2.5 Analysis of rover transects on the Moon

Three countries managed to bring rovers to the Moon: Russia, China, and the United States. The first fully automated rover on the Moon was Lunokhod 1 in 1970. The mission lasted nearly for one year and the rover traveled 10.5 km on the lunar surface. Lunokhod 2 was a more advanced rover that landed three years later on the lunar surface. The rover operated for 4 months and covered incredible 42 km during that time. The Chinese rover Yutu is sitting on the lunar surface since December 2013 and is still collecting useful data, but lost the ability to travel after 2 weeks of the mission. Several rover missions are planned for the Moon in the future.

Within the last 40 years rovers got more and more advanced. The Lunokhod 1 rover can hardly keep up with the instrumentation on Curiosity (Mars 2012). Higher resolution cameras, drilling equipment, and an on board laboratory are included in some rovers from today. Rovers still do not cover large areas, but they provide unique information along the rover track. The advantages for rover missions after all are the probing and in situ research on the surface to obtain results, no remote sensing method could achieve.

We will focus on the Lunokhod 2 mission. It operated from January to May 1973. The rover was maneuvered in real time by a team on Earth. They analyzed incoming imagery and sent driving commands back to the Moon. The rover was equipped with various instruments.

The position of the rover is known as it was found in LRO images by ASU (Arizona State University). The rover itself and the tracks are visible (2 white arrows) with a high resolution camera from orbit. The entire rover path over four months is also shown below.

Remote sensing images provide additional important information to the rover data.
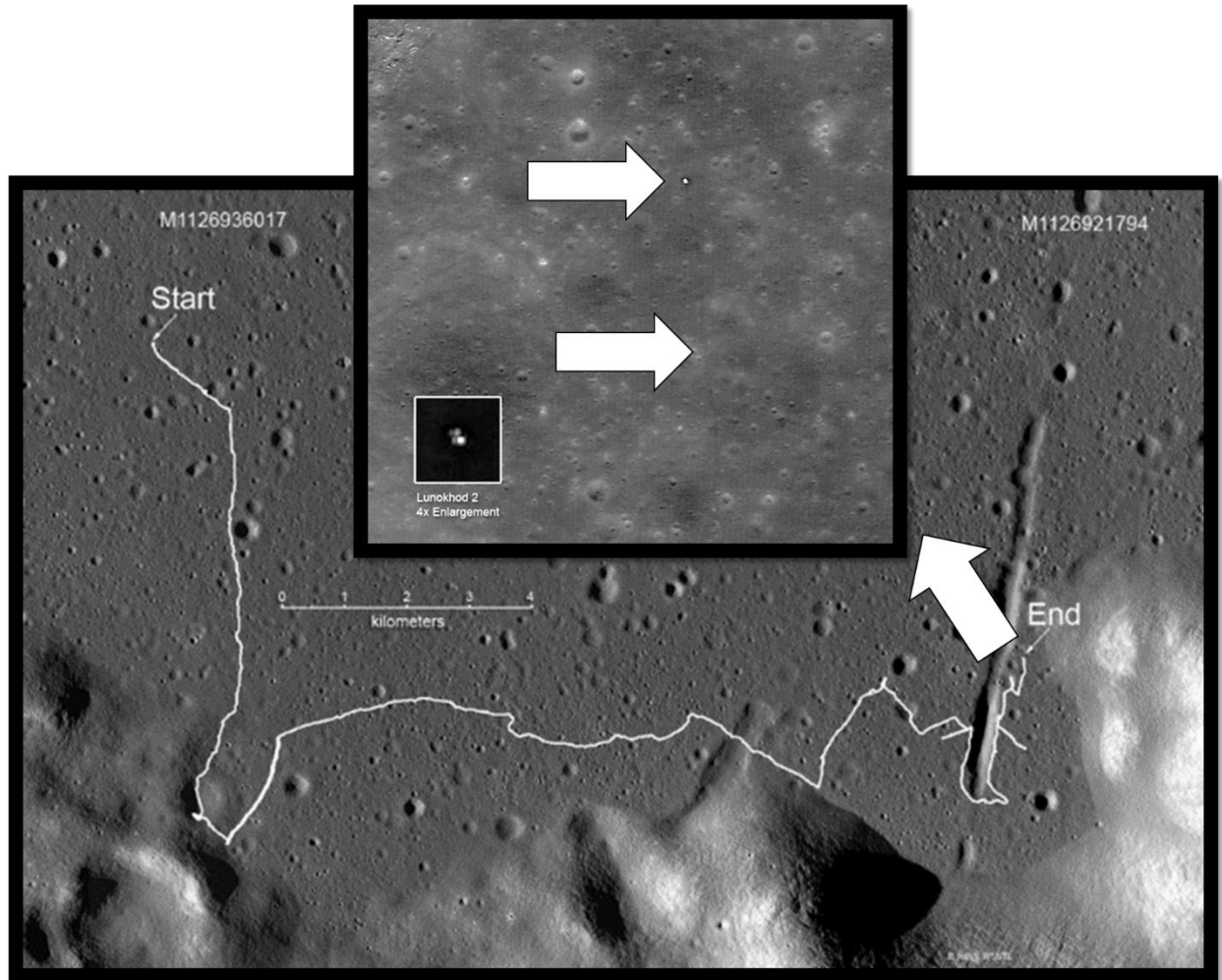
Task:
1. Study the rover images (a)-(i) and the remote sensing images (j) and (k).
   a. Describe the rover and the remote sensing images, what can be and cannot be observed?
   b. Which conclusions can be drawn from the different imaging types (remote sensing vs. rover data)?
   c. Explain the advantage of using rover data in combination with remote sensing data.

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