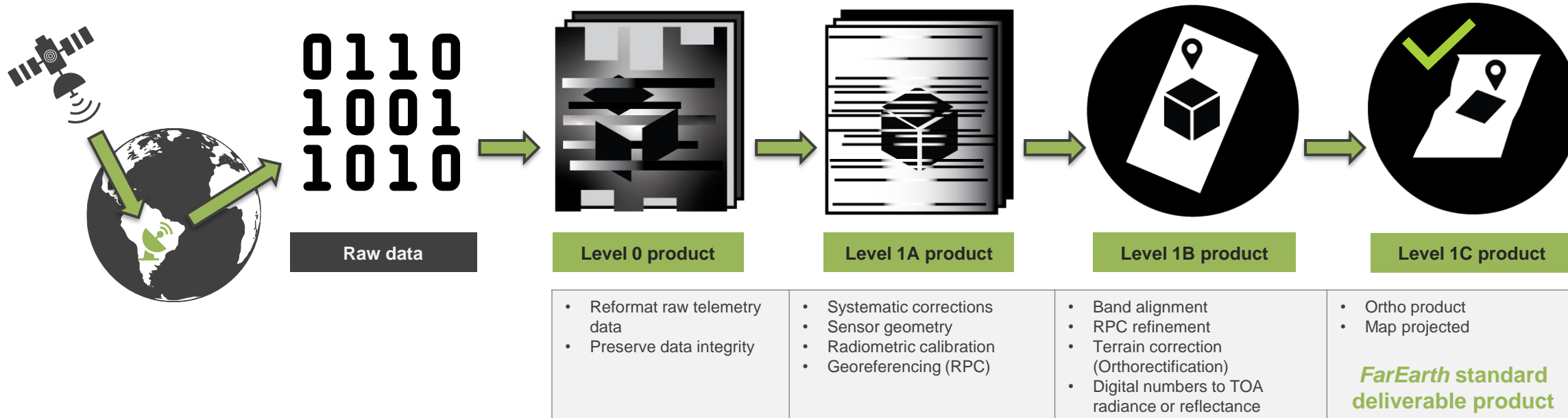# FarEarth for SmallSats
Product level definitions

Small satellite image data received from a ground segment undergoes multiple processing stages to produce usable image data products. Each stage provides products with varying amounts of data manipulation and advancement toward a usable image.

Note: Pinkmatter uses the following definition for the product levels.

The processing level and output data formats can be tailored to operational requirements.

Raw data → **Level 0 product** → **Level 1A product** → **Level 1B product** → **Level 1C product**

Level 0 product	Level 1A product	Level 1B product	Level 1C product
• Reformat raw telemetry data • Preserve data integrity	• Systematic corrections • Sensor geometry • Radiometric calibration • Georeferencing (RPC)	• Band alignment • RPC refinement • Terrain correction (Orthorectification) • Digital numbers to TOA radiance or reflectance	• Ortho product • Map projected *FarEarth* **standard deliverable product**

Product level definitions

FarEarth standard deliverable product

Level 0 product	Level 1A product	Level 1B product	Level 1C
• Image and ancillary data, such as attitude, ephemeris, scanline times, temperature, etc., from raw telemetry • Data integrity preserved • Pixels in DNs • For archive and internal processing **Processing includes** • Communication artefacts eliminated • Extraction of imagery and ancillary information from raw telemetry data • Any sensor-specific requirements **Product format** • HDF5 file containing telemetry and ancillary data	• RPC files • Conversion coefficients for at-sensor radiometric units per band • For archive and internal processing • Unprojected imagery **Processing includes** • Refine, update, and populate metadata • Identification of transmission errors and defective detector artefacts • Refined ancillary data • Radiometric calibration • Geometric modelling • Geolocation (RPC) **Product format** • GeoTIFF image per band • RPC file and metadata in GeoJSON	• Band-aligned • Refined RPC model (Orthorectification) • For archive, internal processing, and advanced use cases • Unprojected imagery **Processing includes** • Geometric model for band-to-band alignment • DNs converted to TOA radiance and reflectance values • RPC refinement per band (alignment, radiometric unit conversion, etc.) • Bad detector corrections • GCP collection • Ortho model generation (RPC) **Product format** • Single GeoTIFF/JP2000 image for all bands of the same resolution • RPC file and metadata in GeoJSON	• Map projected, orthorectified image data in UTM/WGS84 **Processing includes** • All corrections applied • Map projection **Product format** • Single GeoTIFF/JP2000 image for all bands of the same resolution • RPC file and metadata in GeoJSON

Note: Level 1B represents the first stage, where pixel data is modified permanently

* Rational Polynomial Coefficients (RPC)   * Ground Control Points (GCPs)   * Digital Numbers (DNs)   * Top-of-Atmosphere (TOA)