

**Providing KappaMask-based
cloud and cloud segmentation
masks for every Sentinel-2
product over Europe**



Tetiana Shtym

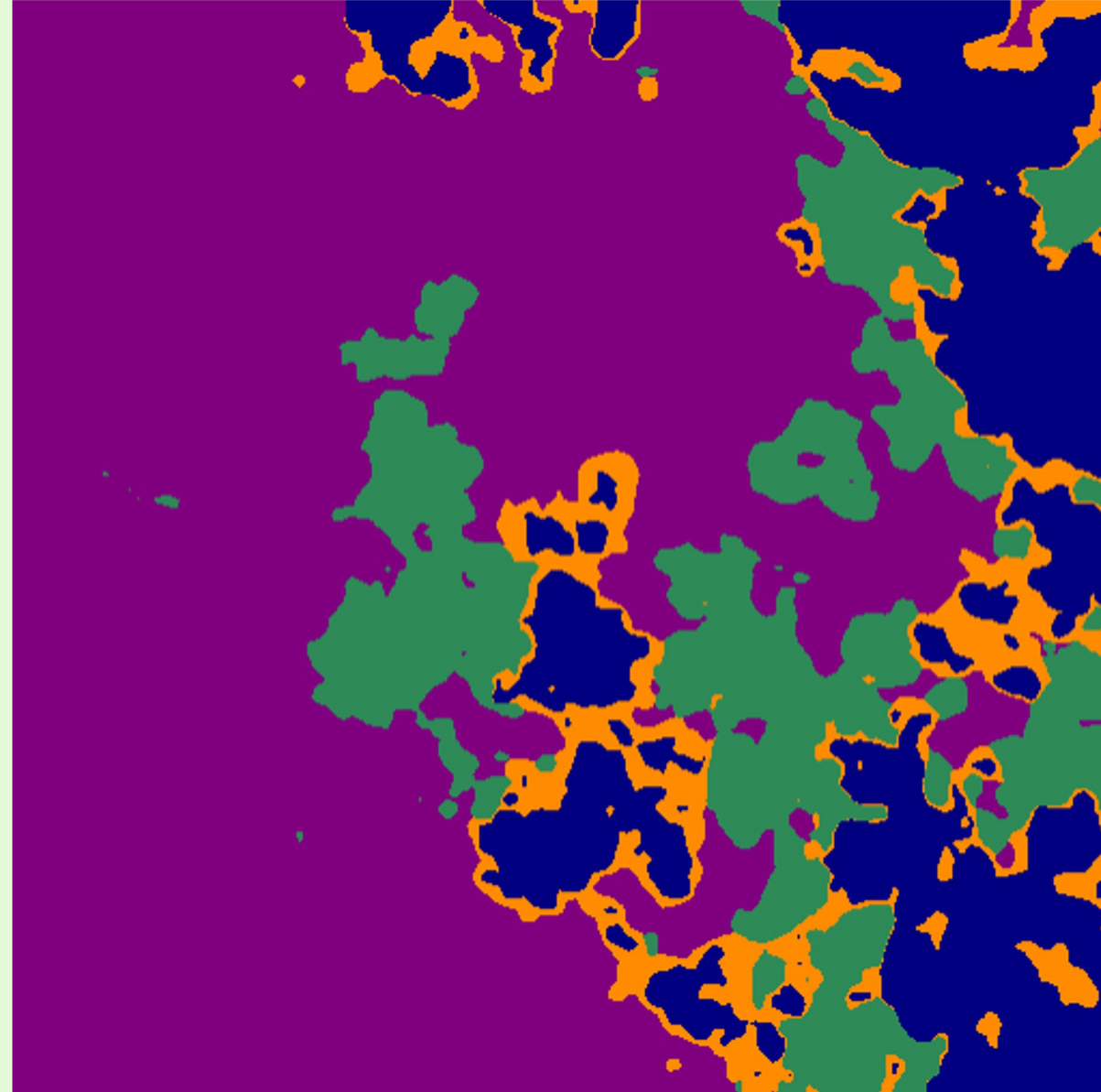
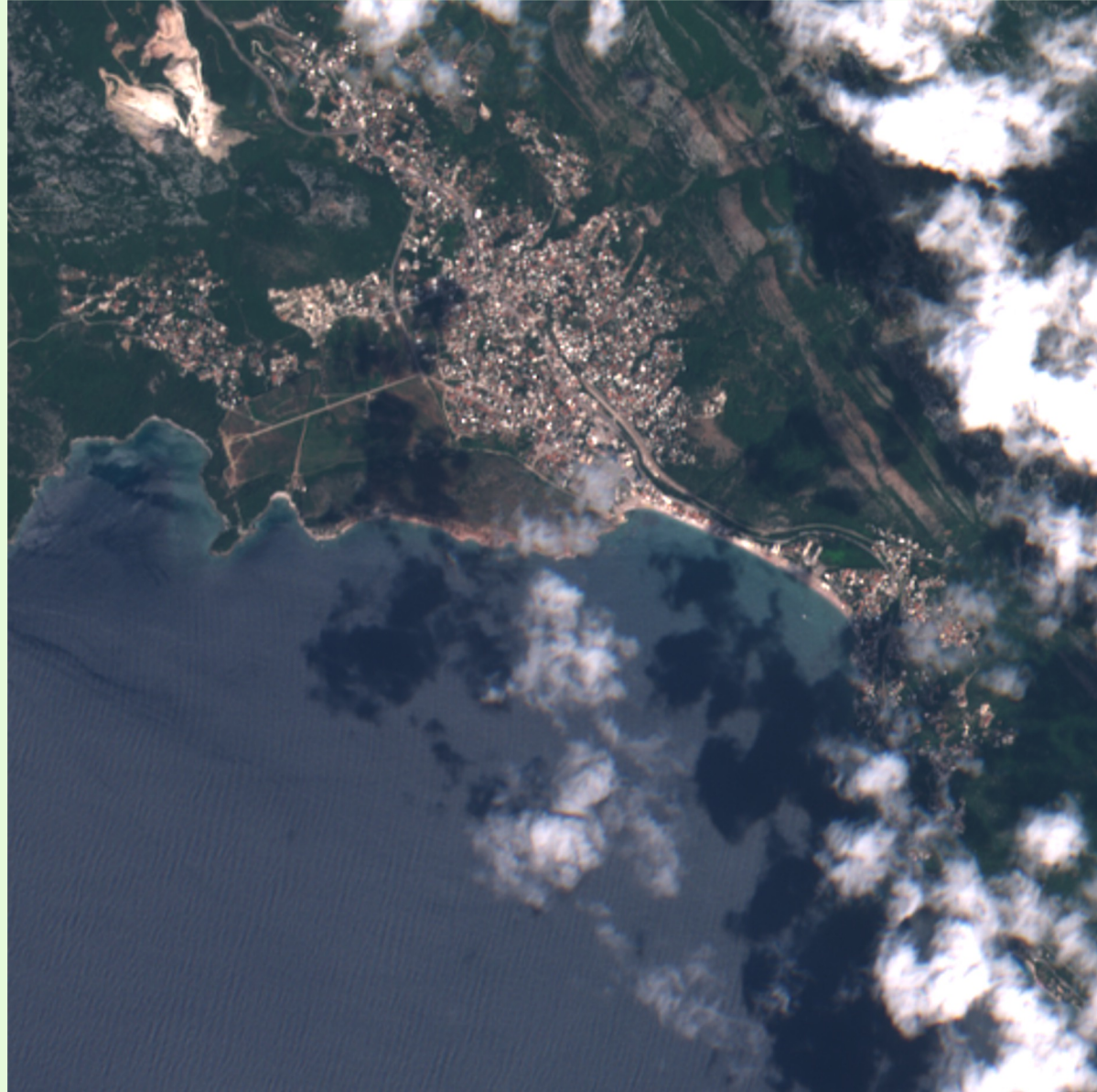
with contributions from the KappaZeta team

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Overview of use case

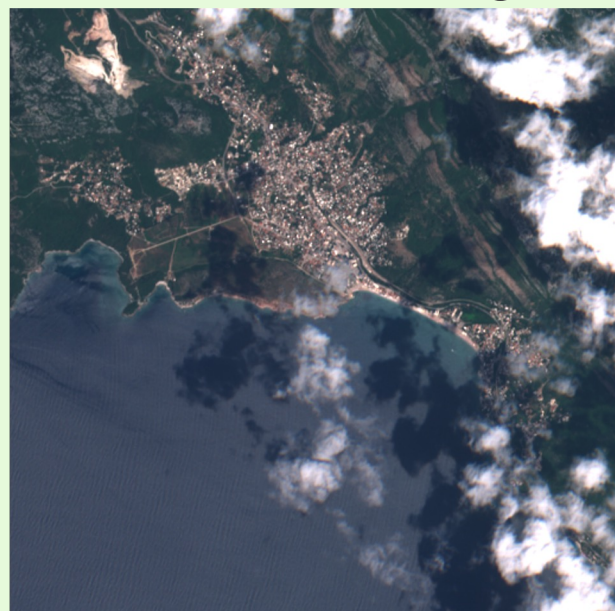


Overview of use case

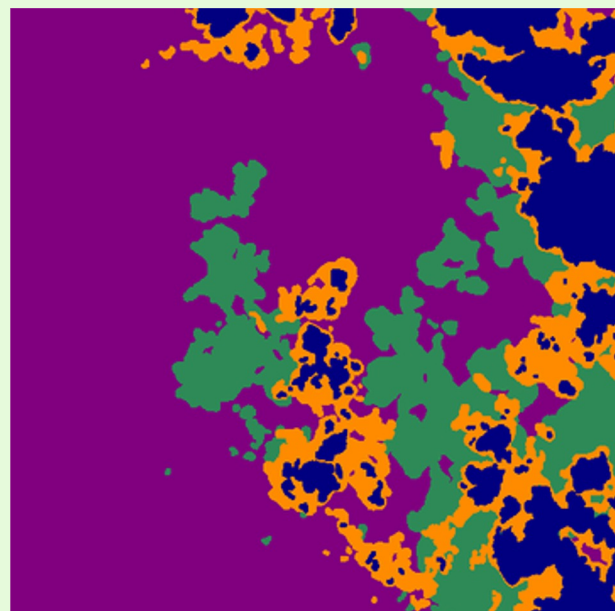


Comparison to other cloudmasks on the KappaSet test set

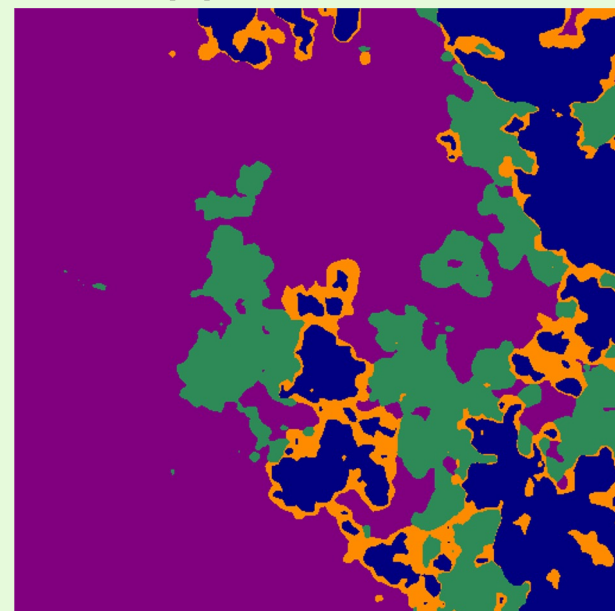
True Color Image



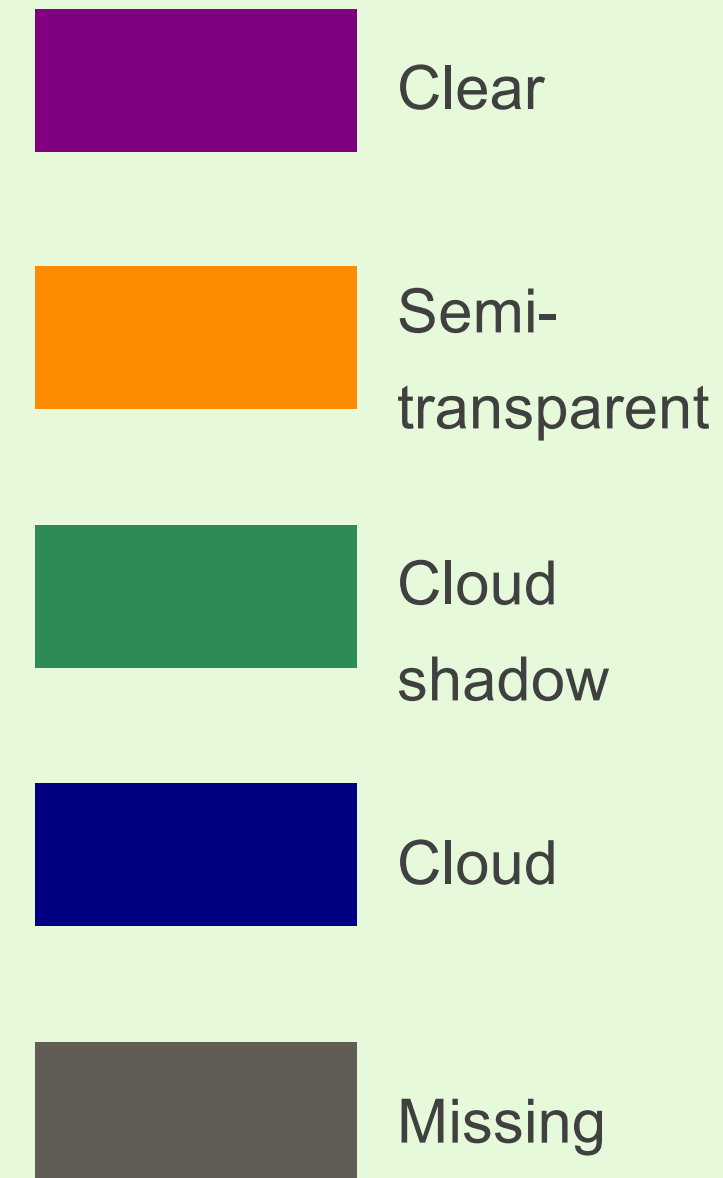
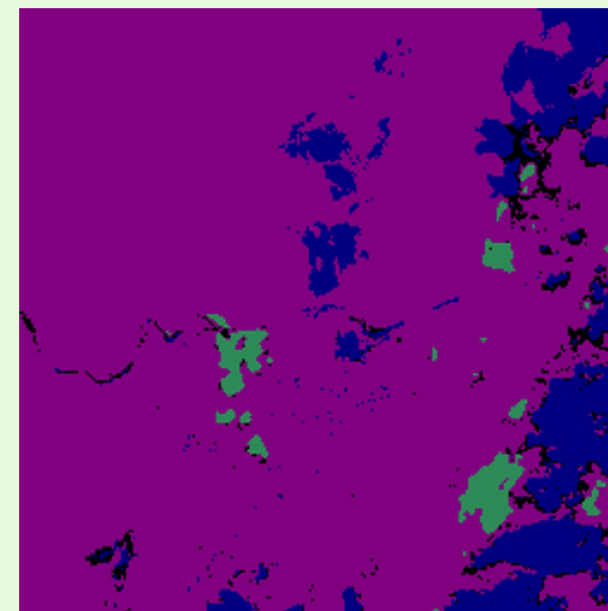
Label



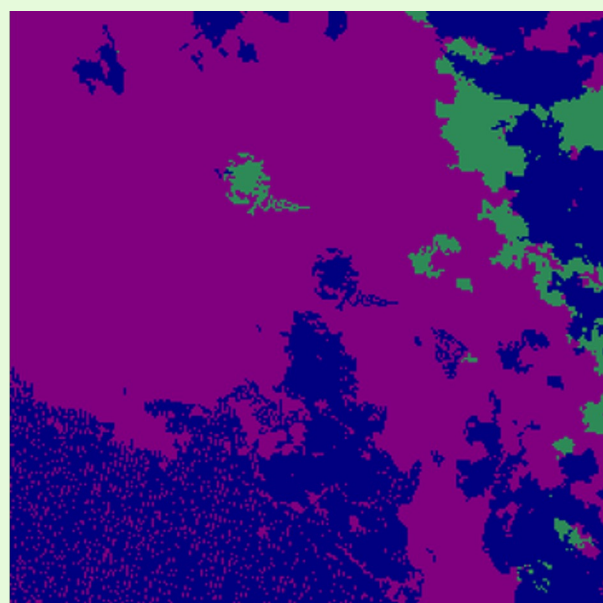
KappaMask L1C



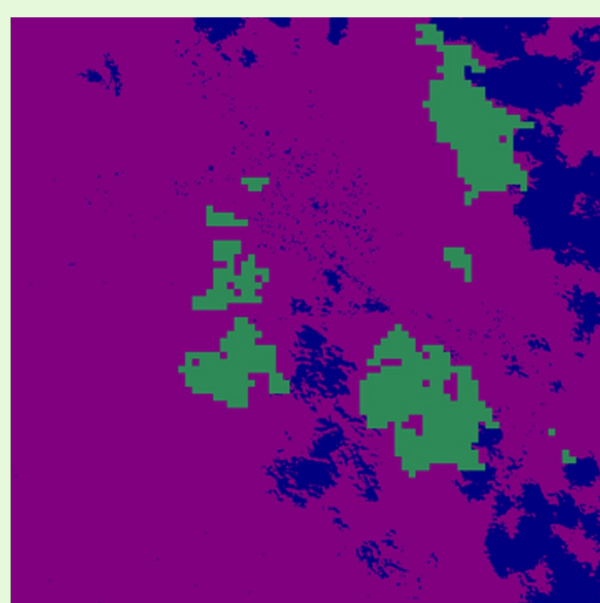
Sen2Cor



Fmask



IdePix



MAJA



S2Cloudless



Processing time



Time comparison (in minutes) performed on the single Sentinel-2 Level-1C product inference. KappaMaskv2 L1C with GPU and CPU, Sen2Cor, Fmask and S2Cloudless on generating a 10 m resolution classification map. IdePix classification map is at 20 m resolution. Sen2Cor's 20m classification mask was resampled to 10 m.

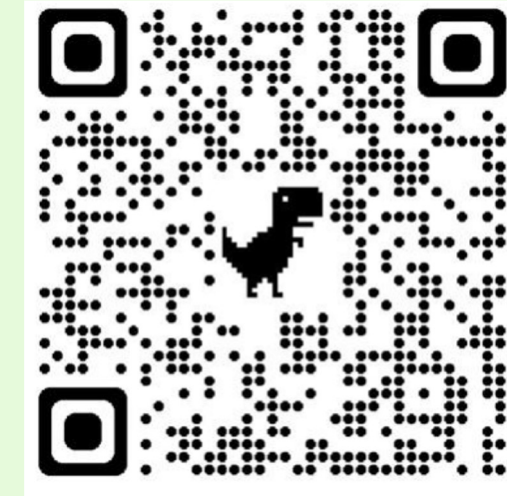
	KappaMaskv2 GPU	KappaMaskv2 CPU	Sen2Cor v2.10	Fmask	IdePix <small>Without cloud shadow processing</small>	S2Cloudless
Running time	02:58	06:01	05:50	06:10	16:53	18:10

Test computer:

CPU - Intel Core i7-8700K, 64GB of RAM,
GPU - NVIDIA GeForce GTX 1070 with 8GB of VRAM,
Linux Ubuntu 18.04.5 LTS (Bionic Beaver)

Overview of use case

- KappaMask is an AI-based cloud and cloud shadow processor for Sentinel-2.
- KappaMask has outperformed other cloud masks (e.g. Fmask, Sen2Cor, IdePix, S2Cloudless and MAJA) on the diverse and challenging test set.



Read more here:

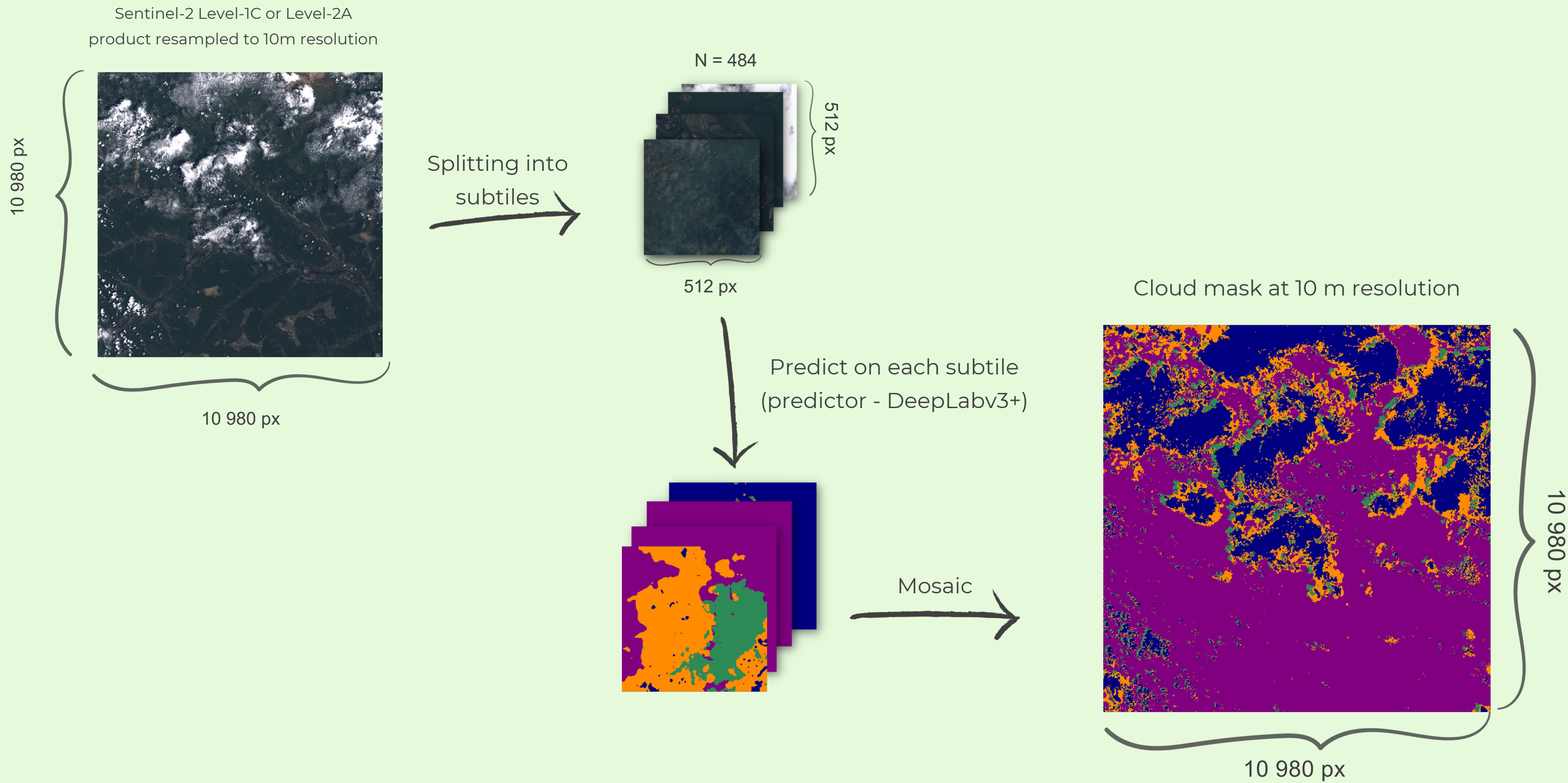
<https://kappazeta.ee/blog/make-the-globe-cloud-free-with-kappamaskv2>

KAPPA
ZETA

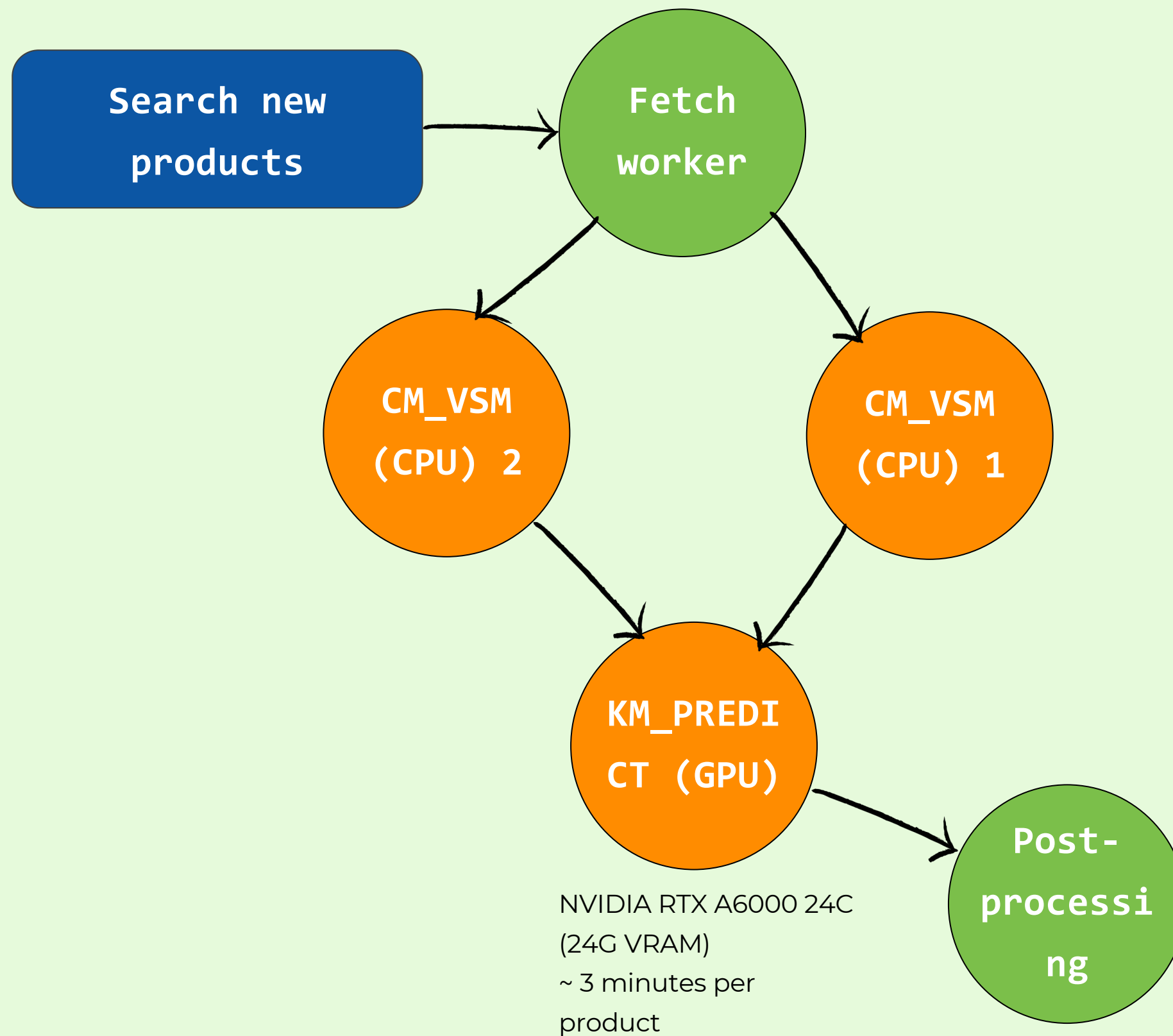
By generating KappaMask-based cloud and cloud shadow segmentation mask for every Sentinel-2 product available in the European region and hosting the masks on CreoDIAS with a free licence, we provide ample opportunities for testing KappaMask performance for all interested parties.



KappaMaskv2 overall flow



Computing KappaMasks at CreoDIAS



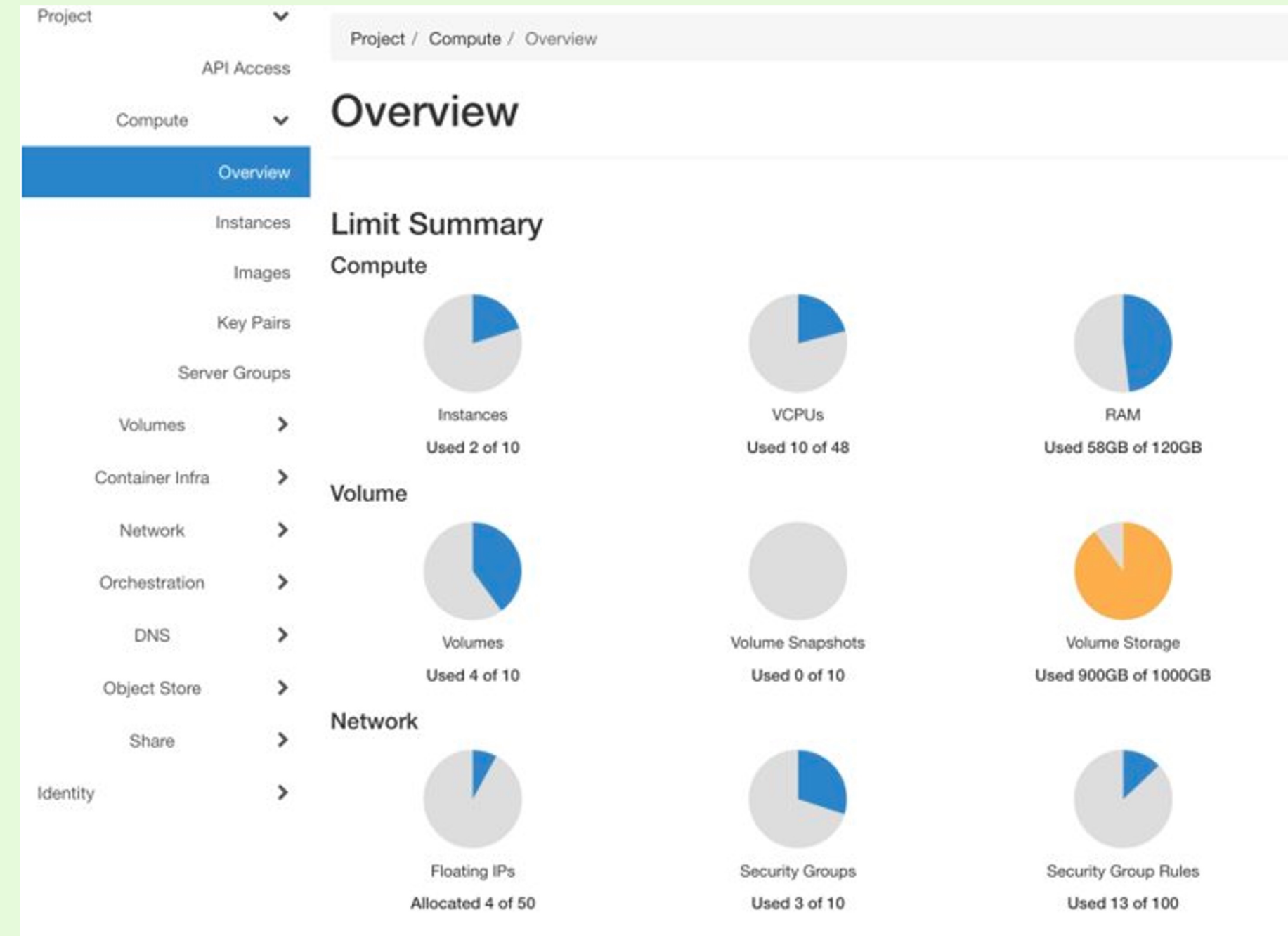
- Architecture is a simple Python-RQ based task-worker scheme
- Easy to distribute processing steps between servers
- Can avoid back-pressure
- Multiple parallel processes for some steps
- Workers run in Docker

CreoDIAS user experience

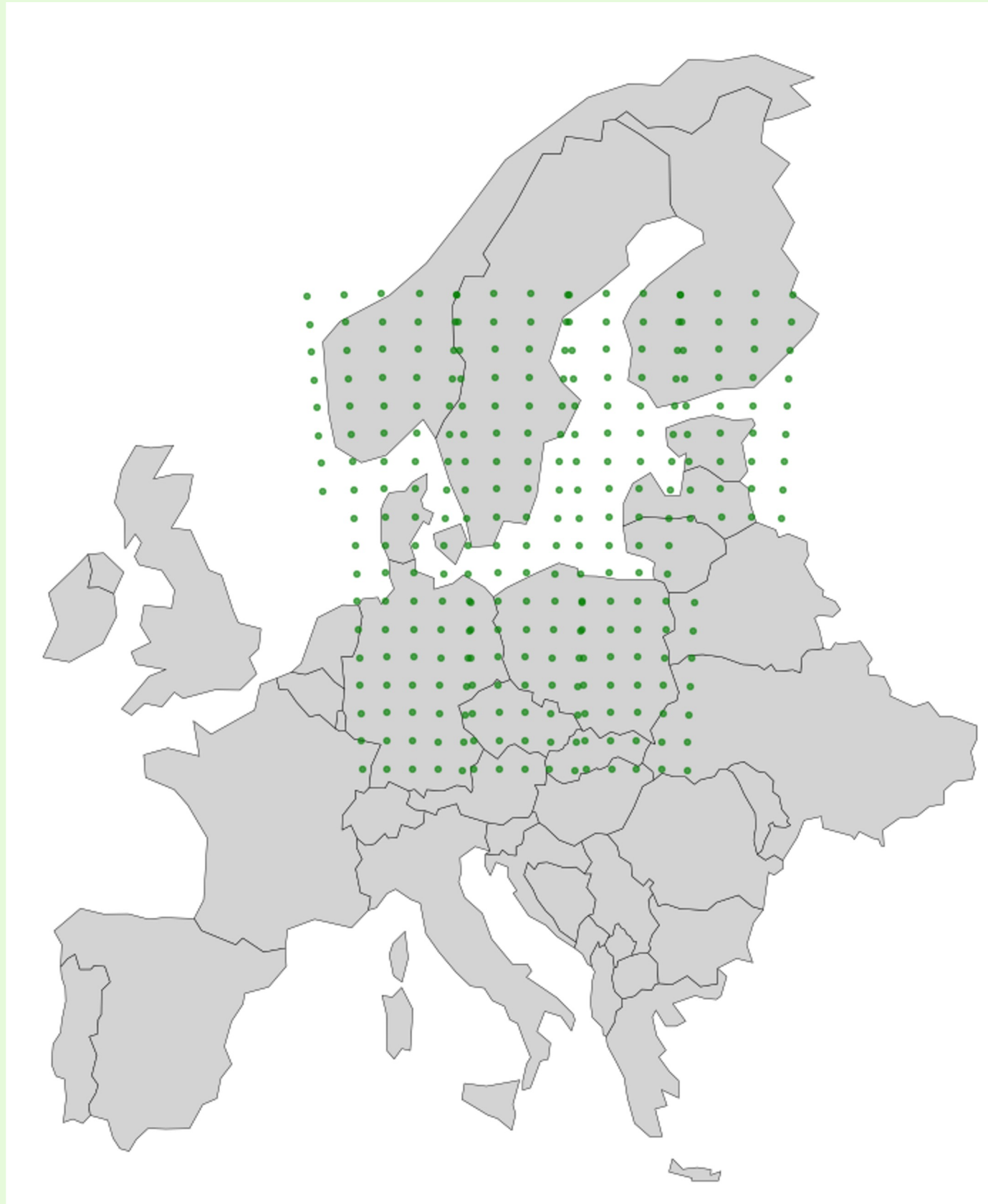


- We received a dedicated project environment in OpenStack.
- Setting up virtual machines, IP address, volumes, etc is straightforward.
- Very comfortable to have a network pre-defined for accessing Sentinel data – virtual machines have all mounted by default.

The only thing that took time in the initial setup was figuring out that default ubuntu user is "eouser" and not "ubuntu"



Results



- **30389** Sentinel-2 products processed starting from January
- ~ 52 GB

Conclusions

- Utilized an OpenStack project with pre-configured networks for seamless access to necessary input data.
- Benefited from flexible computing resources, allowing for efficient processing.
- Engaged in discussions with CESNET to store the final product using STAC metadata, ensuring accessibility to third parties.

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Contact

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- `tetiana.shtym@kappazeta.ee`

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THANK
YOU