Algorithm Developments of SST and SSW for AMSRs

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AMSR2 Tb calibration

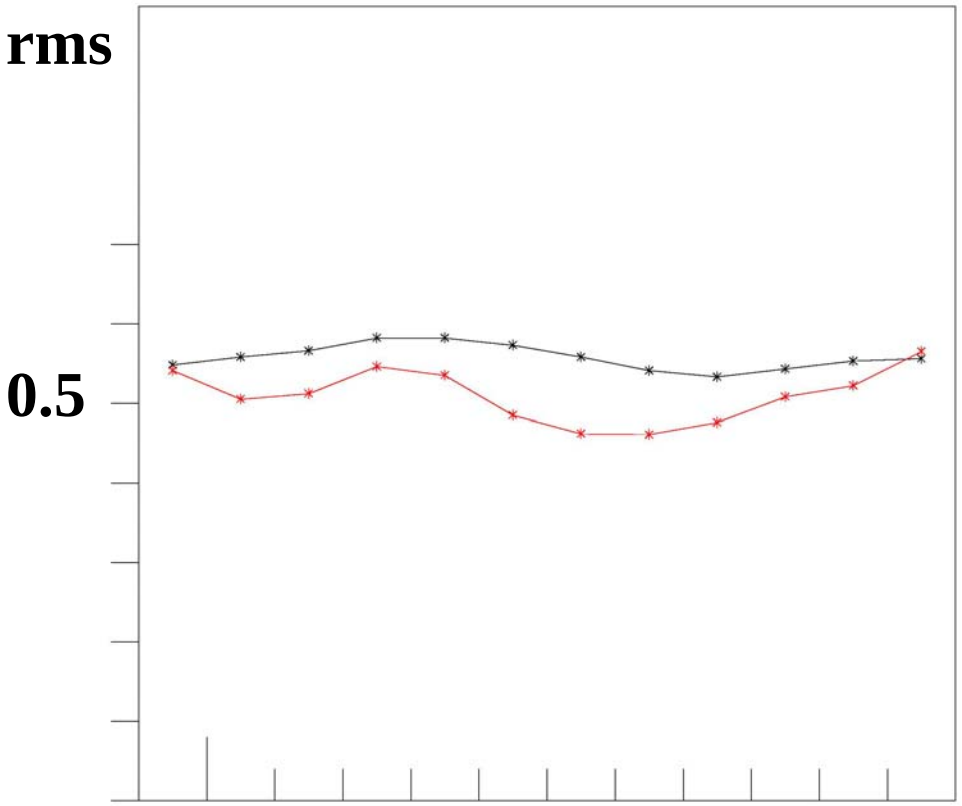
- **Remove constants from AMSR2 Tbs**

6V	**1.1K**	**36V**	**3.3K**
6H	**2.1K**	**36H**	**3.6K**

- **Correct errors along orbits and in season**

Amplitude of 6V error	**~ 0.6K**
s36	**~ 1.5K**

AMSR2 SST accuracy compared with AMSR-E
- rms of SST differences between AMSRs and buoy -



Black AMSR-E
0.56 C
Red AMSR2
0.51 C

AMSR2 6GHz calibration may become better than AMSR-E's

Tb calibration issue related with SST retrieval

- **Corrections of 6V averaged among three months (Jul.-Sep. in 2013) are larger by 0.19K than those among the same months in 2012.**
- **Those among three months (Oct. – Dec. in 2013) are larger by only 0.03K than those in 2012.**
- **Tb of 6V in 2014 may continue to increase by a small order such as 0.03K.**

Comparison of SSW Accuracies

rms of SSW difference between AMSRs and buoy

	rms	
AMSR2	**1.07 m/s**	**(1 year)**
AMSR-E	**1.01**	**(1 year)**
AMSR	**0.94**	**(7 months, mainly summer)**

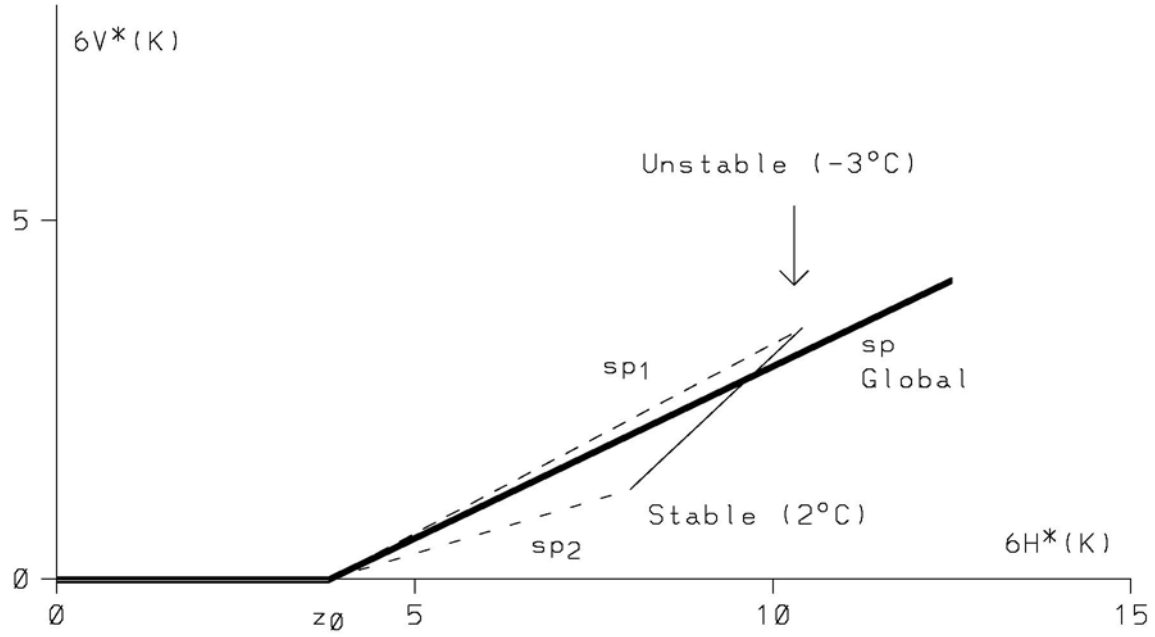
Coefficients used in AMSR/AMSR-E were determined from SeaWinds wind speed and direction

Coefficients used in AMSR2 are determined from GANAL wind speed and direction

AMSR2 SSW accuracy is slightly worse than those of AMSR or AMSR-E, indicating that correction of s36 along orbits or in season is not enough

Tb response to air-sea temp. diff.

- current algorithm -



Questions

z0 is constant to air-sea temp. diff. or SSTs ?

The slope changes with SSTs ?

Definitions of parameters

6V(H)* = AMSR_6V(H) – atmos_effect_6V(H)

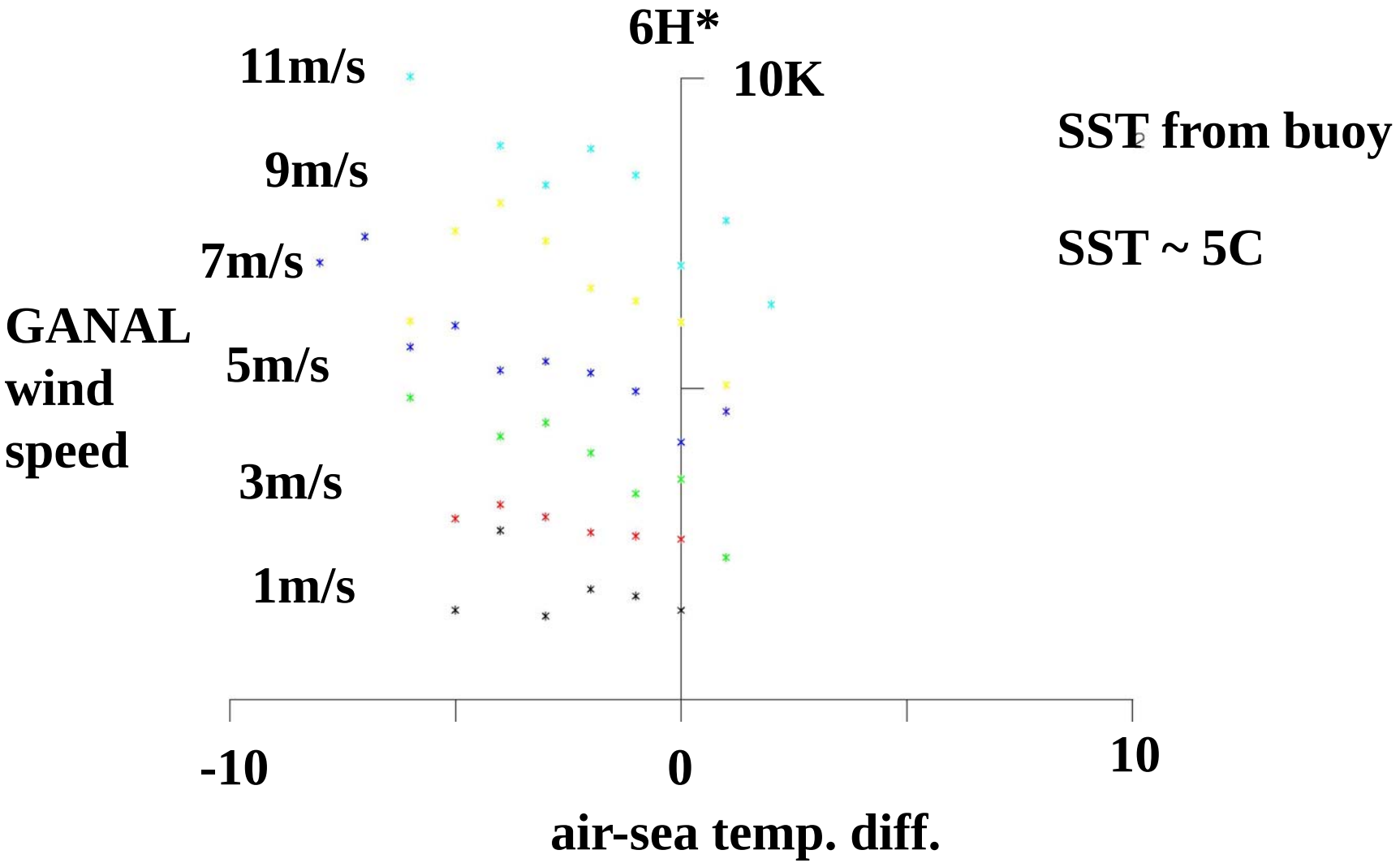
– calm_ocean_6V(H)

calm_ocean_6V(H) = SST × emissivity (SST)

SST from weekly Reynolds or MGDSST (current)

SST from buoys (validation)

6H* response to air-sea temp. diff.
- 1-year AMSR2 using GANAL air temp. -



6V* response to air-sea temp. diff.
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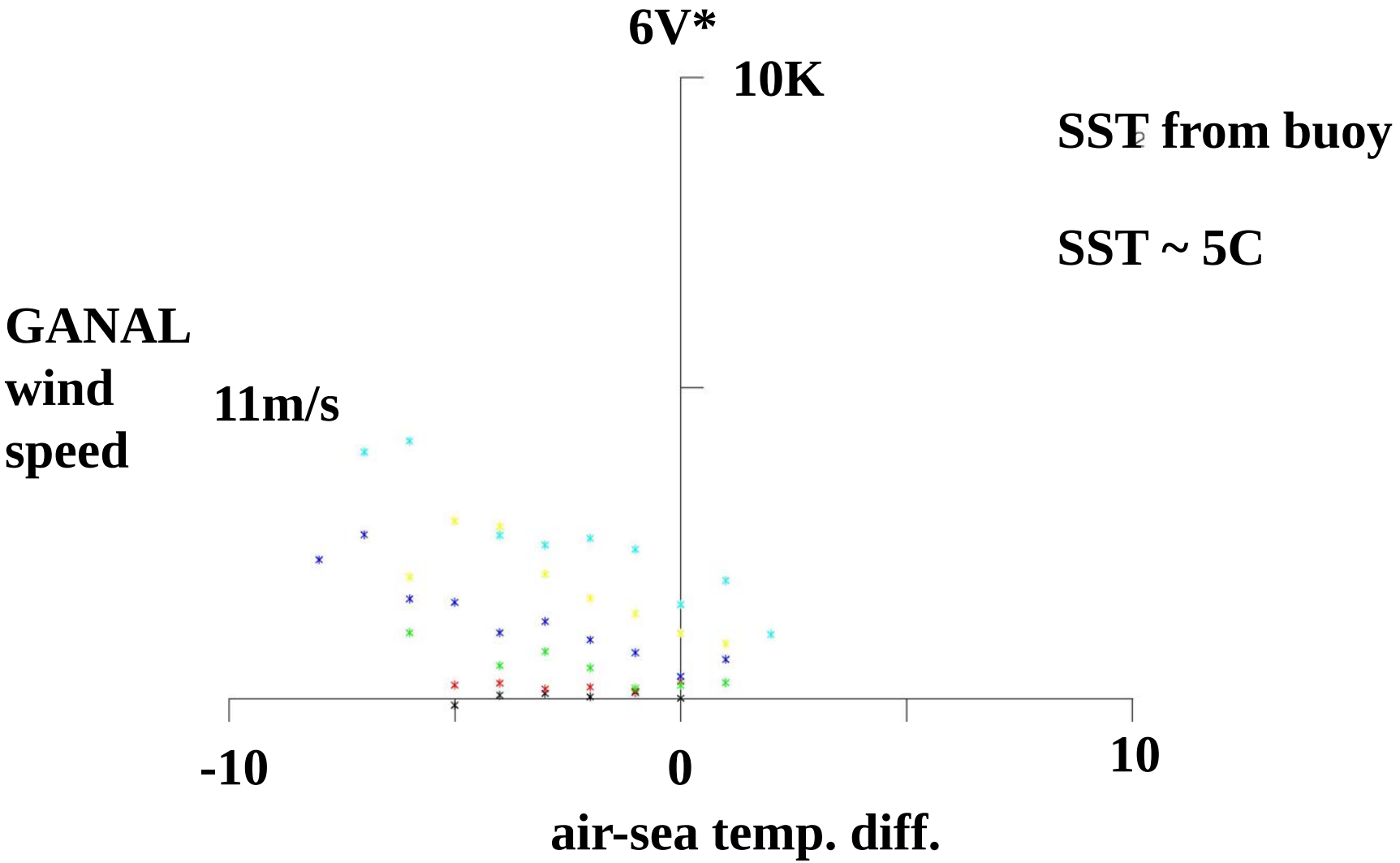
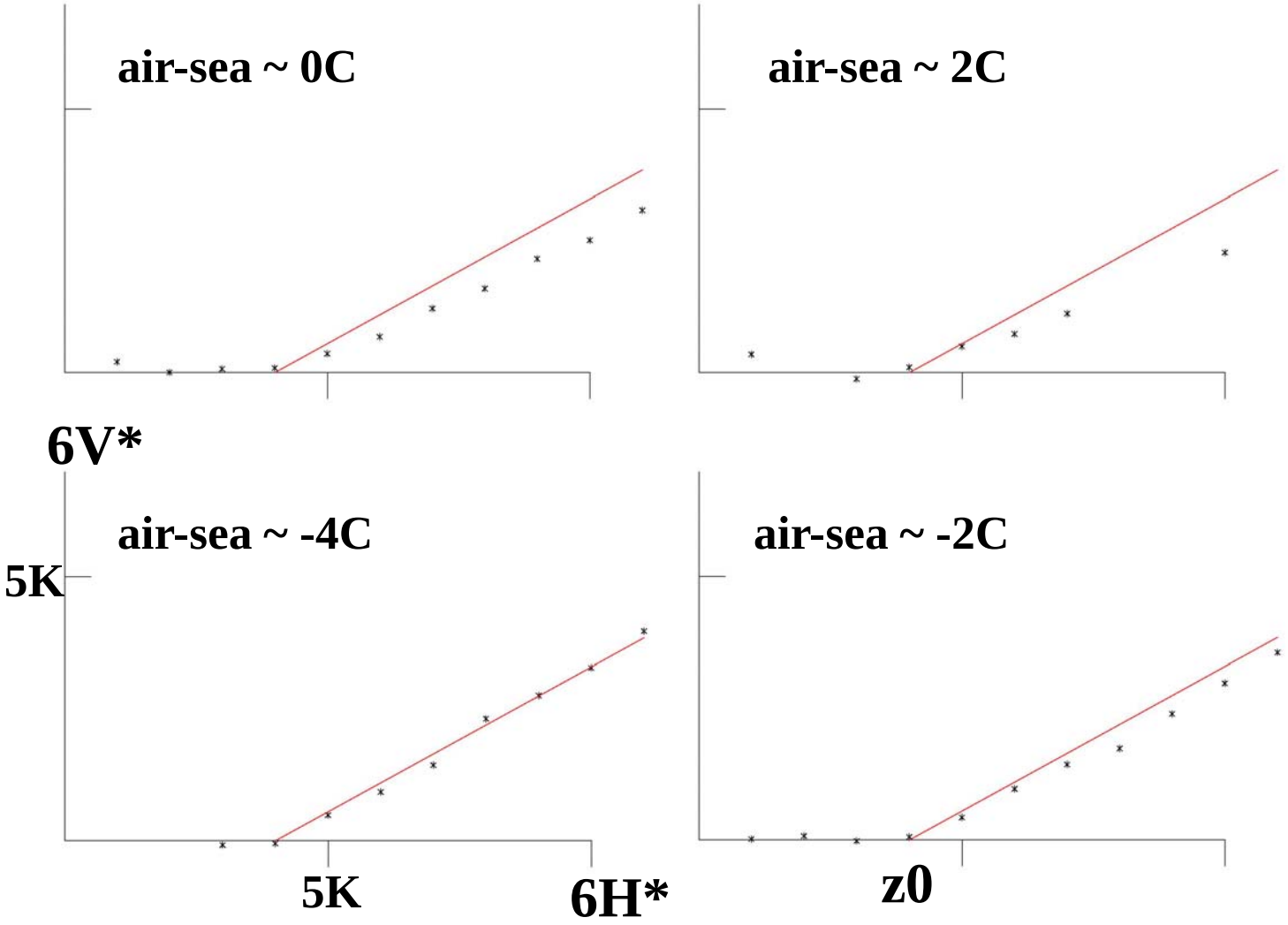


6V* / 6H* relation versus air sea temp. diff.

SST ~ 5C

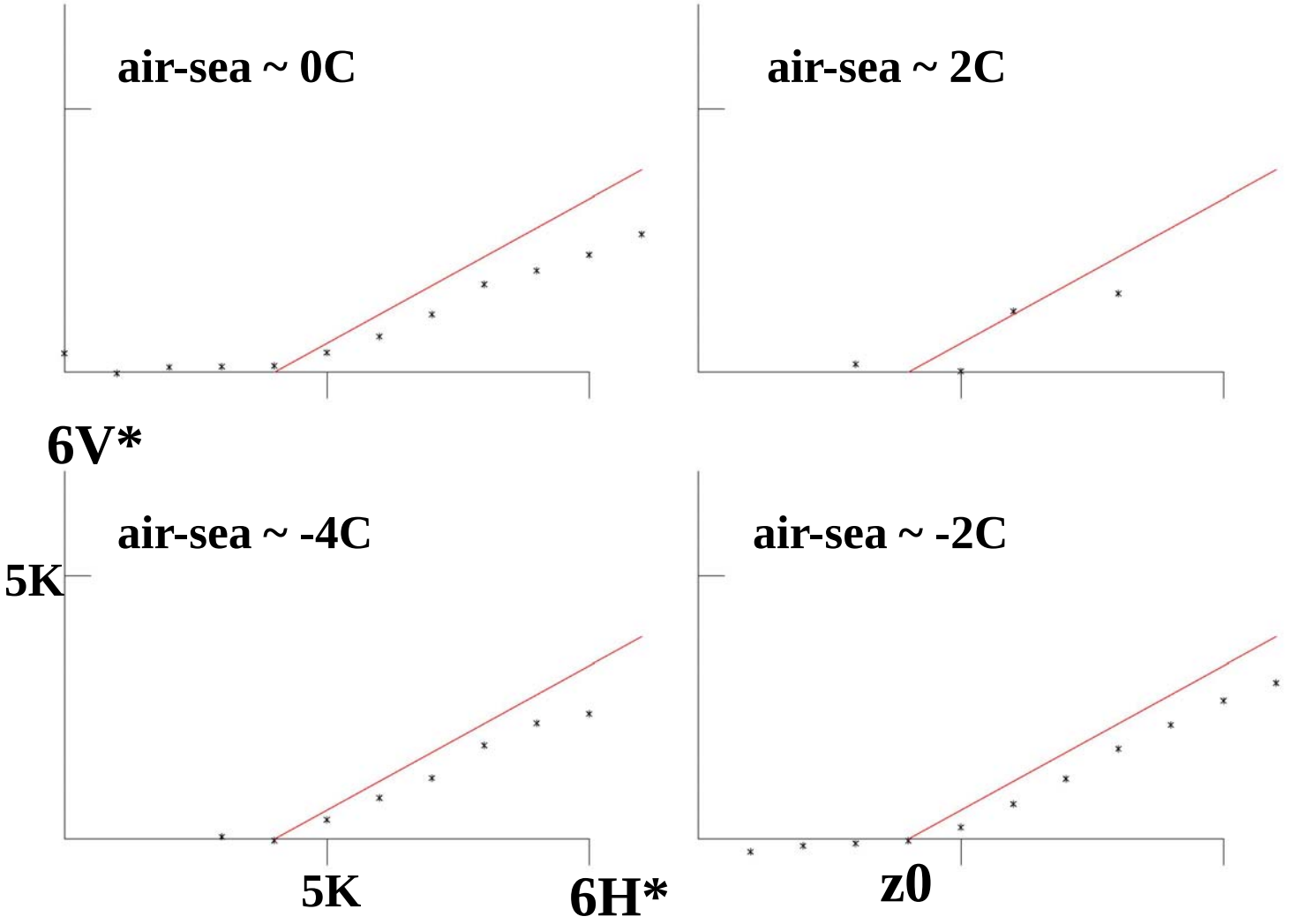


The slope decreases as air-sea temp. diff. increases, which is already adopted in the current algorithm.

z0 seems to be constant to air-sea temp. diff.

6V* / 6H* relation versus air sea temp. diff.

SST ~ 15C

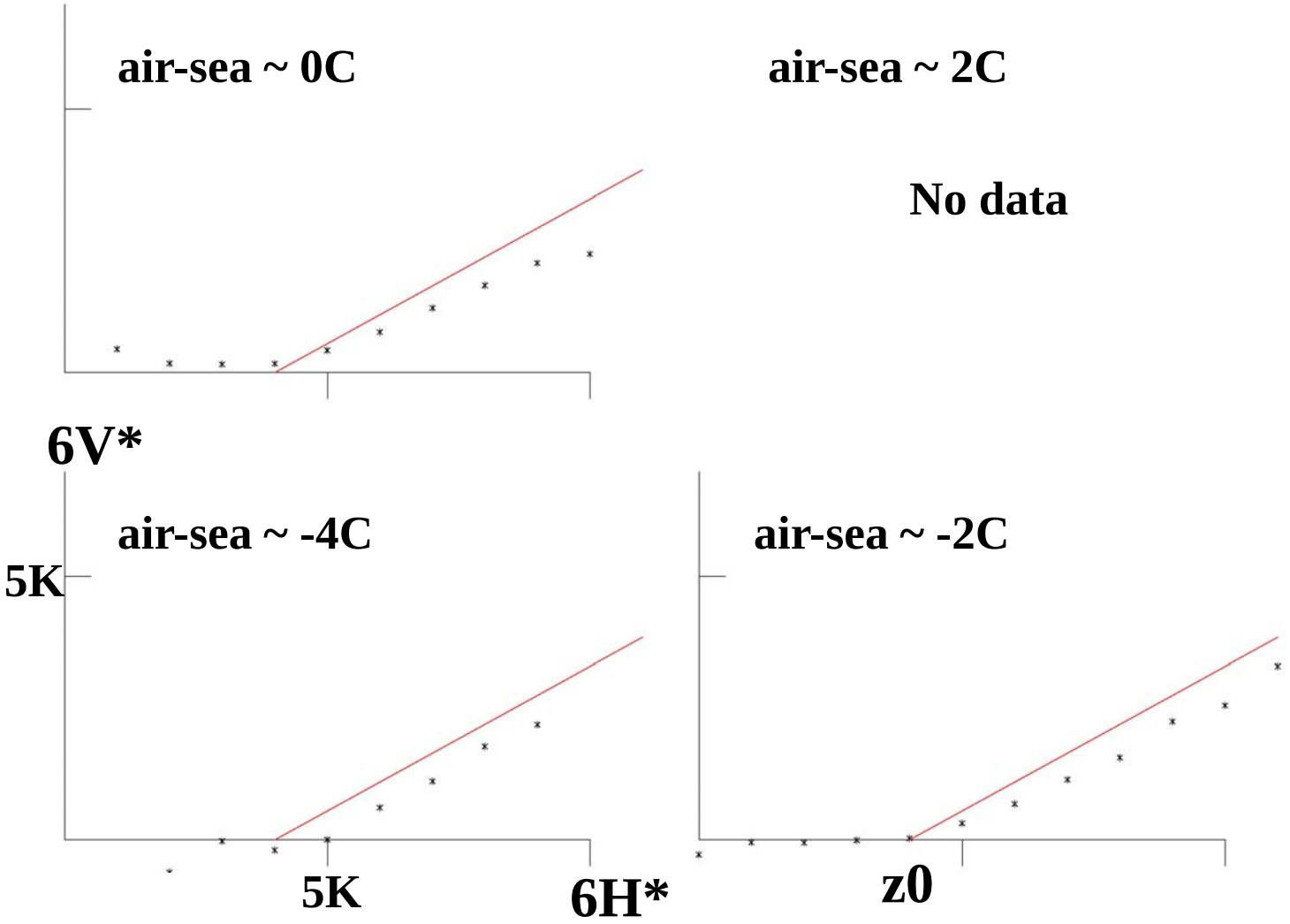


z0 seems to be constant to air-sea temp. diff.

The slope decreases from SST 5C to 15C.

6V* / 6H* relation versus air sea temp. diff.

SST ~ 25C



z0 seems to be constant to air-sea temp. diff.

The slope is the same as SST 15C.

Validation results from using buoy SST

- **z0 is constant to air-sea temp. diff. and SSTs**

- **The slope may change with SSTs**
  - **The slope of SST 5C is larger than those of SSTs 15 and 25C**
- **Above results will be adopted in next algorithm version up**

1-year summary

- **Calibration of 6V in 2013 for SST algorithm**

- **Calculation of coefficients in SSW algorithm, combining AMSR2 and GANAL wind speed and direction**

3-year summary

- **Evaluation of AMSR-E SST accuracies during 9 years**
- **Calibration of AMSR2 Tb (eg. 6V or s36)**
  - **6V contains unknown positive bias**
  - **Bias may increase by a small order (0.03K/year)**
  - **Calibration of s36 is not finished**
- **AMS2 SSW algorithm did not work well, only removing positive Tb bias and applying AMSR/AMSR-E coefficients. AMSR2 SSW coefficients are newly calculated using GANAL wind speed and direction.**

Appendix

Candidate for research product
- All weather wind speed -

Purpose	**wind speed inside typhoon and hurricane**
Method	**combination of 6H and 10H**
Validation	**best truck (US National Hurricane Center)**
Accuracy	**rms 6.8m/s**
Range	**0-75m/s**
Implementation	**ready for operation at EORC**