FAQs – AI-Informed High-Resolution Fuel Mapping

Last updated October 30, 2024

How does the Department of Defense (DoD) 2-year project relate to this project? Is it a continuation? Is the proponent required to use what was developed? Can the details of the DoD work be provided?

This project is the DoD 2-year project.

Can you provide a detailed list of the specific features to be extracted and attributes? What features are to be inferred? For example, an estimate of Above Ground Biomass (AGB), dead or alive tree, wood fuel estimate, or tree attributes such as position, height, crown area…

- Above ground biomass
- Species-level land cover
- Digital terrain model
- Canopy height model
- Ecotype
- Duff layer
- Down woody debris

Can you provide details on the available data? For example, what is imagery resolution? What is multispectral? What is the LiDAR density?

- MAXAR optical imagery, .5m
- LiDAR Collections, 8 pts/m
- ArcticDEM, .5m
- Ecotype classifications, 30m
- Other available datasets are still under investigation

Is there a confidence level expected with the extraction of features?

No specific confidence level. The higher the better.

Can the model be an existing model such as open-source model (e.g. Unet), or does it have to be a novel or newly developed model?

It can be an existing model.

Does the model need to be AI-based or can it be combination of AI with numerical methods?

It must be AI-based.

Can you provide a list of functional requirements?

- AI model
- Hosted on Permafrost Discovery Gateway and software adapted for use in ArcGIS Pro
- Takes optical imagery, LiDAR, and ground-truth datasets as inputs
- Output is at least 1m in resolution

Has there been any label data developed for training the model? If so, can this be provided?

No. Data development and labeling are being worked on and will be part of this effort.

Is there a separate budget for data acquisitions, or can only publicly available data imagery and LiDAR point cloud sources be used in the project?

There is no budget available for data acquisition. All data must already exist.

Is the $400,000 the total for all awards or a single award? Can the same institution apply for multiple awards?

It is the total for all awards. The same institution may apply for any number of objectives.

Is high-resolution data available from the U.S. Army or commercial remote sensing companies?

Both

For the current fuel mapping, what fuel types does the Army use in its forest fire models? What is the resolution of the fuel maps, and is there a designated region of interest for performance evaluation?

The region of interest is Interior Alaska training lands. Current fire management on Alaskan training lands are co-managed by USAG Alaska and Alaska Fire Service, which uses the Canadian Forest Fire Danger Rating System and models, which are 30m.

Could you provide a specific example of a feature to be extracted by the feature-extraction backbone, and clarify who the "researchers" are for coordinating communication with the "wildland fire community?"

- Species-level vegetation cover is one example.
- This solicitation is looking for someone to be the coordinator between the research and wildland fire professionals.

Will the model be required to produce structural components of fuel - Surface, Canopy/Fuel Moisture/Fuel physical characteristics (time-lagged fuels)?

Yes.

What is the high resolution and expected base data feed for the AI model? (e.g. Landsat/HLS/Planet lab Imagery)?

.5m resolution, MAXAR or other equivalent datasets

Is the fuel type classification for this project based on the Canadian Forest Fire Danger System?

Yes.

Are the available data listed in the FAQs overlapping or stacked over the study area?

The data that is to be used is not set in stone; locating datasets is part of the work being solicited. All datasets should exist individually over the study area.

What is the temporal difference between optical imagery and LiDAR?

No specific difference. As small of a temporal difference as possible. The model should take the temporal difference into account.

Is the alignment of the data the vendor's responsibility?

Yes.

Is Maxar imagery provided as panchromatic/multispectral products, and is the multispectral eight bands? What is the processing level?

Whatever level will work with the model. Not sure if multispectral products will be available.

The FAQ identifies extracted features and states that this must be based on the AI model and not numerical methods. Please confirm if all the attributes listed must be generated by the AI model or if the numerical method can be incorporated into the software package (e.g. creating a Canopy Height Model)?

Pre-processing of datasets can be done using numerical methods to create layers such as the canopy height model that will be fed into the AI model.

Can the AI model be developed as a stand-alone tool whereby the outputs can be imported into ArcGIS Pro?

Yes, but the model should also be created as a tool for ArcGIS Pro.

Can you confirm if we are provided with USGS 3DEP LiDAR classified data or is the AI model required to classify the data?

AI will be required to classify the data.

In the FAQ list of extracted features, are you expecting individual output as 1m raster data layers for each feature or a single feature fuel type classification map as a raster?

Single fuel type classification raster.

Will we get access to DoD computing resources without cost to our team?

Yes.

The desired end state is the completion of a multi-modal AI model for wildfire fuel mapping across interior Alaska training lands. The model will be published to the Permafrost Discovery Gateway for community use to be rerun as conditions change. The outputs, model, and all code shall be provided to U.S. Army Garrison Alaska for incorporation into wildland fire management. We have a solution created that is offered as a software as a solution subscription to meet the needs of this requirement. The source code is our proprietary competitive advantage and will not be provided. Is the Government willing to entertain a SAAS approach?

No.

They mention "pre-existing remotely sensed and ground-truthed data." Do we know any specifics about this data? What is the source and how is it presented?

We will work together to locate publicly available data as well as obtain existing data from the U.S. Army Garrison Alaska.

Are they providing the "remotely sensed optical imagery" or does it need to be collected? If they are providing it, what are the specs? What is the capture modality, resolution, bands, and how much? What type of terrain? Burned? Unburned? Likely to burn?

There is no funding available for collecting imagery. All types of terrain. MAXAR imagery that is available to the DoD.

Do we know what they mean by "land cover datasets?"

Land use/Land cover datasets - describing the land cover that exists in a location.

The opportunity states, "The model must ... be published to the Permafrost Discovery Gateway," what is meant by this? A standalone runnable AI pipeline, AI model weights that conform to some standard architecture? Current AI results, or something else? The opportunity mentions that, "The model will be published ... for [the] community use to be rerun as conditions change."

Yes, a standalone AI pipeline that aligns to the architecture of the Permafrost Discovery Gateway.

Would ERDC please elaborate on what its premise is for wanting this work? Additionally, would ERDC please expand on why cold/colder regions are being targeted first (before other regions of the U.S.? Is it simply a matter of funding being available first to CRREL? Or, is there another logistical or project-related reason for the order of precedence for regions?

As these questions are non-technical and unrelated to the posting, they are unable to be addressed.

Should the developed models provide the level of their confidence over the predictions? Should the output layers have an uncertainty map associated with them?

Yes.

In the data available, can we expect to have access to the LANDFIRE Reference Database and other in-situ forest plot-related data? Is there an updated list of available data to be provided?

Data availability is an ongoing process, we do not have a list of available data, but it will be a mix of publicly available data and data owned by USAG Alaska.

Is your expectation that this AI model development will be released for public availability not requiring additional training?

The model will be trained and modified until the best results are achieved.

Is the AI model development applicable for Alaska ecosystem region only? If not, please describe.

Yes.

Is the expectation for AI model development to focus on specific features identified in FAQs or to produce a specify fuel map classification (e.g. Leafless Boreal Mixedwood)? If fuel map classification, please specify.

The AI model focus is to produce a fuel map classification that can be used with Alaska Forest Service models. Future discussions will detail specifics of the output, but should be similar to LANDFIRE with more specification.

Traditional Above Ground Biomass (AGB) has involved in-situ data such as plot data or diameter at breast height (DBH), will this be provided? Or are you looking for a model that can estimate AGB without in-situ data? Is there confidence level your expecting?

Any in-situ data that exists will be provided, but it will not exist across the entire study area, so the goal is to estimate without in-situ data across the rest of the study area. The model should be re-trained and reworked to obtain the highest confidence level possible.

For down woody debris are you expecting the detection or segmentation? Would you be providing label data for this or vendor to develop?

Likely detection, but segmentation could work too. Vendor would develop.