



## **Fire Mapping Methods Using SAR**

# • Synthetic Aperture Radar (SAR)



Microwaves penetrate cloud-cover  
Electromagnetic spectrum  
Microwaves have a longer wavelength than visible light



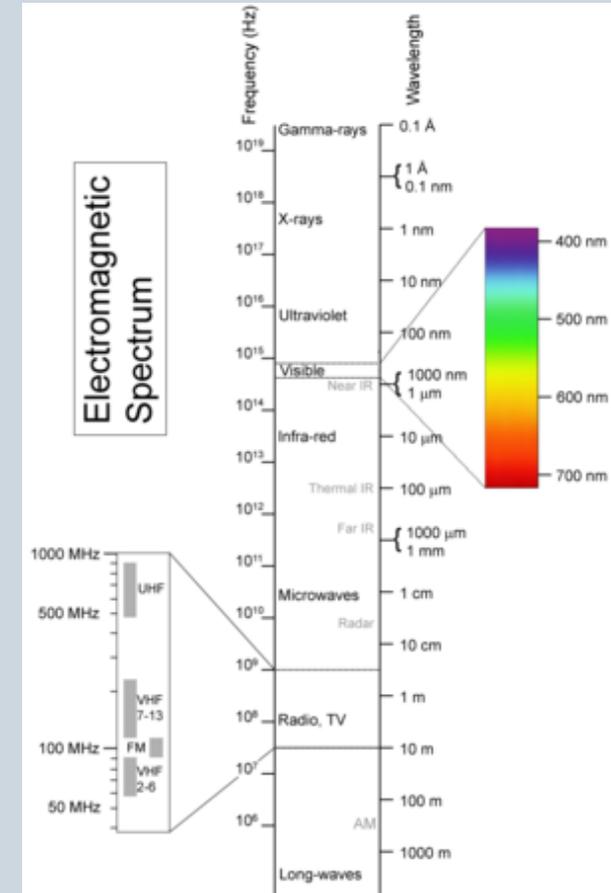
Spatial Resolution  
30 meter pixel size with a footprint of 100 x 100 km



Soil Moisture  
Increased ground moisture is the predominant factor causing enhanced backscatter



Boreal Forests  
With slower vegetation re-growth, fire scars in boreal forest environments are visible much longer.



# • Advantages SAR



## Same spatial resolution as Landsat 7

With the inherent ability to penetrate cloud cover, SAR imagery is not limited to atmospheric conditions like other traditional fire mapping techniques.



## Decreased storage needs versus Landsat 7

One Landsat 7 scene, once compiled/processed is 850 MB.

One SAR scene, a single banded image, is about 100 MB.



## Decreased time acquiring data and digitizing perimeters

Time constraints are decreased when working with SAR data.

# • Disadvantages SAR



## Mountains

Terrain has a significant effect on the ability to clearly delineate fire scars with single images. In order to negate the effects of terrain multiple SAR images are needed.



## Wetlands

Since soil moisture is the main ingredient in microwave fire scar recognition, the presence of water bodies nearby will have similar brightness levels.

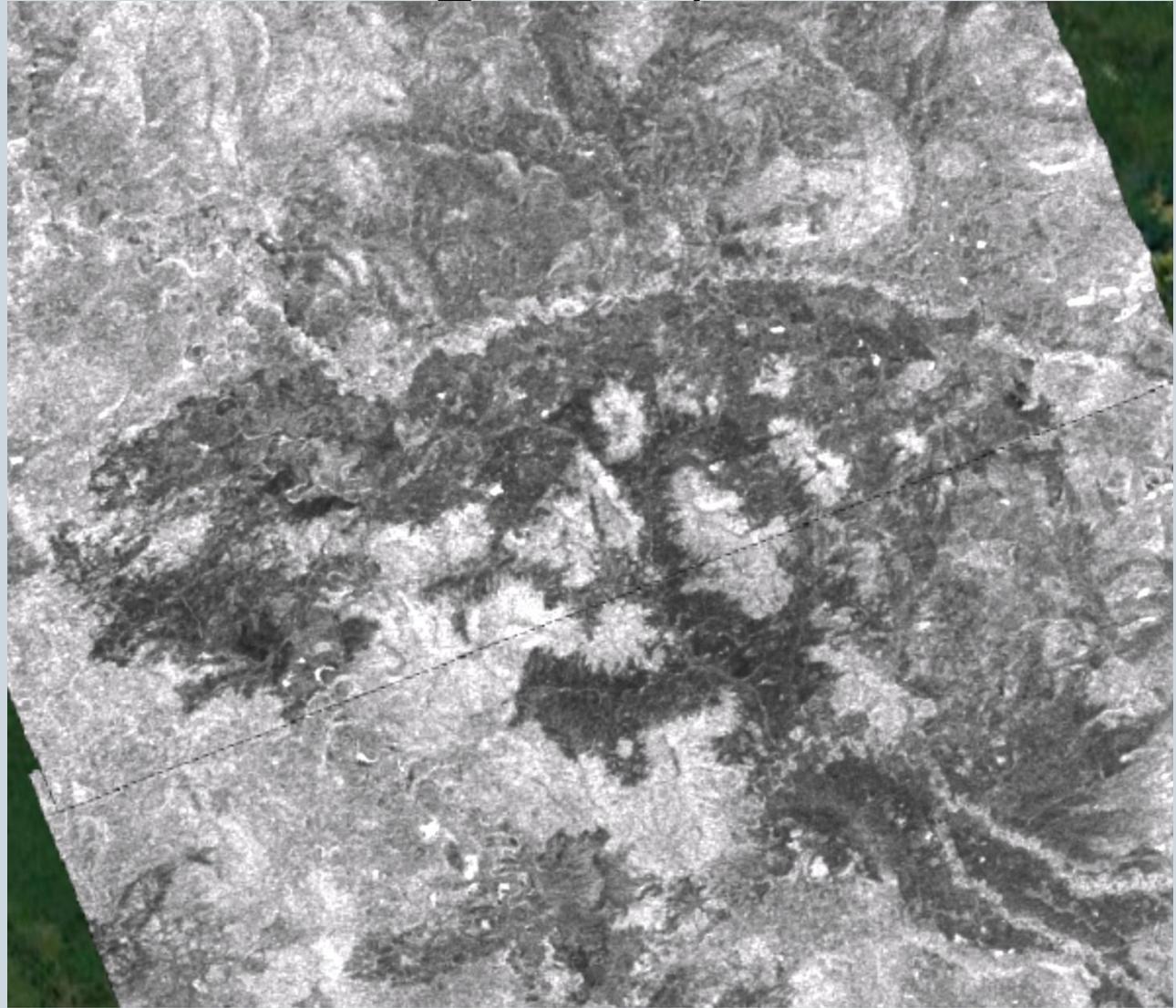


## Season

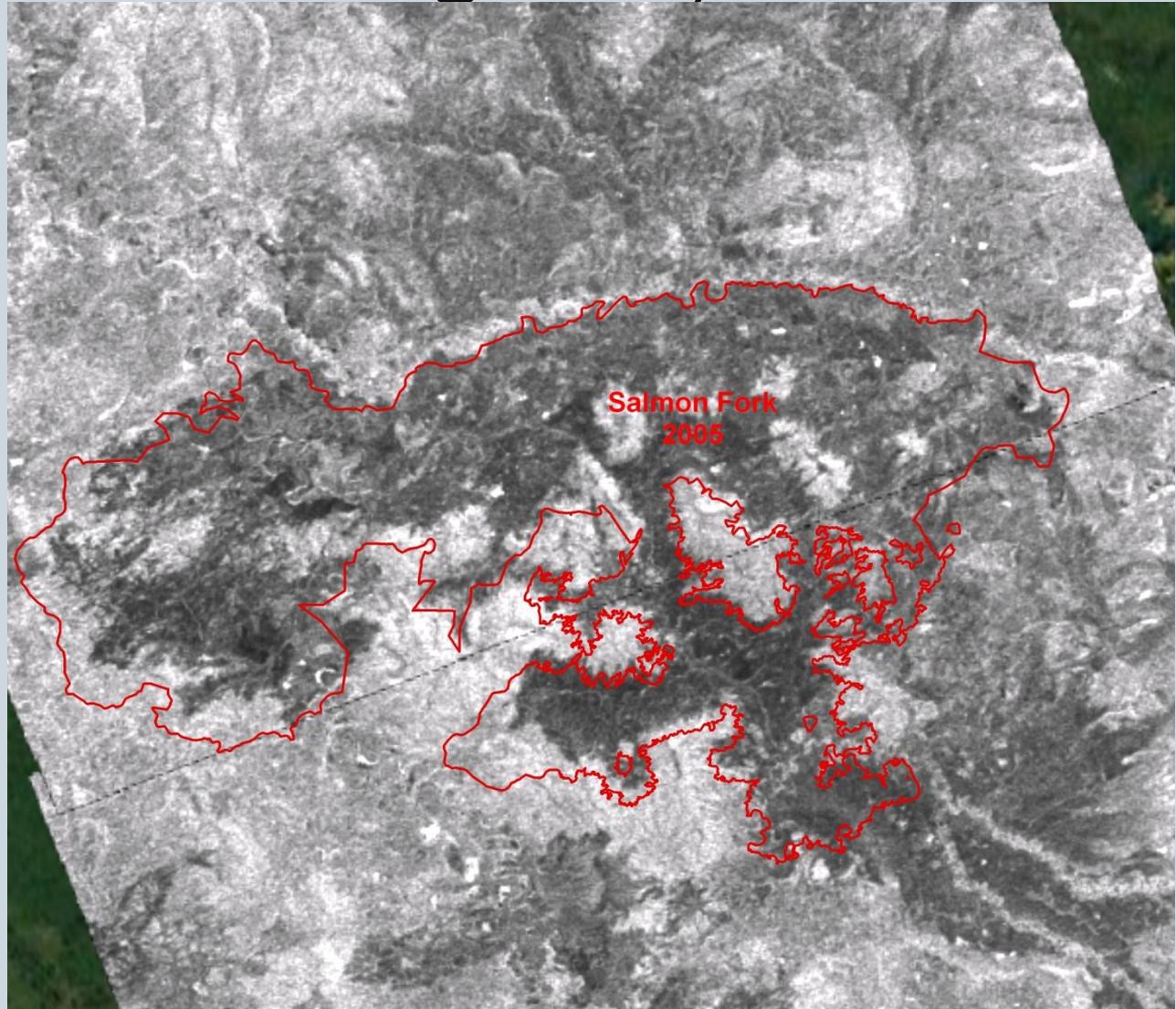
Time of year has an impact for fire scar recognition. Fire scars are better detected in the fall (after the rains and prior to the snow, when soil moisture is greater) as well as the spring after the soils have absorbed the snow melt.

This limits the time of year image acquisition can occur.

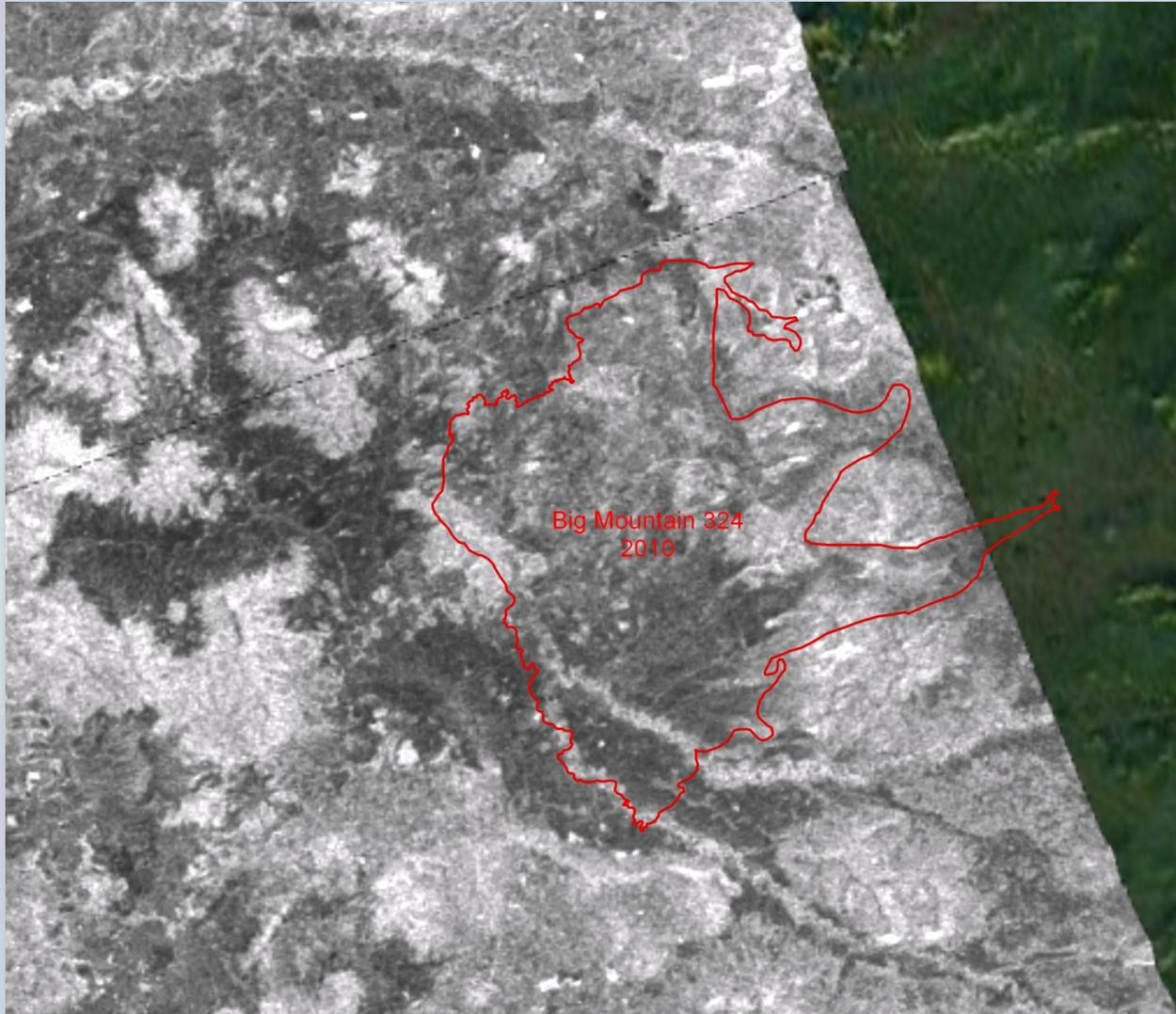
# •SAR C Band from August 25, 2010



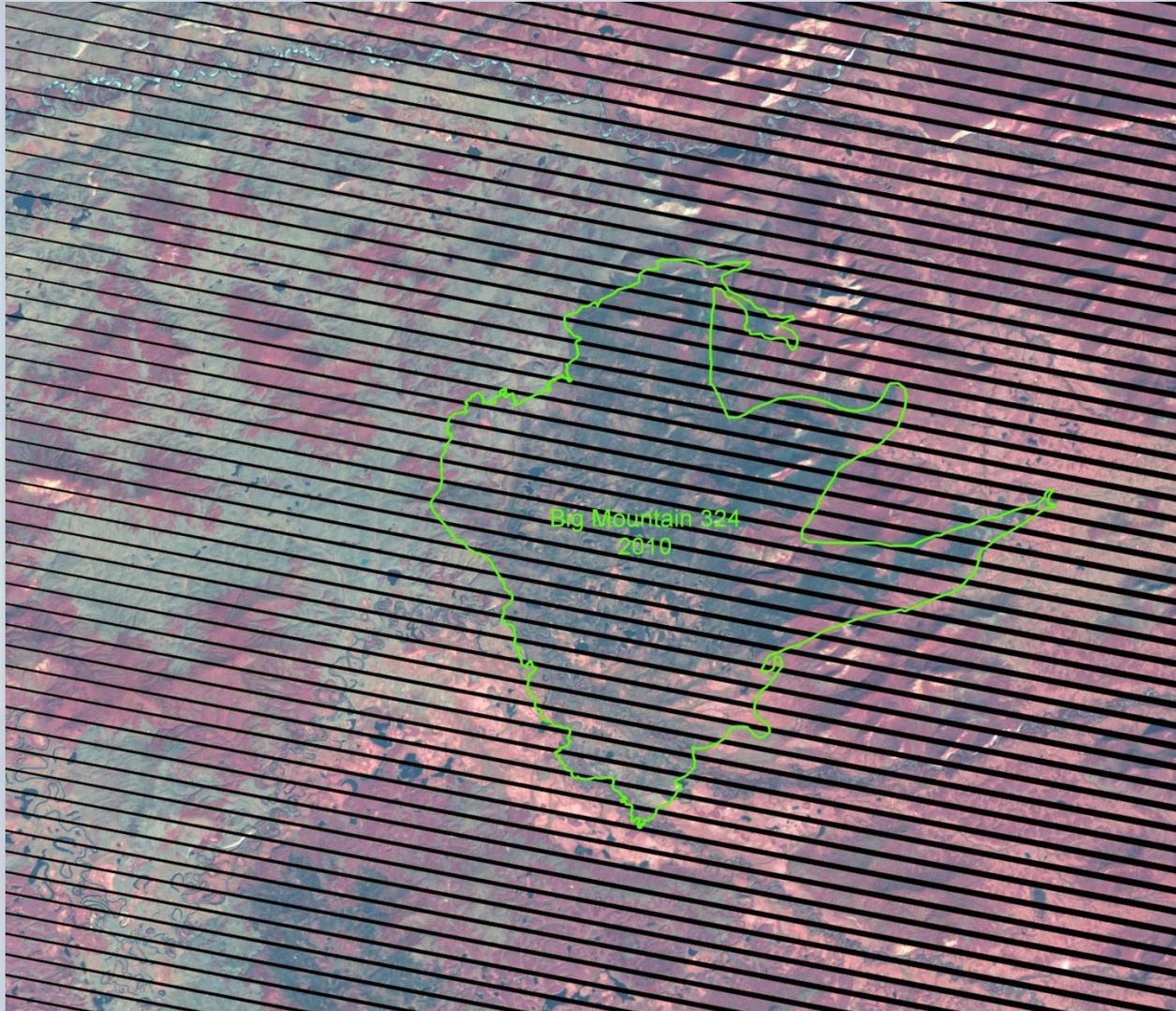
# •SAR C Band from August 25, 2010

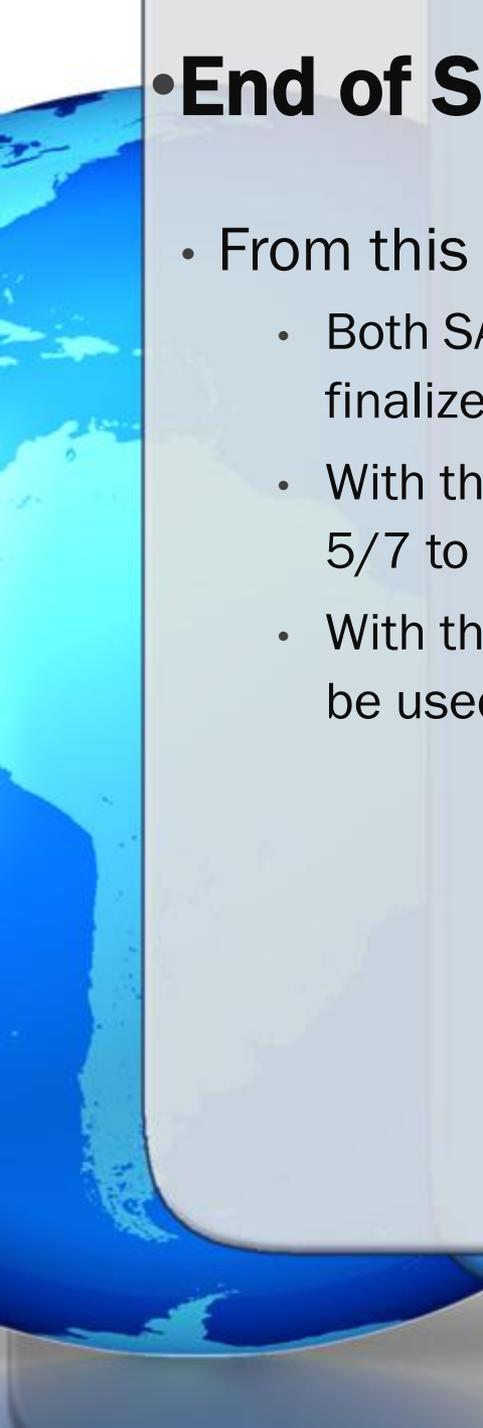


# •2010 Fire # 324



# •2010 Fire #324





# • End of Season Fire Scar Mapping

- From this initial study
  - Both SAR and Landsat 5/7 imagery should be used in conjunction to finalize digitized fire perimeters.
  - With the storage needs and increased processing time using Landsat 5/7 to map all the fire perimeters is not feasible
  - With the data limitations of using SAR, supplemental imagery should be used to corroborate findings and ensure data quality.