

GLI Workshop at EORC, Tokyo

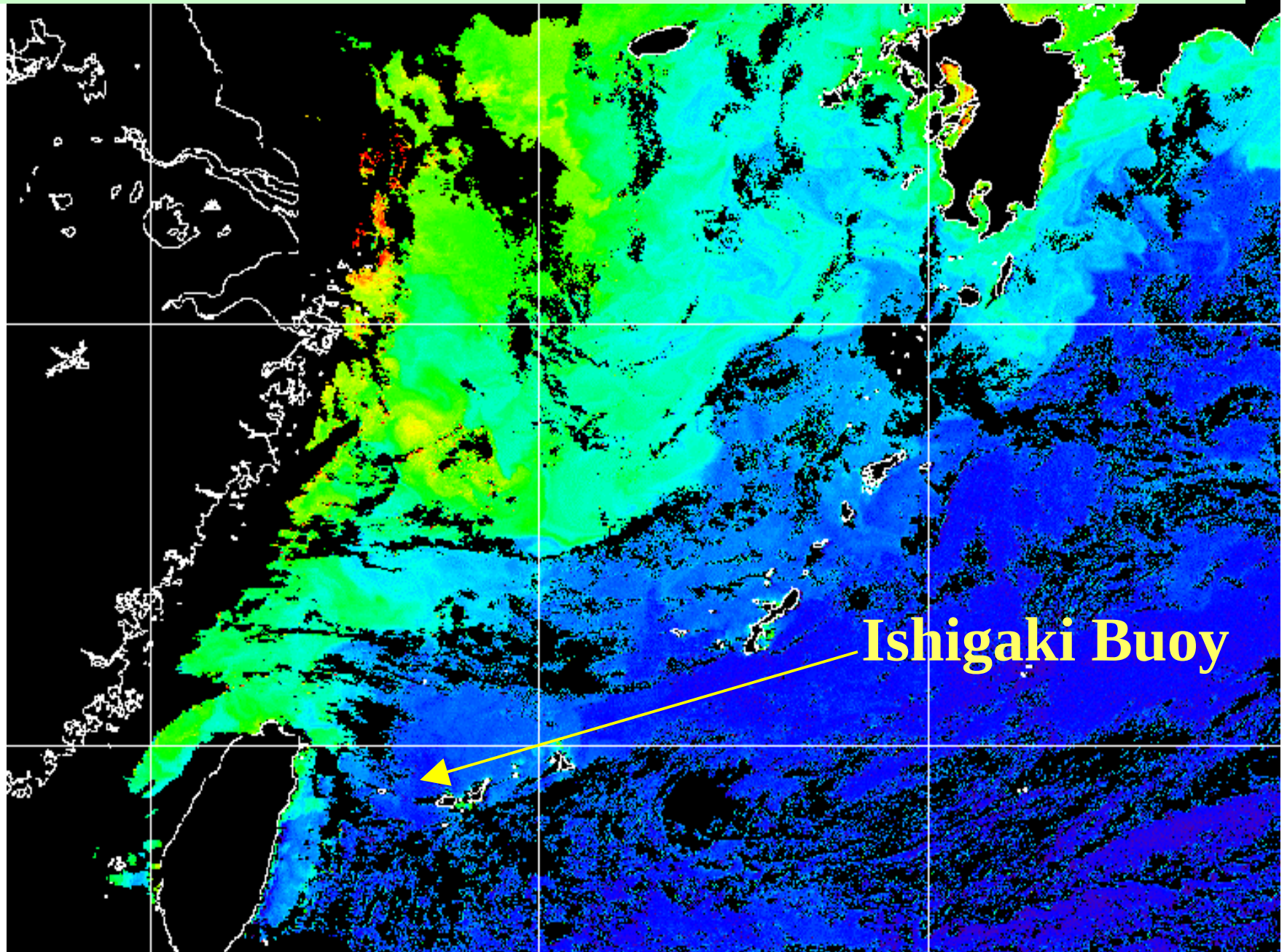
November 14 to 16, 2001

Vicarious Calibration

5th Group of Calibration WG

Ichio ASANUMA

Field Campaign & Vicarious Calibration



Mooring buoy operated by
Communication Research Laboratory
off the Ishigaki Island.

Location (24.5N,123.5E)

Diameter : 9 m

Hight : 10 m

Gross tons : 100 tons

Deployment : March 2001

Plan : 5 years mooring

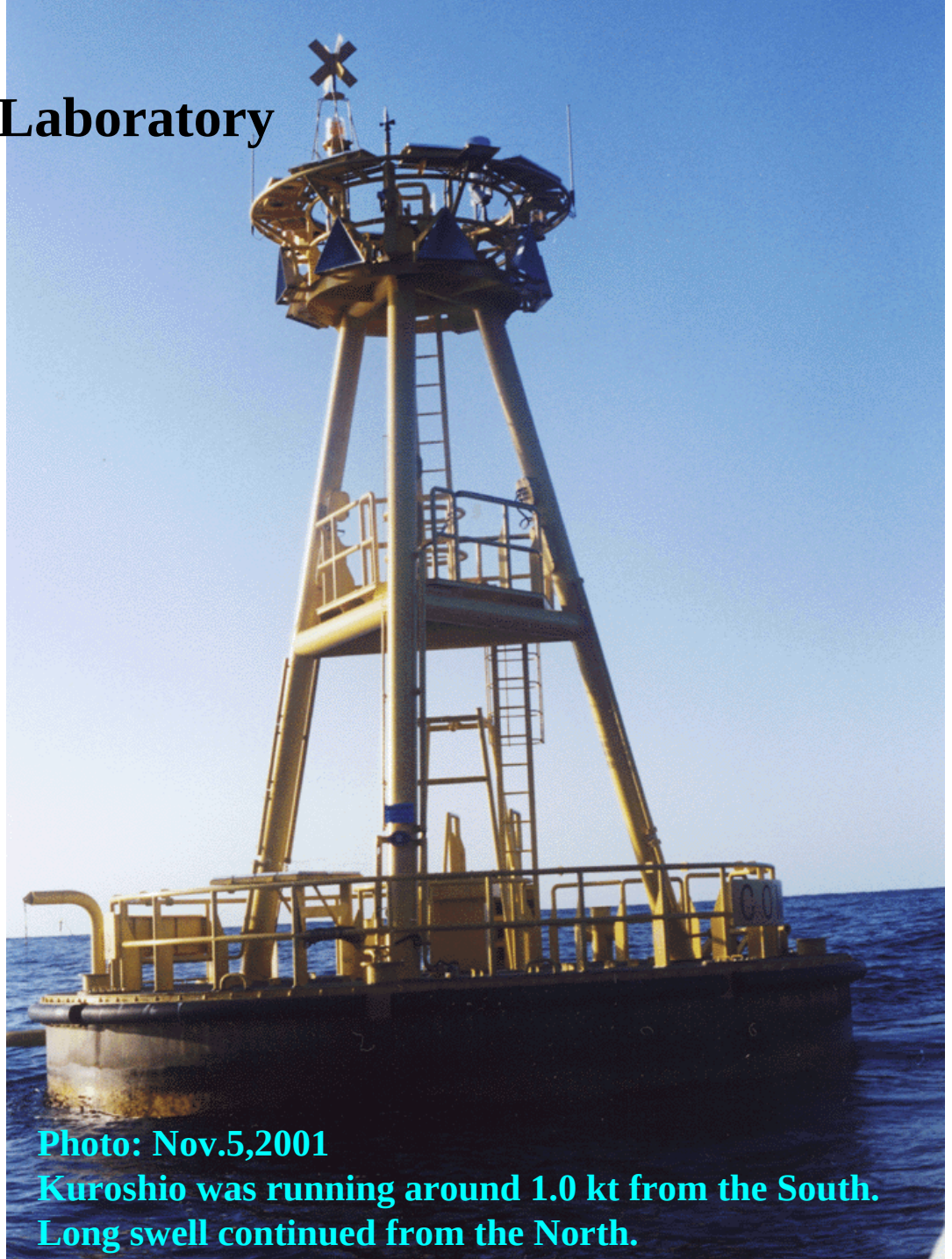
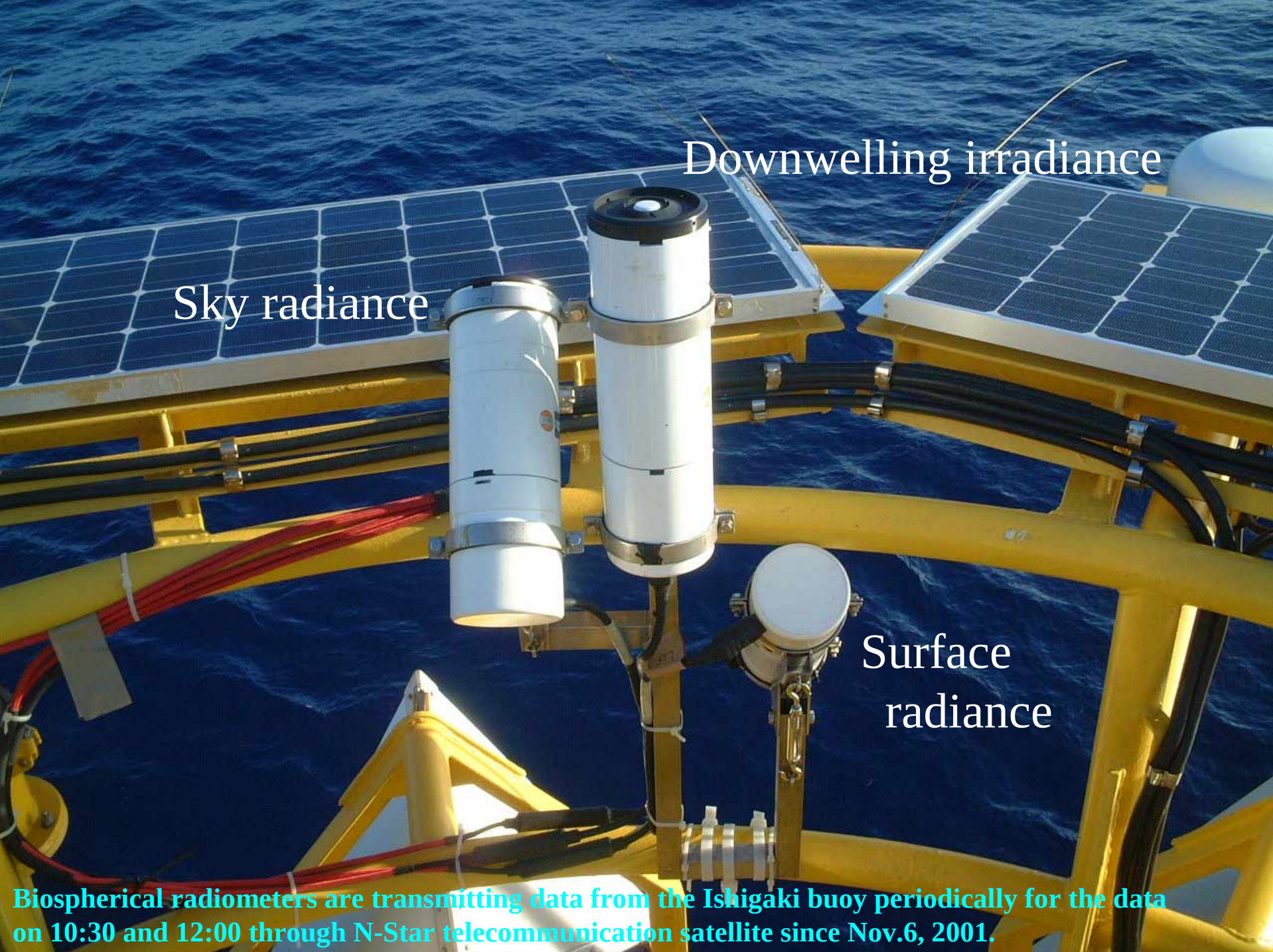


Photo: Nov.5,2001

**Kuroshio was running around 1.0 kt from the South.
Long swell continued from the North.**



Sky radiance

Downwelling irradiance

Surface
radiance

Biospherical radiometers are transmitting data from the Ishigaki buoy periodically for the data on 10:30 and 12:00 through N-Star telecommunication satellite since Nov.6, 2001.

Vicarious Calibration for GLI

- GLI L1b calibration equation:

$$L_t(\lambda) = (C_{out}(\lambda) - C_{dark}(\lambda)) K(g, d, \lambda) \alpha(\lambda) [\beta(\lambda) + \gamma(\lambda)(t - t_0) + \delta(\lambda)(t - t_0)^2]$$

L_t is the calibrated radiance at sensor,

C_{out} is the counts from sensor,

C_{dark} is the median value of dark count from sensor,

K is the counts to radiance conversion factor (calibration coefficient),

g is the gain,

d is the detector,

α is the vicarious gain,

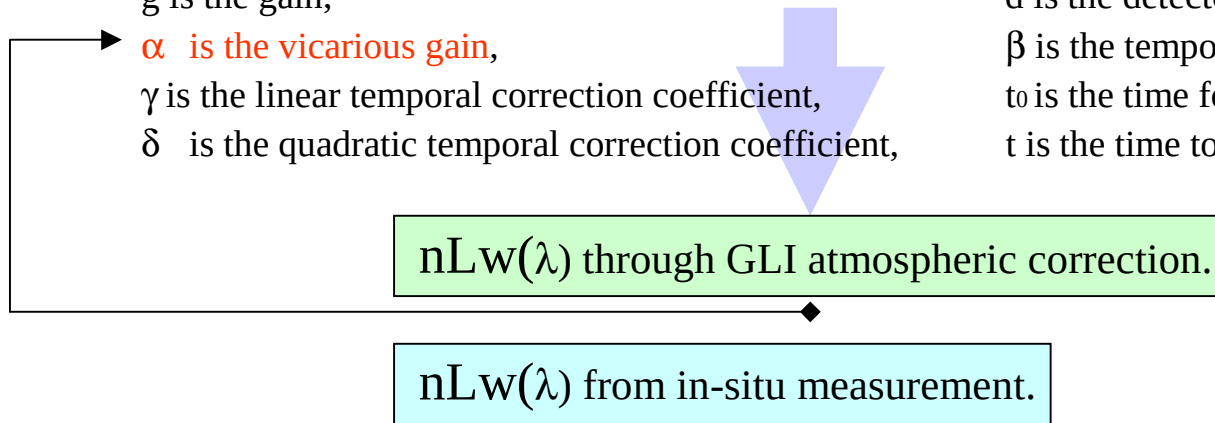
β is the temporal correction coefficient,

γ is the linear temporal correction coefficient,

t_0 is the time for the initial state,

δ is the quadratic temporal correction coefficient,

t is the time to be calibrated.



Approach 1:

$$nLw(\lambda) = Lw(\lambda, \theta_0) F_0(\lambda) / E_d(\lambda, \theta_0)$$

Approach 2:

$$nLw(\lambda) = Lw(\lambda, \theta_0) / \{ \cos(\theta_0) t(\lambda, \theta_0) \}$$

$$t(\lambda, \theta_0) = \exp[-\{0.5\tau_r(\lambda) + \tau_{oz}(\lambda) + \tau_a(\lambda)\} / \cos(\theta_0)]$$

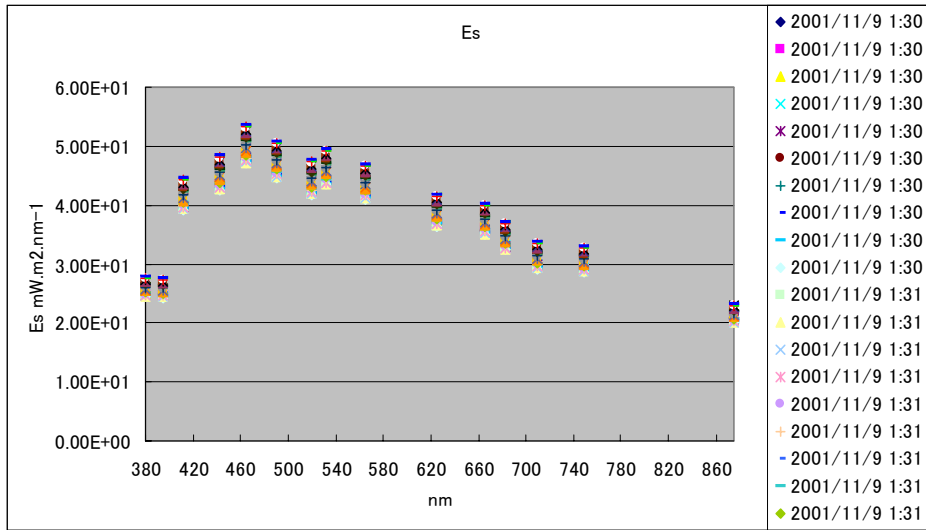
τ_r is the computed Rayleigh optical thickness

τ_{oz} is the ozone optical thickness

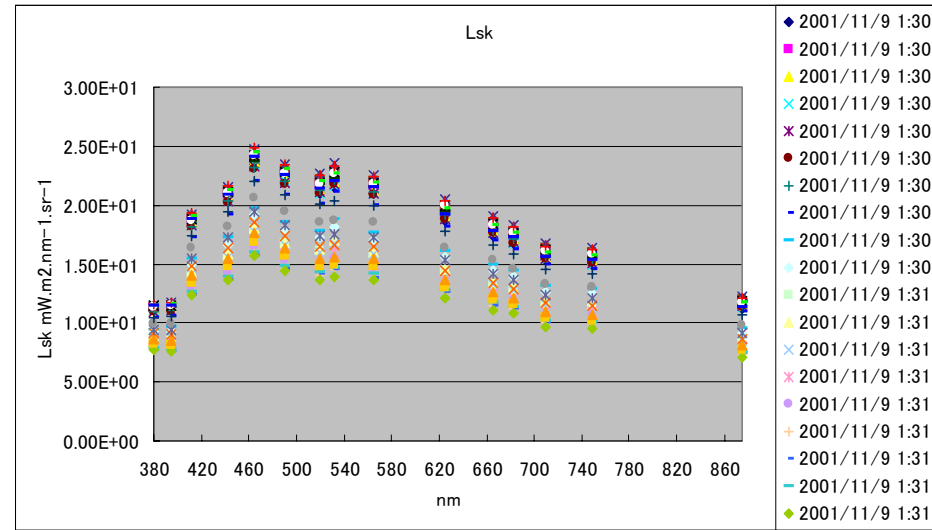
τ_a is the aerosol optical thickness, model or observation.

- In-situ measurement : $Lw(\lambda, \theta_0), E_d(\lambda, \theta_0)$

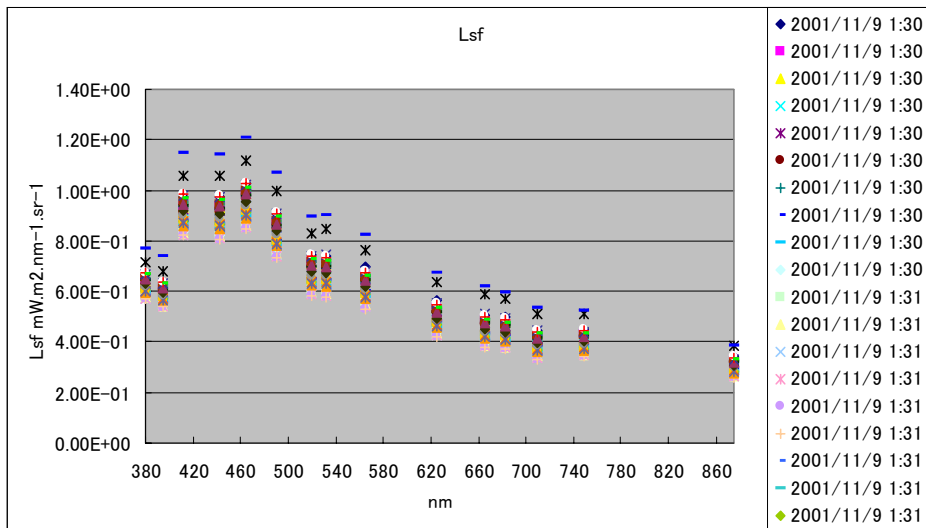
Data transmitted from Ishigaki buoy on Nov.9, 2001 (01:30Z)



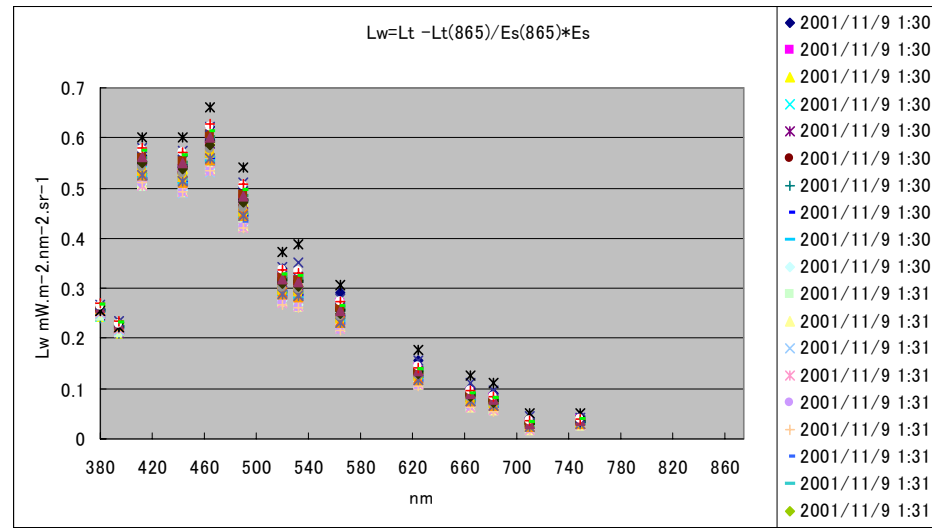
Downwelling Irradiance



Sky radiance



Surface radiance



Estimated water leaving radiance

Vicarious calibration for high radiance region

- Land region
 - Sand region (request to Land group!?)
- Snow and ice region
 - Antarctica, Hokkaido region (request to Cryosphere group!?)
- Cloud
 - No plan.
- Measurements :
 1. upwelling radiance
 2. downwelling irradiance,
 3. aerosol optical thickness

(We need supports from Atmosphere group.)

→ Please discuss a possibility in the group discussion.