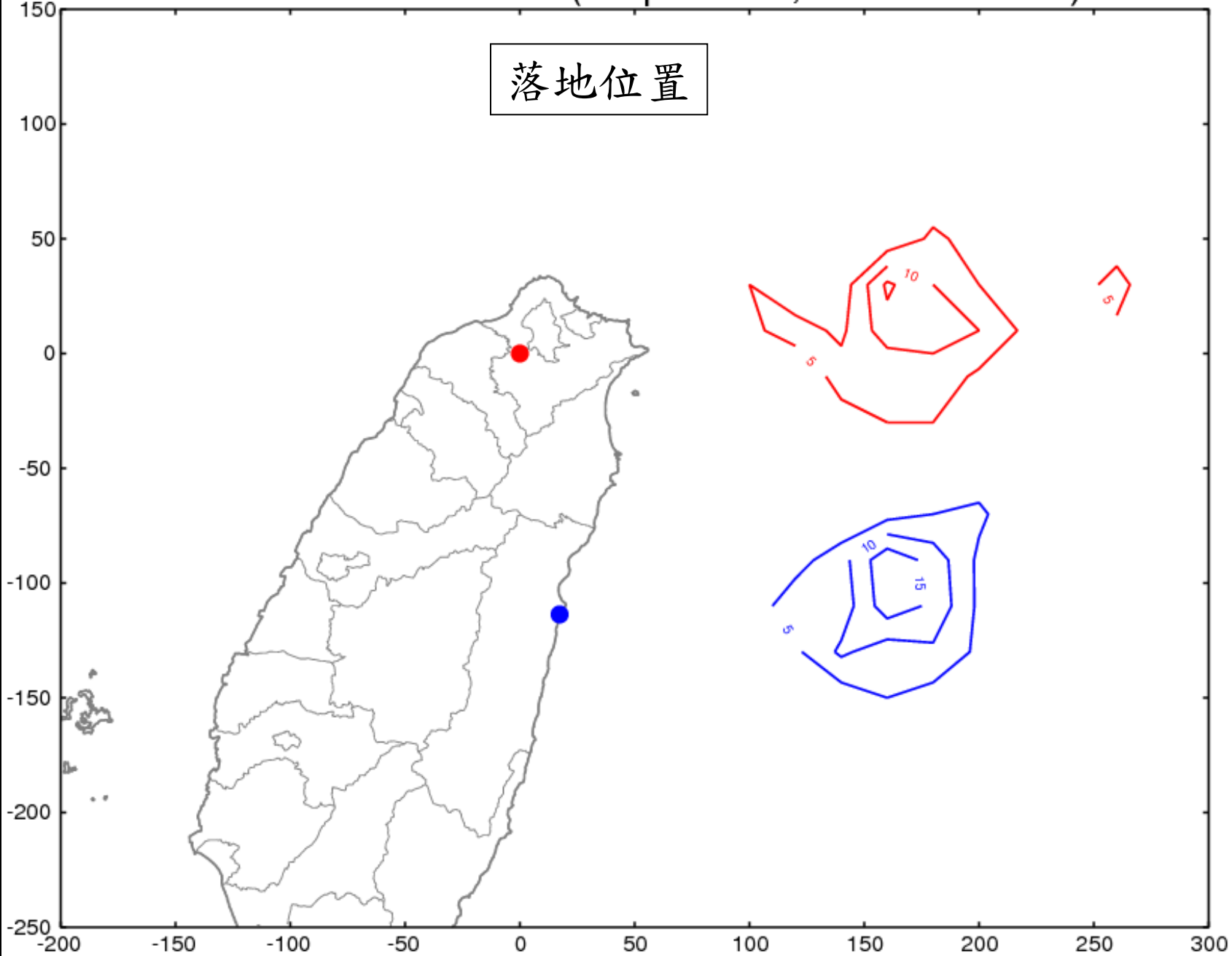
sonde touchdown (estimated)

落地位置



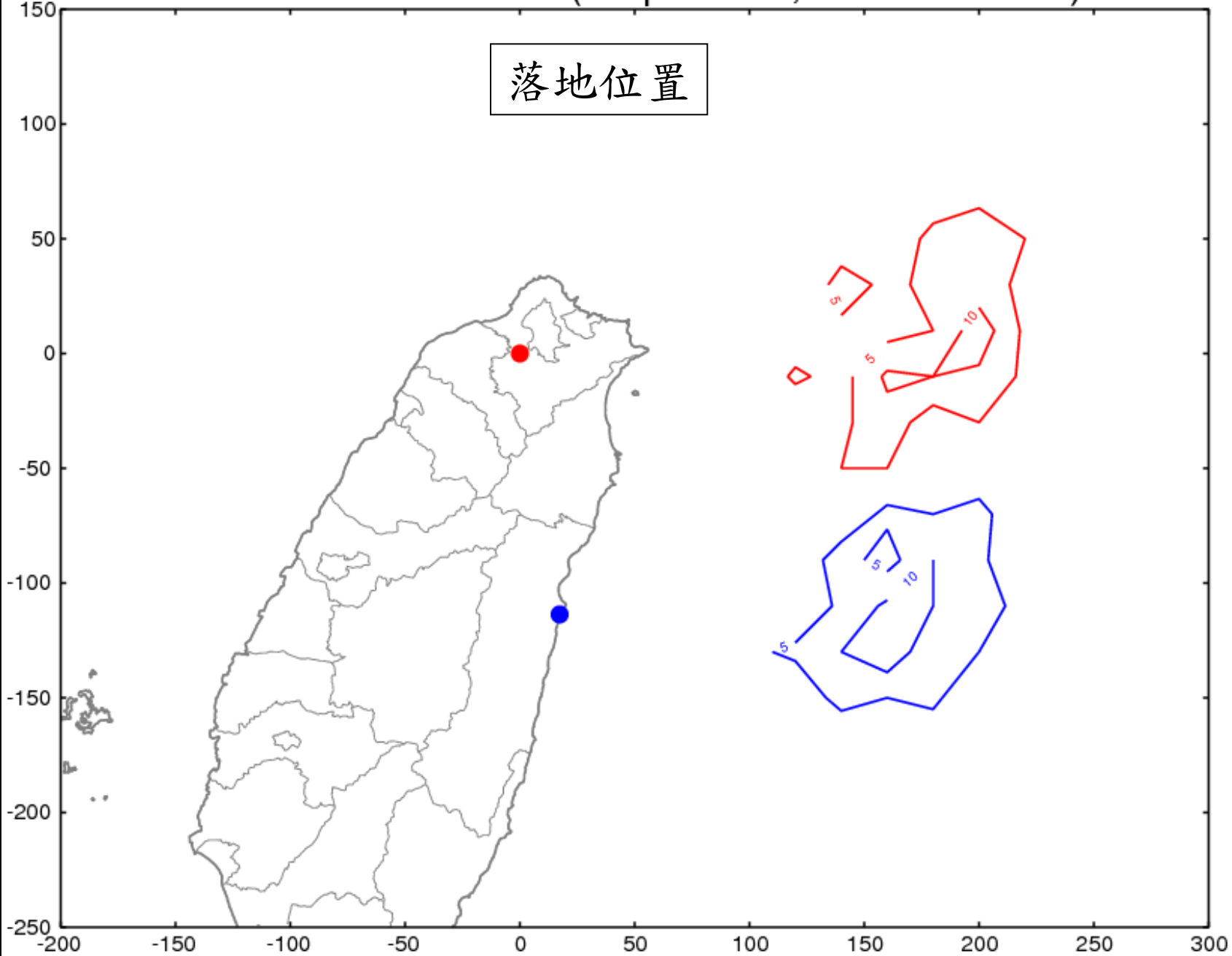
mon=01 sonde touchdown (Ptop<50mb, area:20x20km)

落地位置



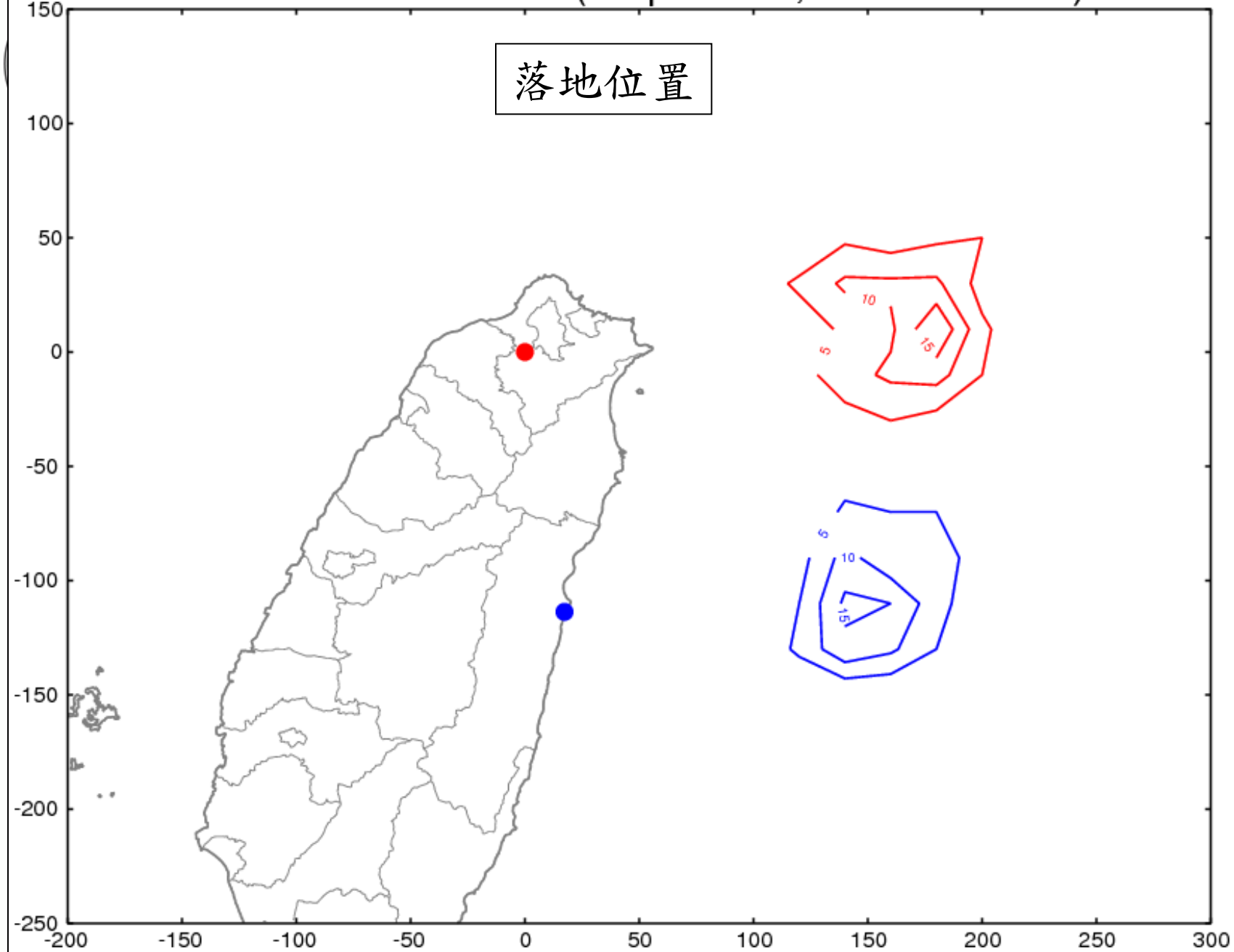
mon=02 sonde touchdown (Ptop<50mb, area:20x20km)

落地位置



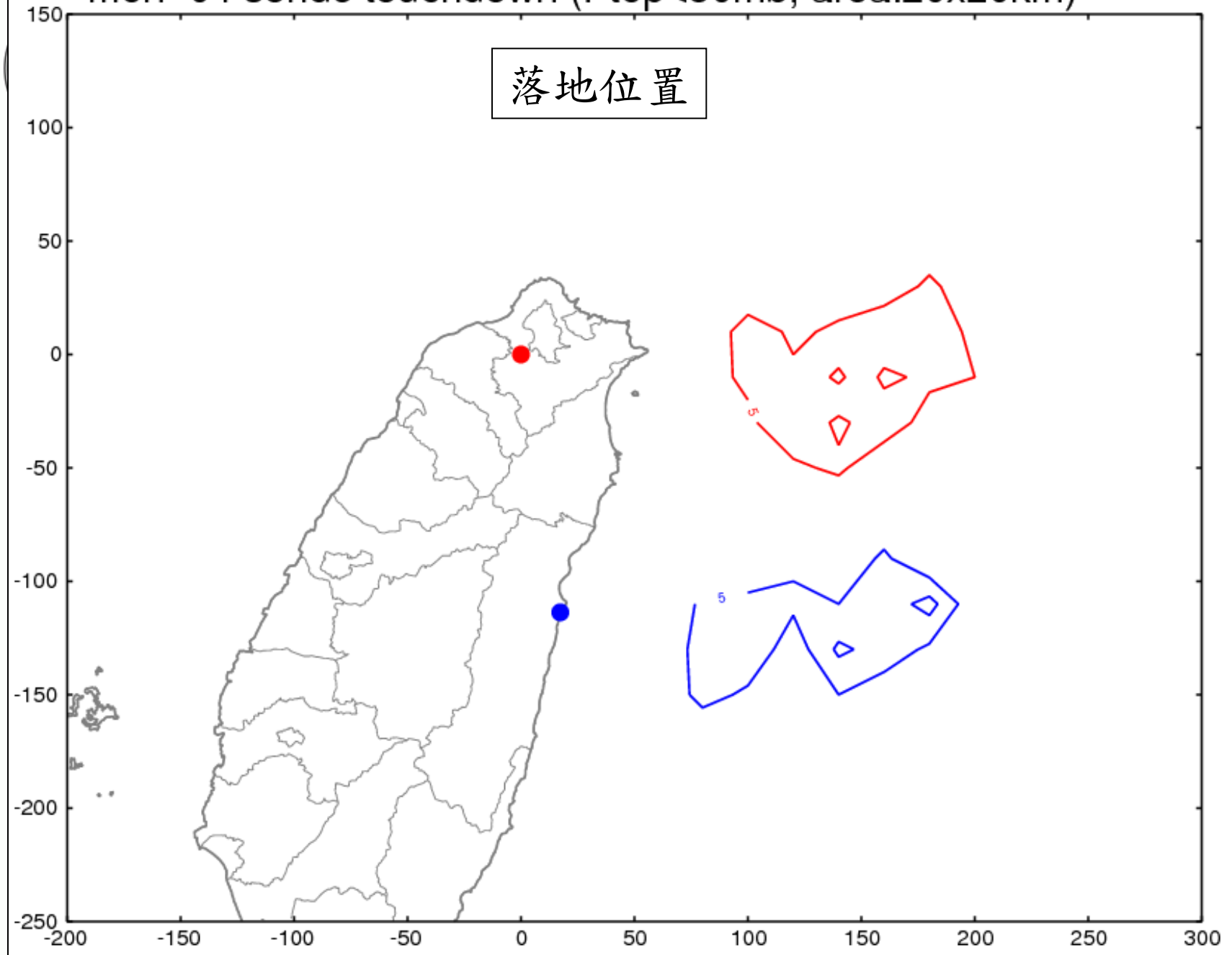
mon=03 sonde touchdown (Ptop<50mb, area:20x20km)

落地位置



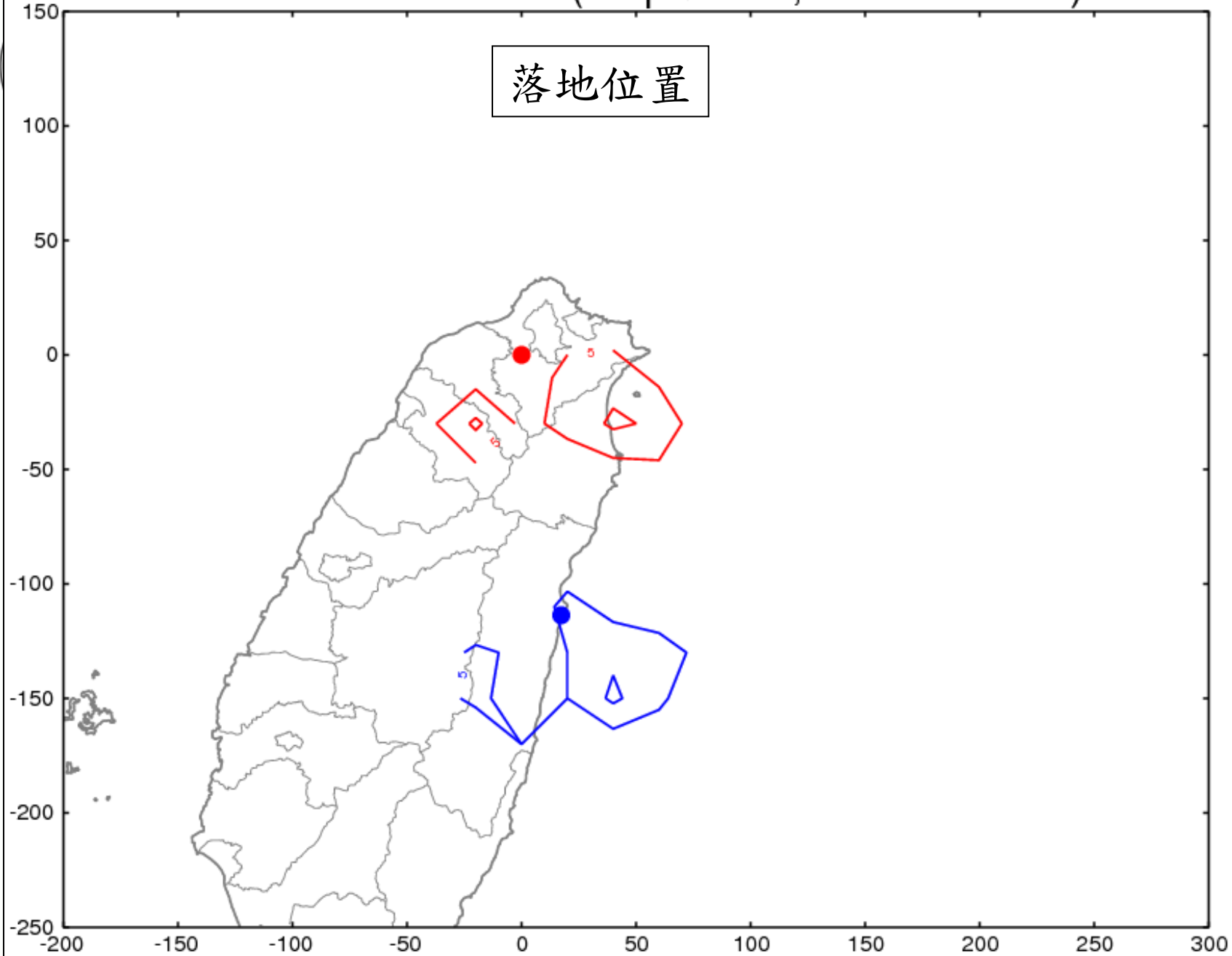
mon=04 sonde touchdown (Ptop<50mb, area:20x20km)

落地位置



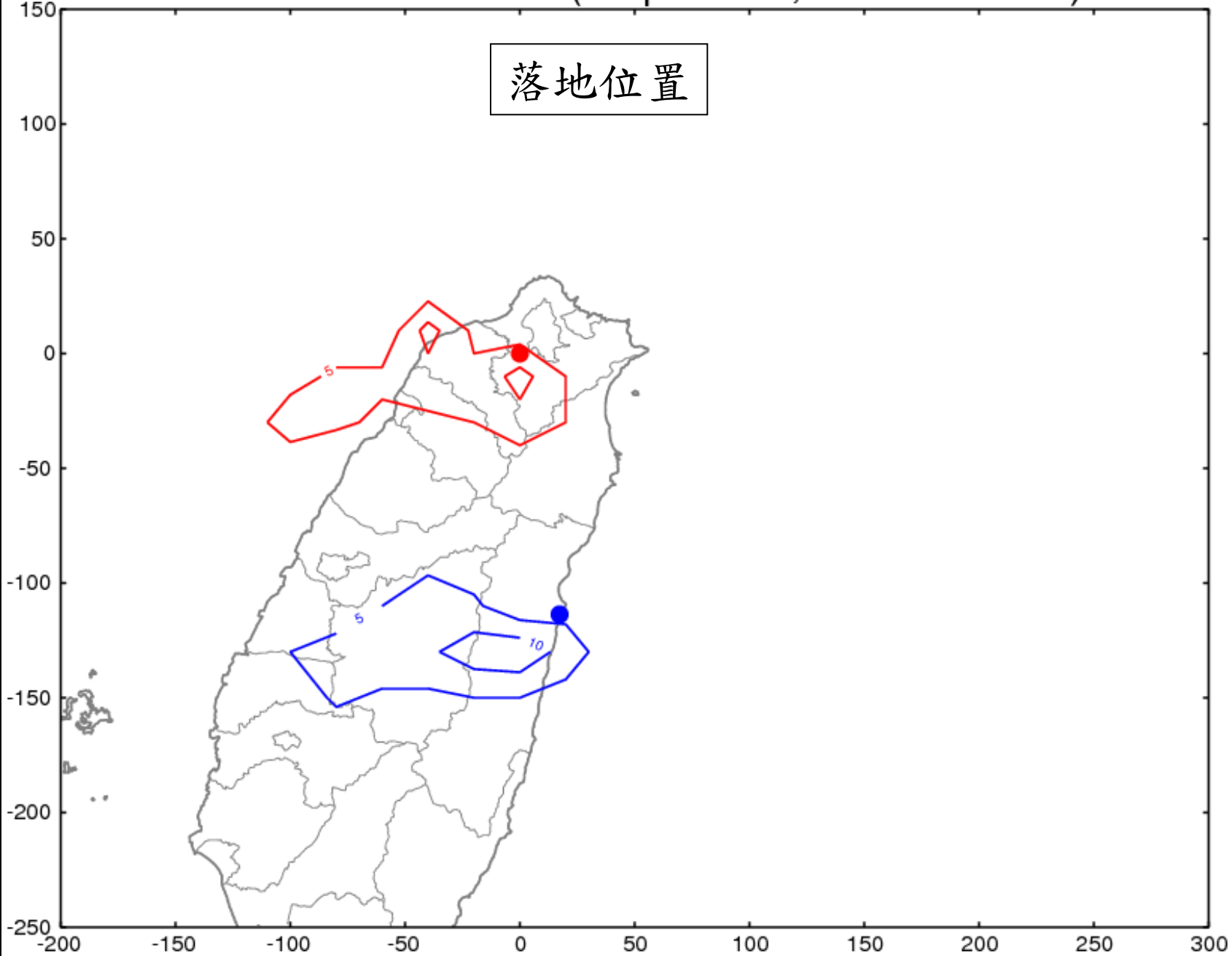
mon=05 sonde touchdown (Ptop<50mb, area:20x20km)

落地位置



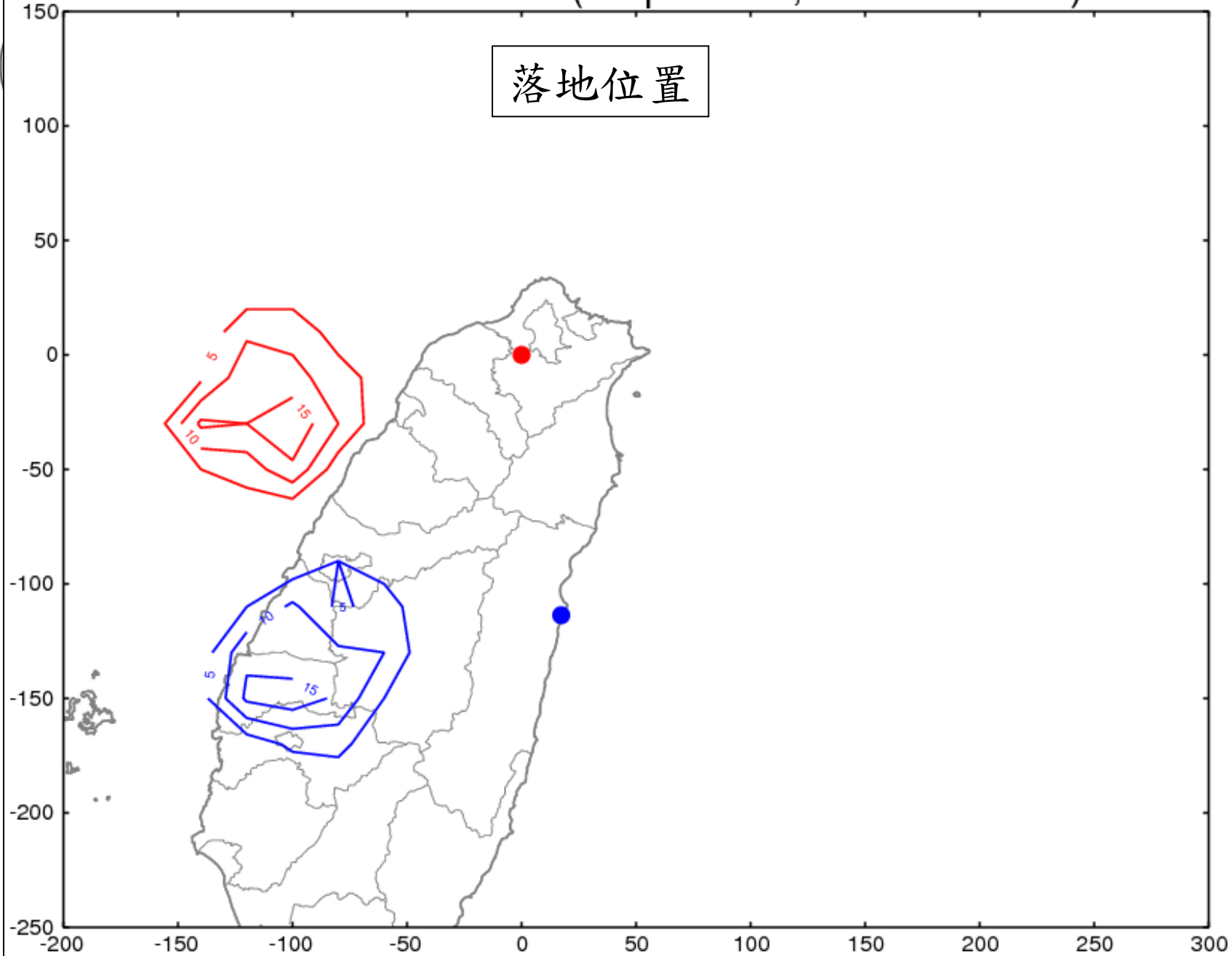
mon=06 sonde touchdown (Ptop<50mb, area:20x20km)

落地位置



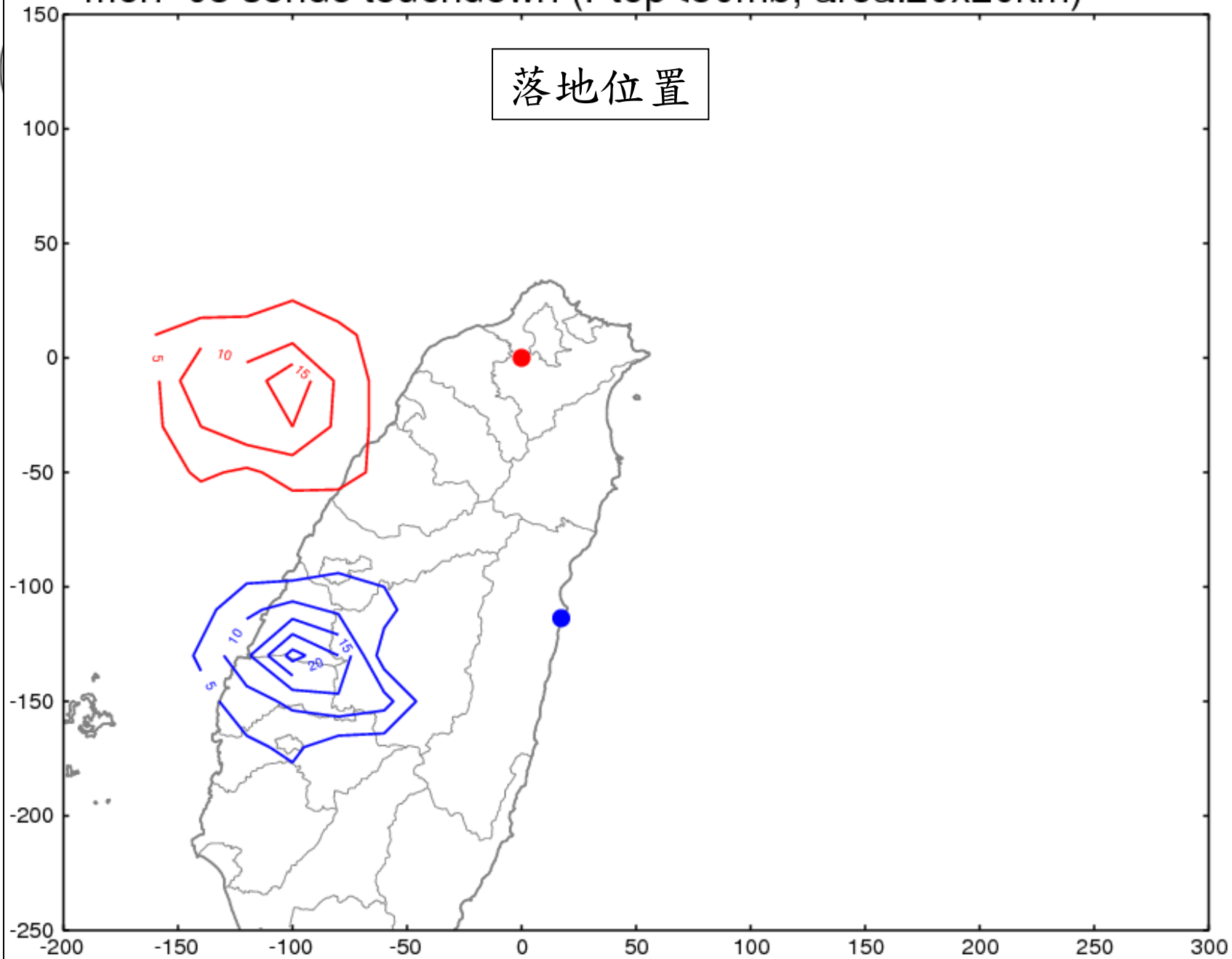
mon=07 sonde touchdown (Ptop<50mb, area:20x20km)

落地位置



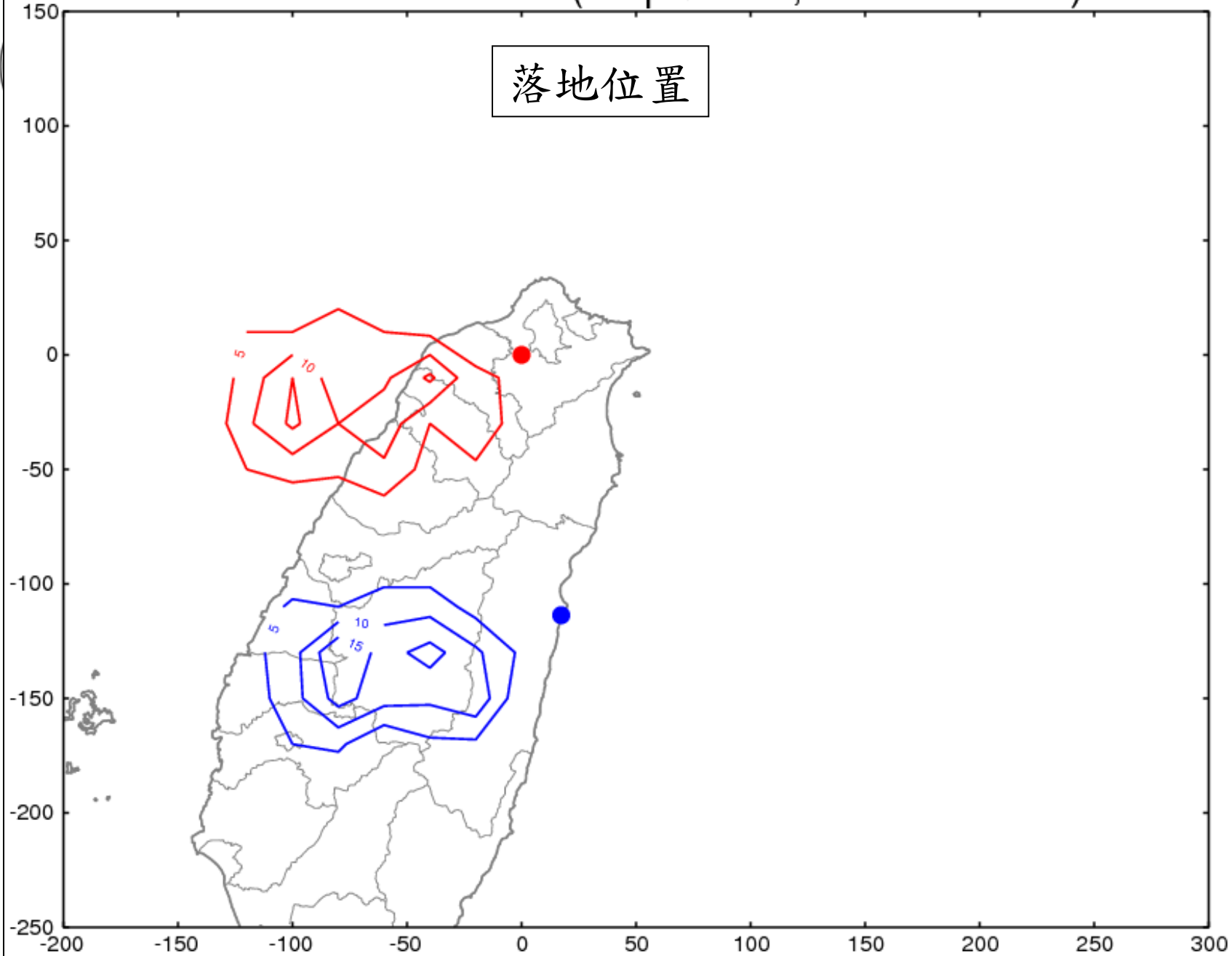
mon=08 sonde touchdown (Ptop<50mb, area:20x20km)

落地位置



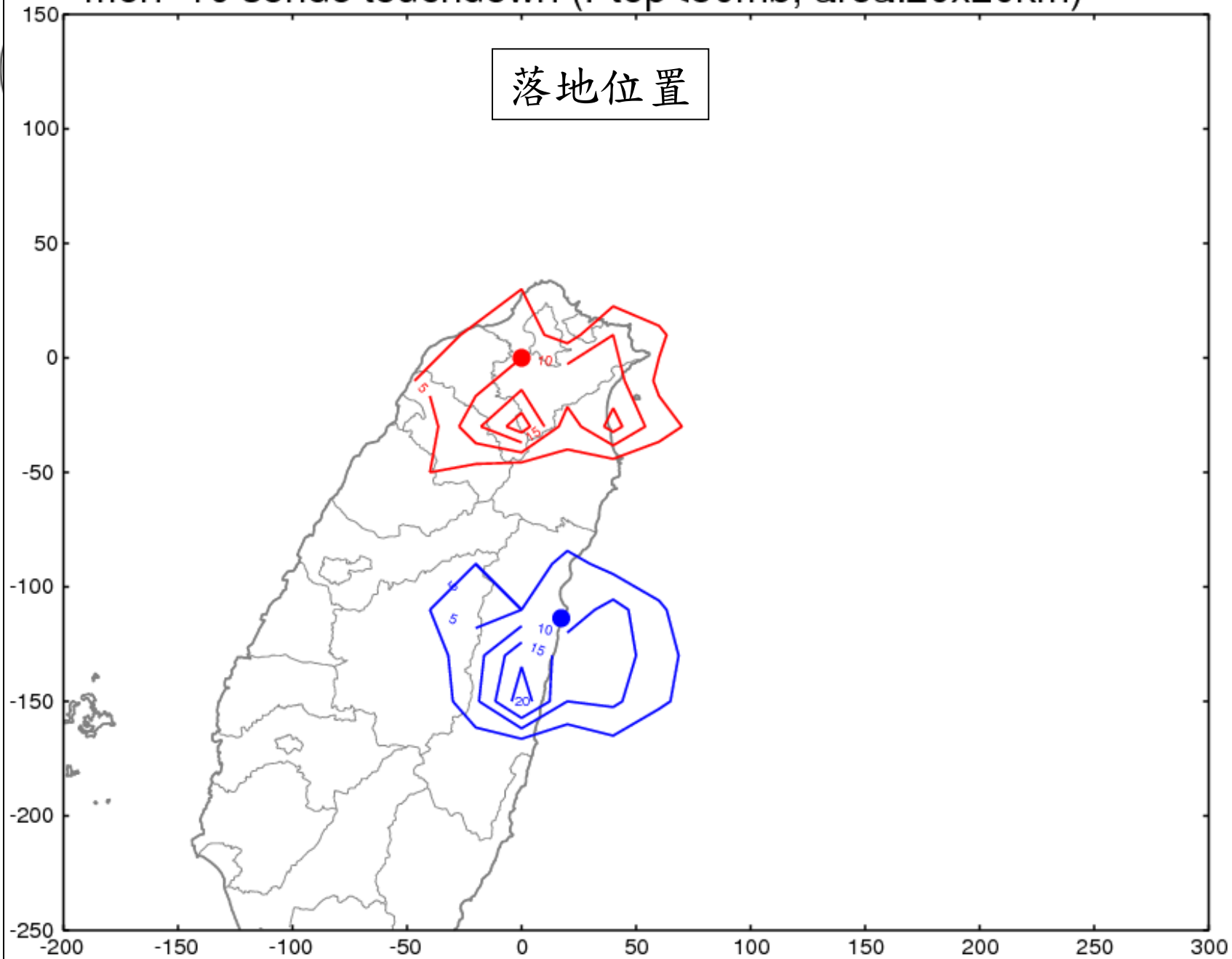
mon=09 sonde touchdown (Ptop<50mb, area:20x20km)

落地位置



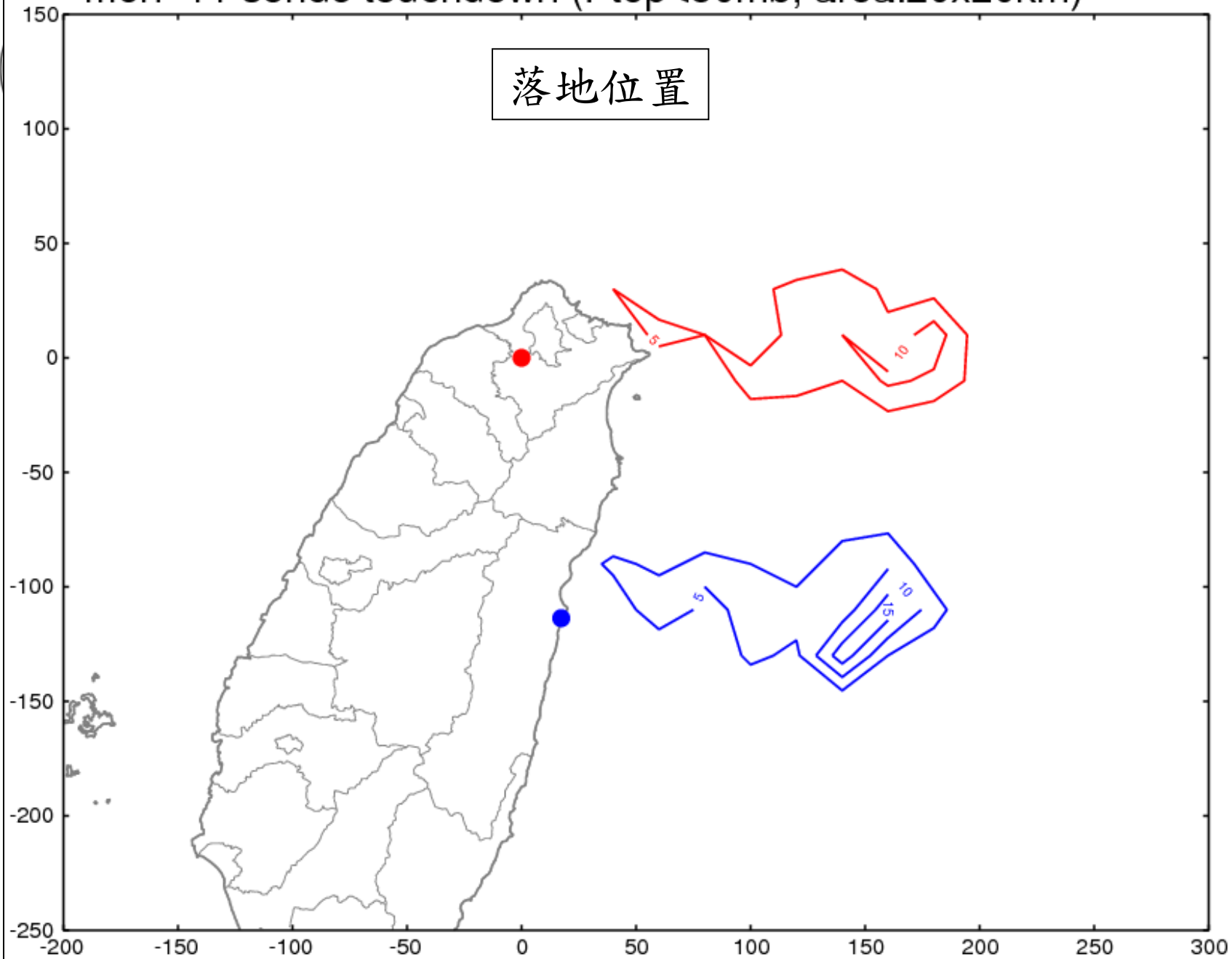
mon=10 sonde touchdown (Ptop<50mb, area:20x20km)

落地位置



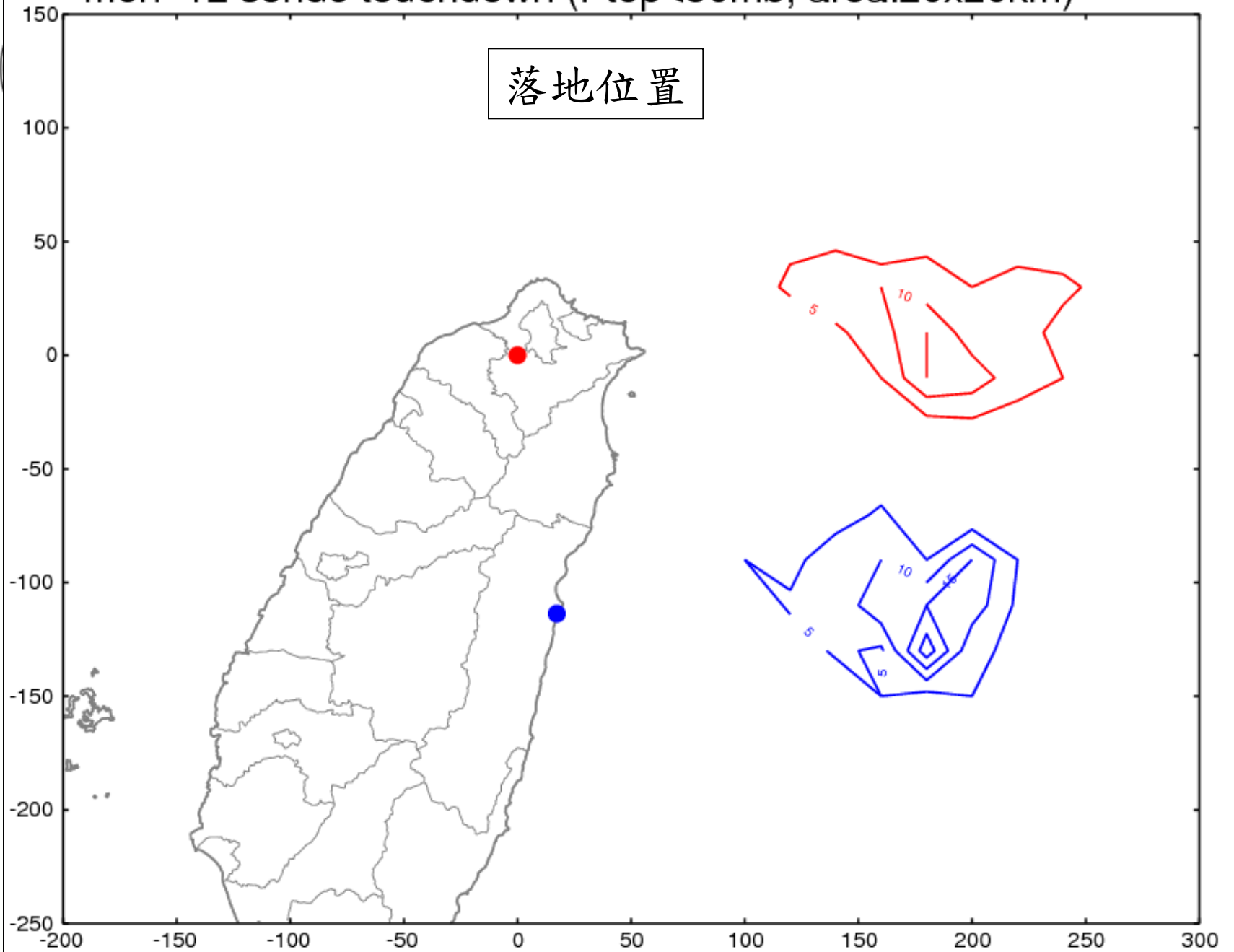
mon=11 sonde touchdown (Ptop<50mb, area:20x20km)

落地位置



mon=12 sonde touchdown (Ptop<50mb, area:20x20km)

落地位置





2013-09-02 08:00 (LST)



中華民國 102 年 9 月 2 日 08 時

聯絡電話：(02)29683884

中央氣象局
臺北氣象站
高空氣象探測儀
非爆裂物

