HICO Data User Agreement
Between the
Naval Research Laboratory
And
The HICO Data User Principal Investigator

Issued on: Data fusion provided by different sensors for water quality monitoring on coastal zones, application to south-eastern cost of France

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Proposal:

Title: Fusion of data provided by different sensors for water quality monitoring on coastal zones, application to south-eastern coast of France

Abstract/project summary (approximately 200 word overview of the project)

We need to compare image fusion methods for coastal zone applications. The best fusion will be applied to future sensor images like Sentinel 2 and 3. Because these images are not available yet, we need to simulate them. HICO will then be used to simulate these input images. Owing to the good spatial and spectral resolutions provided by the HICO images, we can degrade spatially and spectrally to obtain the 2 input images. After the fusion between those 2 images, we will be able to validate and compare different fusion methods because we will also have the reference image that would be obtained by a high spectral and spatial resolution sensor (hypothetic). By this way, we do not have to deal with neither the difference of illumination nor atmospheric effect because images used are provided by the same sensor. For the same reason, we also avoid any problem due to registration process. The quality of the fusion will be evaluated by the mean of statistical parameters but also by the mean of the estimation of bio-physical parameters (chlorophyll, suspended matter, yellow substance concentrations) or the generation of maps (bathymetry and seabed) in the coastal area of Provence Alps Cote d'Azur.

1. **Statement of work/project description, background, state of the field, what HICO data are requested and how the data are useful to the proposer**

For the moment, fusion methods were coded and tested on Hyperion images on Marseille (south of France). But these images are noisy in the blue bands and are not corrected from the atmospheric effect. We then are searching HICO images in reflectance on the south-eastern of France (see coordinates below), but if no image is available on this site, other images (in reflectance) on a coastal areas could be used.

Data area: Provence Alps Cote d'Azur (coastal area)
Up left corner: lat : 43°46', long : 5°16'
Down left corner: lat : 42°58', long : 5°16'
Down right corner: lat : 42°58', long : 7°30'
Up right corner: lat : 43°46', long : 7°30'

2. **Biographical sketch and available facilities**

A. Minghelli-Roman, PhD. is an Associate professor in Image Processing at the Engineering School ISITV, University of Toulon, France. She has been working on image simulation of future sensors (MeRIS, geostationary sensor). She developed many applications on coastal zones area (bathymetry, anoxic crisis survey, seabed mapping). She also works on image fusion and on the optimization of spatial and spectral image resolutions for future missions.

Diogone Sylla, a PhD. Student supervised by A. Minghelli-Roman, is working on the fusion of multispectral and hyperspectral images. His PhD. is co-funded by the Provence Alps Cote d'Azur Region and ACRI-ST(Antoine Mangin). During his first year, he developed 6 methods that he needs now to validate with HICO images. These methods are HSV, PCA, ARSIS adapted to multispectral images.

3 . Output and deliverables

The results of the fusion methods will be published in international journals. The resulting images will also be available. The results will also be presented at the annual team meeting of HICO.

4 . References

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