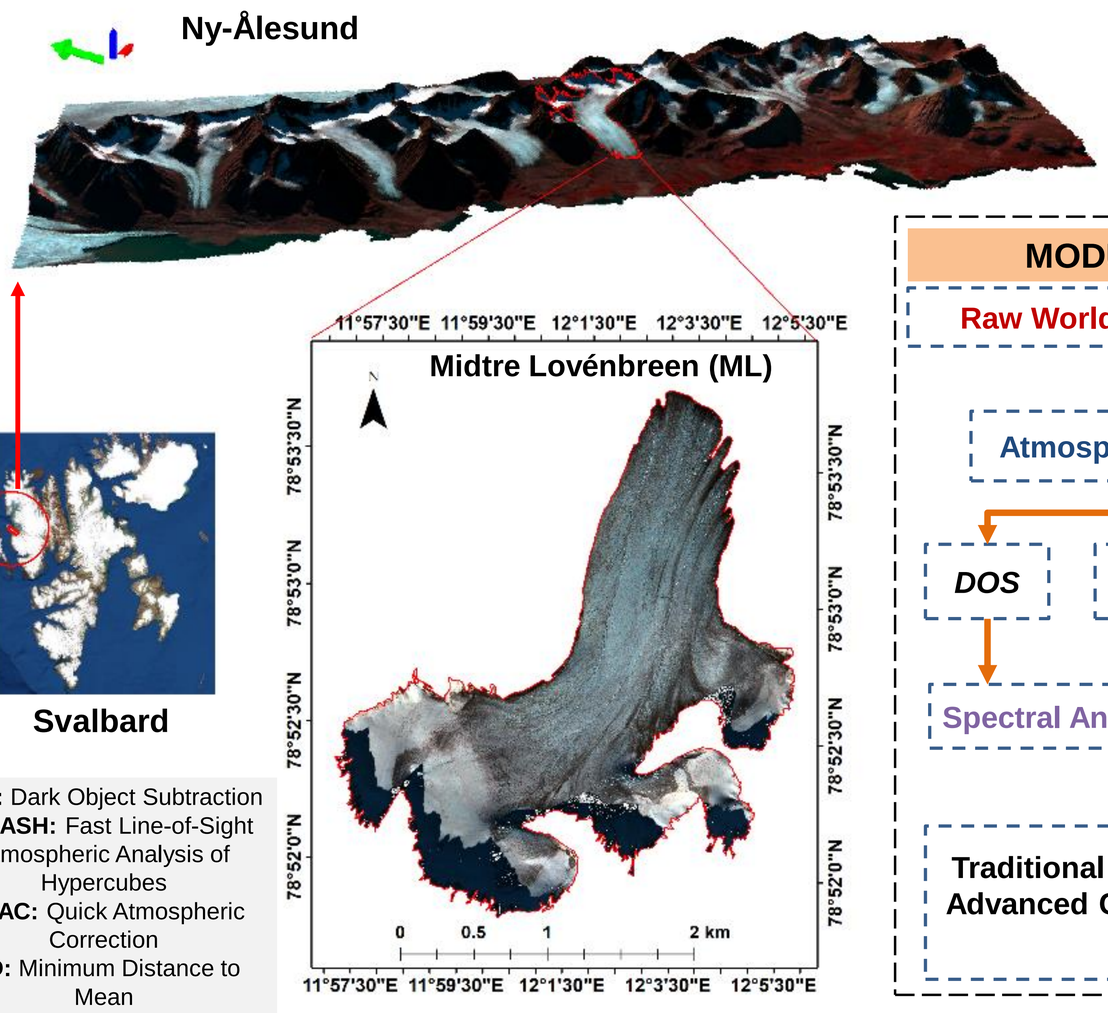
EFFECT OF ATMOSPHERIC CORRECTIONS ON THE SPECTRAL REFLECTANCE AND MAPPING OF GLACIER SURFACE FACIES

Sagar F. Wankhede[1], Keshava Balakrishna[1], Alvarinho J. Luis[2], Shridhar D. Jawak[3]

[1]Dept. of Civil Engineering, Manipal Institute of Technology, Manipal Academy of Higher Education, Manipal 576104, Karnataka, India
[2]National Centre for Polar and Ocean Research (NCPOR), Vasco-da-Gama 403804, Goa, India
[3]Svalbard Integrated Arctic Earth Observing System (SIOS), SIOS Knowledge Centre, Svalbard Science Centre, 9171 Longyearbyen, Svalbard, Norway

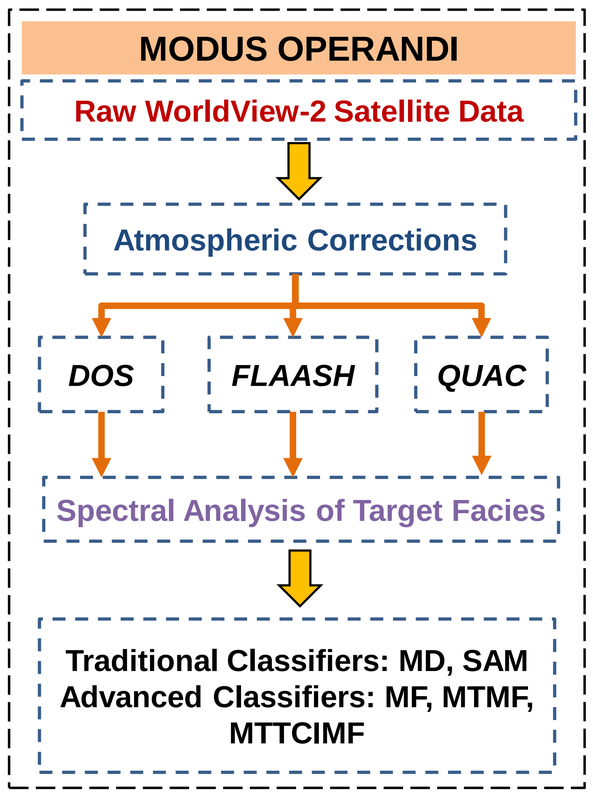
THEORETICAL GIST

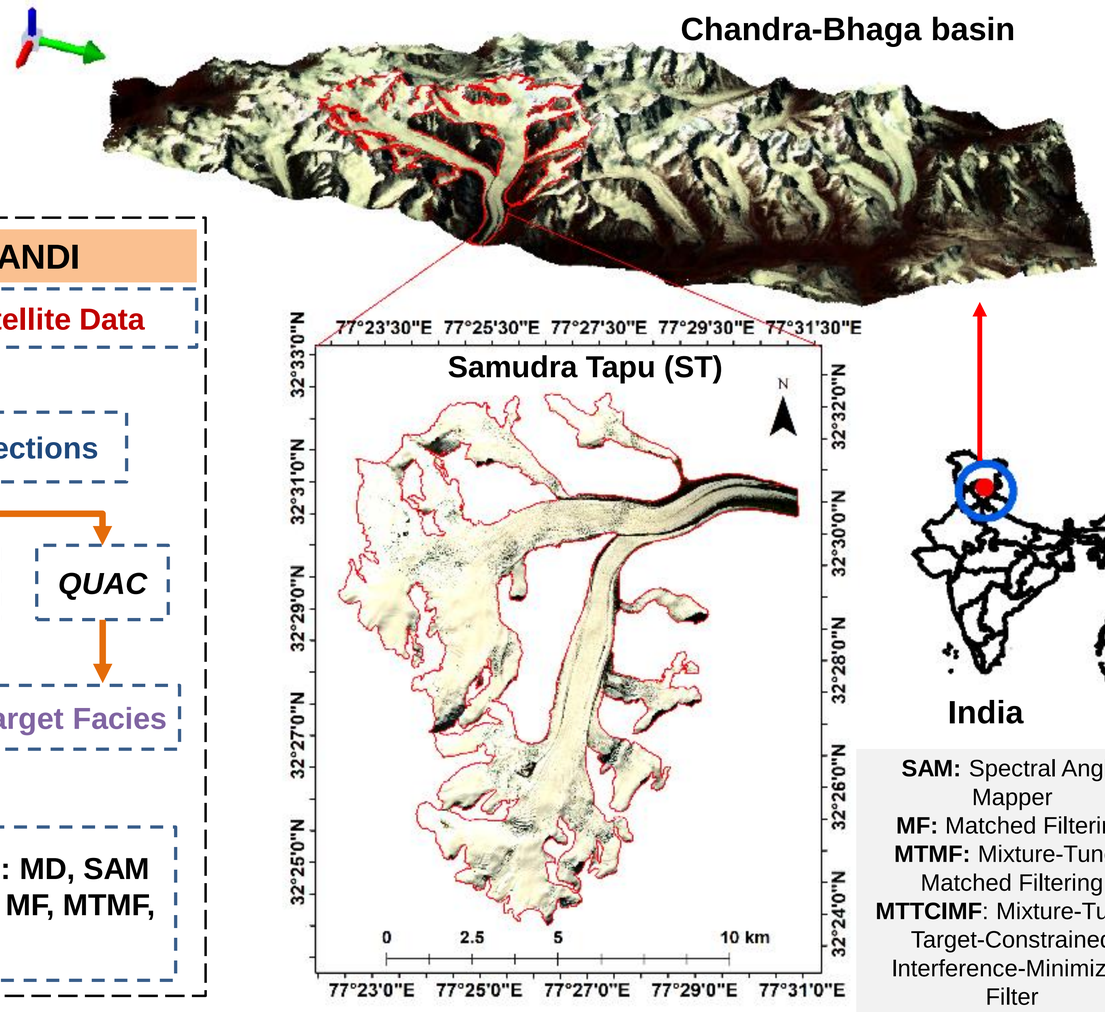
Categorization of **glacier surface facies** using optical satellite imagery relies upon the matching between **derived reflectance patterns** and known spectral responses. Thus, calibration and **atmospheric correction** of satellite data is crucial. However, the impact that different atmospheric correction models have on the **reflectance of facies** is not examined. The current study discusses the consequences of popular atmospheric correction models on **supervised methods** of information extraction using **very high-resolution WorldView-2 satellite data**.



DOS: Dark Object Subtraction
FLAASH: Fast Line-of-Sight Atmospheric Analysis of Hypercubes
QUAC: Quick Atmospheric Correction
MD: Minimum Distance to Mean

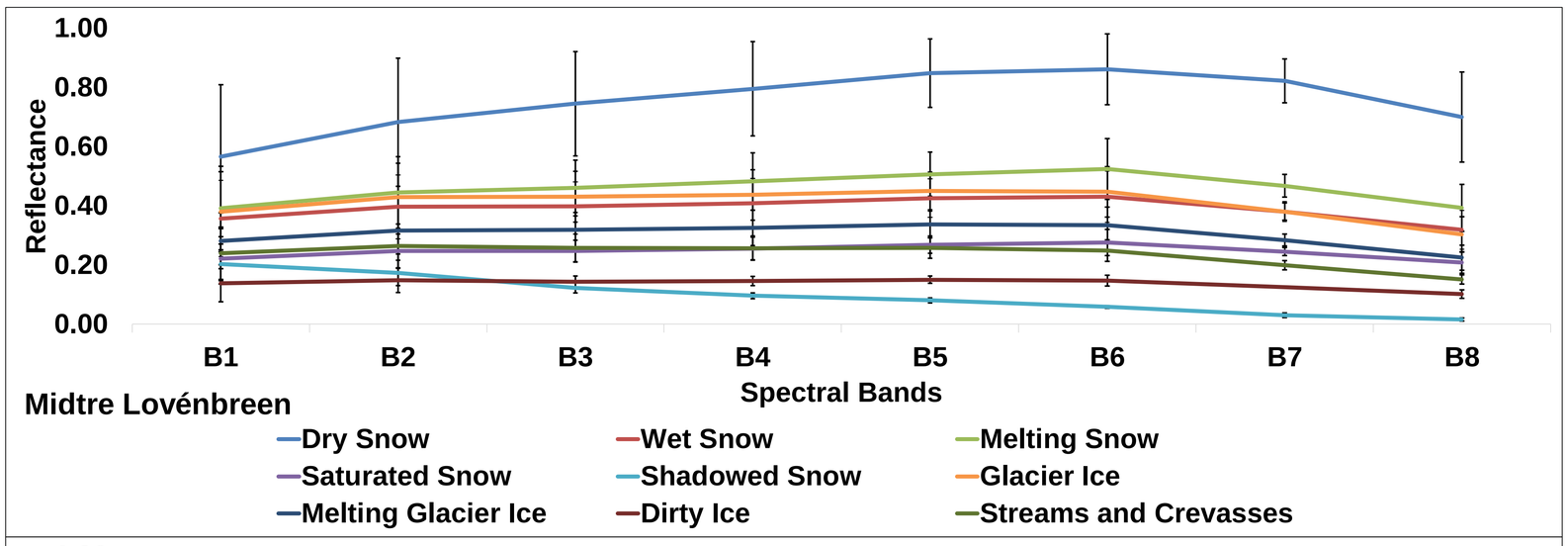
MODUS OPERANDI

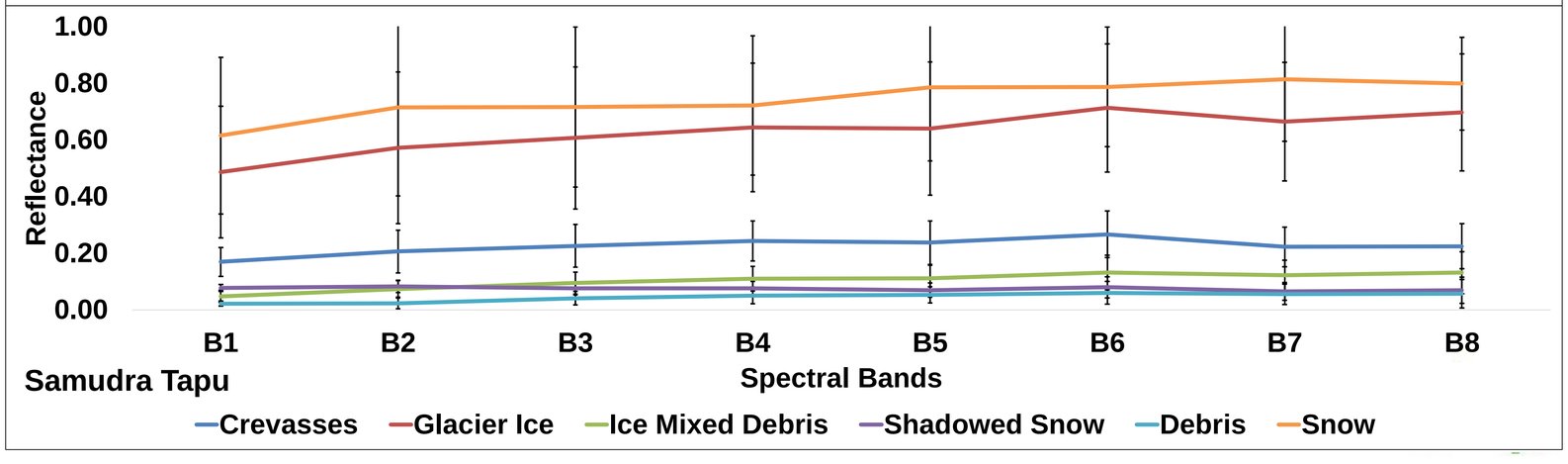




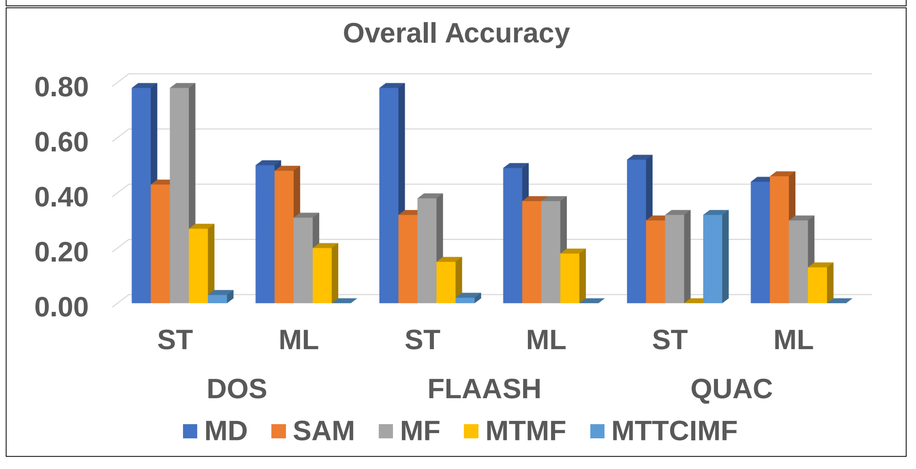
SAM: Spectral Angle Mapper
MF: Matched Filtering
MTMF: Mixture-Tuned Matched Filtering
MTTCIMF: Mixture-Tuned Target-Constrained Interference-Minimized Filter

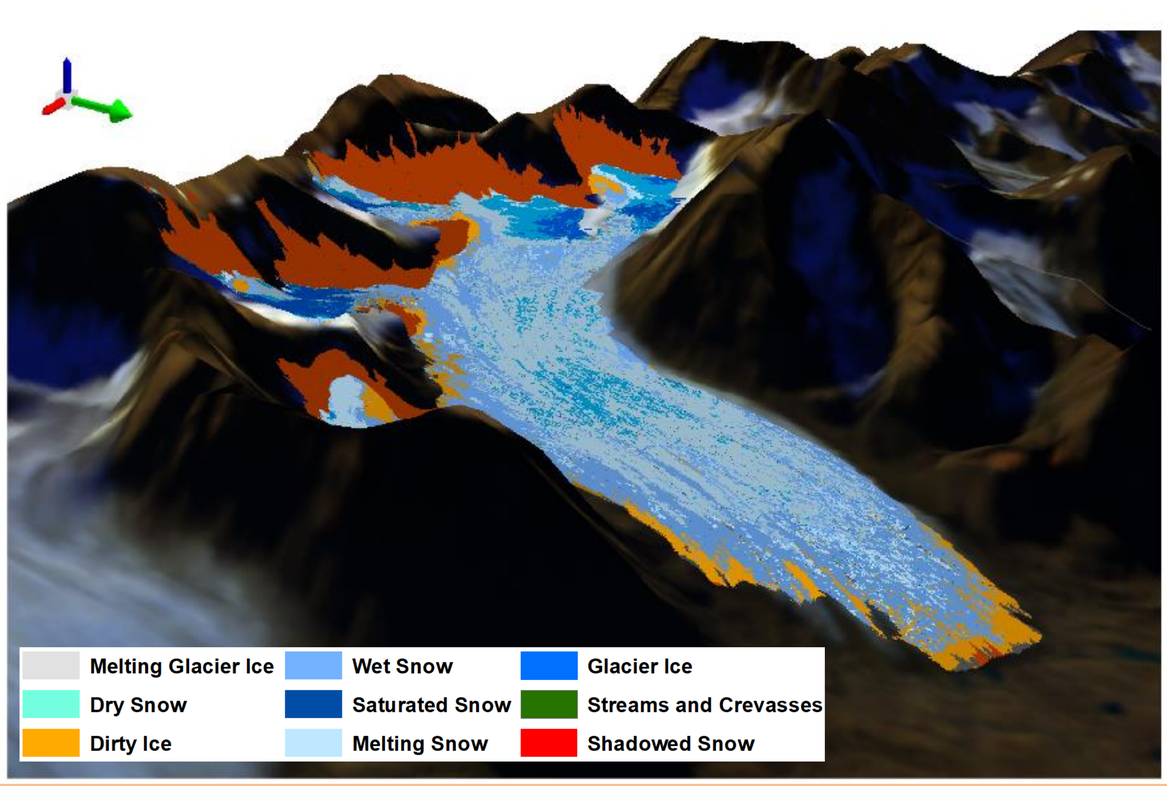
Variations in Spectral Signatures

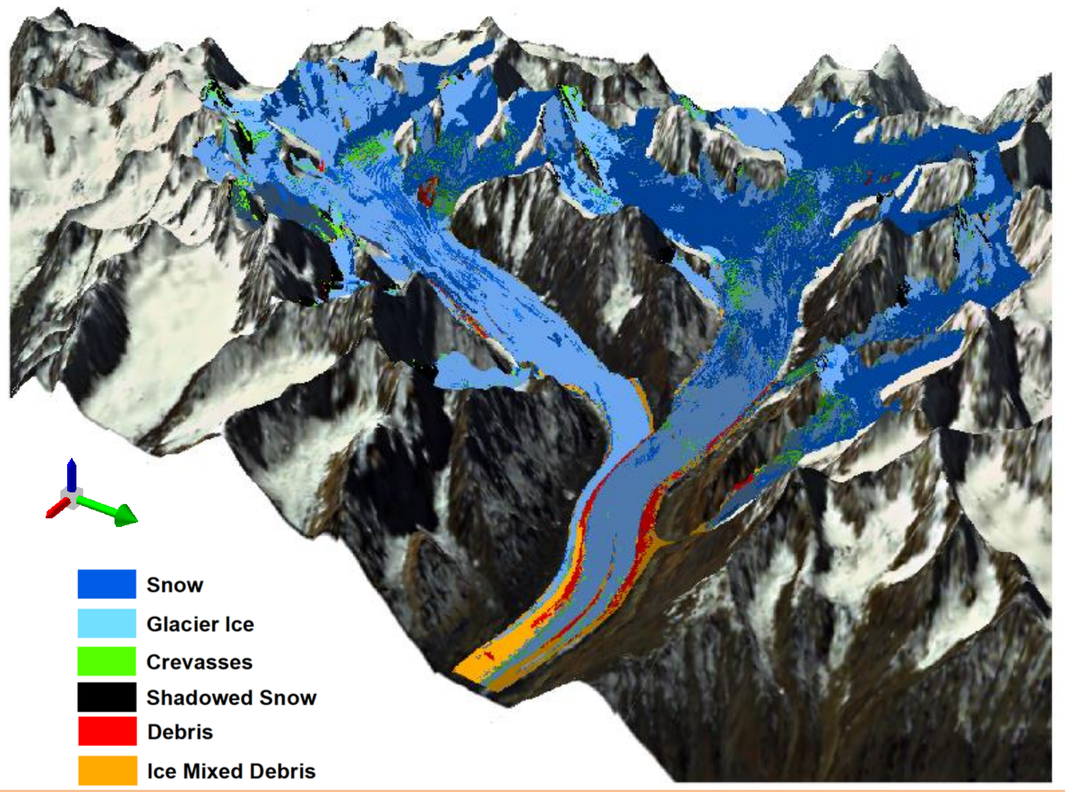




Performance of Tested Methods







Take Home Message!

Accuracy measures indicate that MD delivers the lowest error rates of 0.61 (Himalaya) and 0.68 (Ny-Ålesund). MTTCIMF is the worst performer with error rates of 0.82 for Himalayan facies and 0.91 for Ny-Ålesund. Variations in spectra suggest that for all atmospheric corrections, the coastal band (band 1) displays maximum variation in reflectance patterns for all facies across both study regions. Reliability order of the atmospheric corrections is FLAASH > QUAC > DOS. The current results present an effective analysis to determine the applicability of image processing methodologies and are comparable with medium resolution satellite data for regional mapping of facies.