

고분해능 위성 관측 데이터에 대한 인접 효과의 해석 및 정밀
대기 보정법에 관한 연구
**Adjacent Effect in the Coastal Zone to Investigate Atmosphere
and Surface Environment**

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<Abstract>

인접 효과는, SWIR 데이터 상에 혼선 현상이 명백히 나타나지만, 본토와 반도의 해안지역에서 ASTER 센서의 VNIR과 SWIR 데이터를 이용해서 논의된다. 이 분석의 목적은 정교한 스케일에서 대기과 해양 환경의 광 특성을 이끌어 내기 위해서이다. 에어로졸 모델은 dust-like model을 따른다. Terra 위성의 ASTER와 MISR은 이 모델을 적용한다. 데이터는 2000년 7월 10일 GMT1.55, 나고야 근처의 Atsumi 반도 (34°40'N, 134°00'E) 에서 얻었다. VNIR 공간 분해능은 15m, SWIR은 30m이다.

1. Introduction

When satellite observe land surface or ocean in the visible and near infrared regions of spectrum, the effect of atmosphere over these areas affect attenuation and scattering processes. Therefore, to evaluate surface characteristics quantitatively, radiative transfer between atmosphere and surface (ocean) should properly be evaluated. However, there is a method to neglect this atmospheric effect or using approximate model.

Recently there is a definite trend to improve satellite borne sensor to finer spatial resolution

or multiple channels to evaluate finer information with respect surface or ocean.

Main purpose of Ariran 2 to be launched on March, 2006 is to derive finer map of land areas. It carries sensors of panchromatic 1m resolution and three monochromatic 4m spatial resolutions.

When we scan data from land surface to ocean, the reflected radiation by land contaminates the radiation from ocean. This is called to adjacent effect of radiation. The adjacent effect of radiation depends upon the condition of reflectance difference between land

and ocean as well as atmospheric condition together with wavelength of measurements.

The adjacency effect was discussed at coastal areas of main land and peninsula using VNIR and SWIR on ASTER sensor, although the cross-talk phenomenon is apparently noted on some SWIR. It was 15m spatial resolution for VNIR and 30m for SWIR. The purpose of the analysis is to derive optical characteristics of atmospheric aerosol. The aerosol model is in accordance to the dust-like model. This model is adopted to ASTER and MISR on Terra satellite. Data is the Atsumi Peninsula near Nagoya (34°40' N, 134°00' E), GMT1.55 on July 10,2000.

To scan coastal zone, peninsula in different dimensions or isolated island, surface would be composed of vegetation and soil, whereas in the atmosphere, aerosols of different characteristics and cloud formation would exist. Once feasibility study is promising, we should spend our effort to ground truth.

2.Main Results of ASTER data analysis

The followings are main results of ASTER VNIR & SWIR data analysis.

	channel	wav(μm)	JapanMainland	peninsula(N,S)
VNIR	1	0.56	2.6km	180/200m
	2	0.66	2.6	135/200
	3	0.81	2.5	135/200
SWIR	4	1.65	3.27	330/330
	5	2.165	3.57	6.96/8.19km
	9	2.395	3.54	360m/1.86km

SWIR	6	2.205	2.7	270/450
	7	2.26	2.6	180/210
	8	2.33	2.3	180/270

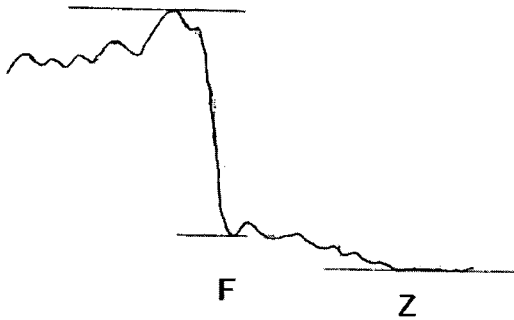
Table. Adjacent Effect and Cross Talk of Land Surface on Coastal Water Atsumi Peninsula near Nagoya (34°40'N, 134°00'E), GMT1.55 on July 10, 2000

Note that the distance between the Japan main land and the peninsula is 11.22km (374 pixels) and the peninsula width is 4.2km(140 pixels). It shows the distance between the coastal zone and the point of the level asymptotically converged on the ocean.

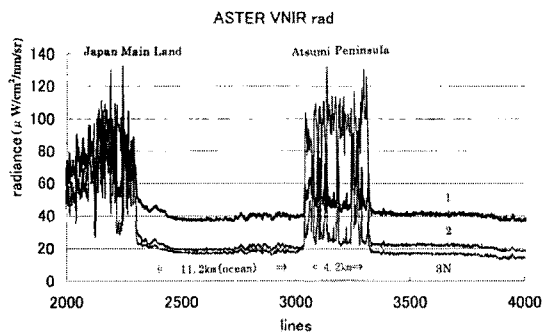
- (1) The Japan Main land indicates 6~20 times more effect than the peninsula on adjacent radiance from ocean water due to contribution of land area. It is large off the main land, whereas it is small off peninsula.
- (2) The effect is asymmetry at the peninsula (N,S). The south side indicates stronger effect than the north side. This might be due to surface characteristics.
- (3) Adjacent effect is similar to all channels 1,2& 3N on VNIR. VNIR < SWIR.
- (4) SWIR & VNIR indicates similar adjacent effect. This might be due to aerosol of large particles in the atmosphere.

(5) SWIR channel 5 indicates cross talk when crosses peninsula, but it is asymmetry.

(6) SWIR channel 9 indicates cross talk at the south crossing. Why it does not at the north crossing?



<그림1> 沿岸域의 복사전달의 概略圖

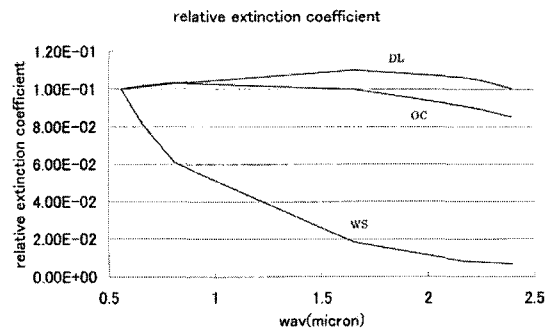


<그림 2> VNIR data of ASTER along the Japan main land and Atsumi peninsula

(7) SWIR 4,5 & 9 indicate strong effect on radiance from the ocean. Average adjacent effect over chs. 6,7 & 8 is 2.53km, whereas it is 3.46km (37% up) over chs. 4,5 & 9.

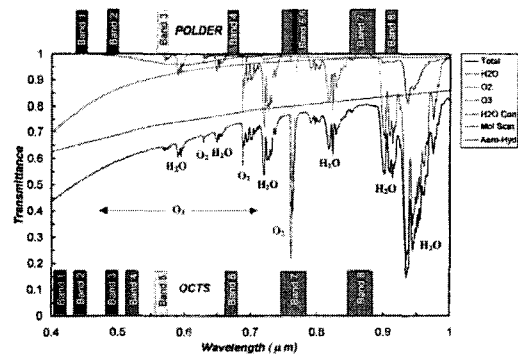
(8) Adjacent effect of ch.5 on SWIR off Peninsula is unusually strong. It is 6.96km(N) & 8.19km(S).

(9) Adjacent effect of ch.9 on SWIR off Peninsula is asymmetry. It is 360m on north side, whereas it is 1.86km on south side.



<그림3> 에어로졸 모델

DL : 塵粒子、OC : 海洋性、WS : 水溶性에
어로졸



<그림 4> Molecular optical thickness