

## SmartSat CRC Bushfire Research Portfolio

ID	Project / Focus	Theme
<b>PREVENTION</b>		
<b>P3-24</b>	OzFuel — Australian Fuel Monitoring from Space (Phase A). Near-infrared spectroscopy of eucalypt fuel moisture content from orbit; developing a continental-scale pre-season fire risk intelligence layer. ANU / EOS Space Systems / ACT Government.	<i>Fuel moisture EO</i>
<b>P4-35</b>	Indigenous Pathways to Advance Fuel Moisture EO for Improved Fire Planning Management Strategies. Integrating traditional ecological knowledge with satellite-derived fuel moisture indices to produce culturally-informed, locally-valid fire risk assessments.	<i>Indigenous EO</i>
<b>P3-23</b>	Adaptive Analytical Tool for Better Understanding and Reducing Future Bushfire Risk. Dynamic risk analytics combining EO data, weather modelling and historical fire records to support pre-season planning.	<i>Risk analytics</i>
<b>P2-19s</b>	Empirical and dynamic tool for prediction of forest fire spread using remote sensing and machine learning (Harikesh, PhD). Develops ML-driven fire spread models trained on satellite observations and terrain data.	<i>Spread modelling</i>
<b>P6-12</b>	Calibration and validation of SAR and stereo/tri-stereo satellite data for assessing vegetation condition. Provides validated multi-sensor baselines for fuel condition and landscape change monitoring.	<i>Cal / Val</i>
<b>P8-02</b>	Bushfire Resilience — Intelligent infrared hyperspectral technologies for a bushfire resilience Earth Observation mission. Develops next-generation sensor and mission concepts for dedicated fire monitoring from space.	<i>Hyperspectral R&amp;D</i>
<b>P3-28</b>	WildFireSat Mission and Australian Bushfire Management. Mission design study for a dedicated Australian fire monitoring satellite, examining sensor requirements, orbit design and operational integration with emergency management agencies.	<i>Mission design</i>
<b>DETECTION</b>		
<b>P3-04</b>	Real-Time Fire Analytics — BRIGHT/AHI algorithm for continent-wide hotspot detection using Japan's Himawari-9 geostationary satellite. Dynamic bioregion-calibrated thresholds; continental coverage every 10 minutes processed in under 45 seconds. Now integrated into Digital Earth Australia (DEA) Hotspots. RMIT University / Geoscience Australia.	<i>Hotspot analytics</i>
<b>P2-38</b>	Small satellite energy-efficient onboard AI processing of hyperspectral imagery for early fire-smoke detection. Foundational algorithm demonstrating sub-14-minute modelled alert latency on a 6U CubeSat platform. University of South Australia.	<i>Onboard AI</i>
<b>P2-61</b>	EM Verification of Onboard Smoke Detection Model and Algorithms. Independent engineering model validation of accuracy, speed and power consumption against flight-hardware constraints. Ground-based precursor to the SmokeScout on-orbit demonstration.	<i>Algorithm Val</i>
<b>P2-64</b>	SmokeScout — deploy and prove an AI algorithm onboard an operational satellite for near-real-time hyperspectral fire detection. Phase 1: tasking Loft Orbital YAM-6 to image active fires for algorithm adaptation. Phase 2: upload flight	<i>On-orbit demo</i>

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	algorithm to YAM-6 for full end-to-end onboard demonstration. University of Adelaide / Swinburne University of Technology.	
<b>P2-66</b>	Onboard AI for Thermal Infrared (TIR) Imagery. Extends detection capability from early smoke signature to active flame front characterisation using TIR sensors, completing the onboard detection stack.	<i>TIR onboard AI</i>
<b>P2-47s</b>	Interpretable Machine Learning for the Early Smoke Wildfire Detection (PhD). Develops explainable AI models that provide detection confidence scores and reasoning — a prerequisite for operational adoption by fire agencies.	<i>ML / XAI</i>
<b>P3-07s</b>	Satellite image-based smoke detection for bushfire detection (Liang Zhao, PhD). Deep learning approaches for reliable smoke classification across diverse Australian landscape and seasonal conditions.	<i>Smoke detection</i>
<b>P3-19</b>	All-weather, near real-time monitoring of bushfire with satellite SAR. Synthetic aperture radar penetrates smoke and cloud cover to provide continuous fire boundary mapping when optical sensors are obscured.	<i>SAR / all-weather</i>
<b>P3-21s</b>	Innovations in spatial response assessment for satellite imagers (PhD). Advances sensor characterisation methodology to improve the accuracy and reliability of satellite-based fire detection and boundary mapping.	<i>Sensor design</i>
<b>P3-31s</b>	Natural hazard prediction and damage assessment using multimodal satellite and geospatial data in self-supervised XAI model (PhD). Multimodal fusion approach combining optical, SAR and ancillary data for improved fire detection and rapid damage assessment.	<i>ML / damage assess.</i>
<b>RESPONSE</b>		
<b>P1-07</b>	Resilient Emergency Search and Rescue (SAR) Communications. Satellite-enabled resilient communications architecture for emergency services when terrestrial networks are damaged or overloaded during a major fire event.	<i>Emergency comms</i>
<b>P3-27</b>	Fusion of multi-platform Earth observation data for mapping of fire progression and post-fire vegetation recovery. Integrates optical, hyperspectral and SAR data streams to provide incident controllers with consistent, near-real-time fire boundary and progression maps.	<i>Data fusion</i>
<b>RECOVERY</b>		
<b>P3-27</b>	Fusion of multi-platform EO data (recovery phase). Post-fire burn severity mapping and vegetation recovery tracking to inform ecological restoration priorities and future fuel risk reassessment.	<i>Post-fire mapping</i>
<b>P3-46</b>	SAEcoMap — Monitoring post-fire carbon dynamics and mapping key native and invasive vegetation species in Kangaroo Island. Combines multi-source satellite data to track ecosystem carbon flux and species recovery trajectories following fire, supporting biodiversity and carbon accounting.	<i>Data fusion</i>

Note: P3-27 (Data Fusion) contributes to both Response (fire progression mapping) and Recovery (post-fire assessment) phases and appears in both. 's' projects are PhD scholarships.