The LSST Detection and Association Pipelines

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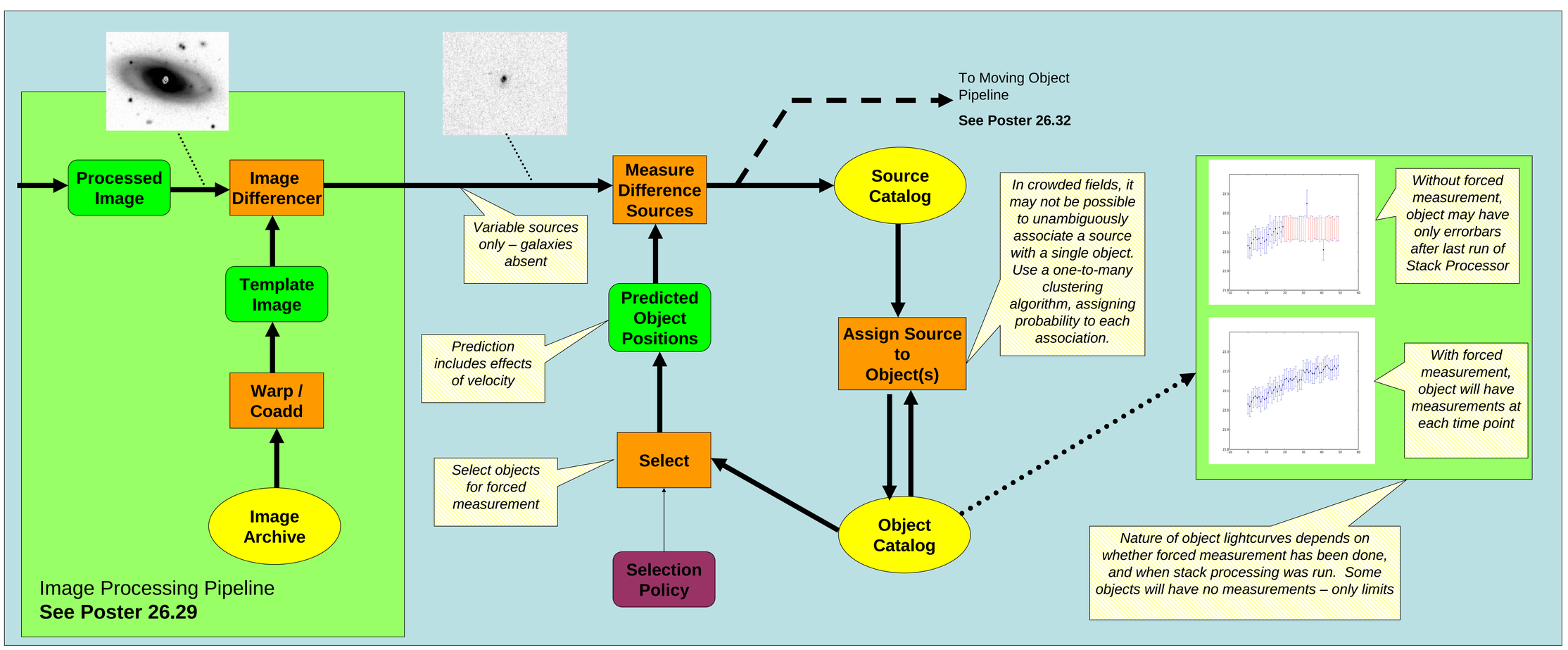
Large Synoptic Survey Telescope

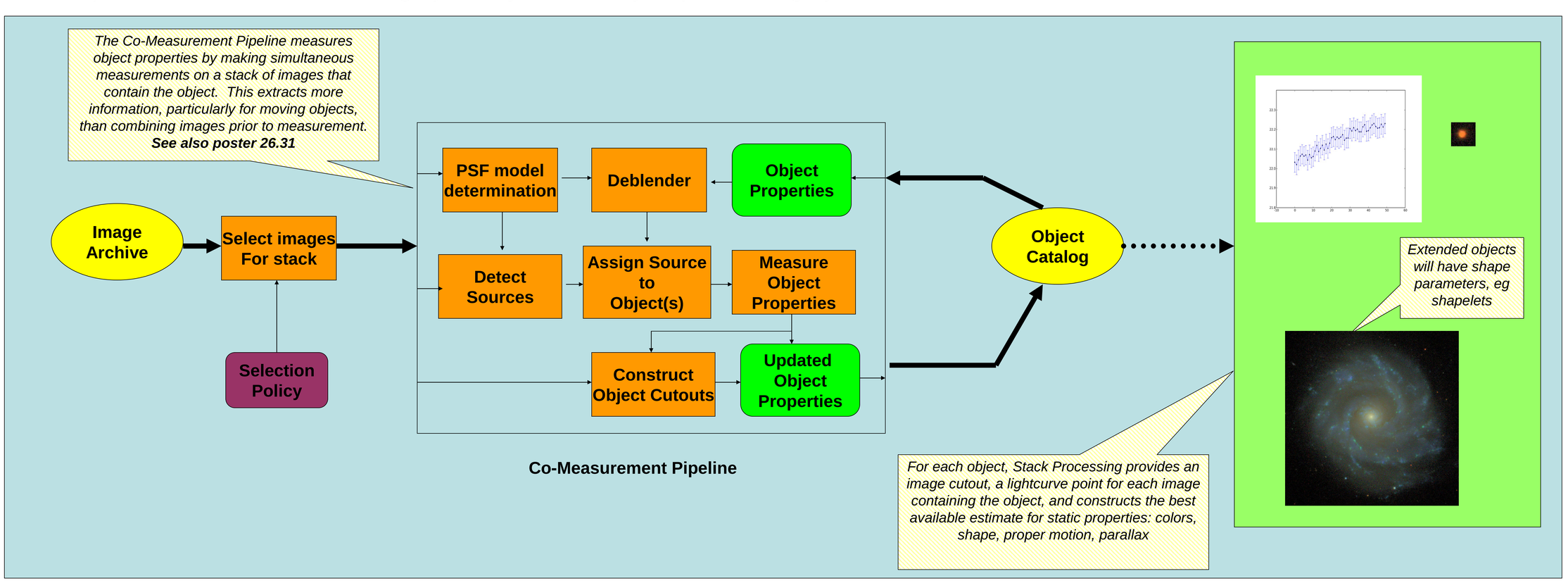
The LSST Detection Pipeline is responsible for finding and measuring sources in the stream of images delivered by the Image Processing Pipeline, producing the Source Catalog. To perform this task, it is provided with both calibrated science images and difference images created from optimized template images. Measurements on both images' sources can be made, guided by information on known object locations from the Object Catalog where appropriate. The overall goal is to be sensitive to transient and rapidly moving objects, as well as to perform measurements on previously detected objects, including those detected with good signal-to-noise in only a single filter. The Association Pipeline is responsible for producing the Object Catalog for all objects except rapid movers by associating sources detected at multiple epochs and filters, producing for each object a single data structure containing all available information. This object structure is then used by later stages of processing, such as the Classification Pipeline.

The time-domain pipelines have two modes of operation: Nightly Reduction and Stack Processing.

Every new science image is processed by the Image Processing Pipeline, and differenced from a template image.
In Nightly Reduction mode these difference images are processed to populate the Object Catalog with information on transient objects.



In Stack Processing Mode "stacks" of archived images that intersect a selected space-time volume are processed together to populate the Object Catalog with the best achievable information on object properties, including lightcurves, shapes, colors, and motions. Stacks will be processed at a cadence largely set by availability of processing cycles.



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