A document discusses a hyperspectral imaging instrument package designed to be carried aboard a helicopter. It was developed to map the depths of Greenland’s supraglacial lakes. The instrument is capable of telescopically to twice its original length, allowing it to be retracted with the door closed during take-off and landing, and manually extended in mid-flight. While extended, the instrument platform provides the attached hyperspectral imager a nadir-centered and unobstructed view of the ground.

Before flight, the instrument mount is retracted and securely strapped down to existing anchor points on the floor of the helicopter. When the helicopter reaches the destination lake, the door is opened and the instrument mount is manually extended. Power to the instrument package is turned on, and the data acquisition computer is commanded via a serial cable from an onboard user-operated laptop to begin data collection. After data collection is complete, the instrument package is powered down and the mount retracted, allowing the door to be closed in preparation for landing.

The present design for the instrument mount consists of a three-segment telescoping cantilever to allow for a sufficient extended length to see around the landing struts and provide a nadir-centered and unobstructed field of view for the hyperspectral imager. This instrument works on the premise that water preferentially absorbs light with longer wavelengths on the red side of the visible spectrum. This property can be exploited in order to remotely determine the depths of bodies of pure freshwater. An imager flying over such a lake receives light scattered from the surface, the bulk of the water column, and from the lake bottom. The strength of absorption of longer-wavelength light depends on the depth of the water column. Through calibration with in situ measurements of the water depths, a depth-determining algorithm may be developed to determine lake depth from these spectral properties of the reflected sunlight.

This work was done by Alberto E. Behar and Moogega Cooper of Caltech; John Adler of NOAA; and Tobias Jacobson of the University of Southern California for NASA’s Jet Propulsion Laboratory. Further information is contained in a TSP (see page 1). NPO-48141