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Technical Note

Toward a standard nomenclature for imagery spatial resolution

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Currently, the remote sensing community uses vague and ambiguous adjectives to relay the resolution of remote sensing imagery. This short technical note proposes a nomenclature based on metric units of the metre as a way to standardize the description of satellite imagery spatial resolution.

When considering the suite of remote sensing imagery available today, there is a significant range of spatial, spectral, temporal and radiometric resolutions from which to choose. While there are good reasons to consider each issue carefully, this short note addresses the relatively simple issue of a naming convention for spatial resolution.

One does not have to spend much time in the remote sensing community to learn that our method for describing the spatial resolution of satellite or airborne imagery is not very precise. We generally use adjectives that are, more or less, subjective and relevant to the discipline or application. For example, we use terms such as 'moderate', 'high' or even 'hyper' to describe a given image resolution. Indeed, there is the Moderate Resolution Imaging Spectroradiometer (MODIS) with a spatial resolution of 250 to 1000 m (depending on the spectral band); while there is the U.S. National Land Imaging Program that defines moderate resolution as 5–120 m (Future of Land Imaging Working Group 2007).

Clearly, the most informative practice is to state the specific resolution of a given image. However, in some cases there is a need for generality in describing a group or class of sensors. In such cases, when it is not possible to give a specific resolution, it would be useful to have a more standardized method for summarizing spatial resolution.

One option is to utilize the International System of Units (SI) prefixes for distance measures (http://www.bipm.org/en/si/si_brochure/chapter3/prefixes.html). This concept is presented in table 1. For example, we could say that MODIS is a hecto-resolution sensor while the US National Land Imaging Program focuses on unit resolution to deca-resolution sensors. Table 1 divides what is really a continuous scale into arbitrary regions as a practical matter of convenience, and the boundaries are probably best interpreted as approximate, rather than precise categories. However, the nomenclature presented in table 1 would avoid ambiguity of using subjective adjectives and place the remote sensing community's description of spatial resolution in the context of standard scientific units.

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Table 1. An SI-based nomenclature to describe image resolution.

SI unit equivalent	Number of metres	Resolution nomenclature	Approximate resolution range	Example
megametre (Mm)	1 Mm = 1 000 000 m	mega-resolution (Mmr)	On the order of 10° latitude; from 100 to > 1000 km	Climate modelling grids
kilometre (km)	1 km = 1000 m	kilo-resolution (kmr)	1–100 km	AVHRR, GOES imager
hectometre (hm)	1 hm = 100 m	hecto-resolution (hmr)	100–1000 m	MODIS, MERIS land products
decametre (dam)	1 dam = 10 m	deca-resolution (damr)	10–100 m	AWiFS, ETM+
metre (m)		unit resolution (mr)	1 to 10 m	IKONOS
decimetre (dm)	1 dm = 0.1 m	deci-resolution (dmr)	0.1 to 1 m	QuickBird Panchromatic band
centimetre (cm)	1 cm = 0.01 m	centi-resolution (cmr)	0.01 to 0.1 m	Airborne imagery

AVHRR, Advanced Very High Resolution Radiometer; GOES, Geostationary Operational Environmental Satellite; MODIS, Moderate Resolution Imaging Spectroradiometer; MERIS, Medium Resolution Imaging Spectrometer; AWiFS, Advanced Wide Field Sensor; ETM+, Enhanced Thematic Mapper Plus.
Details on the five sensors are provided at: http://www.wmo.int/pages/prog/sat/Instruments_and_missions/Instruments.html.
For details on IKONOS, see http://www.GeoEye.com/Ikonos.
For details on QuickBird, see http://www.digitalglobe.com/.

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