Onboard Processing and Autonomous Data Acquisition for the NASA L-Band Spaceborne SAR Mission

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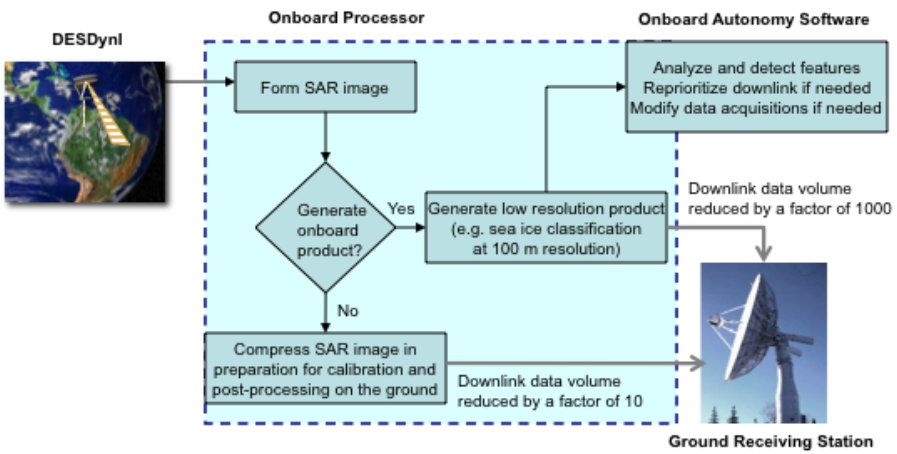
Objective

- Expand the capability of a previously developed onboard SAR processor to streamline data acquisition on-demand and reduce downlink data volume by a factor of 10-1000.
- Add onboard autonomous science processing capabilities to UAVSAR observations to reduce data delivery latency and enable rapid response capability.
- Demonstrate onboard processing system for the NASA L-Band space borne SAR to help reduce risk, cost, and development time for the information system on a space borne L-band SAR.



Operational scenario of onboard information system for a space borne L-band SAR to reduce downlink data volume by a factor of 10 to 1000

Accomplishments

- Determined Onboard Processing (OBP) strategy with inputs from the space borne L-Band SAR project system team and project scientist.
- Adapted complex science algorithms for onboard processing to generate products such as surface water extent for flood mapping, snow/ice/water classification, and land disturbance detection.
- Assessed the performance of ICER image compression technique to reduce downlink data volume.
- Worked with the space borne L-Band SAR and SWOT mission radar teams to develop a common OBP hardware architecture.
- Developed a high fidelity Matlab model for SAR processing that is modularized for application flexibility and parameterized for ease of testing. This model was used to facilitate the tradeoff of OBP design with performance.
- Developed new FPGA-based onboard processing hardware with space qualification path.
- Developed onboard autonomy software to perform data acquisition on-demand.
- Integrated and tested onboard processor and autonomy software with UAVSAR in the lab and demonstrated in flight.

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$TRL_{in} = 3$ $TRL_{out} = 5$

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