スプリットウィンドウデータを用いた
大陸規模での可降水量の推定

久慈　誠

Theme

Retrieval of Precipitable Water in a Continental Scale using Split-Window Data

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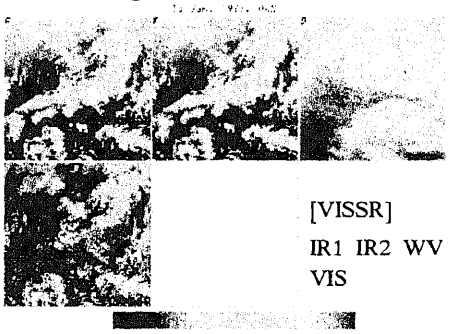
Objectives

- Algorithm Development
  - Retrieval of Precipitable Water (PW);
  - at Clear Sky Condition in a Continental Scale;
  - Split-Window Channels (VISSR and AVHRR); $\frac{\tau_{12}}{\tau_{11}}$
  - By-product: [Effective] Surface Temperature (EST);
- Comparison / Validation
  - Regional Scale (with *in situ* Observation);
  - Continental Scale (with Objective Analysis Data);

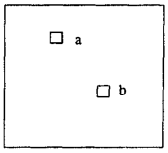
GMS-5 image (00UTC, Jan. 13, 1997)



[VISSR]
IR1 IR2 WV
VIS

Outline of Retrieval Algorithm

Unit (32 * 32 pixels)



(0) Principle

- **Transmittance Ratio:** $\frac{\tau_{12}}{\tau_{11}}$;

(1) Clear Pixels (HCPs)

- **Split Window Difference Ratio (SWDR):**

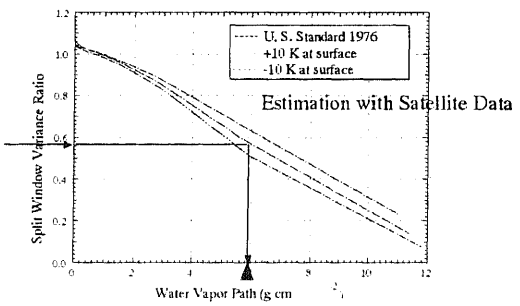
$$SWDR = \frac{T_{bb12,a} - T_{bb12,b}}{T_{bb11,a} - T_{bb11,b}}$$

(2) Calibration

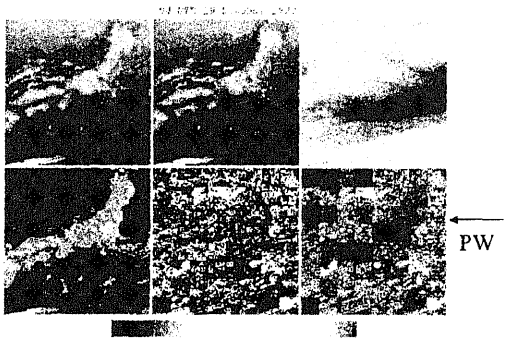
- **Split Window Variance Ratio (SWVR):**

$$SWVR = \left(\frac{\tau_{12}}{\tau_{11}}\right)^2$$

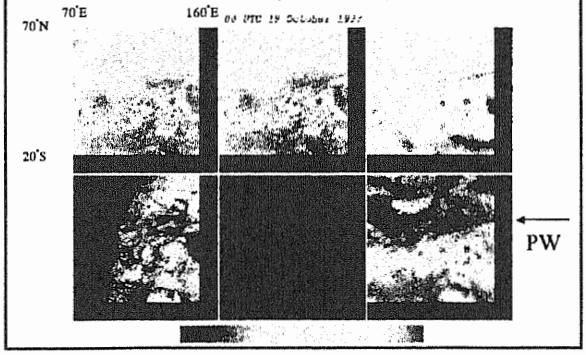
Calibration SWVR and WVP (Simulation for VISSR)



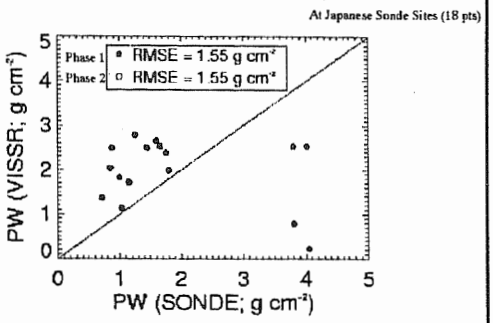
Retrieved Result (00 UTC, Oct. 19, 1997)



Retrieved Result (Wide Area)



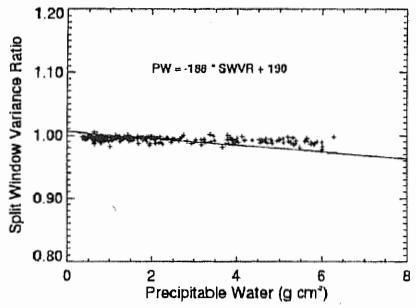
Validation (00 UTC, Oct. 19, 1997)



Summary

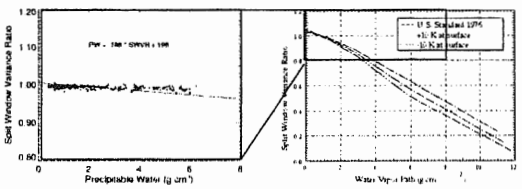
- Precipitable Water Retrieval
  - Algorithm Development
    - Split-Window Channels (VISSR);
    - By-product: [Effective] Surface Temperature (EST)
  - Comparison / Validation
    - Not Good Results in Both PW and EST (1.5° Scale);
      - . PW: 1.55 g cm^{-2} (with Radio Sonde around Japan);
      - . EST: 2 K (with AMeDAS in Shionomisaki, Japan);

Calibration (Shionomisaki during 1997)



Comparison of Calibration Curves

(1) Analysis (2) Simulation



Future Works

- Algorithm Refinement is required;
  - Improvement of Cloud Detection Scheme;
  - Comparison with Inland Region (China, Mongolia, etc.);
  - Comparison with Difference Method (T_{11}-T_{12});
  - Analysis of AVHRR Split-Window Data (Match-up);
  - Utility of WV Channels (VISSR);
- Validation
  - Continental Scale (with Objective Analysis Data);