

가시화 및 판독

Visualization / Interpretation

투영 및 좌표



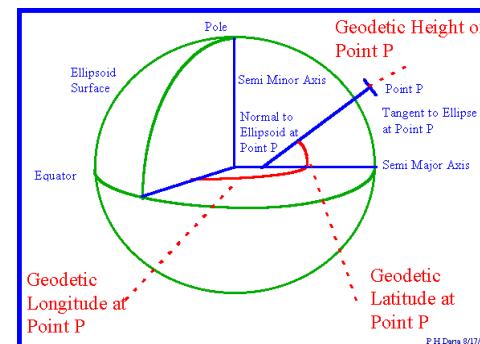
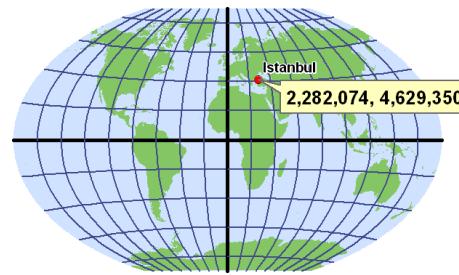
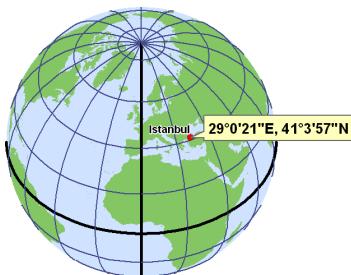
회전 타원체 지구 모델 사용

- 실제 지구 형태는 매우 복잡하여 사용하기 어려움
- 나라별로, 기관(회사)마다 여러 회전 타원체가 정의되어 있음



위·경도 값으로 위치 정의

- 위도(latitude): 적도의 북쪽 또는 남쪽의 각
- 경도(longitude): 본초 자오선의 동쪽E 또는 서쪽W의 각도 (도 분 초)
- 본초 자오선 (진북(자전축), 진남, 영국의 그리니치 천문대를 지나는 자오선)
- 자오선: 지구 자전축의 북극과 남극을 지나는 선

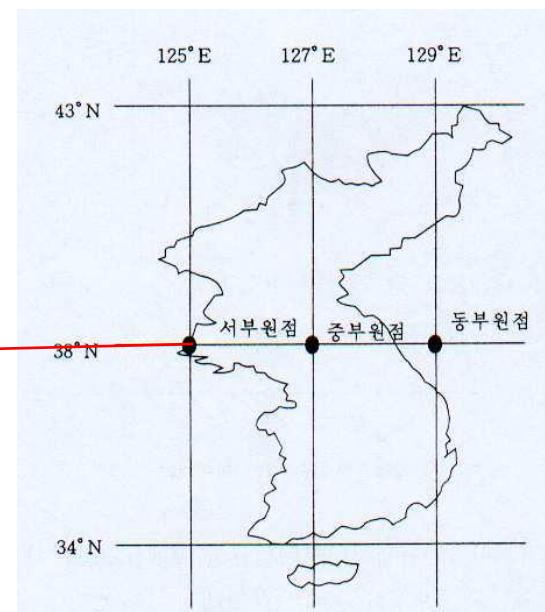
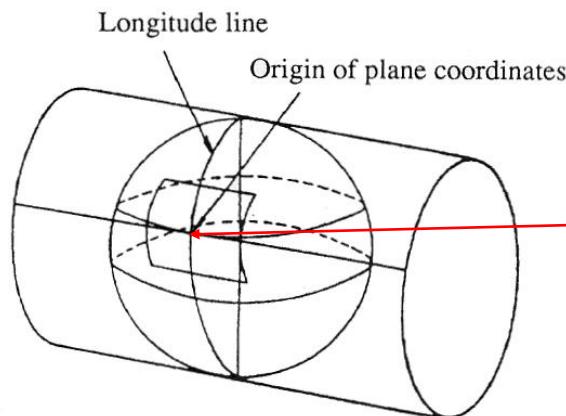


투영 및 좌표



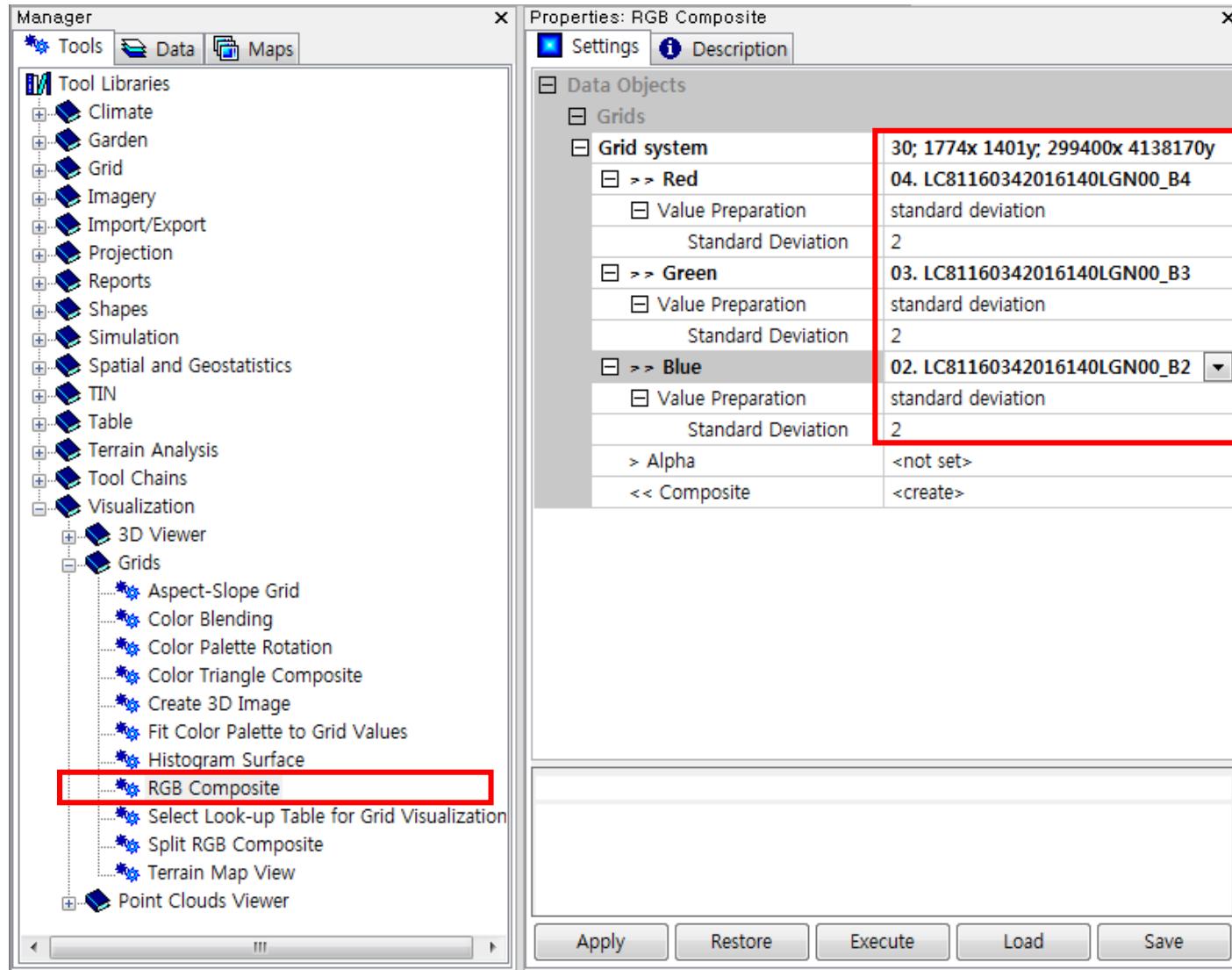
우리 나라 좌표계

- 세 개의 원점과 2개의 보조 원점으로 구성
- TM (횡단 메르카토르) 좌표계를 기본 도법(투영법)으로 사용
- 원점: X-Y 축으로 이루어지는 평면 좌표계의 원점



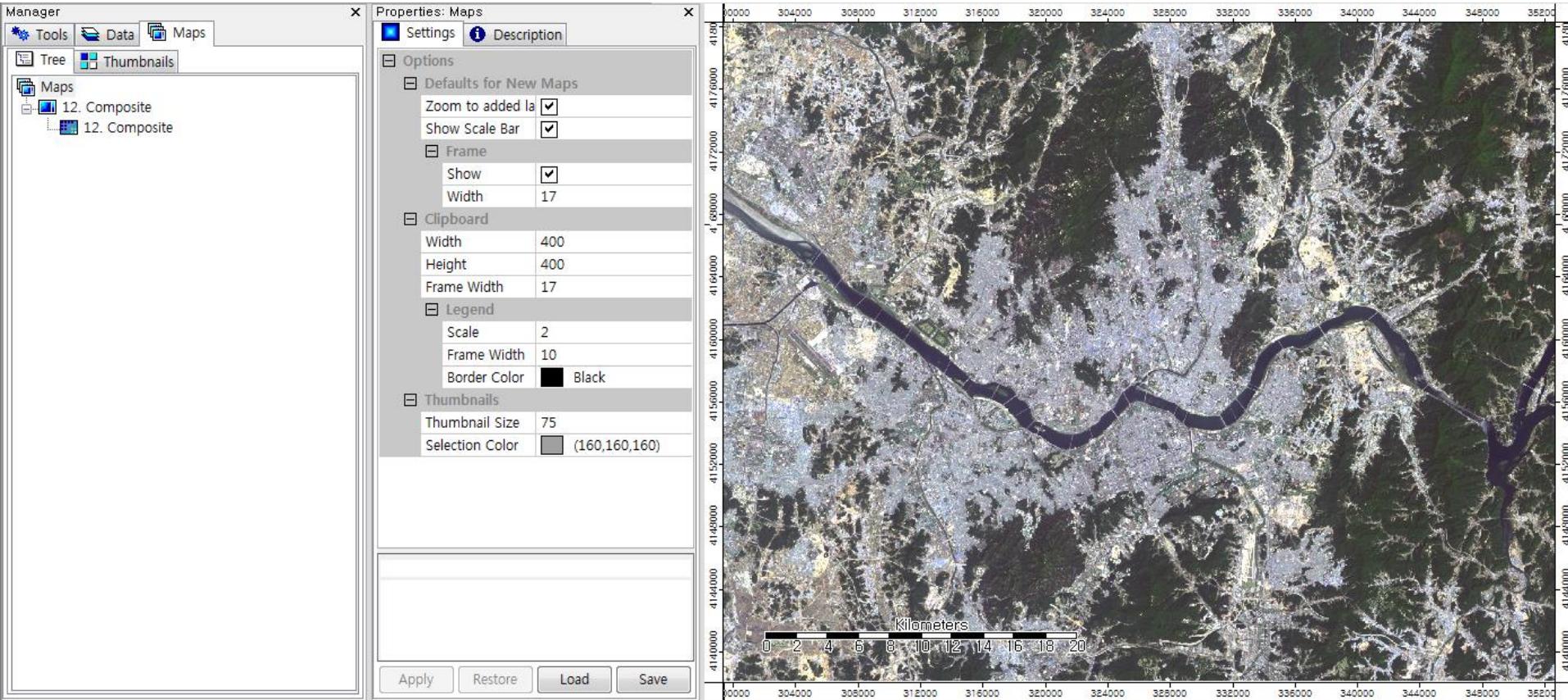
Introduction to SAGA

❖ RGB 혼합 영상 시각화 (Tools -> Visualization-> Grids -> RGB Composite)



Introduction to SAGA

❖ RGB 혼합 영상 시각화 (Tools -> Visualization-> Grids -> RGB Composite)



Landsat 8 각 밴드 별 정보 (뒷장 더 자세히)

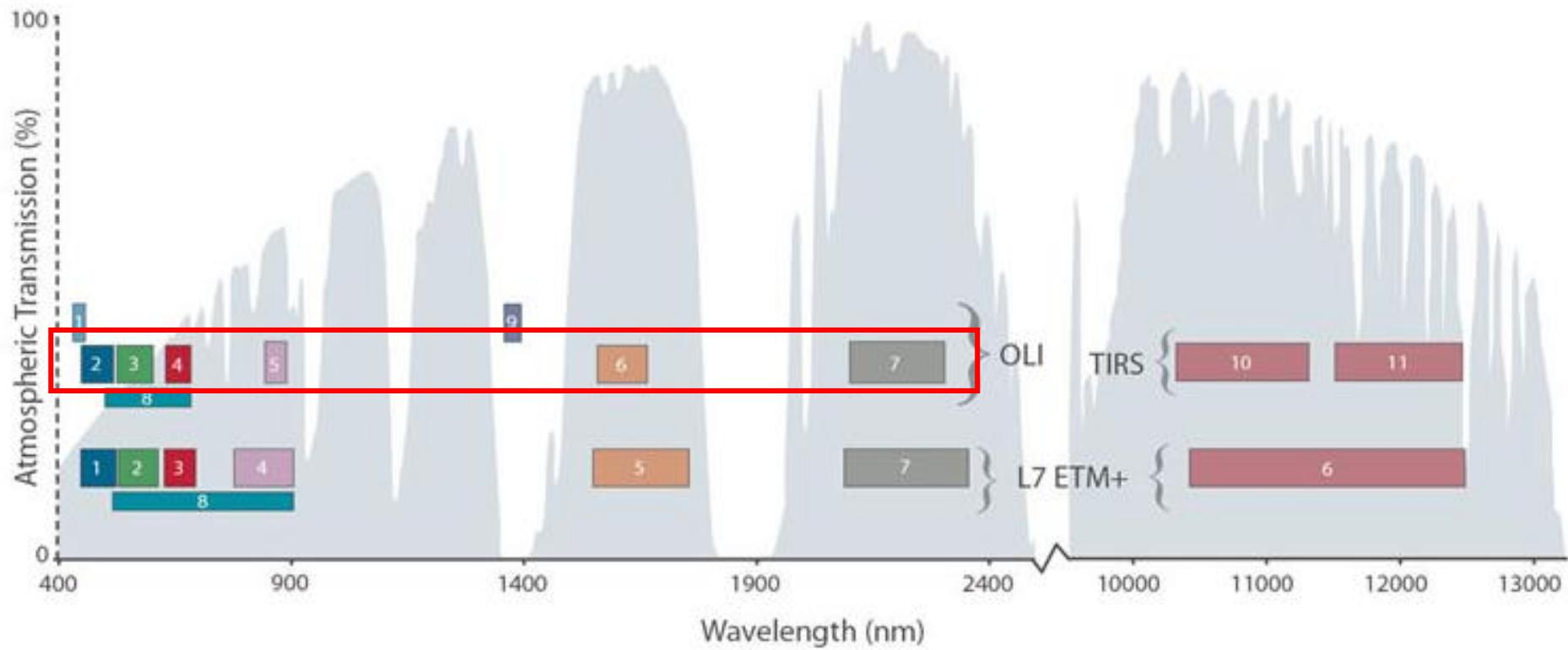
Band 4: 가시화 빨간색

Band 3: 가시화 녹색

Band 2: 가시화 파란색

Introduction to SAGA

- ❖ RGB 혼합 영상 시각화 (Tools -> Visualization-> Grids -> RGB Composite)



출처 : <http://landsat.gsfc.nasa.gov/?p=10643>

Introduction to SAGA

	Landsat 5			Landsat 8		
	Name	Wavelength (microns)	Resolution (m)	Name	Wavelength (microns)	Resolution(m)
Band1	Blue	0.45~0.52	30	Coastal/Aerosol	0.43~0.45	30
Band2	Green	0.52~0.60	30	Blue	0.45~0.51	30
Band3	Red	0.63~0.69	30	Green	0.52~0.60	30
Band4	NIR	0.76~0.90	30	Red	0.63~0.68	30
Band5	NIR	1.55~1.75	30	NIR	0.84~0.88	30
Band6	Thermal	10.40~12.50	120	SWIR	1.56~1.66	30
Band7	MIR	2.08~2.35	30	SWIR	2.10~2.30	30
Band8				PAN	0.50~0.68	15
Band9				Cirrus	1.36~1.39	30
Band10				TIRS	10.30~11.30	100
Band11				TIRS	11.50~12.50	100

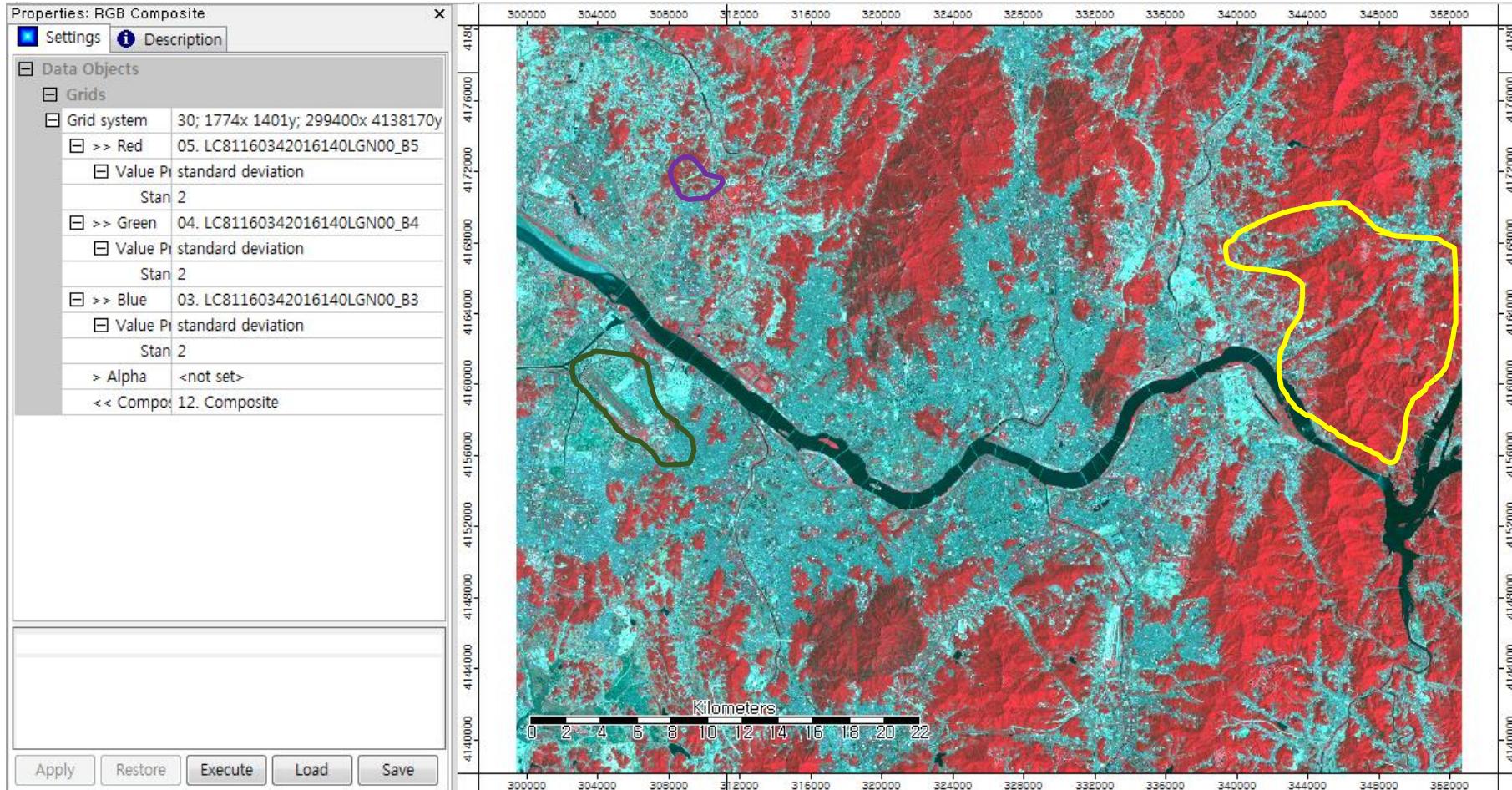
Introduction to SAGA

- 각 스펙트럼 특징을 활용해 조합을 함으로써 여러 특징을 부각할 수 있으며 이를 RGB에 넣을 경우 시각적으로 아래처럼 보여짐 (Landsat7 밴드)

Bands (R, G, B)	Color	Information Content	note
4, 3, 2	Red	Vegetation	false color
	Cyan blue	Urban	
	Light brown	Soil	
	White, light cyan	Snow and cloud	
3, 2, 1	Appearance to the human visual system		natural color
7, 4, 2	Bright green	Healthy vegetation	It is useful for geological, agricultural and wetland studies. (natural-like)
	Green	Grassland	
	Pink	Barren Soil	
	Orange	Dry vegetation	
	Blue	Water	
4, 5, 1	Green and brown	Soil	For vegetation studies, the addition of the Mid-IR band increases sensitivity of detecting various stages of plant growth or stress
	White, cyan, gray, Bright blue	Urban	
	Reddish	new vegetation growth	
	Lighter blue	water	

Introduction to SAGA

❖ RGB 혼합 영상 시작화 – Band 5, Band 4, Band 3을 각 RGB에 혼합할 경우



산맥 / 숲

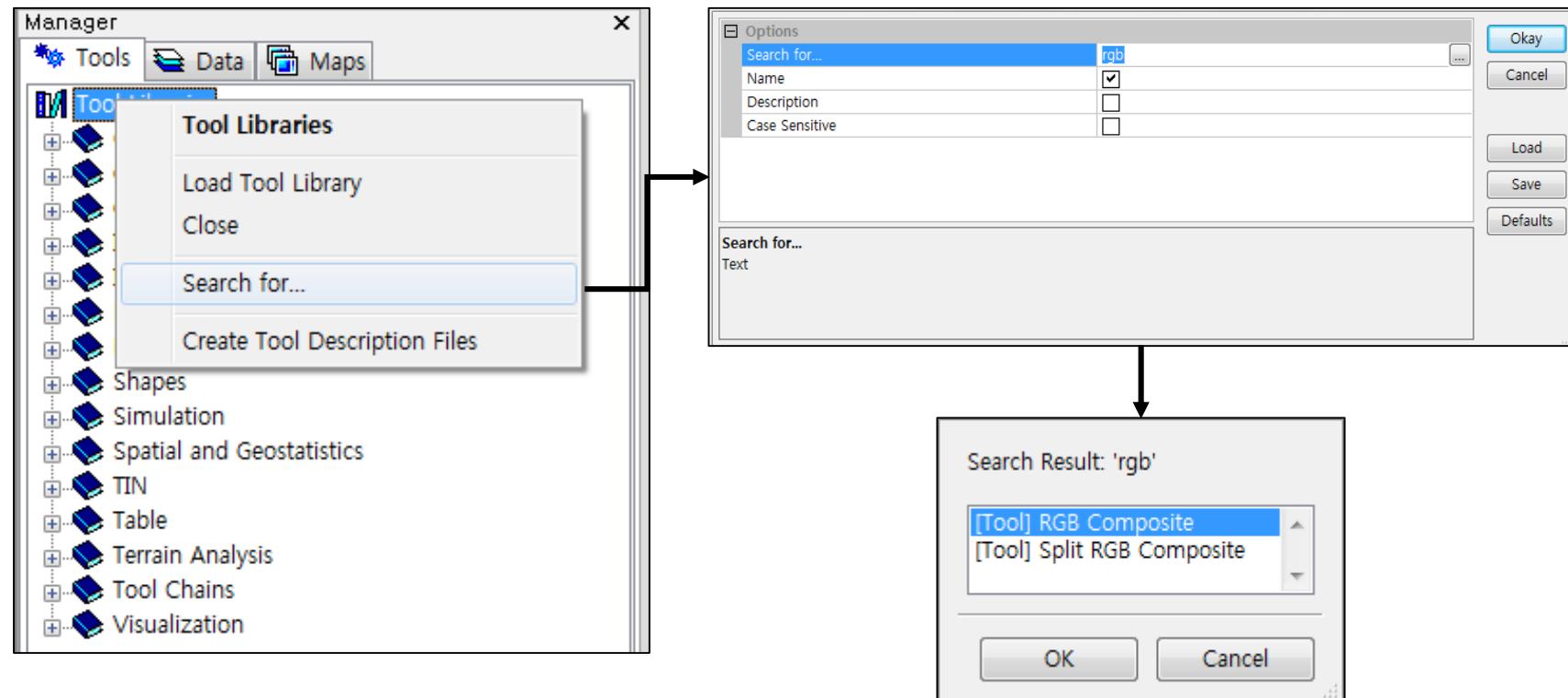
도심

농업

데이터 위치(data/LC81160342016140LGN00_SEOUL_20160524/LC81160342016140LGN00_B3.tif, LC81160342016140LGN00_B4.tif, LC81160342016140LGN00_B5.tif)

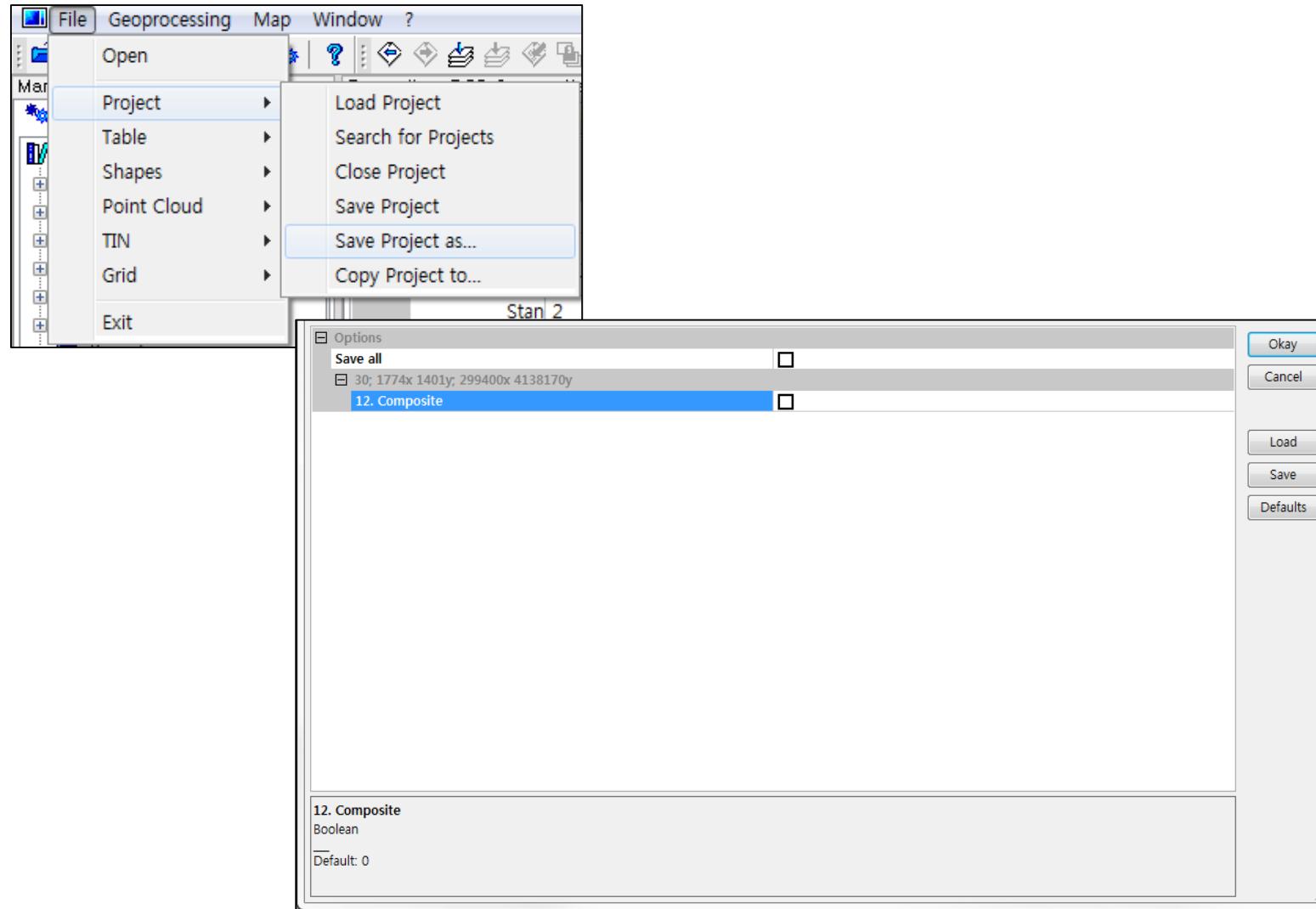
Introduction to SAGA

❖ Tool 검색 가능



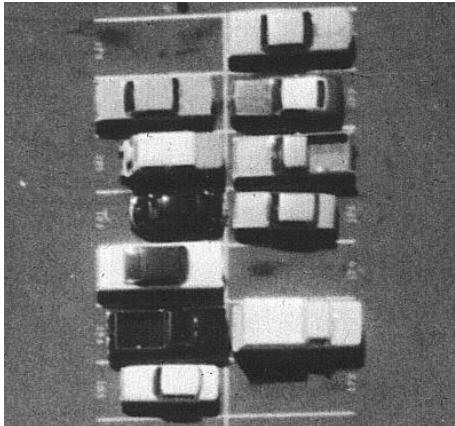
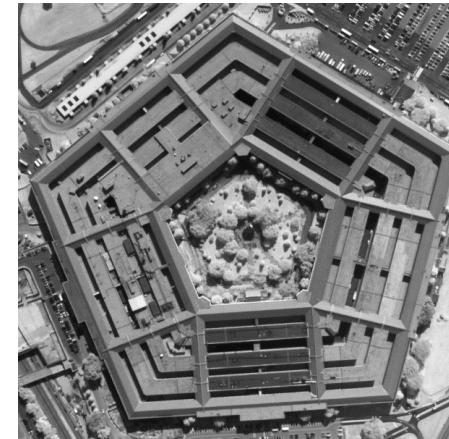
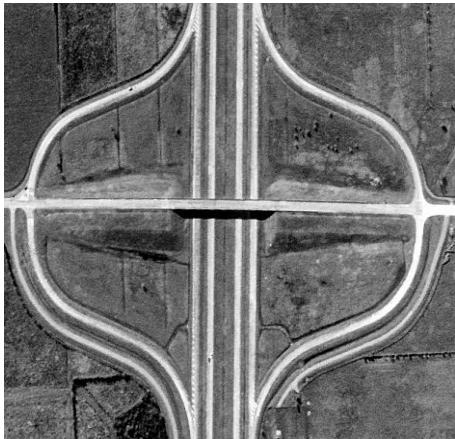
Introduction to SAGA

- ❖ 결과 SAGA Project 저장 (SAGA 확장자로 저장, SAGA 프로그램에서 불러오기 가능)



Visual Interpretation of Image

- ❖ 영상 판독 요소
 - 모양, 크기



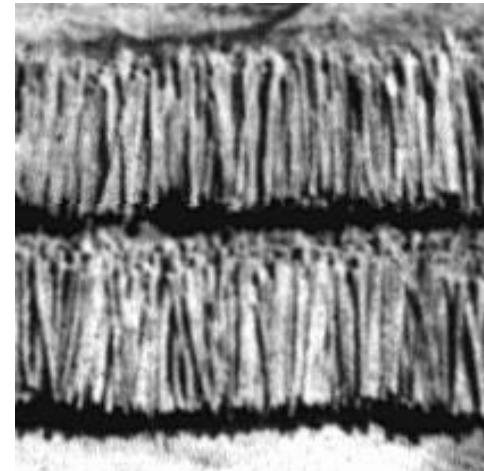
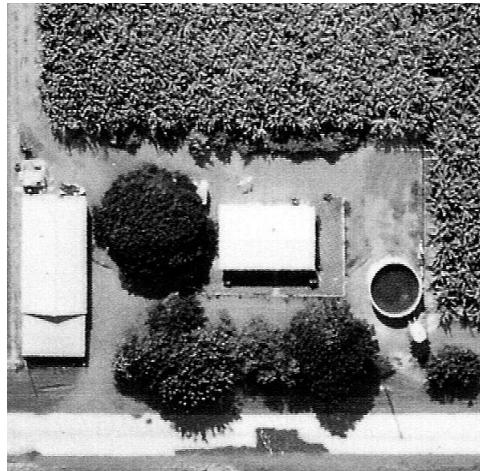
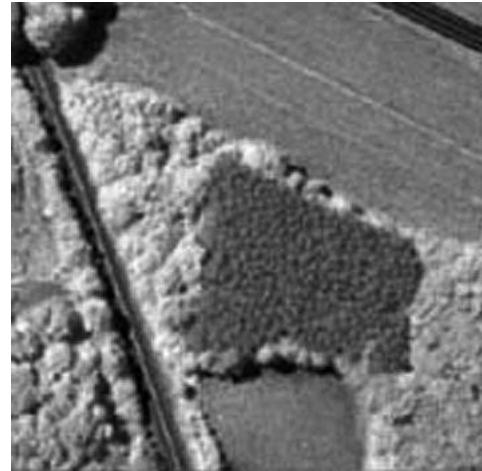
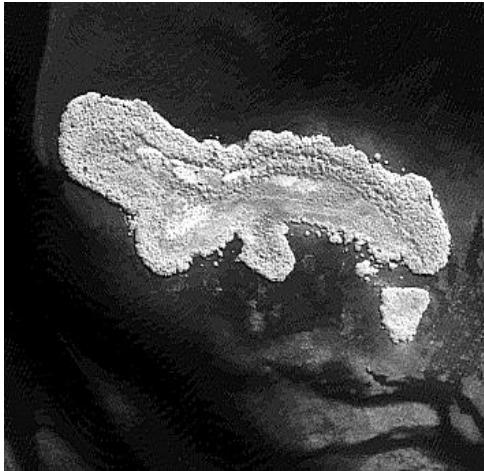
아날로그(시각화) 영상처리

영상판독 요소

- 회색조(명암)
- 컬러(적색, 녹색, 청색 = RGB)
- 높이(고도) 및 깊이
- 크기(길이, 면적, 둘레, 부피)
- 모양
- 질감
- 패턴
- 그림자
- 입지(site, 증거수집 이용)
- 관련(association, 증거수집 이용)
- 배열(arrangement, 증거수집 이용)

Visual Interpretation of Image

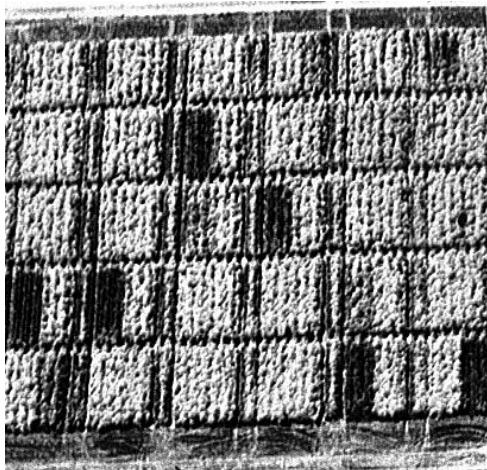
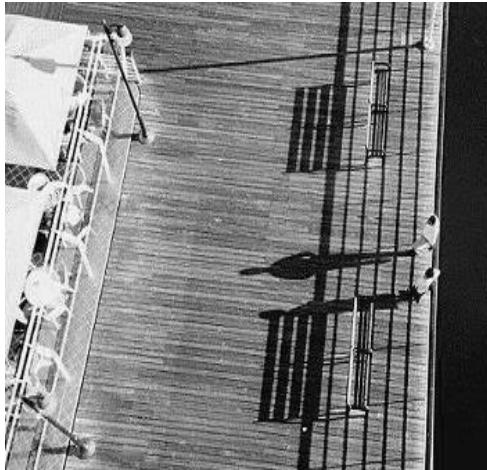
- ❖ 영상 판독 요소
 - 색조, 질감



Visual Interpretation of Image

❖ 영상 판독 요소

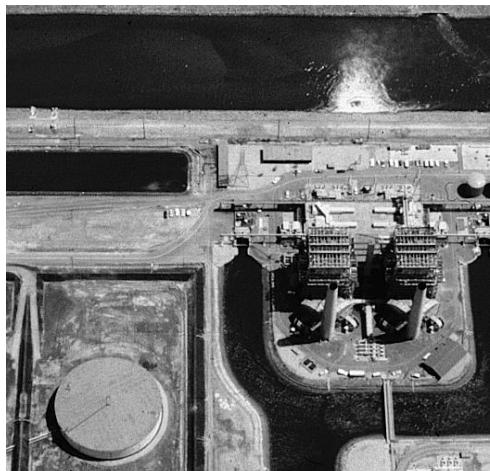
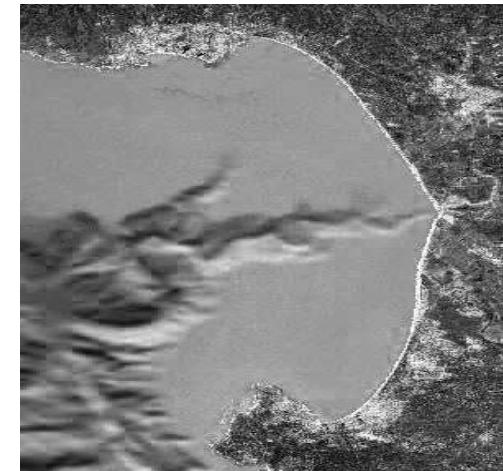
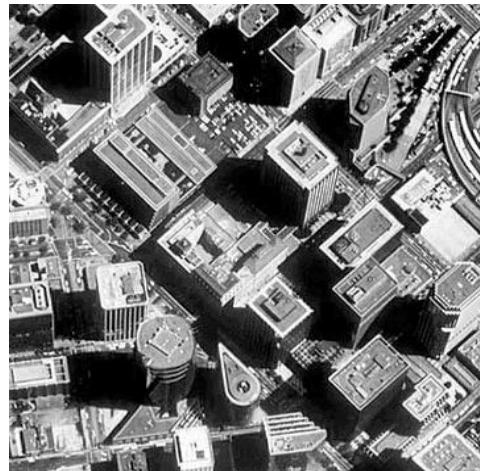
- 그림자
- 패턴



Visual Interpretation of Image

❖ 영상 판독 요소

- 높이 또는 깊이
- 장소, 상황, 연관성

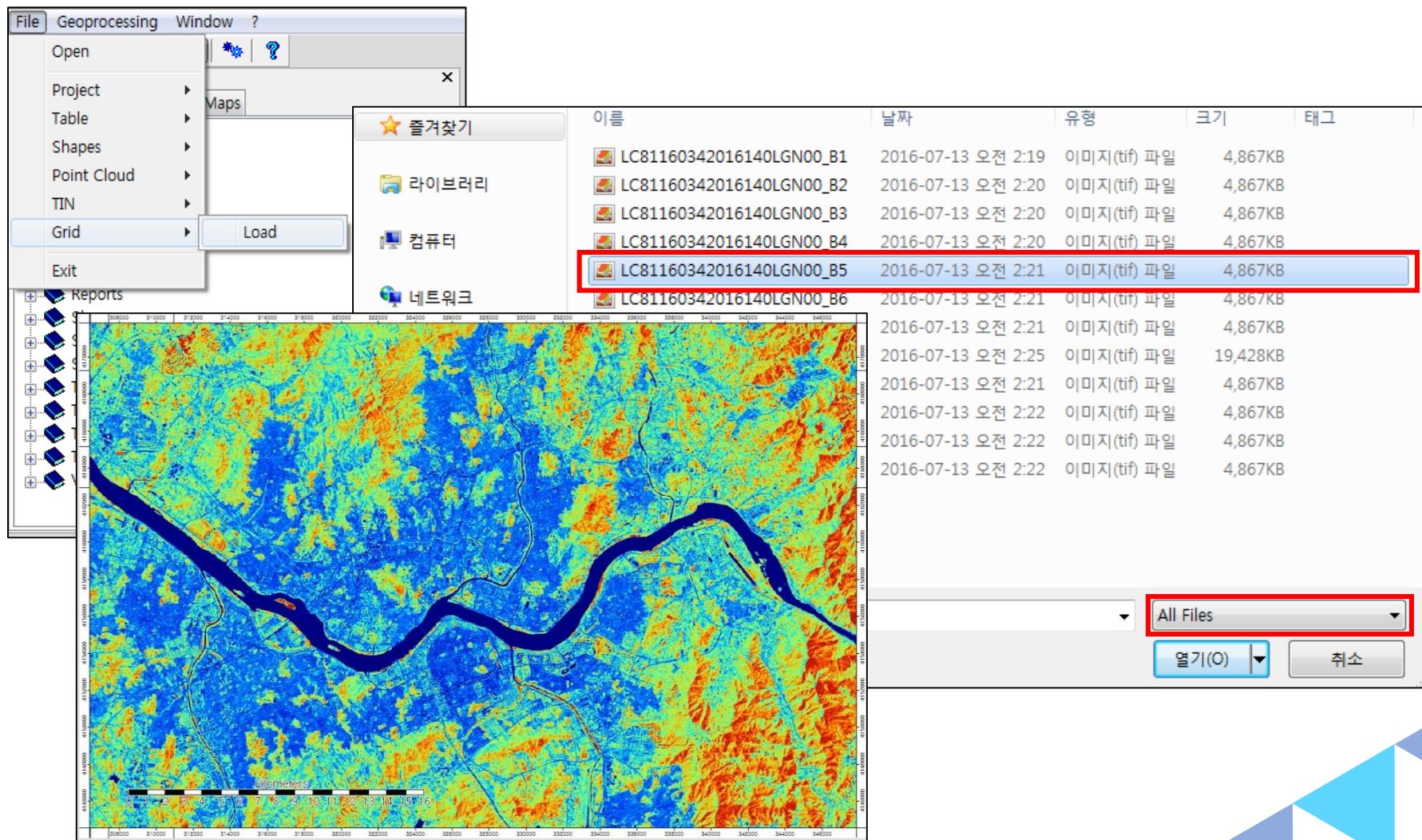


Visual Interpretation of Image

❖ 데이터 불러오기(File -> Grid -> Load)

흑백 이미지 해석

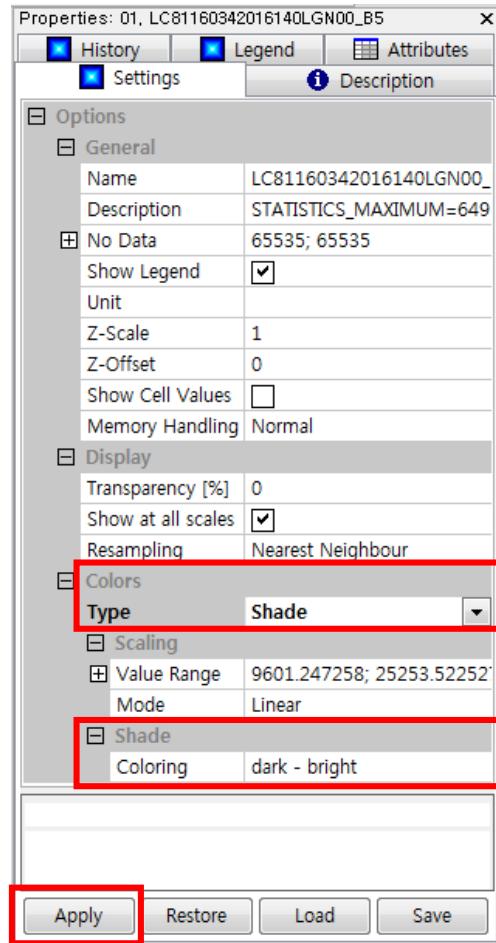
❖ 5번 밴드 선택 후 데이터 확인



Visual Interpretation of Image

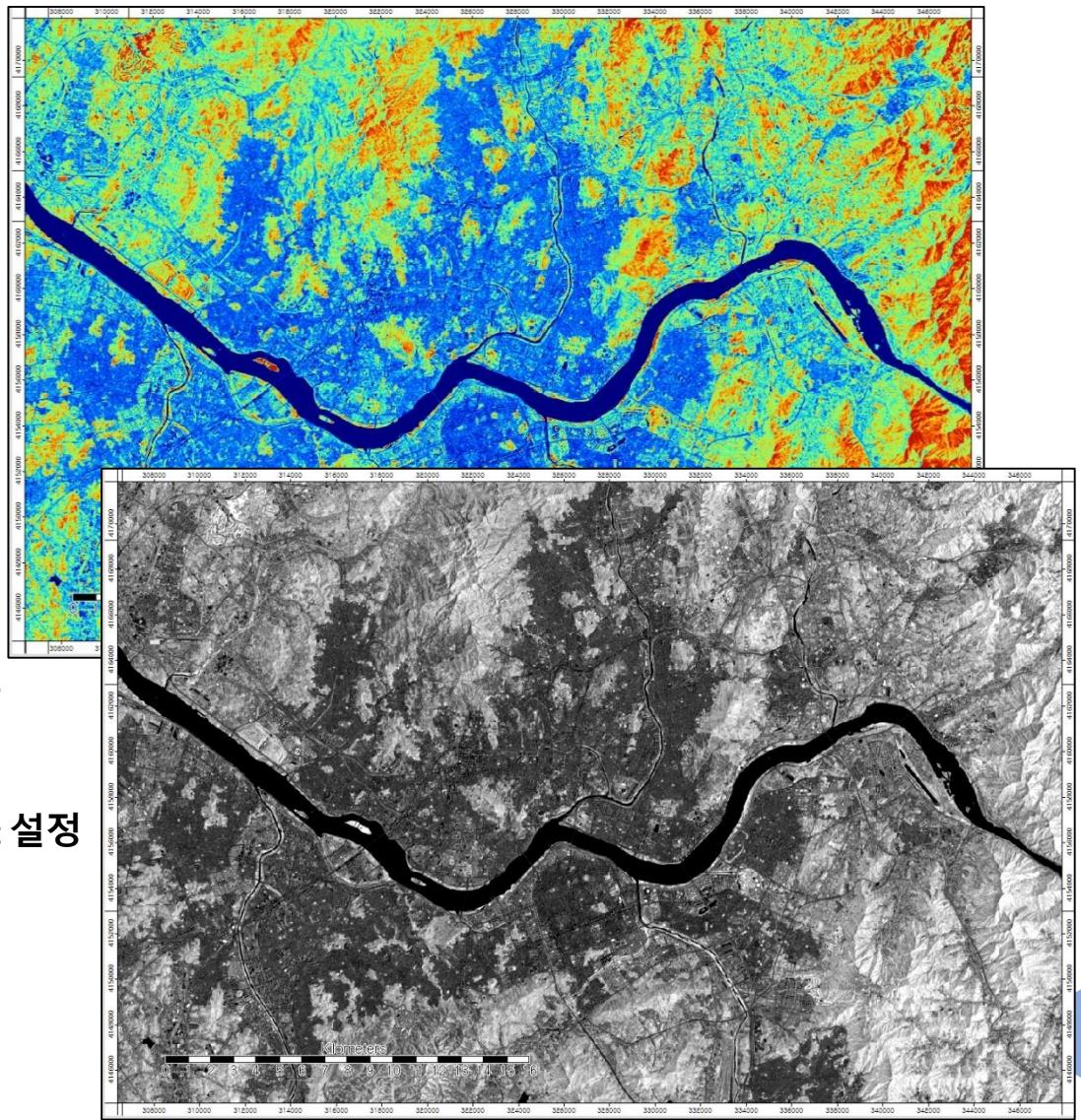
❖ 영상의 색 변경 (Settings -> Color)

흑백 이미지 해석



Shade 설정

dark-bright 설정

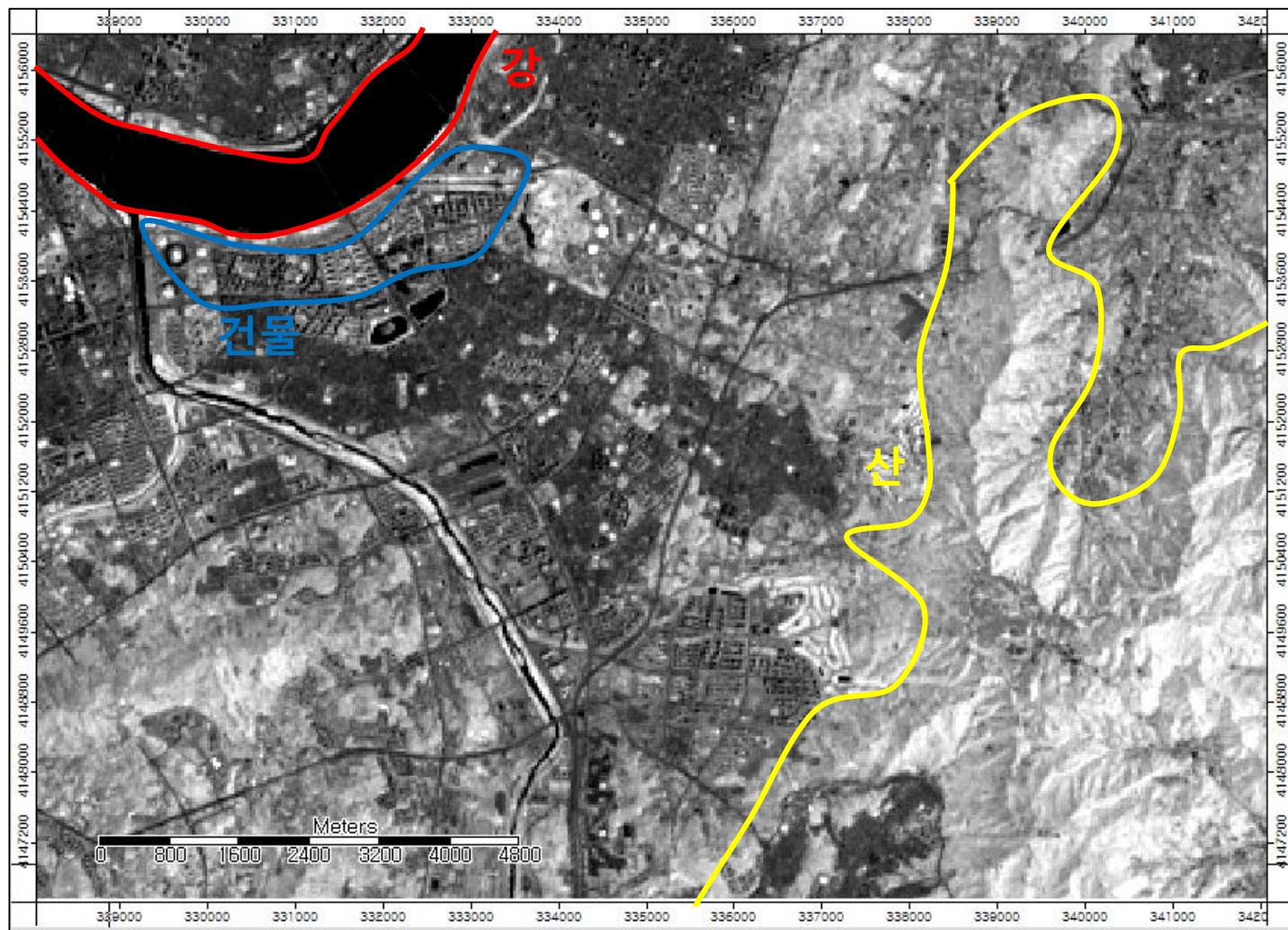


Visual Interpretation of Image

❖ 데이터 음영에 따른 육안을 통한 이미지 해석 가능

흑백 이미지 해석

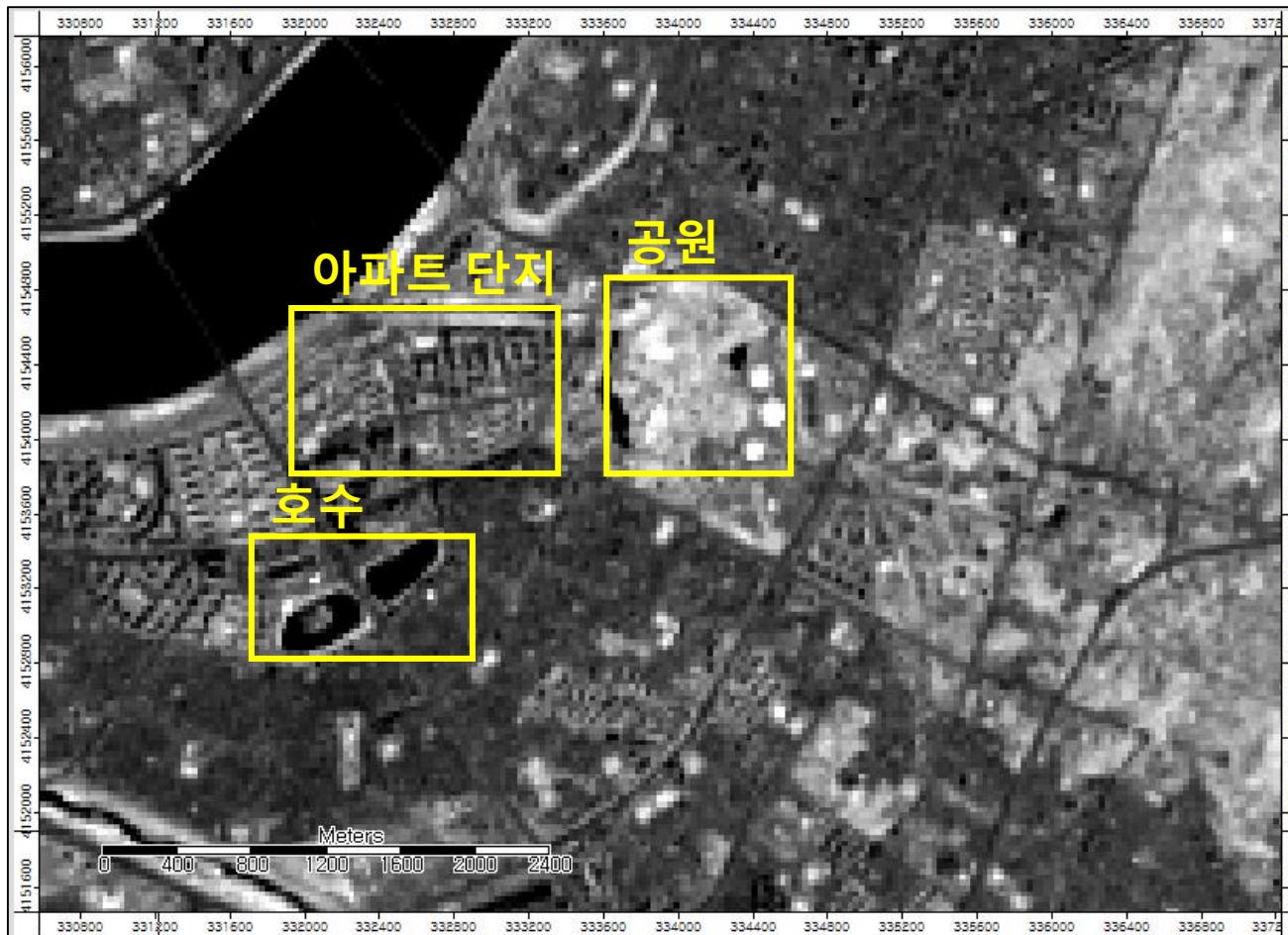
- 빨간색 : 강
- 노란색 : 산
- 파란색 : 건물



Visual Interpretation of Image

- ❖ 확대하여 볼 경우 자세한 건물의 윤곽이나 특징 파악 가능
- ❖ 친숙한 지역일 경우 어떠한 지역인지 바로 파악 가능
- ❖ 영상 판독 요소 : Size, Pattern, Texture, Shadow, Association 등

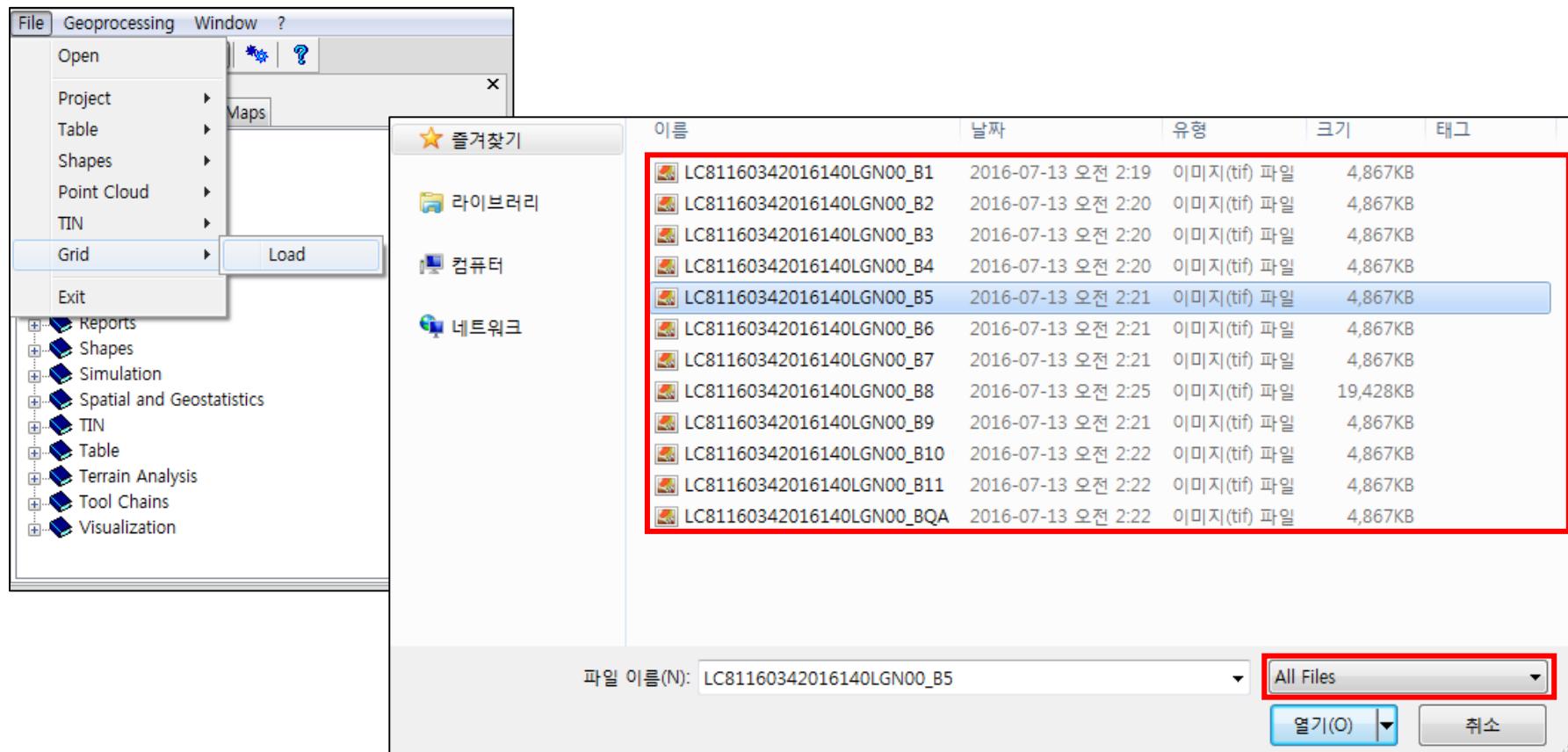
흑백 이미지 해석



Visual Interpretation of Image

❖ 모든 밴드 데이터 불러오기(File -> Grid -> Load)

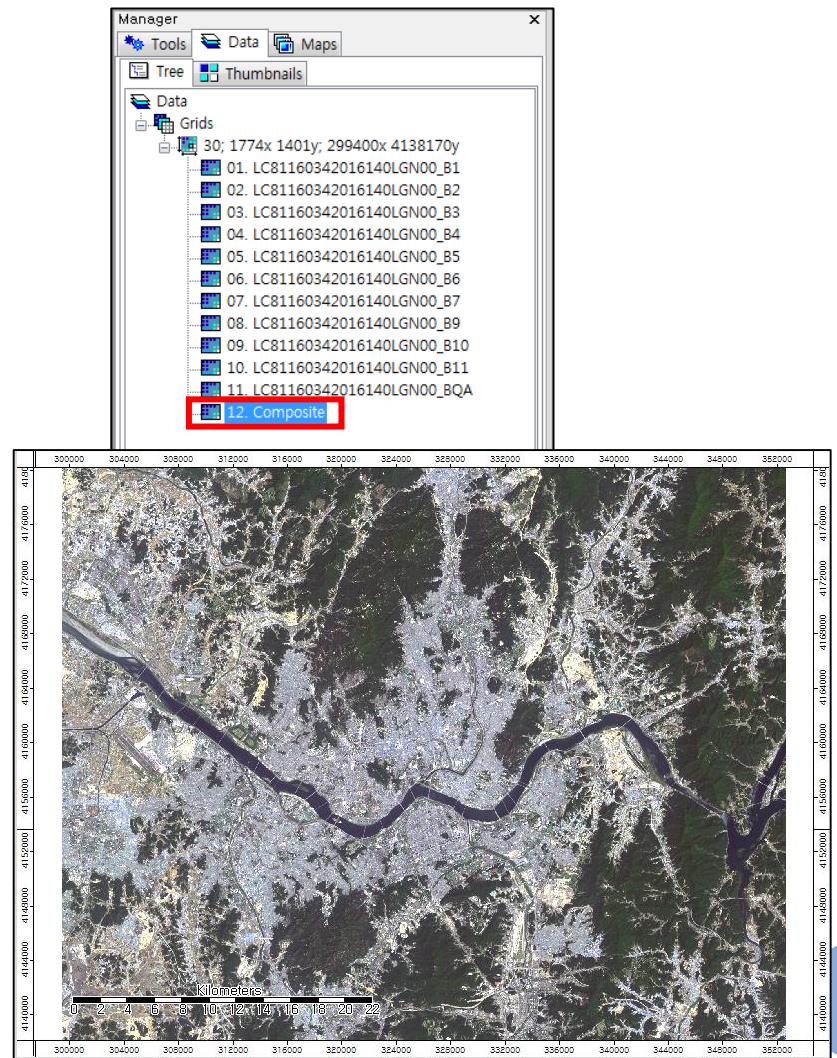
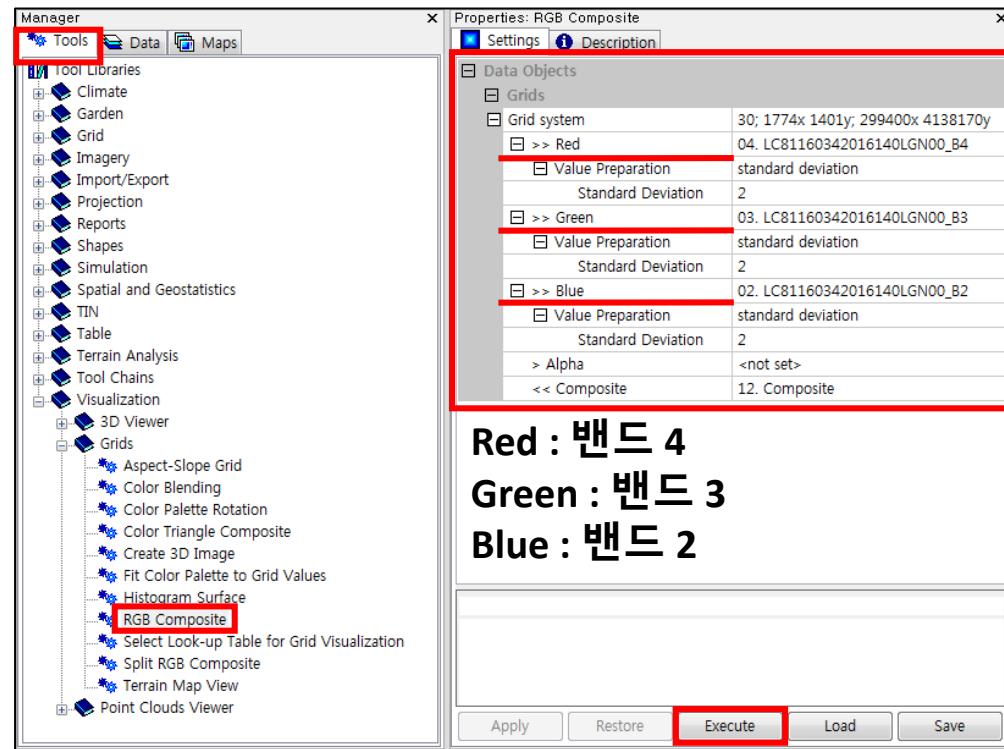
컬러 이미지 해석



Visual Interpretation of Image

❖ 컬러 이미지 제작(Tools -> Visualization -> Grids -> RGB Composite)

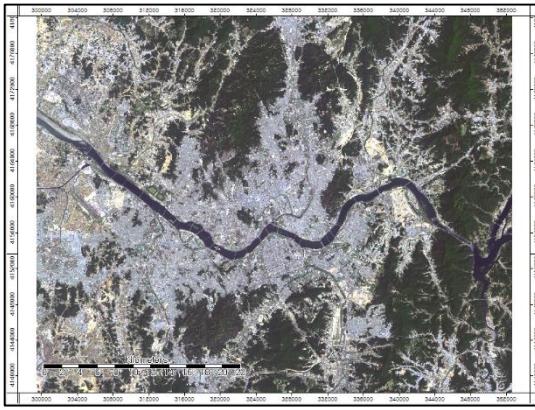
컬러 이미지 해석



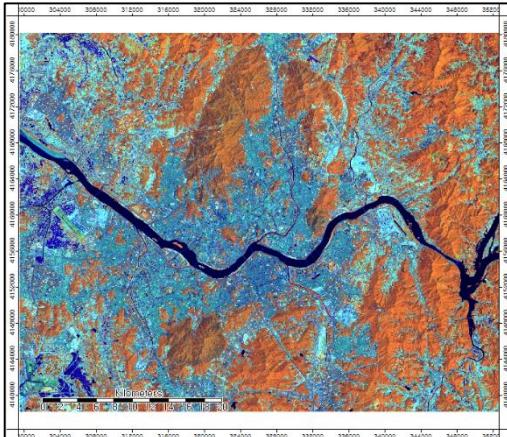
Visual Interpretation of Image

- ❖ 같은 방법으로 5,4,3번 밴드로 컬러 이미지 생성
- ❖ 밴드 조합을 통해 가시 범위를 벗어난 영상의 시각화 및 측정 가능
- ❖ 4,3,2번 밴드 조합: 시각화 용도로 사용
- ❖ 5,4,3번 밴드 조합: NIR(Near Infra Red) 영상으로 사용

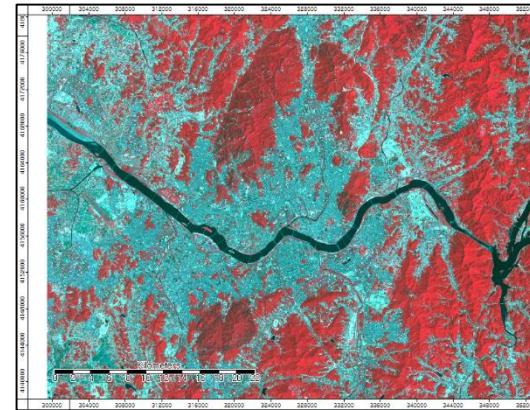
컬러 이미지 해석



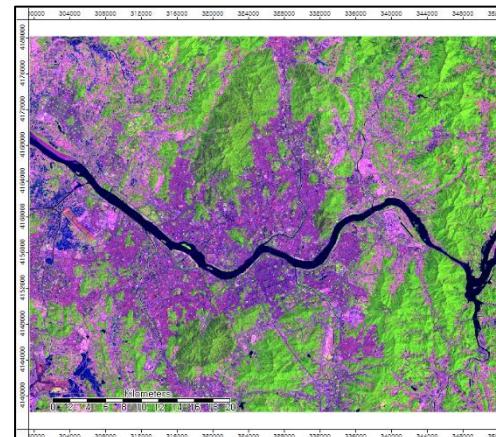
4,3,2번 밴드 조합



5,6,4번 밴드 조합



5,4,3번 밴드 조합



6,5,2번 밴드 조합

Visual Interpretation of Image

Band 10, Band 4, Band 3 Composite 결과는 ?

Band 8, Band 4, Band 3 Composite 결과는 ?

Band	Wavelength	Useful for mapping
Band 1 – coastal aerosol	0.43-0.45	coastal and aerosol studies
Band 2 – blue	0.45-0.51	Bathymetric mapping, distinguishing soil from vegetation and deciduous from coniferous vegetation
Band 3 - green	0.53-0.59	Emphasizes peak vegetation, which is useful for assessing plant vigor
Band 4 - red	0.64-0.67	Discriminates vegetation slopes
Band 5 - Near Infrared (NIR)	085.-0.88	Emphasizes biomass content and shorelines
Band 6 - Short-wave Infrared (SWIR) 1	1.57-1.65	Discriminates moisture content of soil and vegetation; penetrates thin clouds
Band 7 - Short-wave Infrared (SWIR) 2	2.11-2.29	Improved moisture content of soil and vegetation and thin cloud penetration
Band 8 - Panchromatic	.50-.68	15 meter resolution, sharper image definition
Band 9 – Cirrus	1.36 -1.38	Improved detection of cirrus cloud contamination
Band 10 – TIRS 1	10.60 – 11.19	100 meter resolution, thermal mapping and estimated soil moisture
Band 11 – TIRS 2	11.5-12.51	100 meter resolution, Improved thermal mapping and estimated soil moisture

Visual Interpretation of Image

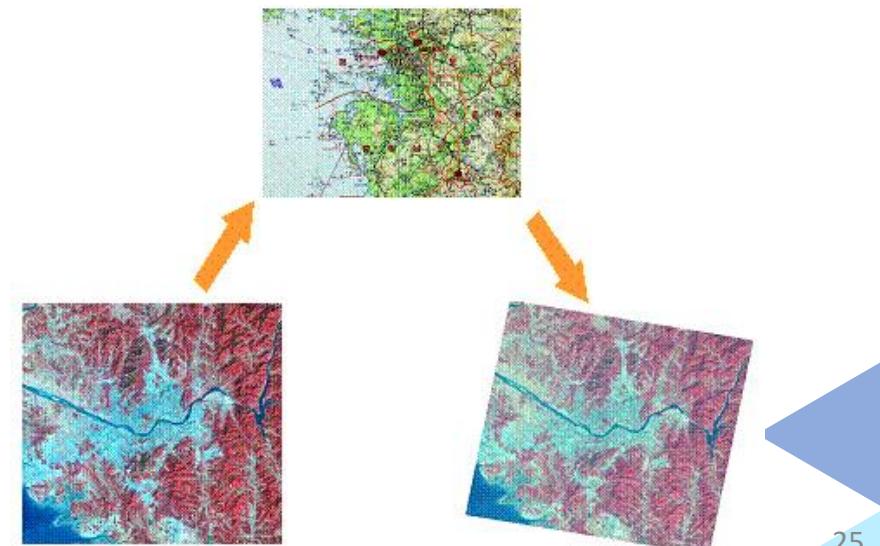
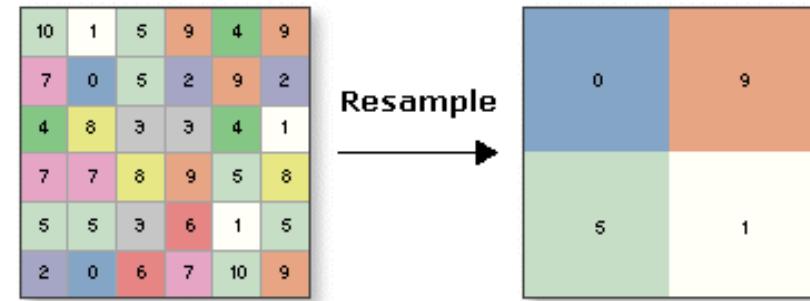
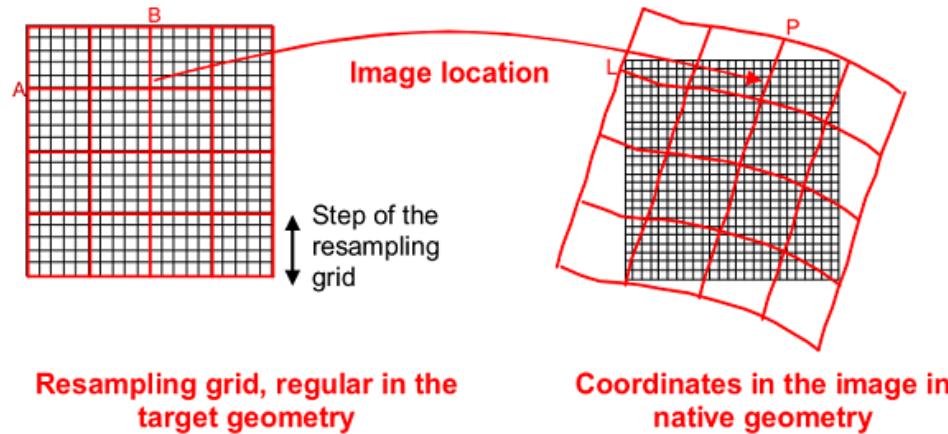
❖ Band 8은 사용하기 전 Resampling 작업 수행

The screenshot shows the GRASS GIS interface with several windows open:

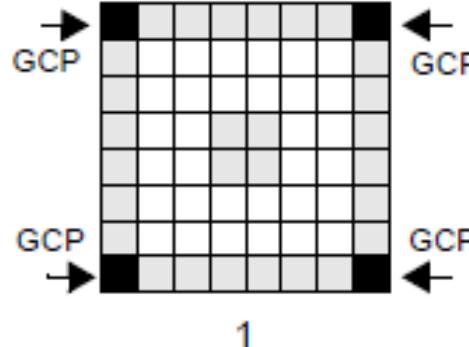
- Tools Window:** Shows a list of geospatial tools under categories like Gridding, Tools, and Projection. The "Resampling" tool is highlighted with a red box.
- Data Tree Window:** Shows a hierarchical tree view of data objects. A specific entry, "06. LC81160342016140LGN00_B8", is highlighted with a red box.
- Resampling Dialog:** A modal dialog titled "Resampling". It has sections for "Data Objects" (Grids, Grid system), "Options" (Preserve Data Type checked, Upscaling Method set to Mean Value (cell area weighted)), and "Target Grid System" (Grid System set to "30; 1774x 1401y; 299400x 4138170y"). Buttons for Okay, Cancel, Load, Save, and Default are visible on the right.

리샘플링 (Resampling)

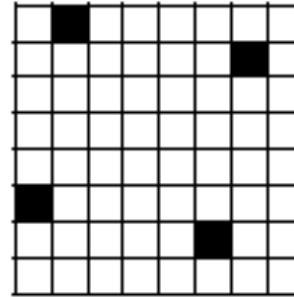
- 오리지널한 샘플링 이미지에서 장소를 바꾼 샘플점의 값을 구하고 그에 의해서 원래 영상의 축소 혹은 확대된 이미지를 다시 구축



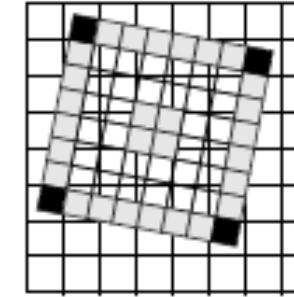
리샘플링 (Resampling)



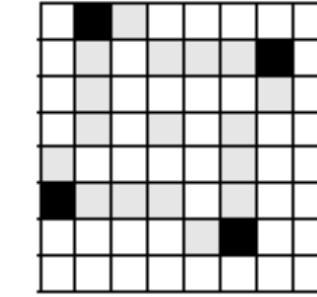
1
GCP(Ground Control Point)
를 포함한 입력영상



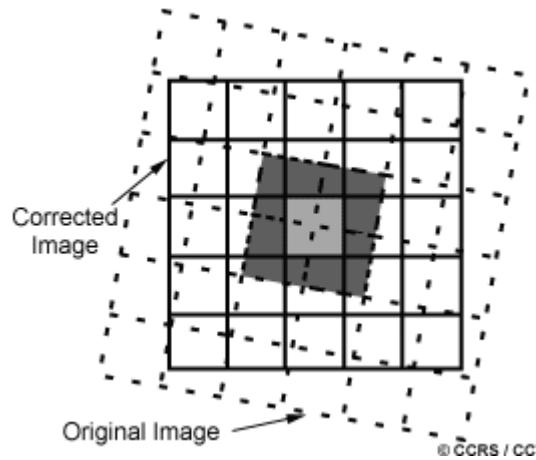
2
GCP를 포함한
대상(출력)자료



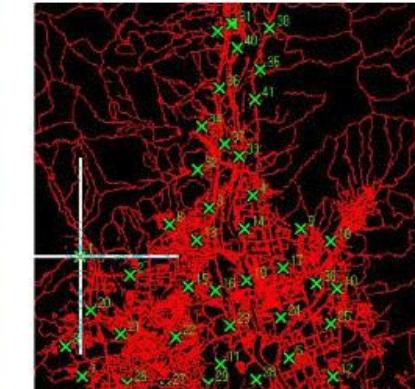
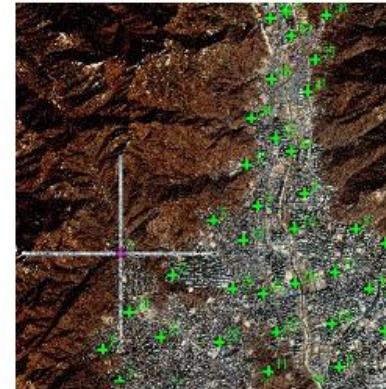
3
대상(출력)영상에
입력영상 겹쳐보기



4
Resampling에 의한
입력영상 수정(새로운
영상 생성)

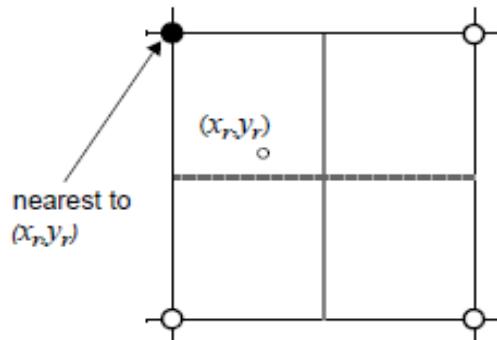


지상기준점 선정



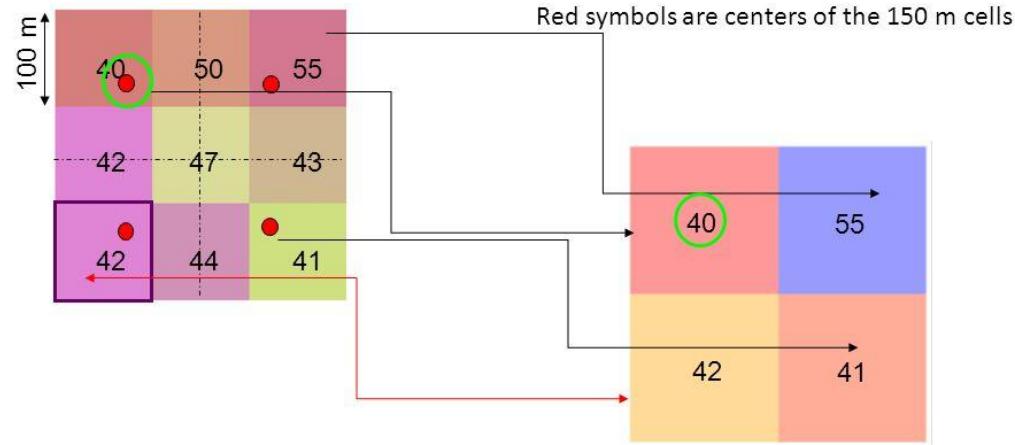
리샘플링 (Resampling)

- Nearest Neighbor 가장 가까운 곳에 위치한 값으로 출력 값 결정



Nearest Neighbor (NN) Resampling using Cell size based on “Maximum of Inputs”

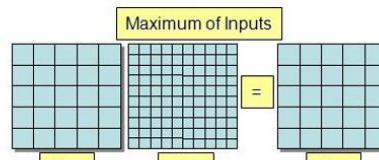
The NN resampling grabs the input cell that is closest to the center of the output cell



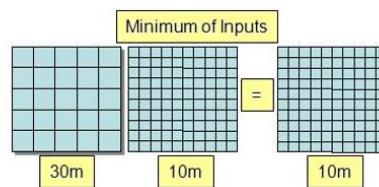
Resampling the 100 meter input to 150 meters using NN

Output options:

- Maximum of inputs (default)
- Minimum of inputs
- Same as layer
- As specified

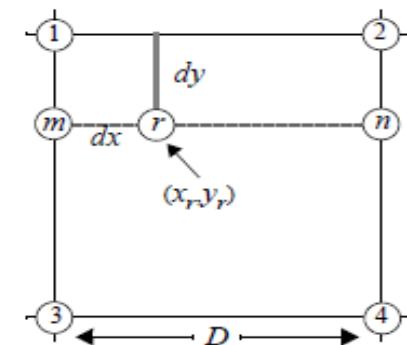


There are Nine 100 m cells . Only 4 of them will be selected for the calculations (because we use NN). Note that some spatial information is lost during resampling.

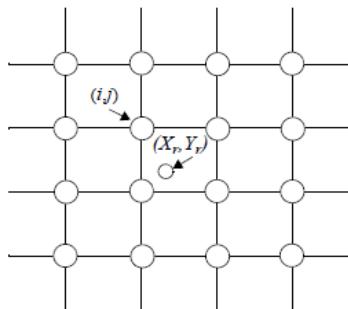


리샘플링 (Resampling)

- Bilinear Interpolation 2×2 창내에 있는 4 개의 픽셀 값과 1차원 선형 함수를 이용하여 출력 값 결정



- Cubic Interpolation 4×4 창내에 있는 16 개의 픽셀 값과 2 차원 방정식을 이용하여 출력 값 결정



1; 654x 402y; 0x 0y
01. google_toposheet_seoul
Automatic
B-Spline Interpolation
Nearest Neighbour
Bilinear Interpolation
Bicubic Spline Interpolation
B-Spline Interpolation