

Dynamic Tasking of Earth Observing Assets

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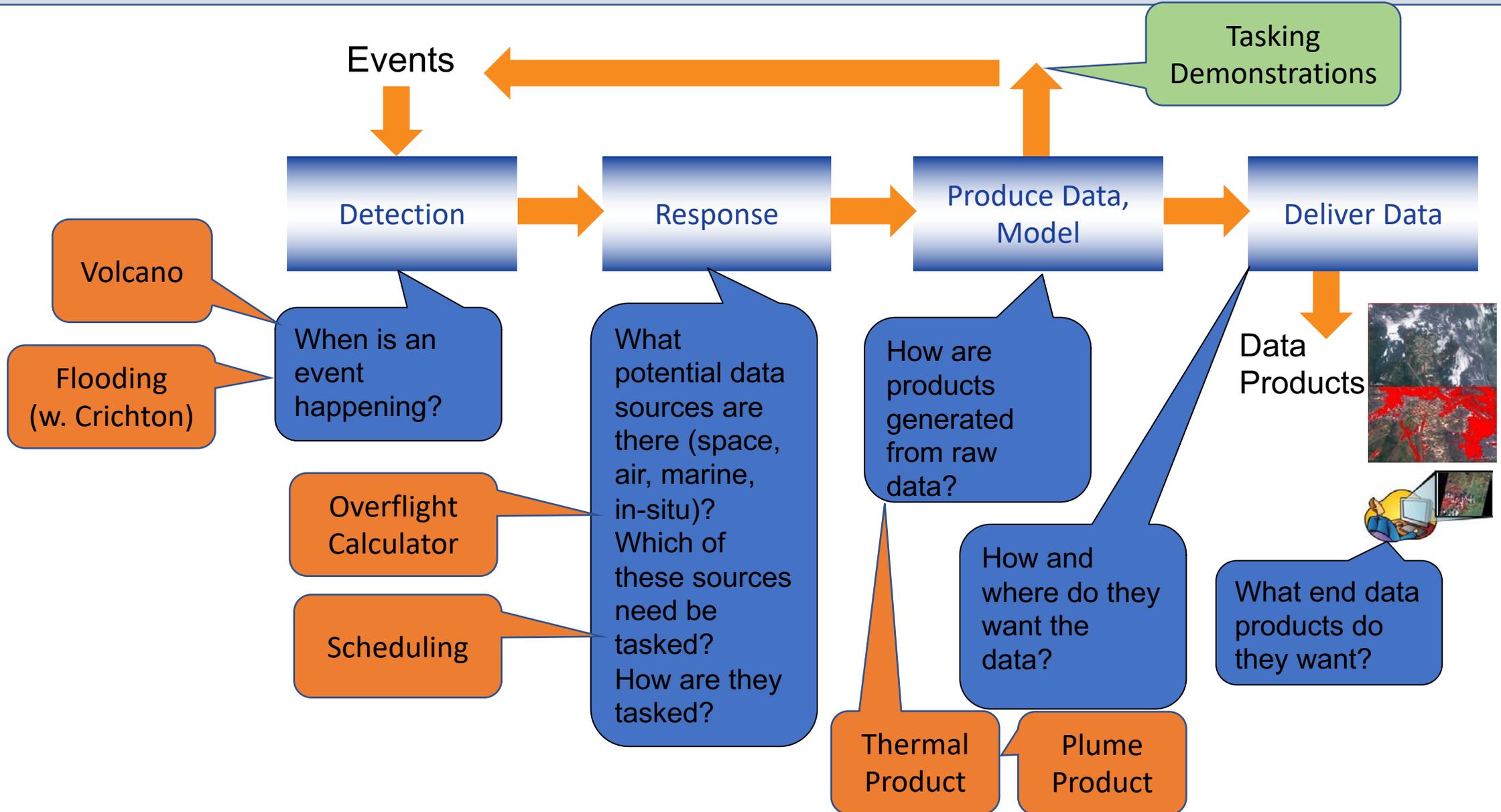
¹ - Jet Propulsion Laboratory, California Institute of Technology

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Project Technologies

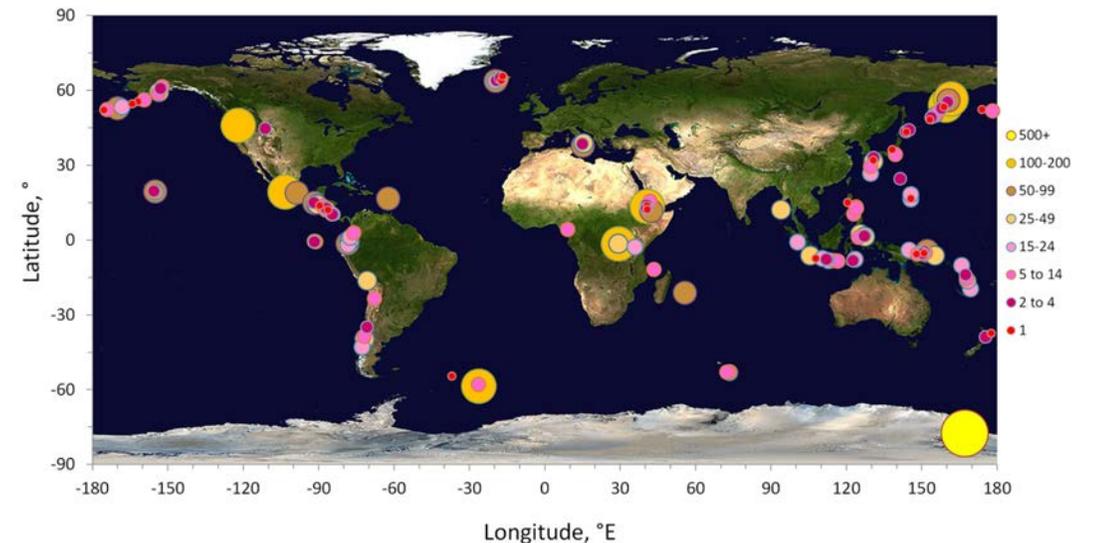
- Alert generation
 - Volcano Alerts
- Overflight Computation
 - TLE or Kernel
- Automated rescheduling of satellites
 - Demonstrated on above
 - Continuous (re) scheduling
 - Federated scheduling

Project Technologies in Context



Project Technologies – Alert Generation

- Volcano Alert generation
 - Satellite Triggers
 - MODVOLC (thermal output)
 - VIIRS Active Fires (temperature, thermal output)
 - Investigating Sentinel-1,2,3,5p
 - In Situ
 - Iceland Met Office (Seismic, others pending)
 - IGEPN (Ecuador)
 - SERGANOMIN (Chile)
 - USGS (Seismic, many)
 - Other
 - VAAC (7 regions implemented, 2 pending)
- Potential to use subset of sources as ground truth and apply ML to learn better trigger strategies (any other ML parties here interested in partnering with us on this?)



Project Technologies - Scheduling

- Scheduling/retasking (led by Jim Boerkoel, Harvey Mudd College)
- Investigating OR/LP/MIP based approaches.
 - One is a variant of Nag 2017. (possible collaboration?)
 - One is a variant of Shah 2019 (Planet).
- Currently focusing on three aspects of the problem.
 - Continuous (re) planning – alerts come in continuously, utility v. staleness, cost of changing schedule
 - Federated planning – can task other constellations with limited insight and delays into their availability (other than overflights) and accepted requests can be cancelled (with delayed notification)
 - Weather – acquisitions can be nullified (resulting in re-instating of the request)
- Working on paper submission to the Integrated Planning and Execution (IntEx) ICAPS 2020 Workshop.

Flight Demonstrations: Tasked Skysat

- Linked Volcano alerts to Planet Skysat tasking system using JSON request format.
- Three successful alert → task → image sequences based on 11 Feb 2020 alerts.
- Future work:
 - Derived thermal output estimation
 - Derived plume estimation



13 Feb 2020
Bill Mitchell (Papua-NG)
VIIRsvolc



14 Feb 2020
Nishinoshima
VIIRsvolc, MODVOLC



14 Feb 2020
Mere Lava (Vanuatu)
USGS Seismic