

# SNPP VIIRS V2 L1 and Land Reprocessing

**Updated March 20, 2019**

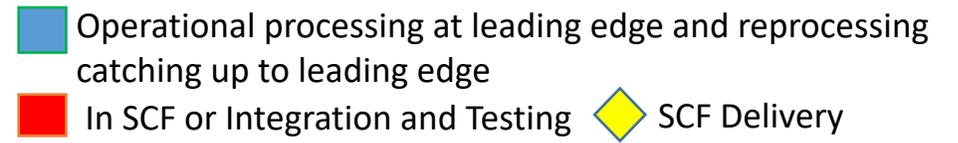
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# SNPP VIIRS V1 Product Status

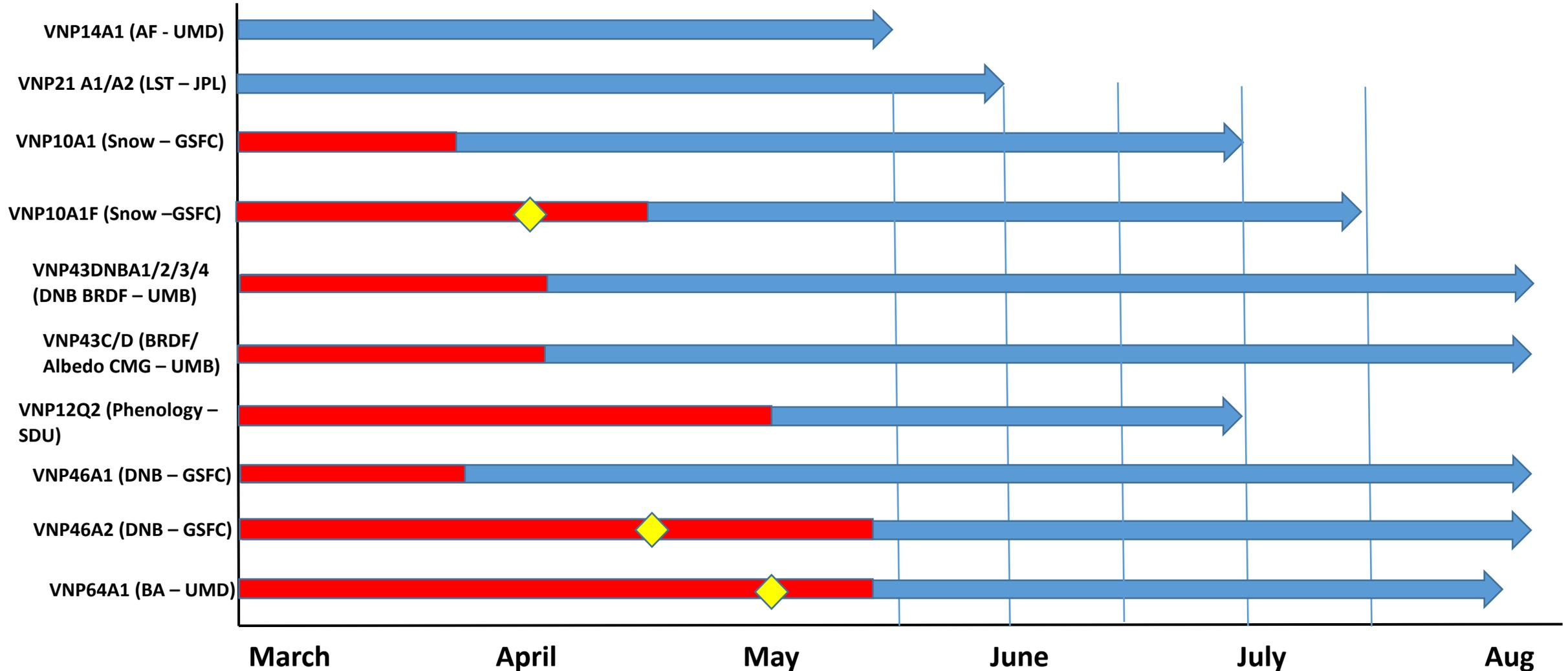
■ Operational      ■ SCF to deliver  
■ Integration Testing   ■ Not in V1

- LSR (GSFC) – VNP09, VNP09GA, VNP09A1, VNP09H1
- VI (UA/GSFC) – VNP13A1, VNP13A2, VNP13C1, VNP13C2 (C1/C2/C3 not in LAADS. Needs reprocessing to generate product and browse images)
- LAI-FPAR (BU/GSFC) – VNP15A2H
- Active Fire (UMD) – VNP14, VNP14IMG, VNP14A1 (processing of VNP14A1 in progress for years 2015 – 2017)
- BRDF-Albedo – VNP43MA1/2/3/4, VNP43IA1/2/3/4, (data push to LPDAAC for days after Aug 2, 2018 in progress), VNP43C1/2/3/4, VNP43D01 – VNP43D84, VNP43DNBA1/2/3/4
- LST – VNP21, VNP21A1D, VNP21A1N, VNP21A2 (processing in progress for years 2014 – 2017, leading edge varies for each product)
- DNB (Black Marble) – VNP46A1/A2
- Phenology – VNP12Q2
- BA – VNP64A1
- Snow – VNP10, VNP10A1, VNP10A1F, VNP10C1
- Sea-Ice – VNP29, VNP29P1D, VNP29E1D
- IST – VNP30, VNP30P1D, VNP30P1N, VNP30E1D, VNP30E1N
- MAIAC – VNP19MA1, VNP19MA2, VNP19MA3, VNP19IA1, VNP19IA2, VNP19IA3

# SNPP VIIRS V1 Product Status



VNP43C/D and VNP46A1/A2: Needs to run at ~20x to finish reprocessing in August 2019 assuming start of processing by early April.



# Proposed Changes for V2 and Beyond

Suggested Changes	Description	Level of Effort and team involvement	Recommendation
Use NASA L1B and Geolocation	<ul style="list-style-type: none"> <li>- NASA L1B and Geo are in HDF5/netCDF4 with some minor difference in SDS and QA</li> <li>- L1B SDR and Geo used in V1 are in HDF4</li> <li>- All L2 processes need to be updated to work with inputs in HDF5/netCDF4</li> </ul>	<ul style="list-style-type: none"> <li>- Moderate</li> <li>- Science Teams update and deliver the L2 PGEs</li> <li>- Land SIPS and LDOPE verify change through science test</li> </ul>	Included
Use best of available Cloud Mask Product	<ul style="list-style-type: none"> <li>- Use Atmosphere SIPS-generated Cloud Mask which is in HDF5/netCDF4.</li> <li>- Or fine tune the V1 version of Land SIPS cloud mask (in HDF4) for better performance.</li> </ul>	<ul style="list-style-type: none"> <li>- Significant</li> <li>- LDOPE evaluate SIPS cloud mask, explore improvements to V1 land cloud mask.</li> <li>- LDOPE present cloud mask performance result to science teams</li> </ul>	Included
Use MODIS C6 Land Water Mask (in VNP03)	<ul style="list-style-type: none"> <li>- C6 LWM is provided as an SDS in the NASA Geolocation product (VNP03MOD/IMG)</li> <li>- V1 reprocessing used LWM from the QSTLWM, an ancillary input. This propagates to downstream through cloud mask.</li> </ul>	<ul style="list-style-type: none"> <li>- Moderate</li> <li>- Science Teams update and deliver the L2 PGEs</li> <li>- Land SIPS and LDOPE verify change through science test</li> </ul>	Included

# Proposed Changes for V2 and Beyond

Suggested Changes	Description	Level of Effort and team involvement	Recommendation
Transition to all HDF5	<ul style="list-style-type: none"> <li>- Update all processes and L2 and L3 IPs and L2G products to HDF5</li> <li>- No software or system support available for HDF4 (e.g. failure to compile on future system upgrade)</li> </ul>	<ul style="list-style-type: none"> <li>- Significant</li> <li>- Land SIPS and science teams will need to update all the PGEs and internal libraries to HDF5</li> </ul>	- After start of V2 reprocessing
Transition to gridding in native resolution – 750m and 350m	<ul style="list-style-type: none"> <li>- DNB, MAIAC, Snow and Sea-ice are expected to be in their respective native grid resolution.</li> <li>- Rest of the products are at MODIS resolution.</li> <li>- MODIS Continuity vs Better Accuracy</li> </ul>	<ul style="list-style-type: none"> <li>- Code update is minimum</li> <li>- Prepare for new series of products and processing stream</li> <li>- Preparation and Acceptance at DAACs</li> </ul>	Delayed to V3
Products in different map projection	<ul style="list-style-type: none"> <li>- Generate as value added products - different map projection at higher latitude</li> </ul>	<ul style="list-style-type: none"> <li>- Code update is minimum</li> <li>- Prepare for new series of products and processing stream</li> <li>- Preparation and Acceptance at DAACs</li> </ul>	Delayed to V3

# V2 Changes: Use NASA L1B and Geolocation

- Update all L2 PGEs to
  - read in the NASA L1B and Geolocation in HDF5/netCDF4
  - Account for scaling of TOA reflectance (by cosine of solar zenith)
  - Derive BT using Radiance to BT LUT
  - Use additional scan-level and pixel-level QA information (not available in V1 L1 and Geo)
- Current status with projected date for readiness.
  - Land Cloud Mask (VNP35\_L2), AOT (VNP04), LSR (VNP09), Snow (VNP10), IST (VNP30) – fully transitioned, tested, and verified
  - LST (VNP21) and Sea Ice Cover (VNP29) in integration testing (March 2019)
  - L2 Products awaiting delivery (April 2019)
    - AF (VNP14IMG and VNP14): Delivery expected in March 2019
    - DNB L2 LSR (VNP39), DNB L2G (VNP02DNB L2G): Delivery in March/April 2019

# V2 Changes: Use Best of Cloud Mask, Land SIPS CM or Atmosphere SIPS MVCM

- Land SIPS processing uses the IDPS version of the Cloud Mask algorithm built into the land processing stream. The product (VNP35\_L2) is in HDF4 format. **Use of VNP35\_L2 will require**
  - Minor changes to the current processing system and no change to any of the L2 land PGEs.
  - LDOPE and science team work together to evaluate and tune the algorithm to address known issues from V1, i.e., commission and omission errors, confusion between snow and cloud.
- Atmosphere Cloud Mask is generated by the SIPS developed MVCM algorithm run at the Atmosphere SIPS. The product is in HDF5 format. **Use of Atmosphere SIPS MVCM will require**
  - Integration of the new process into land processing stream or ingest of SIPS MVCM product into Land processing system
  - Update all L2 PGEs to use the MVCM in HDF5/netCDF4 format and to account for difference in the cloud confidence and QA bits.

# V2 Changes: Use C6 MODIS LWM

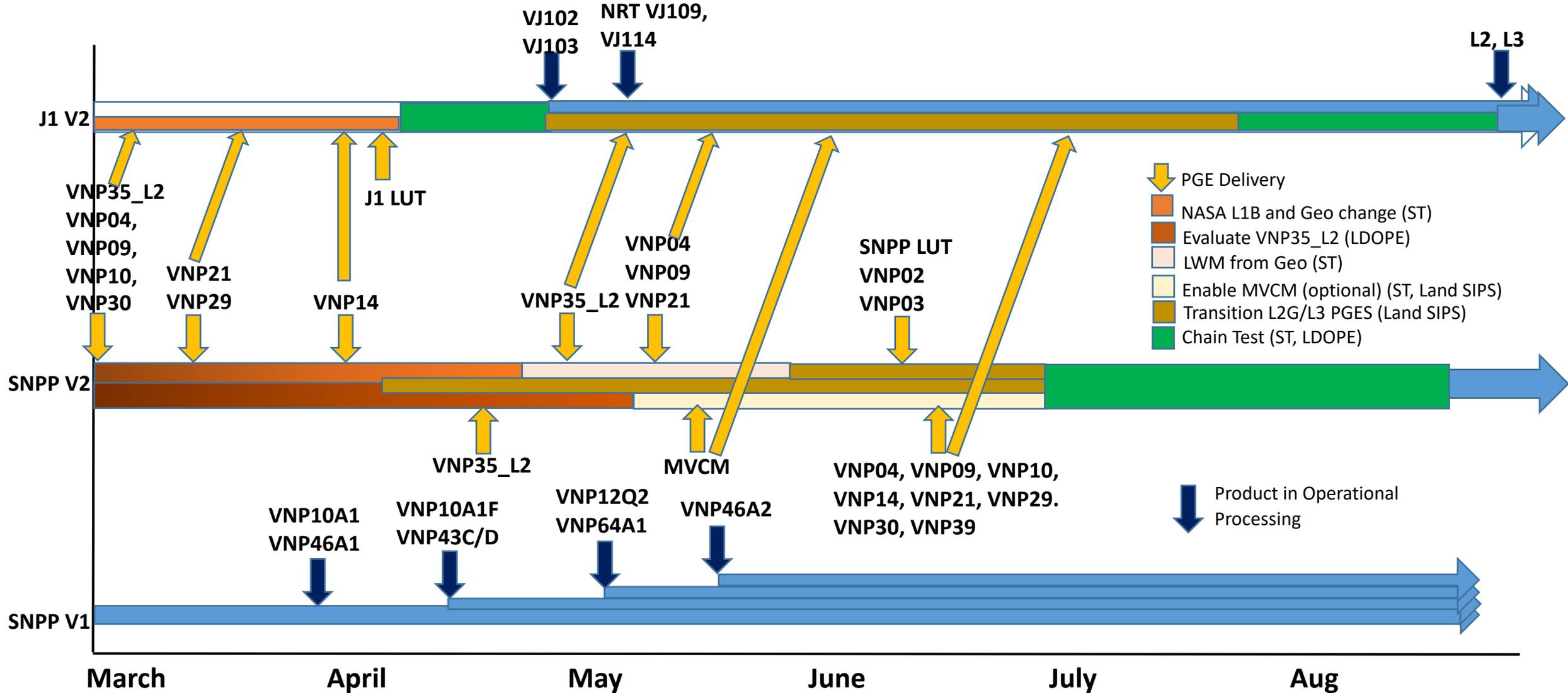
- C6 MODIS LWM is available as a separate dataset in the V2 NASA geolocation product (VNP03IMG and VNP03MOD)
  - MODIS L2 processes use LWM from the geolocation product (MxD03)
  - This will also facilitate use of improved versions of LWM in future collection reprocessing.
- Will require VIIRS Land L2 process to read the LWM from Geolocation file (June 2019)
  - Snow, and sea-ice are ready
  - Cloud Mask, AOT, LST, and LSR needs to be updated – V2 PGEs are already updated to use the V2 geolocation. Minor additional change required to read the LWM dataset.
  - AF (VNP14) – New delivery expected to use the V2 geolocation product.

# PGEs to be updated

■ Ready
 ■ Integration Testing
 ■ Major Change or delivery

PGE / Product	Proposed Changes	Responsible Team	Status - %completed
503 – Cloud Mask	Tune VNP35_L2 or Integrate Atmos MVCM	Land SIPS	0%
504 – Land Aerosol	Use NASA L1B and Geo, Cloud Mask	Science Team	50%
505 – IST	Use NASA L1B and Geo, Cloud Mask	Science Team	50%
507 - Snow	Use NASA L1B and Geo, Cloud Mask	Science Team	50%
508 – Sea Ice Cover	Use NASA L1B and Geo, Cloud Mask	Science Team	50%
509 – DNB Refl	Use NASA L1B and Geo, Cloud Mask	Science Team	0%
510/530 – Fire Mask	Use NASA L1B and Geo, LWM	Science Team	0%
511 – LSR	Use NASA L1B and Geo, Cloud Mask, LWM	Science Team	50%
616 - LST	Use NASA L1B and Geo, Cloud Mask, LWM	Science Team	50%
512 – L2G LLL	Gridding L1B DNB, Cloud Mask	Land SIPS	0%
554 – L3 DNB	Cloud Mask	Land SIPS	0%
590 – Subset	NASA L1B, Geo, Cloud Mask	Science Team	90%
5xx – L2G/L3/L4 PGEs	V2 related metadata and attribute changes	Land SIPS	0%

# SNPP and J1 V2 Reprocessing Time Line



Assumptions: No major science algorithm changes to V1 products. Timely delivery of PGEs for V2 products not in V1, else processing of those products could be delayed.

# V2 L1 and Land Reprocessing of SNPP

- V2 L1 Reprocessing (July 2019)
  - VCST to deliver new V2 L1B code with minor update to RSB calibration (and new LUT) in June 2019
  - L2 downstream testing to assess differences in TOA reflectance and BT between V1 and V2 (July 2019)
- V2 Land Reprocessing (July/Aug 2019)
  - Science Test1: L2 updates to use NASA L1B and Geo (April 2019)
  - Science Test2: Evaluation of Land Cloud Mask (May 2019)
    - Test 2.1: V1.0 VNP35\_L2 vs Atmosphere SIPS MVCM (April 2019)
    - Test 2.2: V2.0 VNP35\_L2 vs Atmosphere SIPS MVCM (May 2019)
    - Test 2.3: L2 Land Chain Test (June 2019)
  - Science Test3: Install Atmosphere MVCM into Land Reprocessing (June/July 2019)
    - This is optional and is pursued only if V2 VNP35\_L2 could not be used in V2 land reprocessing
    - Land SIPS install MVCM into land reprocessing stream (June 2019)
    - Land ST delivery all PGEs with update to use the Atmosphere MVCM (June 2019)
    - Land L2 Land Chain Test (July 2019)
  - Science Test4: Test of changes to L2G/L3 (July 2019)
    - Metadata and other changes to L2G/L3: Delivery and Test by Land SIPS (April 2019 – June 2019)
    - Final Land Chain Test (July 2019)
  - V2 reprocessing of L1, L2 and L3 land products (July/Aug 2019)

# J1/N20 Processing Status

- Processing in AS 3194
  - L1B and Geo available from the beginning of mission. NASA L1B and Geo in HDF5/netCDF4 format generated using V3 version of the NASA delivered L1 PGE.
  - LSR stream operational (includes land AOT and Cloud Mask) starting data day 2018299
  - Mix of pre and post-launch LUT, with incremental updates to L1 process put in forward processing.
  - Products not available to public.

# V2 L1 and Land Reprocessing of J1/N20

- L1 Reprocessing: L1B and Geo (April/May 2019)
  - VCST to deliver new Calibration LUT generated using 1-year of mission data (March/April 2019)
  - Geolocation PGE updates (March 2019)
  - L2 downstream testing to assess differences in TOA reflectance and BT between SNPP and J1 (March/April 2019)
- Land Reprocessing (Sept/Nov 2019)
  - Transition the V2 PGEs from SNPP to J1 processing stream (Aug 2019)
  - Run Land Chain Test (Aug/Sept 2019)