
PHY 499S
EARTH OBSERVATIONS FROM SPACE
Spring Term, 2005
COURSE OUTLINE and REFERENCES

1. Introduction

2. Satellite Orbits

- 2.1 orbital mechanics
- 2.2 co-ordinate systems
- 2.3 types of satellite orbits
- 2.4 launching, positioning, tracking, navigation
- 2.5 observational geometries

References

- *Kidder and Vonder Haar: chapter 2*
- *Stephens: chapter 1, pp. 25-30*
- *Rees: chapter 9, pp. 174-192*

3. Radiative Transfer

- 3.1 electromagnetic radiation
- 3.2 blackbody radiation
- 3.3 radiative transfer equation
- 3.4 gaseous absorption and spectroscopy
- 3.5 atmospheric scattering
- 3.6 surface reflection
- 3.7 solar radiation

References

- *Kidder and Vonder Haar: chapter 3*
- *Stephens: chapter 2, pp. 65-76; chapter 3, pp. 81-87, 99-121*
- *Liou: chapter 1; chapter 2, pp. 38-41; chapter 3, pp. 53-56, 60-63; chapter 4, pp. 87-93*
- *Lenoble: parts of chapters 1,3,5,6,17*

4. Remote Sounding

- 4.1 definitions and the inverse problem
- 4.2 active remote sensing/sounding techniques
- 4.3 passive remote sensing/sounding techniques

References

- *Stephens: chapter 1, pp. 3-11; chapter 3, pp. 123-135; parts of chapters 6,7,8*
- *Houghton, Taylor, and Rodgers: parts of chapters 1,6,7*
- *Liou: chapter 7, pp. 234-236*
- *Rees: chapter 1*
- *Lenoble: parts of chapter 22*

5. Observations of the Earth's Atmosphere

5.1 Measurements of Temperature

References

- *Kidder and Vonder Haar: chapter 6, pp. 183-196*
- *Stephens: chapter 7, pp. 356-364*
- *Houghton, Taylor, and Rodgers: chapter 5; chapter 6*
- *Liou: chapter 7, pp. 250-271, 280-285*

5.2 Measurements of Composition

References

- *Kidder and Vonder Haar: chapter 6, pp. 210-218*
- *Stephens: chapter 6, pp. 271-278, 294-298, 302-304; chapter 7, pp. 328-331, 356-364*
- *Houghton, Taylor, and Rodgers: chapter 10*
- *Liou: chapter 7, pp. 236-242, 246-250*
- *Lenoble: chapter 23, pp. 454-461; chapter 24, chapter 25, pp. 490-498*

5.3 Measurements of Clouds, Aerosols, and Precipitation

References

- *Kidder and Vonder Haar: chapter 5, pp. 145-154; parts of chapters 8, 9*
- *Stephens: chapter 6, pp. 261-271; chapter 7, pp. 347-355, 368-385; parts of chapter 8*
- *Houghton, Taylor, and Rodgers: chapter 3; chapter 11*
- *Liou: chapter 7, pp. 285-289*

5.4 Measurements of Winds

References

- *Kidder and Vonder Haar: chapter 7*
- *Stephens: chapter 8, pp. 438-454*
- *Houghton, Taylor, and Rodgers: chapter 12, pp. 227-232*

If there is time...

6. Observations of the Earth's Surface

6.1 imaging techniques

6.2 non-imaging techniques

References

- *Rees: parts of chapters 4,5,6,7*
 - *Sanchez and Canton: parts of chapters 1,2,3,4,5*
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