Downscaling Satellite Precipitation Estimates With *Multiple Linear Regression*, *Artificial Neural Networks*, and *Spline Interpolation* Techniques

2020/3/11

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Study Area:

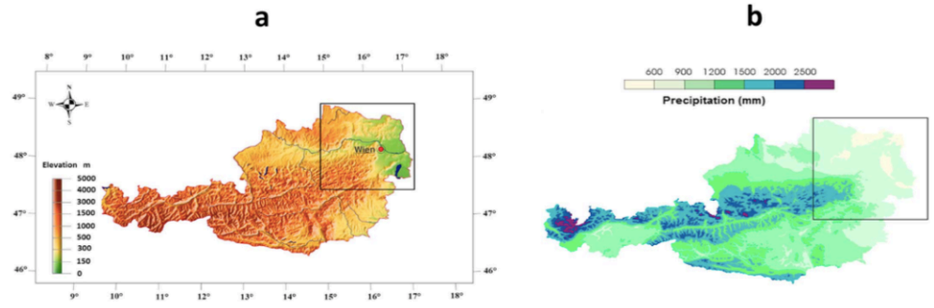


Figure 1. (a) Elevation map of Austria and (b) mean annual precipitation map of Austria.

Method:

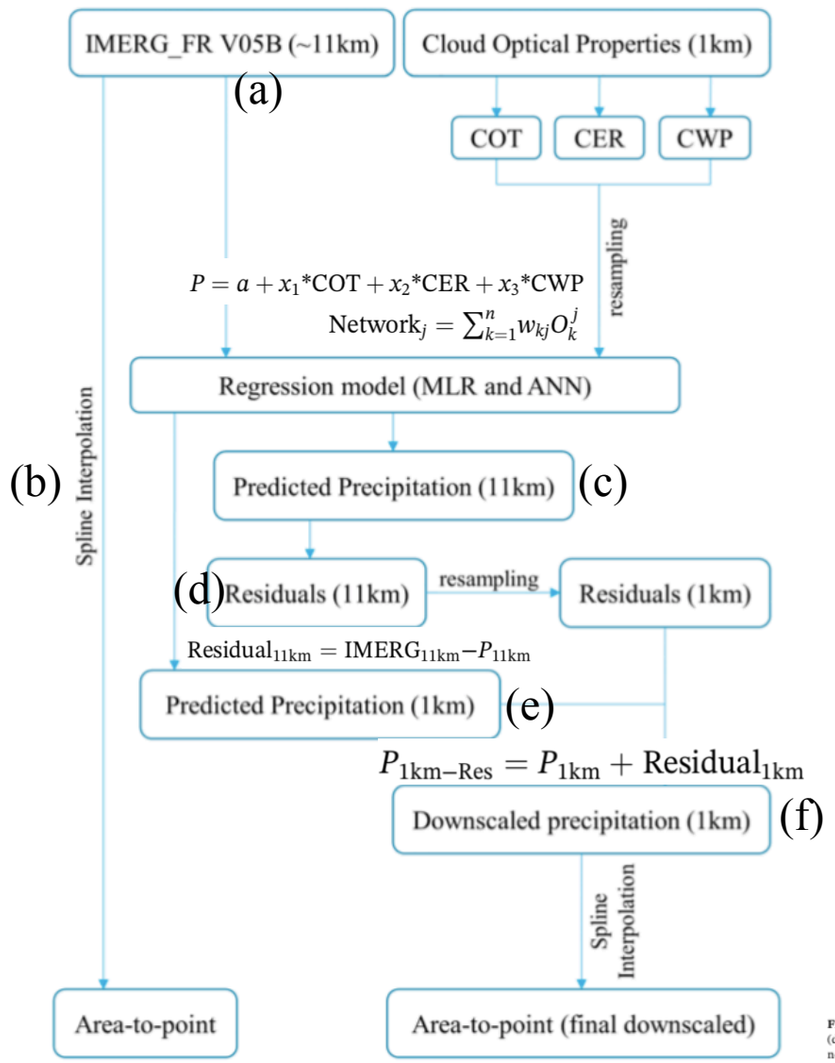


Figure 3. Workflow for statistical downscaling of coarse IMERG precipitation data. COT = cloud optical thickness; CER = cloud effective radius; CWP = cloud water path; IMERG = IMERG = Integrated Multi-satellitE Retrievals for GPM; MLR = multiple linear regression; ANN = artificial neural network.

Station Data:

Central Institute for Meteorology and Geodynamics (ZAMG)−Austria(奥地利中央气象与地球动力学研究所)

IMERG-FR V05B:

IMERG V05B 的最终运行产品由美国国家航空航天局(NASA) Goddard 太空飞行任务中的GPM任务提供

MODIS:

Terra(1999) and Aqua(2002) satellites. In the morning Terra passes from north to south, while in the afternoon Aqua passes from south to north across the equator.

Results:

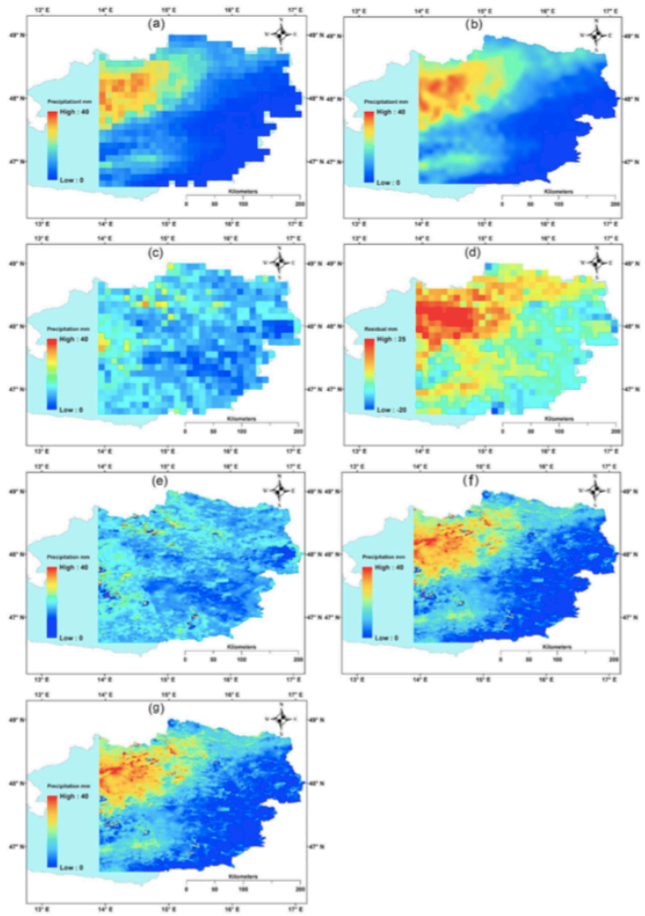


Figure 5. (a) Original Integrated Multi-satellitE Retrievals for GPM, (b) spline interpolation, (c) predicted precipitation based on artificial neural n (d) $\text{Residual}_{11\text{km}}$, (e) predicted precipitation ($P_{1\text{km}}$), (f) downscaled residual corrected, and (g) final downscaled precipitation for 3 September 20 northeast of Austria.

five specific heavy precipitation events with the rain intensity above 30 mm/day, which occurred in 2015 over the study area, were chosen. (17/4/2015, 23/5/2015, 3/9/2015, 25/9/2015, 7/10/2015)

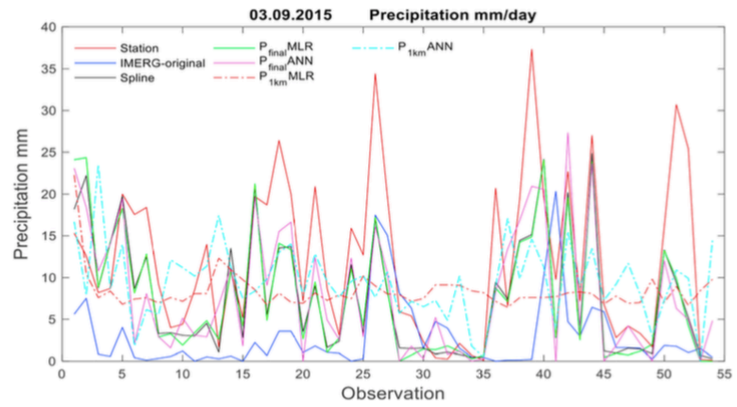
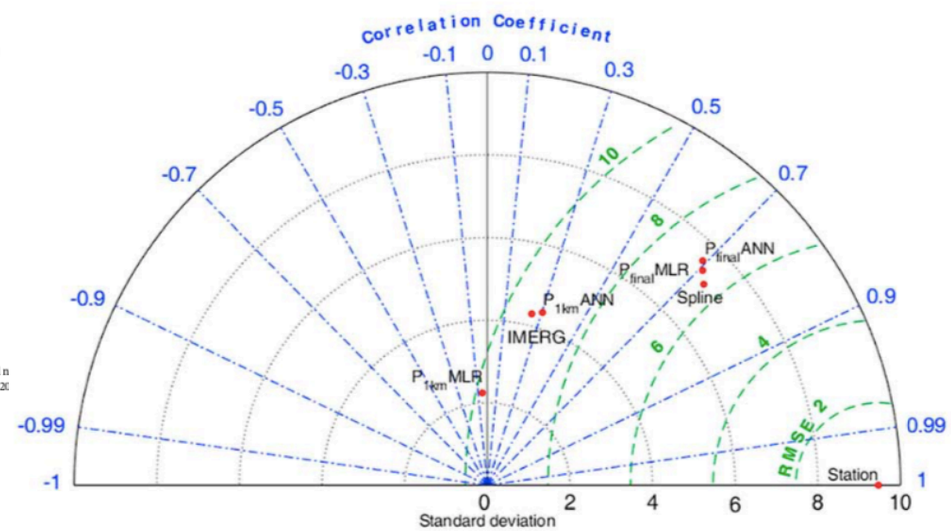


Figure 7. Comparison of precipitation values of all data sets for 3 September 2015. IMERG = Integrated Multi-satellitE Retrievals for GPM; MLR = multiple linear regression; ANN = artificial neural network.



About Neural Networks:

前传网络；前向计算；后向算法；

Report

2020.3.14

張慕琪

Methods

实验设计：

检查——

1. historical阶段，全国所有点，ANN得到的tmax和tmin与GMFD相差较大的问题；

地区： China

时间： Train & validation

数据： CCSM, GMFD, ANN(before BC)

变量：

·Temperature:

1. Maps(differences): yr=1960, mon=1/7;
2. Time series

Results

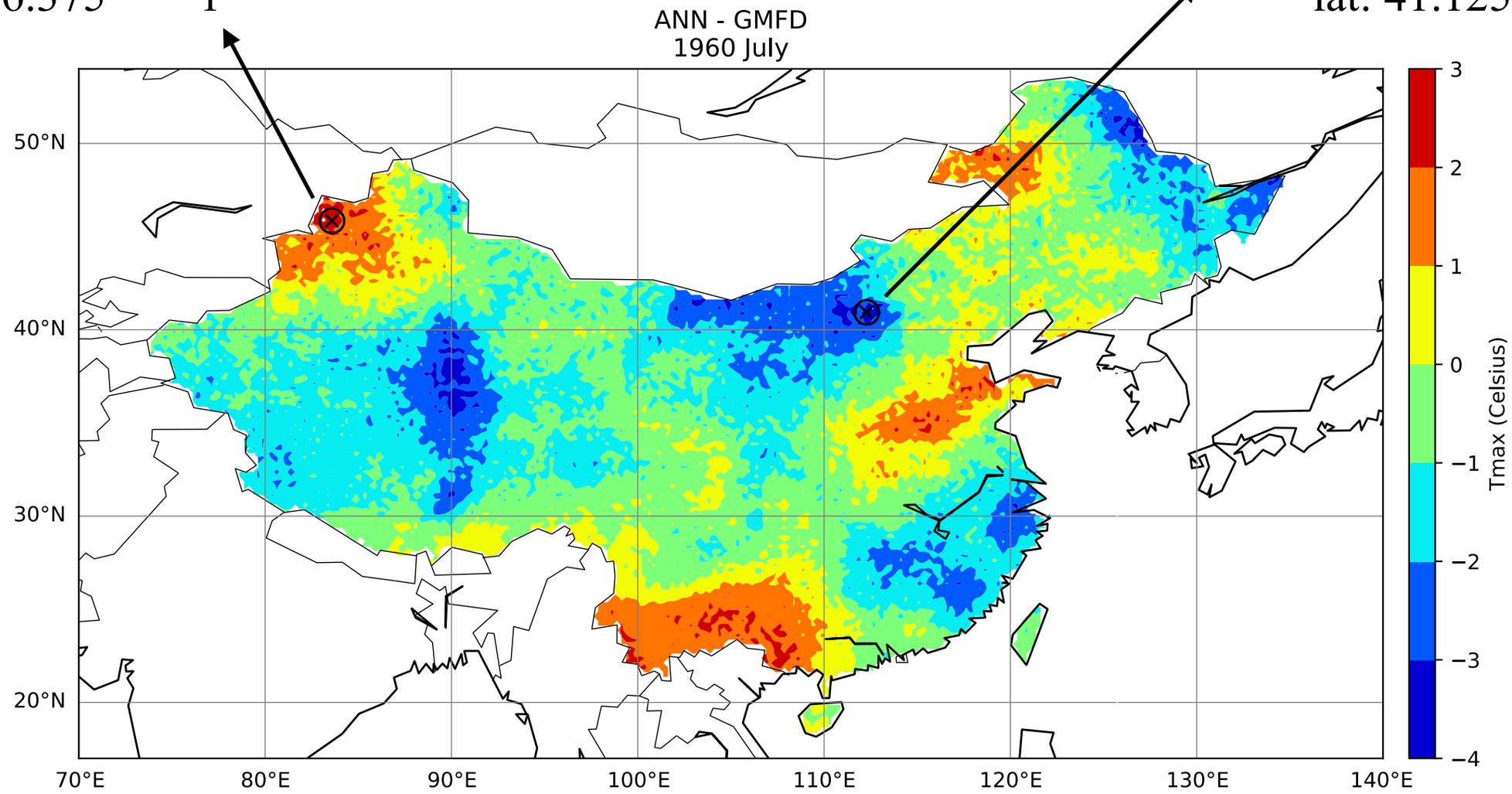
Maps China Tmax

lon: 83.125
lat: 46.375

1

2

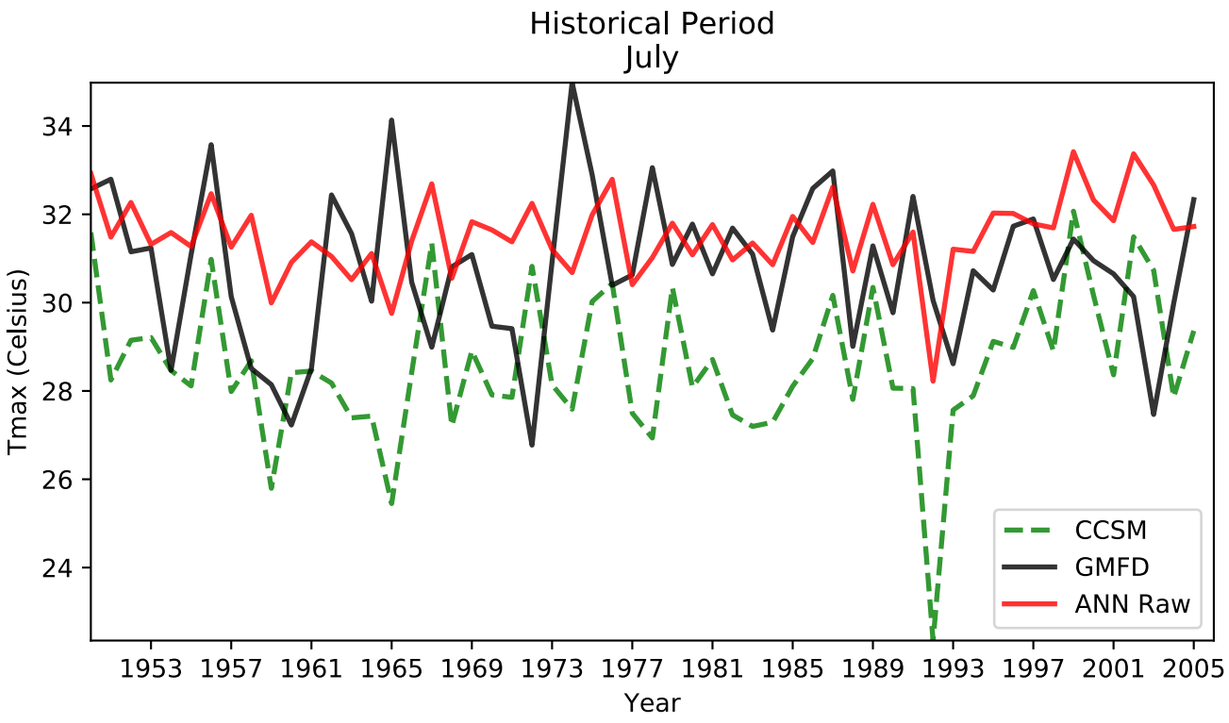
lon: 112.625
lat: 41.125



Results

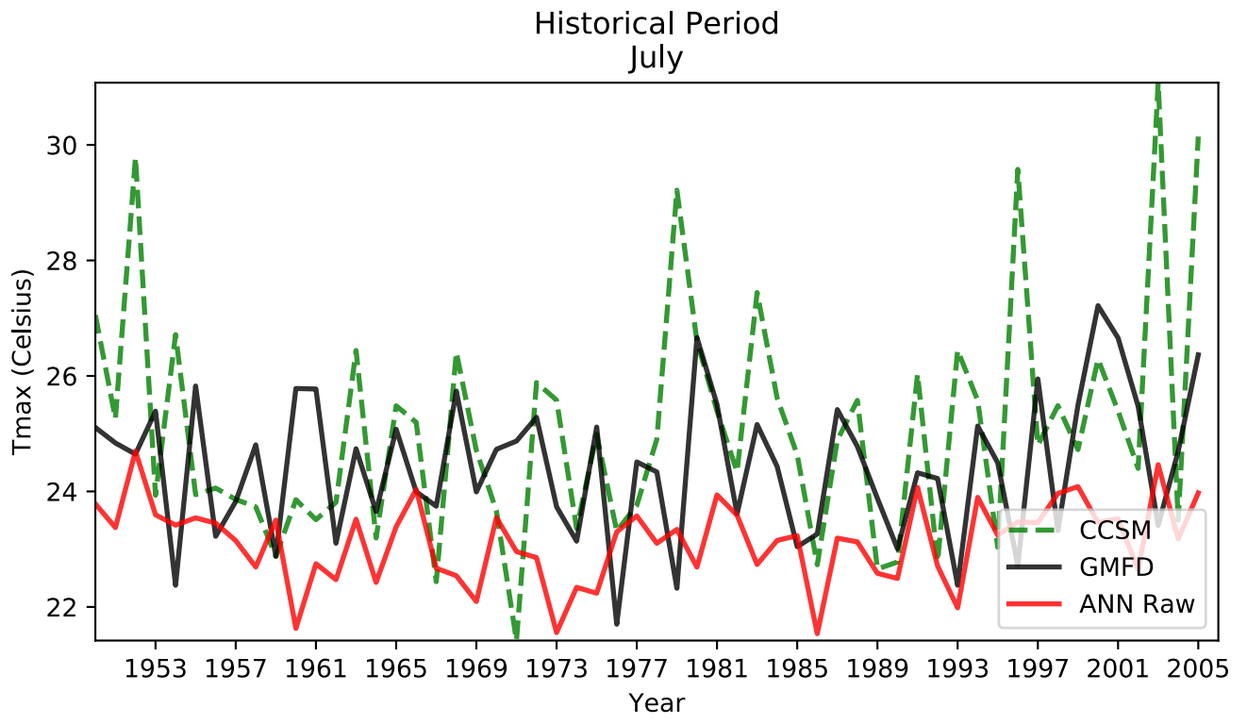
ts China Tmax

1



mean_ccsm = 28.608961
mean_ground = 30.771933
mean_ann = 31.52463

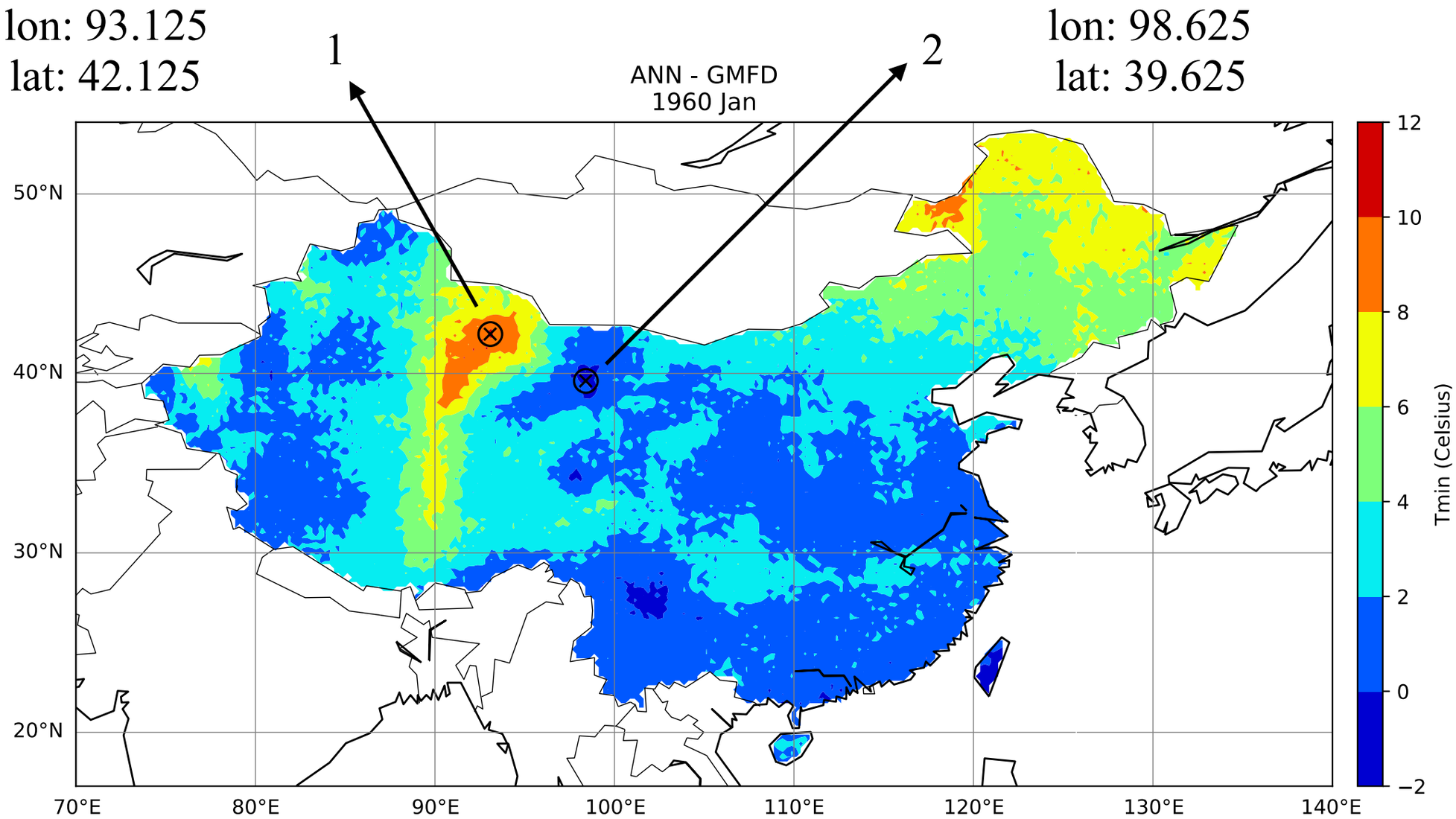
2



mean_ccsm = 25.076063
mean_ground = 24.4442
mean_ann = 23.14191

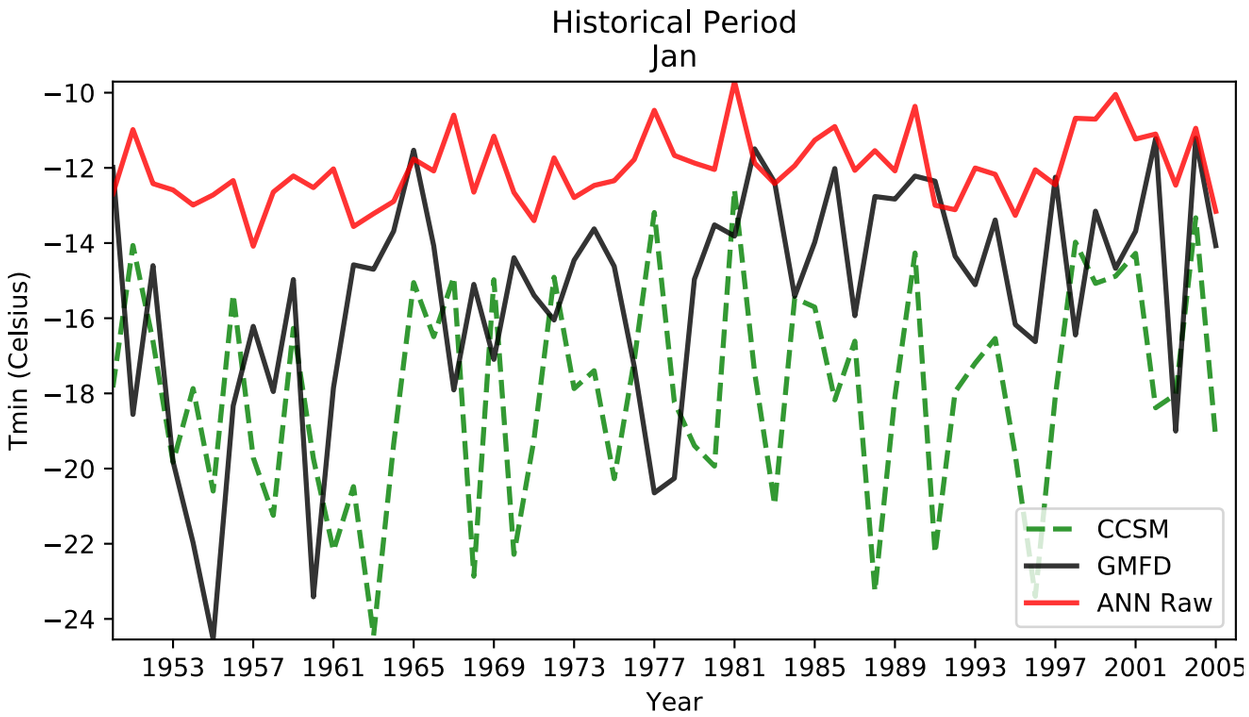
Results

Maps China Tmin



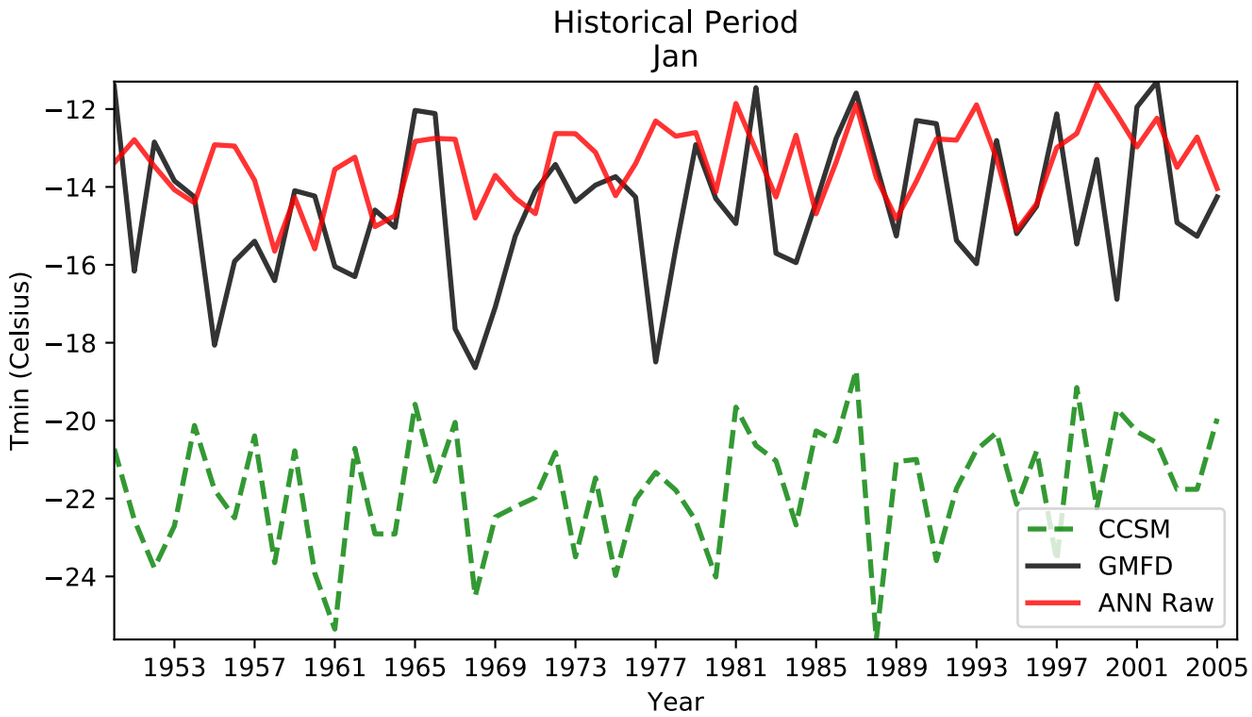
Results ts China Tmin

1



mean_ccsm = −17.936739
mean_ground = −15.36831
mean_ann = −12.033644

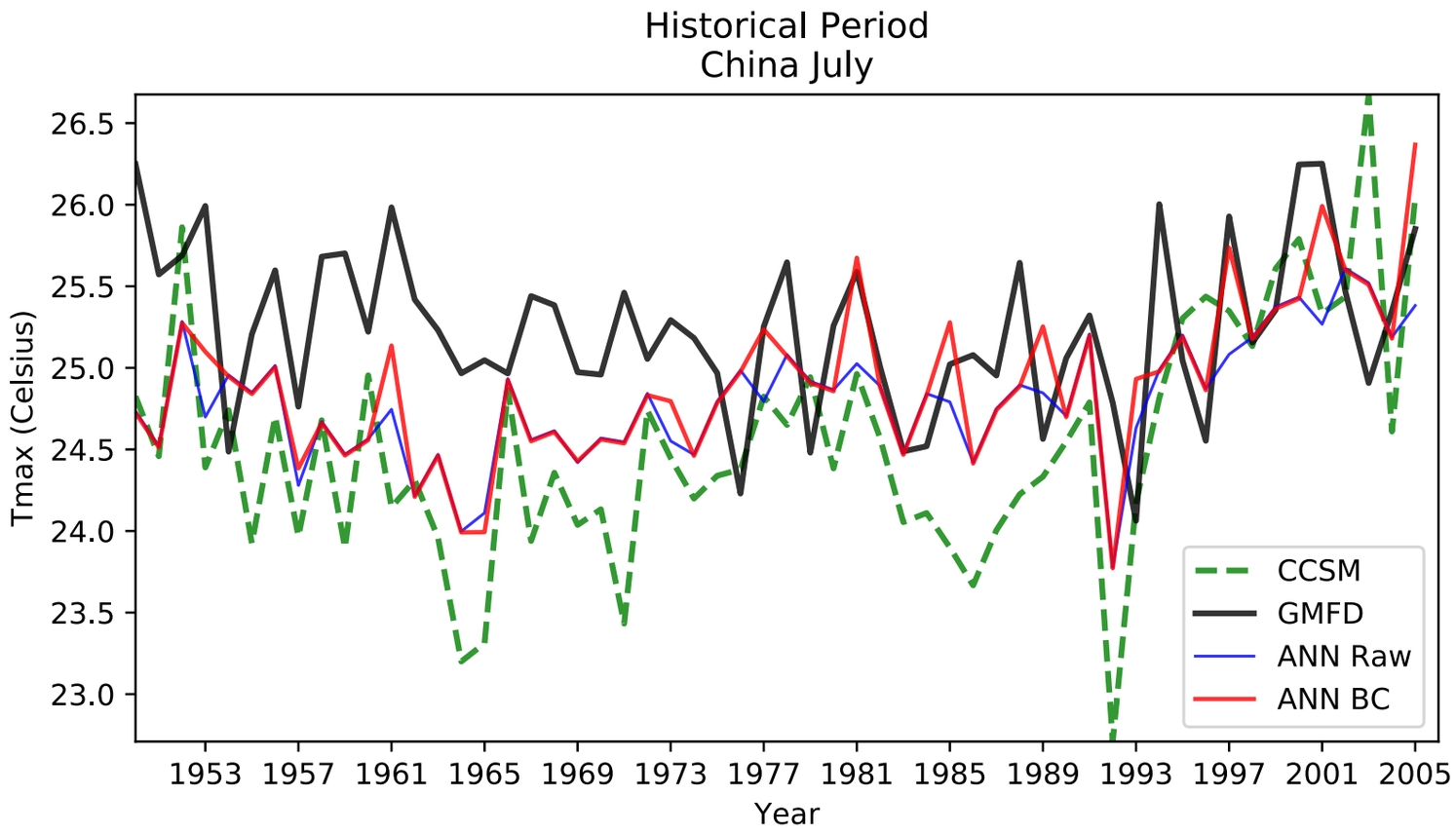
2



mean_ccsm = −21.751781
mean_ground = −14.498897
mean_ann = −13.437401

Solutions

- 针对tmin表现差的两个区域单独调参，训练ANN?



谢谢