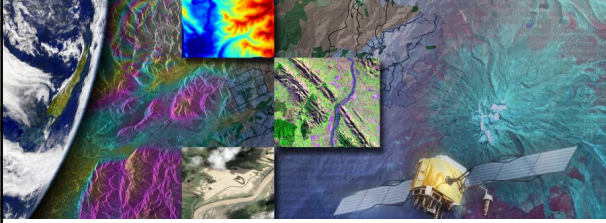


## Lecture 6 – How are Remote Sensing Data Acquired?



Assoc. Prof Stefan Maier  
School of Environment  
Bldg Purple 12.3.09

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## Passive & Active Remote Sensing Systems

**Passive** systems measure naturally available energy. This energy either originates from a natural source (e.g. sun) and interacts with the target or is emitted by the target itself (e.g. thermal radiation).



**Active** systems provide their own energy source for illumination. This energy interacts with the target before it reaches the sensor.



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## Passive & Active Remote Sensing Systems - Examples

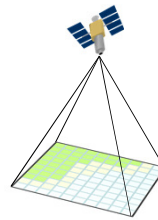
- human eye - *passive*
- digital camera - *passive*
- digital camera with flash - *active*
- Landsat ETM+ - *passive*
- RADAR - *active*
- depth sounder - *active*
- thermal camera - *passive*
- satellite - a platform, not a remote sensing system
- Lidar - *active*
- human with a torch - *active*
- MODIS - *passive*

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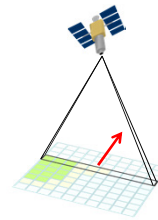
## Sensor Types

*frame camera*



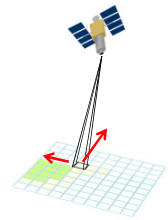
captures whole  
image at once

*push-broom scanner*



captures image  
line by line

*whisk-broom scanner*

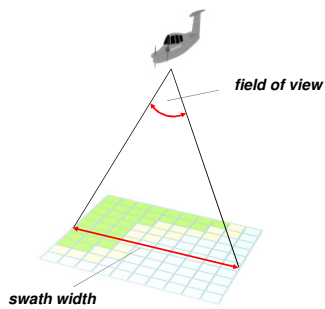


captures image  
pixel by pixel

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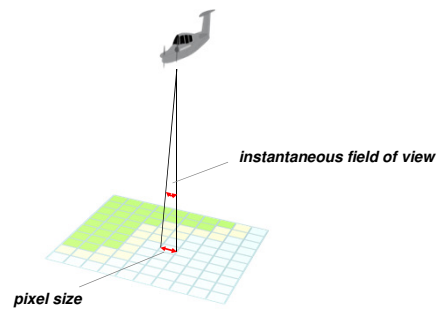
## Geometric Characteristics - Swath Width / Field of View



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## Geometric Characteristics - Pixel Size / Instantaneous Field of View

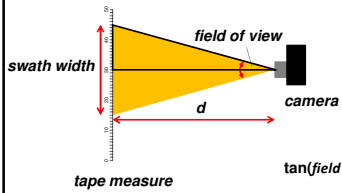


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### Exercise

Determine *swath (image) width*, *field of view*, *pixel size* and *instantaneous field of view* for a digital camera at 1m (2m) distance from the target (don't change zoom)



$$\tan(\text{field of view} / 2) = \text{swath width} / 2 / d$$
$$\text{field of view} = 2 \cdot \tan^{-1}(\text{swath width} / 2 / d)$$

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### Questions

What is the advantage of using *field of view* and *instantaneous field of view*?

How far do you have to position the camera away from the target to achieve a *pixel size* of 30cm?

What *swath width* do you get?

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