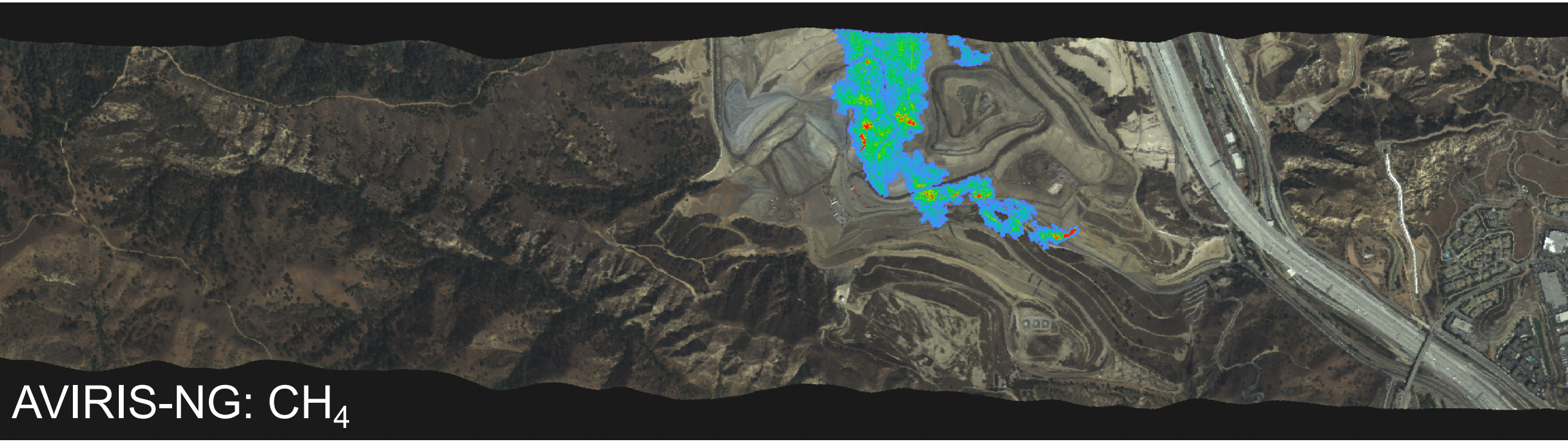
Mapping methane and carbon dioxide point source emissions with spaceborne imaging spectrometers



Thorpe, A.K.[1], Duren, R.M.[1], Frankenberg, C.[1,2], Dennison, P.E.[3], Ayasse, A.K.[4], Foote, M.D.[3], Cusworth, D.H.[1], Jongaramrungruang, S.[2], Thompson, D.R.[1], Joshi, S.[3] , Roberts, D.A.[4], Green, R.O.[1], Miller, C.E.[1], and others

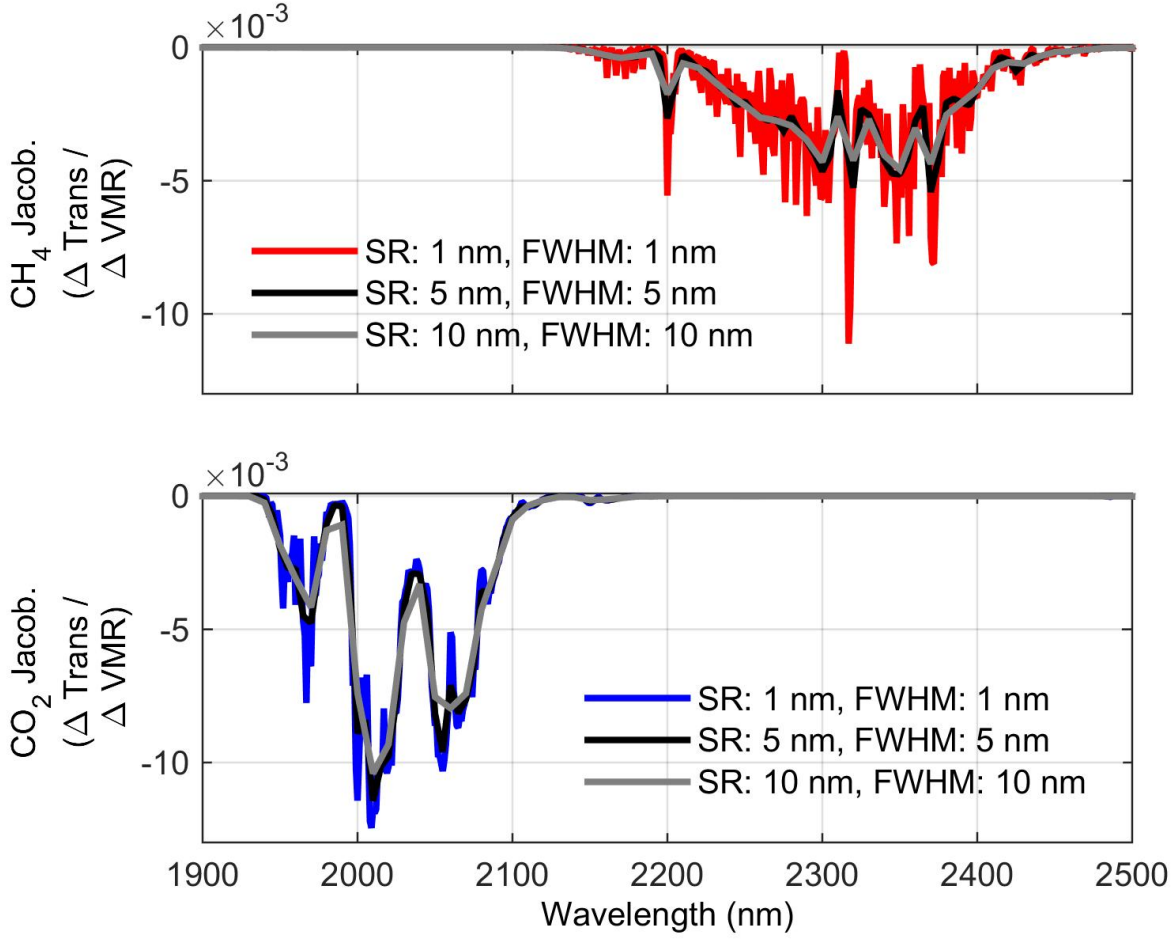
[1] Jet Propulsion Laboratory, California Institute of Technology, Pasadena, California, United States

[2] California Institute of Technology, Pasadena, California, United States

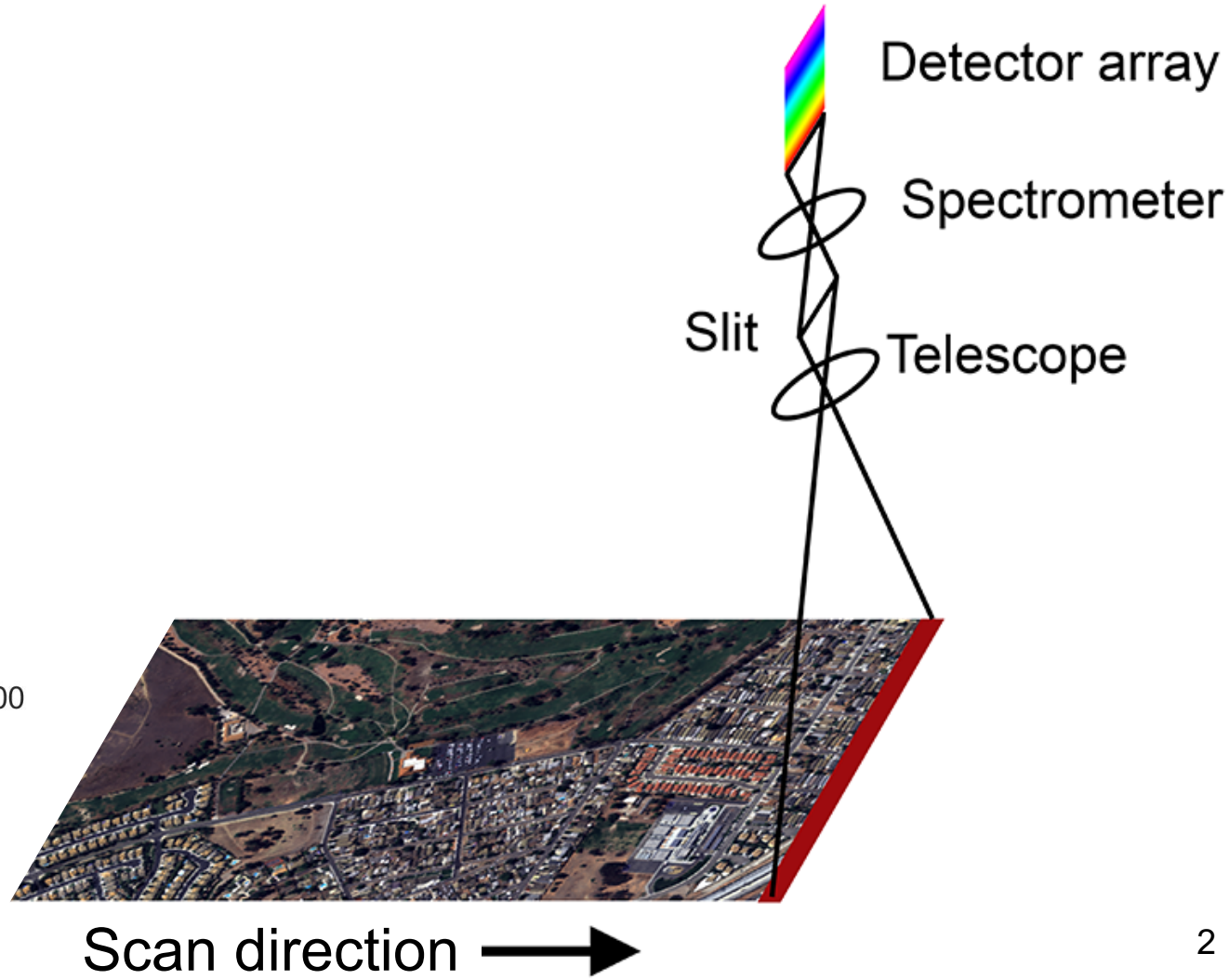
[3] University of Utah, Salt Lake City, Utah, United States

[4] University of California, Santa Barbara, Santa Barbara, California, United States

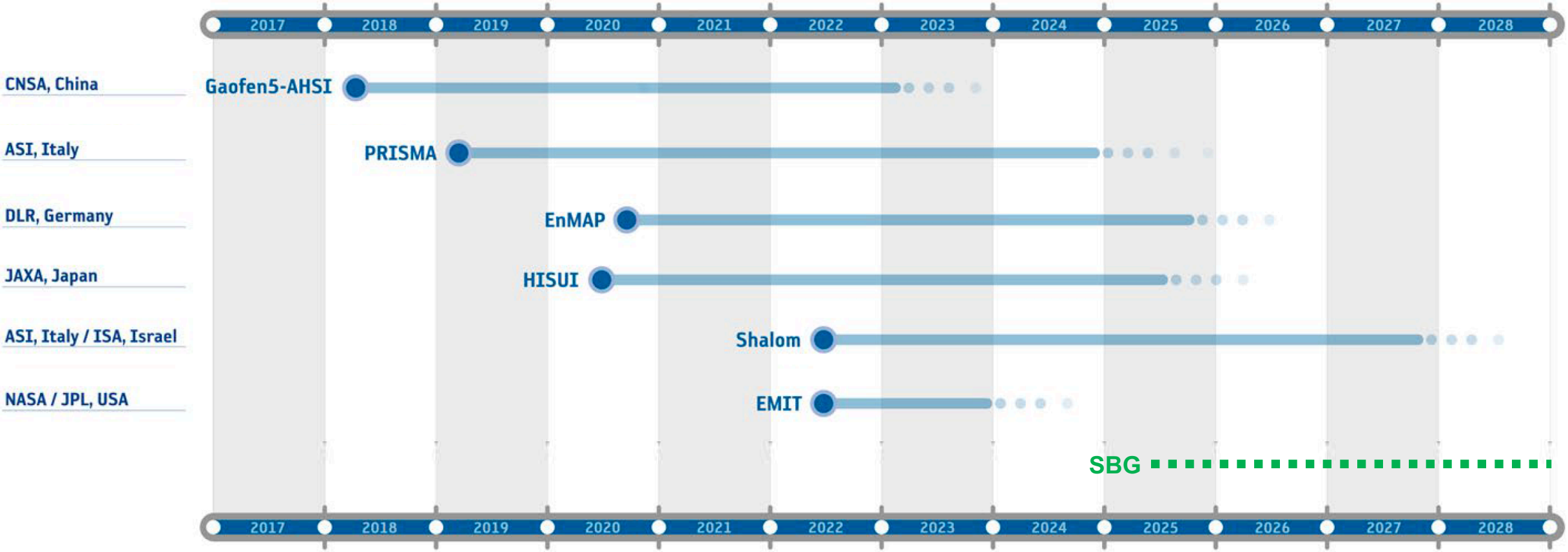
CH_4 and CO_2 sensitivity of imaging spectrometers



(Thorpe et al., 2017)

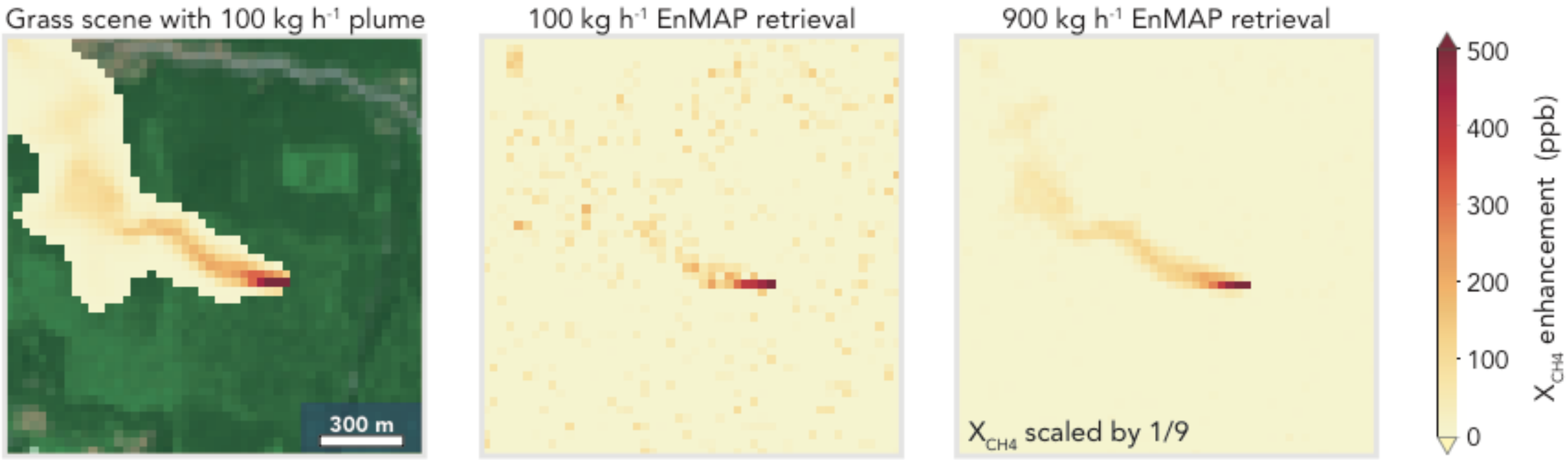


Potential for spaceborne imaging spectrometers



Modified from Rast & Painter (2019)

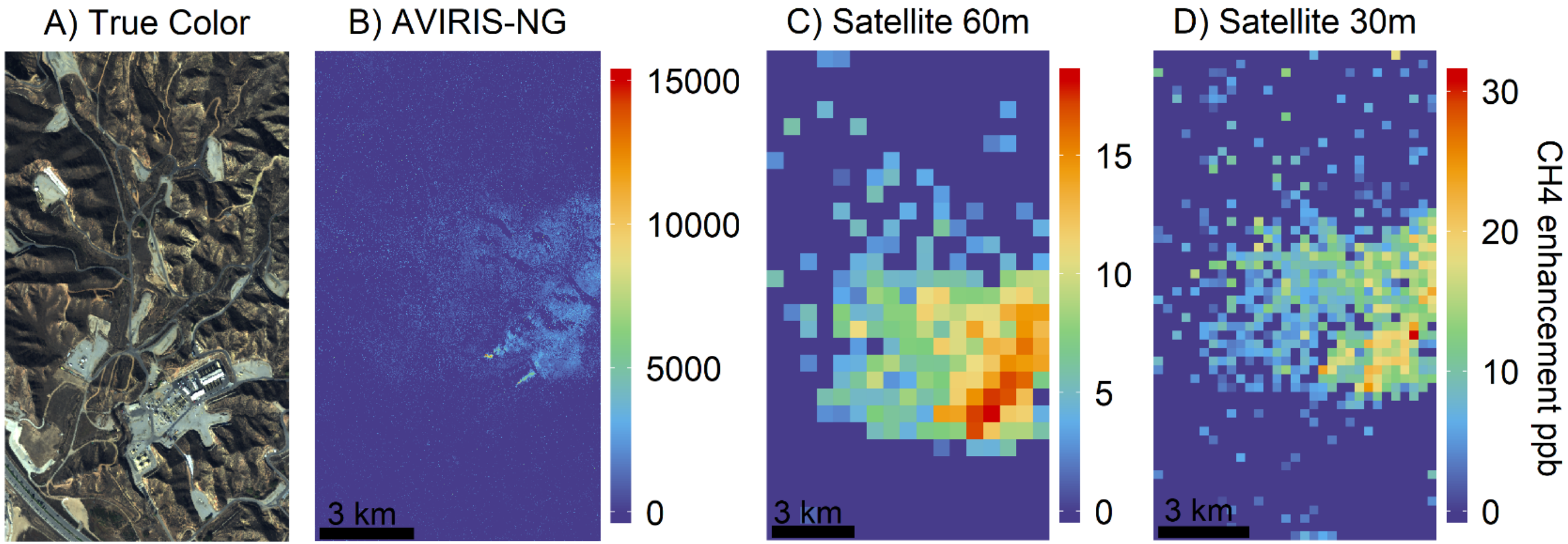
CH_4 sensitivity study (ENMAP focus)



Atmospheric Measurement Techniques Discussions
Open Access
EGU

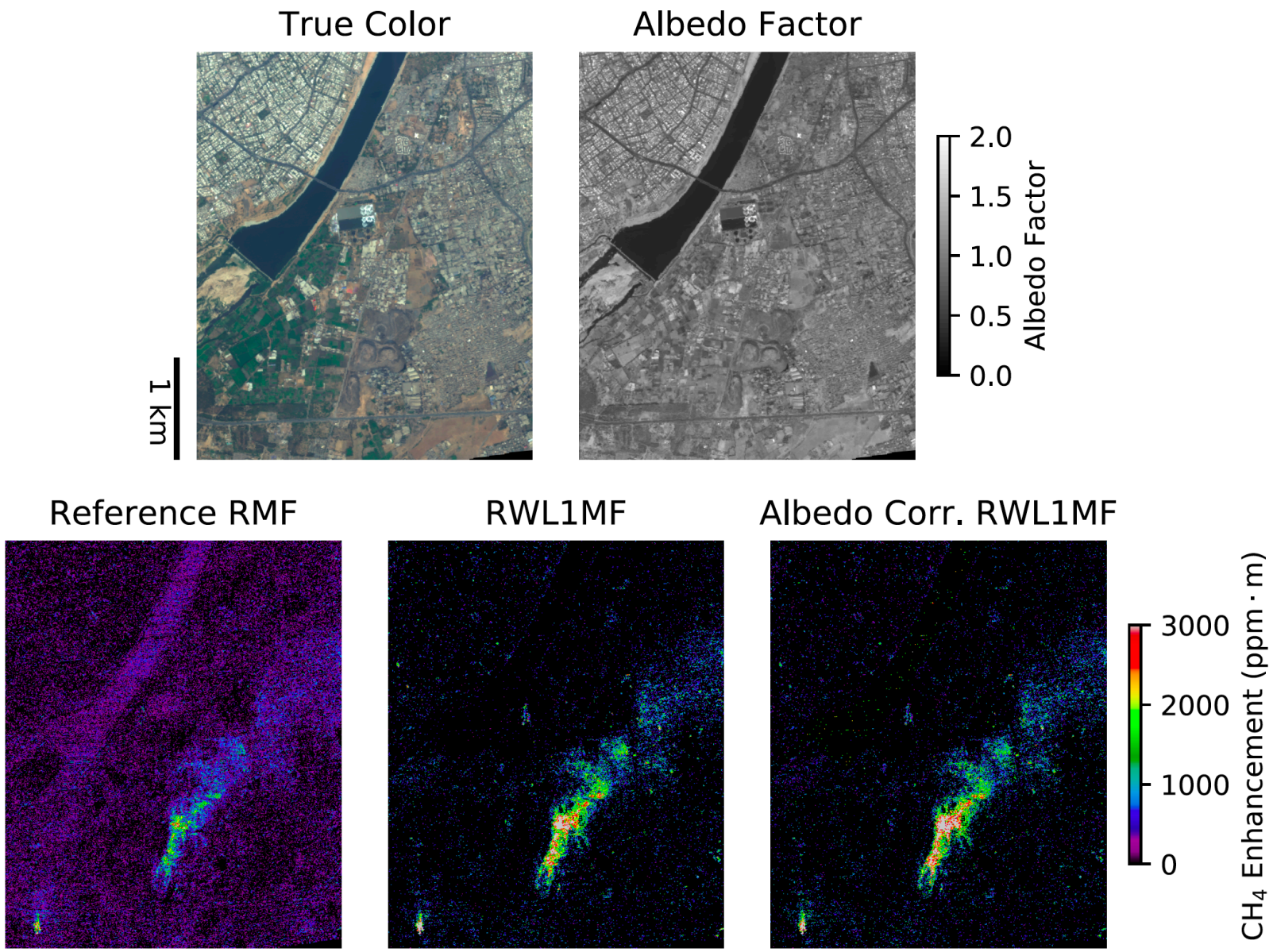
Cusworth, D., Jacob, D., Varon, D., Miller, C.C., Lu, X., Chance, K., Thorpe, A., Duren, R., Miller, C., Thompson, D., Frankenberg, C., Guanter, L., Randles, C., Potential of next-generation imaging spectrometers to detect and quantify methane point sources from space, *Atmospheric Measurement Techniques Discussions*, **in review**, 2019.

CH_4 sensitivity study (EMIT focus)



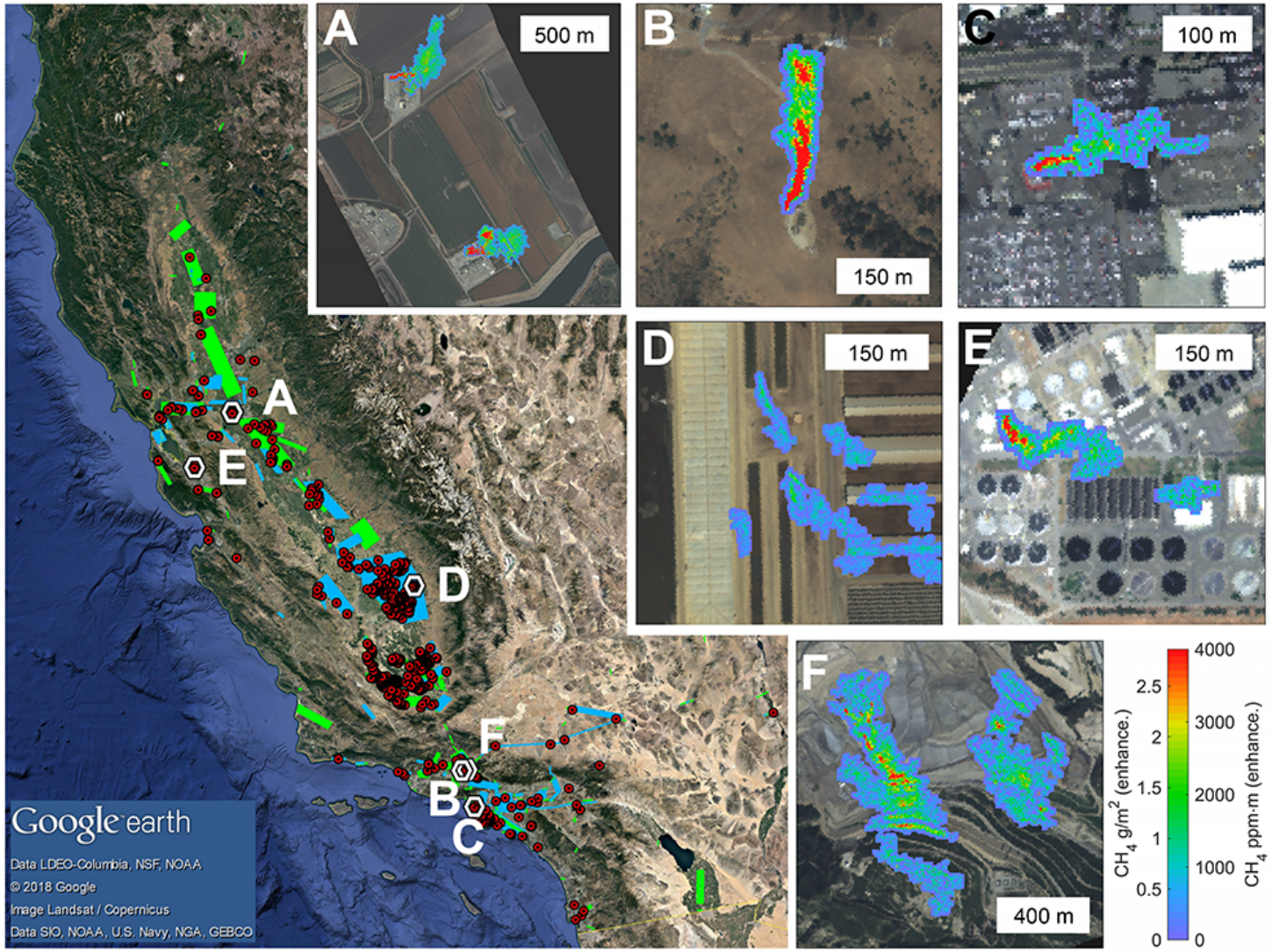
Alana Ayasse poster: Potential for mapping point source methane emissions with satellite VSWIR imaging spectrometers.

Improving retrieval algorithms



Foot, M., Dennison, P., Thorpe, A., Thompson, D., Jongaramrungruang, S., Frankenberg, C., Joshi, S. Fast and accurate retrieval of point-source methane emissions from imaging spectrometer data using sparsity prior. *Remote Sensing of Environment*, **in review**, 2019.

California Baseline Methane Survey

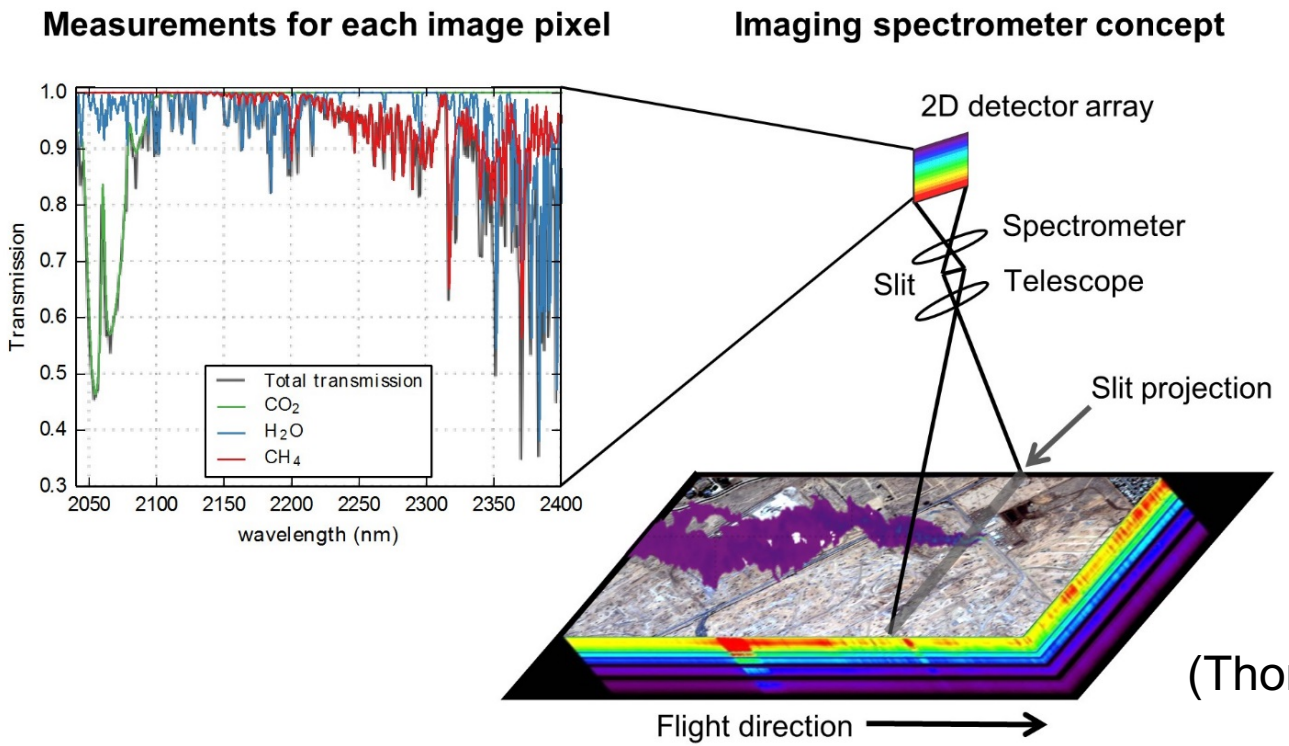


(Duren et al., in revision)

Dedicated imaging spectrometers for gas mapping

Decadal Survey Earth System Explorer for Greenhouse Gases category:

"Low Earth Orbit observation of [CH4 and CO2] plumes from point sources using SWIR spectrometers with very high spatial resolution (less than 50 m) over limited viewing domains." (NRC, 2018)



(Thorpe et al., 2016)