ASTERRA
Technology by Utilis

How satellite-based infrastructure intelligence transitioned the unknown to common practice

Oct 22th , 2021

Welcome

Elly Perets

CEO

elly@asterra.io

NEWS | 28 September 2020

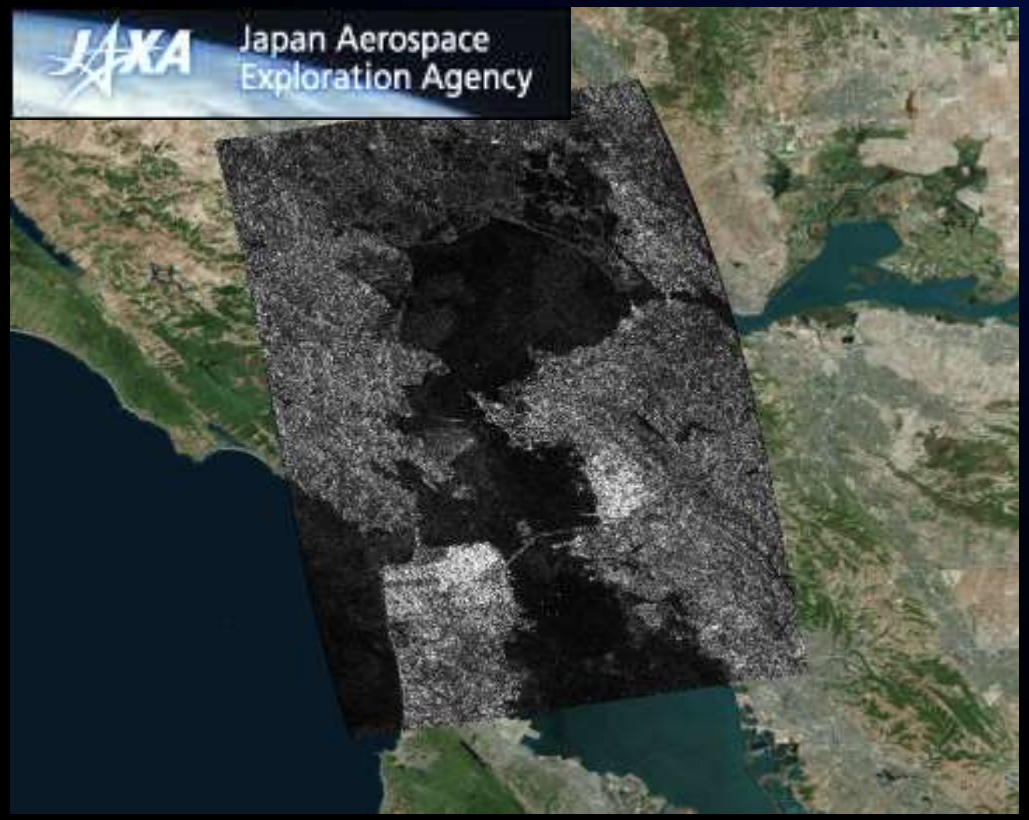
Water on Mars: discovery of three buried lakes intrigues scientists

Researchers have detected a group of lakes hidden under the red planet's icy surface.

Jonathan O'Callaghan

ALOS-2: Advantages of Remote Sensing

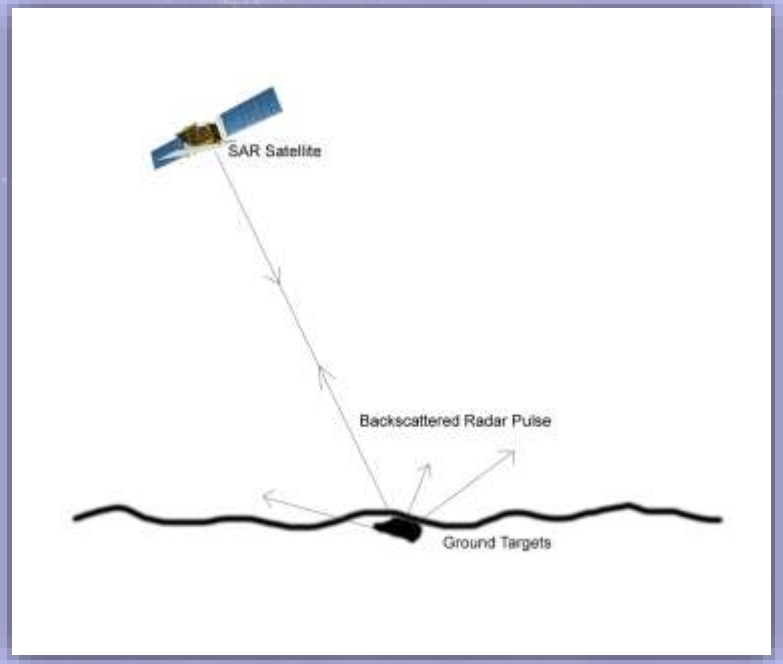
L-band, 1.3 GHz



Efficient and accurate survey of very large areas – 3.500km^2

ASTERRA
Technology by Utilis

SAR Satellites



All weather capability

Sensitive to dielectric properties

Day/night operation

Subsurface penetration

ASTERRA
Technology by Utilis

What is Satellite (RADAR) Imagery?

The received signal

The data pixel values

	0	1	2	3	4	5	6	7	8	9	10	11	12
0	-11.2808510904296837	-3.5264342163085937	-1.4163818703375	-1.8803398681640625	-2.998951538085375	-2.6389007568359375	-14.6502107549453531	-11.0599609024414063	-13.4186172485351156	-17.4911573173828281	-9.1696537099609375	-6.6399154663085938	-7.2899998463
1	-11.1550998244531125	-0.1426696777734375	-2.2546746652343375	-3.1027890341796875	-6.9203633447265625	-0.2943069372070312125	-8.0195007324218875	-14.1789944326867	-5.855598023125	-12.8788468502508938	-14.2766268866914062	-11.7827654189457031	-17.3604945434
2	-20.8763664794921897	-11.7777484795153625	-17.3606381125988844	-26.5895385742187	-6.2161254882812125	-6.5944403530273417	-17.3712997436523344	-0.5144668720703112	-6.7282409666396688	-6.9375930796132812	-5.4766769409179687	-18.9194950240488281	-14.1284032275
3	-19.3208266694335994	-8.8668346313476562	-20.4276289794921219	-11.5944866128125	-20.2645389911113281	-9.2118899835352562	-21.6153995307812125	-2.6217878375993656	-3.8532796202117187	-15.2755126953125	-16.2884067320703112	-18.2860763594980469	-11.7215728799
4	-12.5470397963867375	-5.531000125	-37.5807266125335156	-16.9328862715572656	-14.4656295776367375	-28.7508266859375	-18.2131881713867125	-18.5413899969375	-14.2654876308984438	-12.3628540039062125	-3.5240308794921875	-18.1820375835125625	-11.6579541523
5	-18.4381203515625	-29.6236479999023344	-16.3999114550781125	-6.7015128827148437875	-15.1379487285351719	-16.5670812661113281	-5.2629928988867187	-18.3074492351757812	-6.5365337109375	-7.9712595252929875	-6.3698124511718875	-6.0281337203703125	-8.1403656268
6	-13.0259122128125718	-8.3717498779296875	-14.6867919636869125	-8.2581969698242187875	-6.6787906685595375	-10.7819661279296688	-12.9191978825195531	-8.8828893742675	-13.1173095703125	-8.2791442871093375	-13.6181396679687875	-9.3508868286132812	-13.6245367772
7	-13.5452362665194688	-22.4113389152145375	-18.1853790038320312	-17.8531799316406125	-11.1303976562625	-10.5347061137326688	-3.2231826308226562	-8.3898892029902187875	-15.5346832270390625	-5.8152630408203125	-8.9038734130859388	-9.2717686629879062	-20.3205146240
8	-6.2408388223046875	-22.5223677980224388	-16.4790466826171188	-11.6821187653222656	-12.2864912984842969	-10.2994989117187875	-7.0421800041796875	-1.2310488878984375	-18.1208801268553125	-6.4798834726796875	-16.3123544921875	-13.7817822370937812	-8.0029602038
9	-14.0440347118124063	-34.8542584954140625	-14.5988531494140063	-12.7302861132812125	-24.5810424804687375	-13.8336078125625	-5.1404847827148437	-10.7448959335693594	-6.7258587481234375	-10.3487243853234375	-11.2487546191406125	-38.6897137451117188	-20.7057878586
10	-4.5225534802234375	-26.1998387389570312	-10.3578812794914062	-2.4786008278367187875	-6.5003483516406125	-11.5863115483332031	-8.0876778610953125	-8.9134521484375	-12.0686264838088594	-19.5812984728562625	-6.8169328782226562	-15.2949650218728656	-8.8907241821
11	-7.6220628801854687	-11.4743854821814063	-16.9865747439652344	-4.6234326782226562	-11.7245178222656625	-11.2310928344472656	-27.4211885154462188	-5.4490148536132812	-5.3683084822851563	-14.6270448777734375	-11.5156503859375	-37.5875881152234375	-28.9035034179
12	-20.2723613753371094	-17.0458303344728656	-18.4432678222656625	-11.4808088684828531	-6.2615051269953125	-8.4765625	-15.5085052498125437	-10.3440617739192531	-12.5735804125039063	-14.5488037648484438	-8.8058975219726562	-12.3885813889375	-8.4828423185
13	-1.6827612566578875	-11.0032202122078313	-5.5353358888371875	-17.2812880281953125	-6.5085449212875	-17.7242279652275438	-5.6662903822831125	-5.0686798696783125	-4.0869795978625	-12.2848221923828125	-12.8121484968515156	-12.9873237956835594	-13.4500787211
14	1.0113026772388437	5.8496154785156625	-9.6383480824960937	-4.7911148871289062	-13.5575988785352125	-14.5227058078125	-2.9984941259765625	-4.8489998413085938	-0.4196929931840625	-6.3155157578125	-20.3684480634398563	-5.8815623235156625	-5.8697588659
15	-3.8117330625468875	8.6308664438087812	-8.4026144482125	2.8378862189375	-0.8016396409176875	8.4897903173828125	-6.3670512573242187875	-9.2526367708078125	-5.2846374811718875	-6.7183908691406625	-5.4486541748046875	-8.1774063183051862	-5.3092488776
16	-6.4177390111367188	-10.7896748877929969	-4.9631009976562	-9.9873175788835937	-14.7907233088078125	-8.4806615962914062	-4.7016806738281125	-20.0193617138671188	-2.0180798608718125	3.4978648748623437	1.5392938184296875	-0.1281703828127875	-20.7982330332
17	-7.3803624042054687	-10.7847663338078125	-19.3084782573242719	-7.0846922729492188	-13.1754613338078125	-12.1386457553125	-6.3670512573242187875	-9.7803938478125	-6.3983344726562625	-7.9373177880859375	1.6696503268546875	1.1689147946218875	-2.3006408864
18	-8.8347544026269531125	-9.9782477781265125	-8.2453146269335937	-10.2848138648437875	-12.5446399874012344	-6.3246660589375	-12.0071963737876313	-20.1623849233203125	-4.4837036132812125	2.9576566803515625	-8.2814102172851562	-5.5984908787890625	0.0486988425
19	-8.2399134445125	-12.7778268981123844	-17.2861799694703656	-13.4221161237375	-3.9681091308859375	-4.4637756345656625	-8.7528399441406125	-15.8886771378906625	-18.4944238281125	0.9076751789844375	8.7817364282226625	-9.8635563864843375	-14.2622374721
20	-14.1926593237304688	-25.6629257332148844	-9.7630767822265625	-19.9660834176687375	-8.0059156668945125	-14.4059993041992719	-6.1092758178710937	3.7291130717777437375	-1.9435281458125625	-6.6488287514648437875	3.7236328125	-1.7289548695195313	-5.6126708884
21	-10.1457672944218750	-4.7524941358859375	-3.2657546997070312	-7.3914413452148437	-2.7680514746093375	-3.8531126278808438	-6.5111236672265625	-17.5213994658203312	-7.7273338867187875	-7.1578879492187875	-14.9718891347656625	-21.9726638793945531	-24.2673997807
22	-6.5928812490234375	1.3948898868164063	-6.8884617177734375	-5.7757539531125	-6.0442504882812125	-5.3368347617968875	-12.7556763695312125	-8.8548513398484375	-4.1306691798875	-5.7354451152343875	-13.3489450683593375	-20.1488418578720156	-16.9981946057
23	-9.9121542746826437	-3.3559112548828125	-11.7893658447265625	-9.9635484375	-7.2401428222656625	-6.6779418945312125	-6.6825654021289063	-7.5514654213867188	-3.2636757736328125	-4.5322798828125188	-4.9089548338984375	-5.5798888475	-28.3304626025
24	-12.1215925212890625	-24.3405993041992219	-14.4986223535937031	-11.0810528204972656	-14.1196777734375	-4.5998638918015625	-19.8725288018125	-17.0878398412367188	-17.3895257125	-8.4788834726796875	-20.4272017214844531	-8.6628892088984375	-10.1837082989
25	-13.4703464343750531	-24.7212397803906625	-26.2220849472656563	-7.1333770751953125	-13.7991522217578688	-28.5886916218953375	-17.3895208742234938	-12.4588738200125	-7.2255249523437875	-14.7125998059867969	-17.0783014794921188	-7.2026197753906625	-5.6207177759
26	-6.0940389169921875	-9.8095787841015625	-20.6140538188476563	-6.0289916921875	-14.6950838126953063	-23.0569956668152996	-13.3579707363281125	-16.0581288588933594	-13.9230408869140063	-14.7969252929687875	-4.8586662841796875	-5.5212482234375	-5.1404861443
27	-7.3386678868593375	7.3368522094726562	-14.6805496212828531	-6.8286784711914062	-12.8363885488046875	-25.9372888125938	-11.8894711303712094	-5.5942328124609375	-2.9447988046875	-12.1984482125	-7.6387879773632813	-11.0357818605351563	-8.1456221606
28	-12.1462651225585594	-20.4739227294921187	-6.5240148883720938	-8.3867950439453125	-8.5869618159570312	-9.2908782958984375	-14.3298265429687875	-18.4783477783203312	-8.5151375735242125	-14.2288867880625	-12.2310714721679969	-12.9726335812826406	-8.5337948120
29	-0.8821792802539625	-11.6038970947265563	-22.9988784790039062	-18.5020045410156562	-38.4758834838867125	-20.4968752441406625	-22.6898868140625	-20.3891881125625	-22.2824359133789938	-21.6266708374023344	-6.1807935222070312	-14.4884148925781212	-7.1809788787
30	-12.9354251708984438	-30.5417633056640625	-16.4244003295898844	-28.8967895507812125	-17.0582259277734375	-21.0584564028869438	-9.1403884887695312	-20.5791591392894531	-18.6157548925354969	-20.4755248023437375	-11.3089000244140063	-9.3082351684570312	-14.7943192528
31	-14.0631942748023344	-17.7957524780239062	-10.9156552175781312	-18.4008407592773344	-11.2503204345703125	-8.8828838182861125	-12.0011732921875625	-20.3689771728515562	-12.2492141723633281	-18.9794498168945531	-28.5145118883888438	-23.2446765898438375	-8.7935358813
32	-17.9468812670898844	23.8887788685232438	-25.4756546820507812	-14.9302348801757812	-11.3807159423828125	-25.7244415820312031	-10.8546371459960844	-6.3440008222558938	-16.8882569995117188	-18.4962838692255938	-17.3688957883056312	-22.4825862841796875	-26.2767185434
33	-16.7547229452148844	26.3329010009765562	-9.7367964985117188	-12.0834267191406625	-20.7513046264648844	-23.6327972412109375	-15.4822238107421888	-8.9927833447265625	-11.8268803222656625	-14.1840257373046875	-15.5836394042968875	-16.7048362284668875	-8.2127151486
34	-19.6803850097656625	20.5463972087890625	-27.7001137470703125	-14.6801527270468219	-17.9891586302734094	-14.2484201660156625	-11.3898038082031125	-16.3143001371093375	-14.0284942258398844	-14.8408357128906563	-11.7611846923828125	-18.0847302246093375	-10.3782730182
35	-12.3896716080300781	20.3268127441406625	-11.9874725341796875	-18.6367896502929688	-24.1927496234375	-10.8045501708984438	-28.5137231445312125	-5.5492592041015563	-16.6842515088867188	-14.0238255126953125	-27.7725549316406563	-24.6470813696289062	-13.2161393017
36	-21.5849996944726562	-13.6537761513086625	-20.4447784423828125	-14.4248164794921875	-14.2276375781125625	-17.0280276166944531	-18.7712029527734375	-16.5741843908203125	-13.9463983482234375	-11.5611416677734938	-18.1280512084960844	-22.0835418701171188	-18.1364440917
37	-19.9820446123046875	-21.0581278988125	-13.7696228827734375	-20.8125468875	-16.4096176953125	-14.1375437246093375	-8.5712099155273437	-15.7784315185546688	-14.4306161499023344	-20.6394465332031125	-16.0349482562463656	-14.0574798502988438	-13.9713688886
38	-24.1825354001906625	21.7443084726796875	-17.8984843375	-19.1154225683398438	-17.1456508488281125	-14.8029731369140063	-18.7968513962890063	-14.8622028296875125	-14.7880288453781312	-21.9123228988046875	-8.6306884991218875	-15.6770629882812125	-10.6445288875
39	-15.9610995703125	20.0350875844921219	-11.4453188425781312	-18.4636466259765625	-21.8974609375	-17.4189447870312125	-19.4538574218875	-9.2912898728515625	-13.2877044677734344	-9.2912898728515625	-5.8988134163320312	-16.1293815429687875	-22.5195374096
40	-13.7406005859375	-12.6927490234375	-11.1133575439453125	-13.1805517578125	-17.8812026977539062	22.6436267114355469	-13.4271318652832031	-19.5188569338375	-18.0803662308375	-14.0805746236444531	-8.4005178332226563	-21.8163809911209375	-14.5946850948
41	-18.0793562207031125	-11.7812847900390625	-19.2304677148437375	-15.4994327392578125	-13.7265095932128281	-28.2842041015625	-6.4573440551757812	-11.1986962792382812	-11.1836862243652031	-17.8337478863369531	-12.6357690756835594	-11.0649804931013562	-13.9538158624
42	-16.4899393130859594	-28.5553131133125563	-23.6620860400390063	-15.6704101562125	-12.4964441658203063	-35.0183759765625	-22.8773317065429688	-20.2480928128906781	-13.0379943847656625	-12.6861172485351156	-20.7096862792968875	-13.2190817700195531	-13.1707839965
43	-6.0048294967382812	-23.5898132232421875	-20.3363948738968750	-14.8156325242187875	-21.7864450195312125	-14.5009765625	-25.3346939086914406	-21.5604395458984375	-14.4511488868164063	-10.8728250732421188	-18.3843103948875	-12.7389862661	-8.3
44	-7.8337330791815625	-6.8238623046875	-9.3982543945312125	-12.3671264484375	-18.1849932285156125	-17.7734985351562625	-15.9234923418408625	-10.4368581338903375	-13.7340136772946094	-25.9581728074218875	-22.0219988189179969	-21.8226828718975	-21.2573384775

ASTERRA
Technology by Utilis

AI & Machine Learning

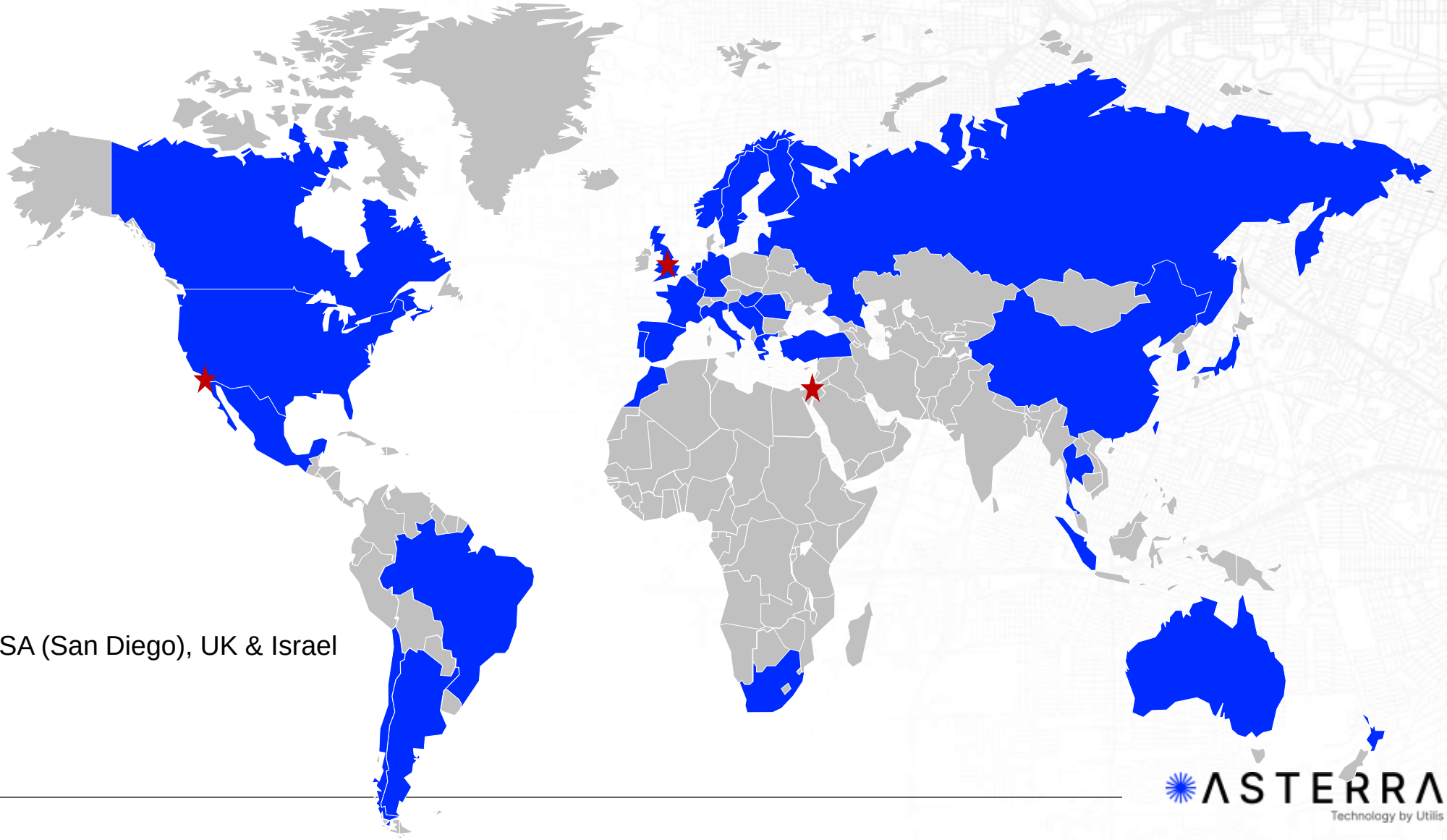
Asterra started from the foundations of Physics and actual physical properties in the real world.

Due the chaotic nature of SAR, there’s an upper limit of success that can be achieved.

Introducing AI

The AI & Machine learning methods took the hundered of thousends cases from all around the world and created a working model yielding better results.
To produce a working AI model, you have to have an extensive scienctific properties and proofs.

Worldwide Presence



★ Offices in USA (San Diego), UK & Israel

ASTERRA
Technology by Utilis

ASTERRA Impact by the Numbers

OVER **430 PROJECTS** COMPLETED IN **57 COUNTRIES**

CARBON DIOXIDE EMISSIONS REDUCED BY **14,500 METRIC TONS**

equivalent to 12.5M pounds of coal burned

21,800 MWH of ENERGY SAVED yearly

More than **36,000** LEAKS VERIFIED

3.5 LEAKS FOUND PER CREW DAY

VS. 1.3 found using traditional acoustic methods (on average)

9200M GALLONS (5 million m^3) **WATER SAVED EVERY YEAR** (EQUIVALENT TO 33% OF THE WATER USED BY A CITY OF 500K RESIDENTS)

Jan 2017 through Jun 2021

ASTERRA
Technology by Utilis

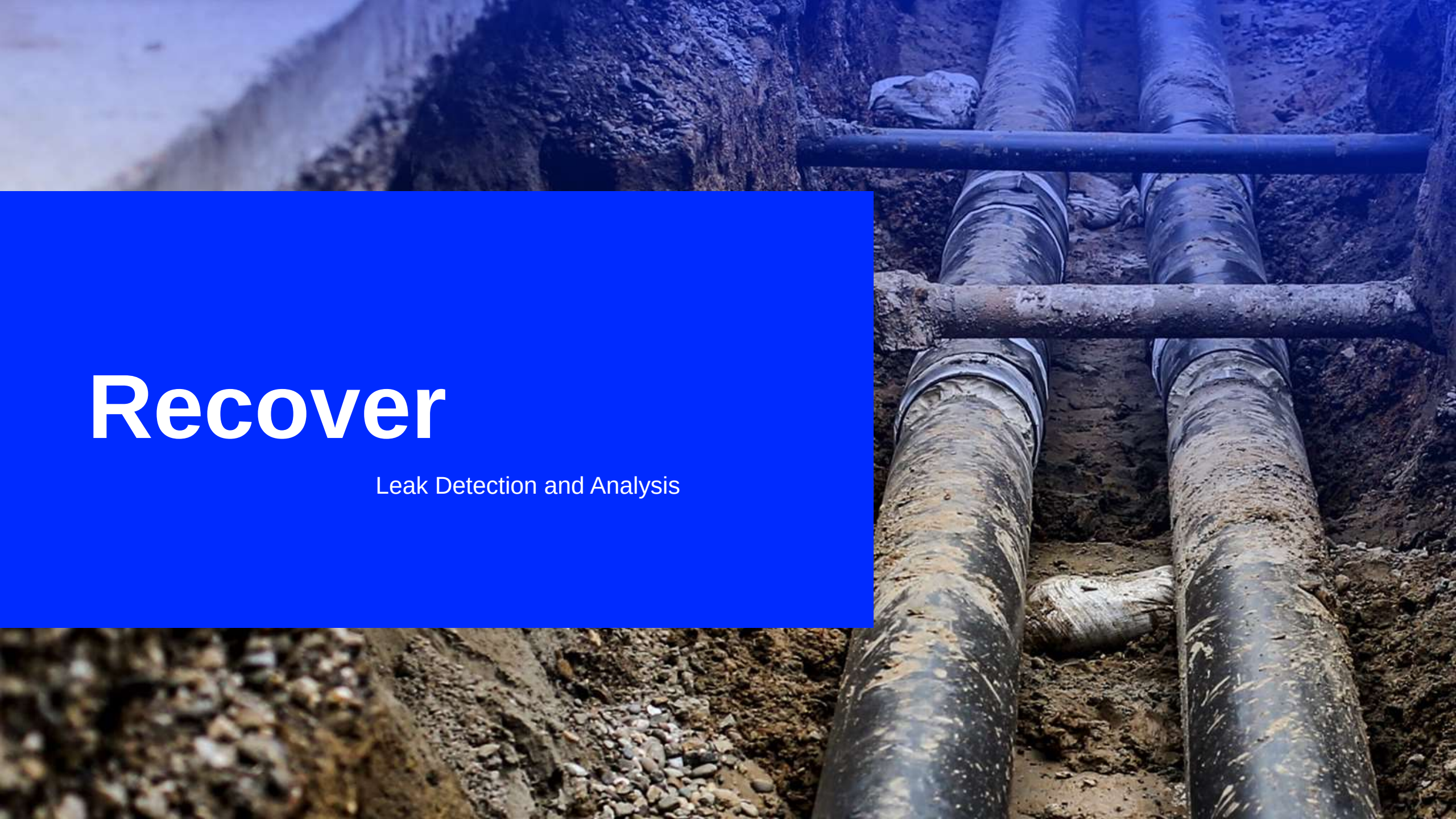
Sustainability ➔ ESG / SDG program

- We believe that sustainability is not only part of our business strategy, but that is also guides our mission
- Our products contribute to three of the seventeen goals: 6, 9, 13.
- Goal 6: Ensure access to water and sanitation for all
- Goal 9: Build resilient infrastructure, promote sustainable industrialization, and foster innovation
- Goal 13: Take urgent action

ASTERRA
Technology by Utilis

Recover

Leak Detection and Analysis



Leak Detection – Current Approach

Reactive approach

Blindly surveying

Listening/acoustic

Correlators/Monitors

ASTERRA
Technology by Utilis

What is Wrong With the Status Quo?

Searching blindly…

ASTERRA
Technology by Utilis

Triage Approach – Satellite Guided Data

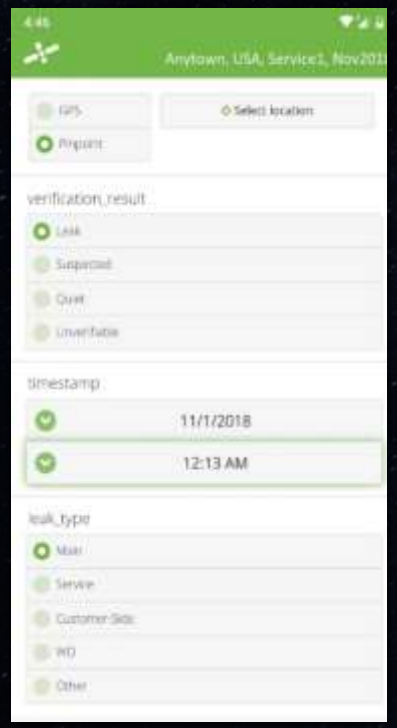
Satellite imagery screening tool

ASTERRA
Technology by Utilis

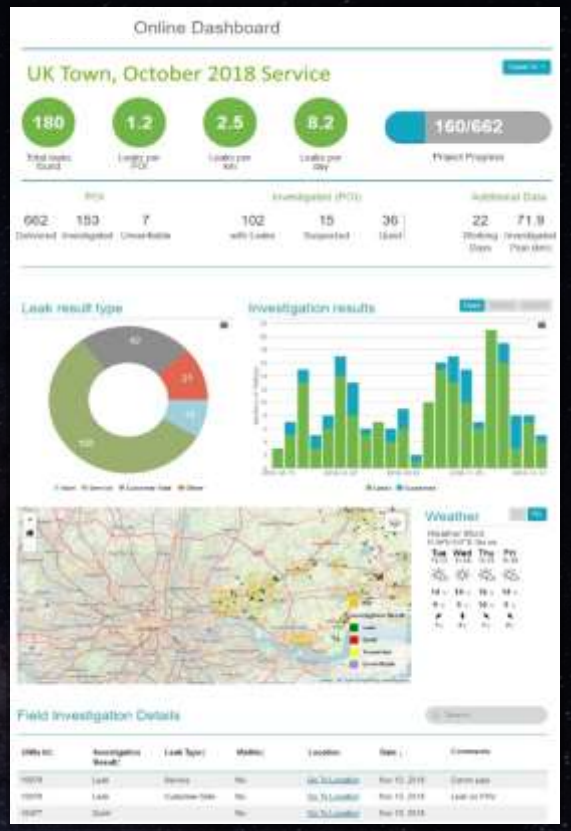
Delivery Options

Mobile accessories with your delivery

U-View & U-Collect



Dashboard



- Each delivery comes with one (1) license for each of the following: U-View, U-Collect, and U-Collect online dashboard

ASTERRA
Technology by Utilis

U-Collect Online Dashboard

- Project overview
- POI metrics
- Leak metrics
- Weather and forecast
- Fieldwork details

ASTERRA
Technology by Utilis

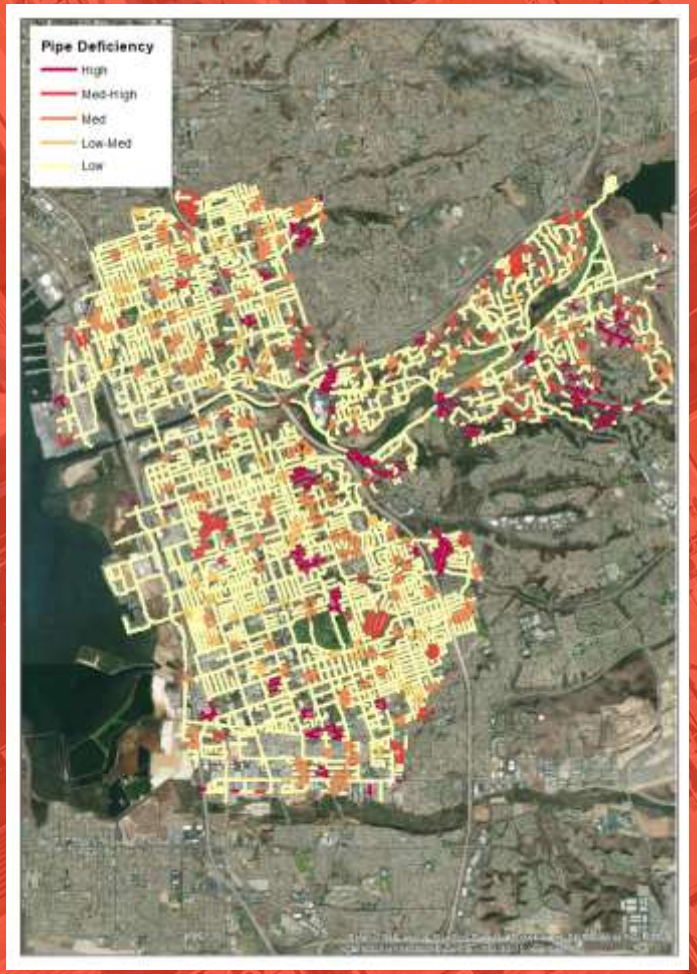
MasterPlan

Pipe Deficiency Assessment

MasterPlan is…

- A GIS data layer to prioritize your pipe replacement
- A tool to guide your deployment of fixed acoustic assets
- An input into a replacement planning model or water system master plan
- A non-invasive indicator of leaking pipes
- Pipe agnostic
- An easy input into all GIS and asset management tools such as Esri and Innovyze

MasterPlan is a real indication of a leak from a real sensor, it is not a prediction or model output



ASTERRA
Technology by Utilis

Why MasterPlan?

Capital Planning & Improvement

- Data input to forecast impacts
- Risk-based prioritization of pipe replacement
- Minimize asset lifecycle costs
- Long-term planning

Operations & Maintenance

- Identify problem assets
- Identify areas to deploy fixed assets
- Prioritize areas for inspection

Resilience & Response

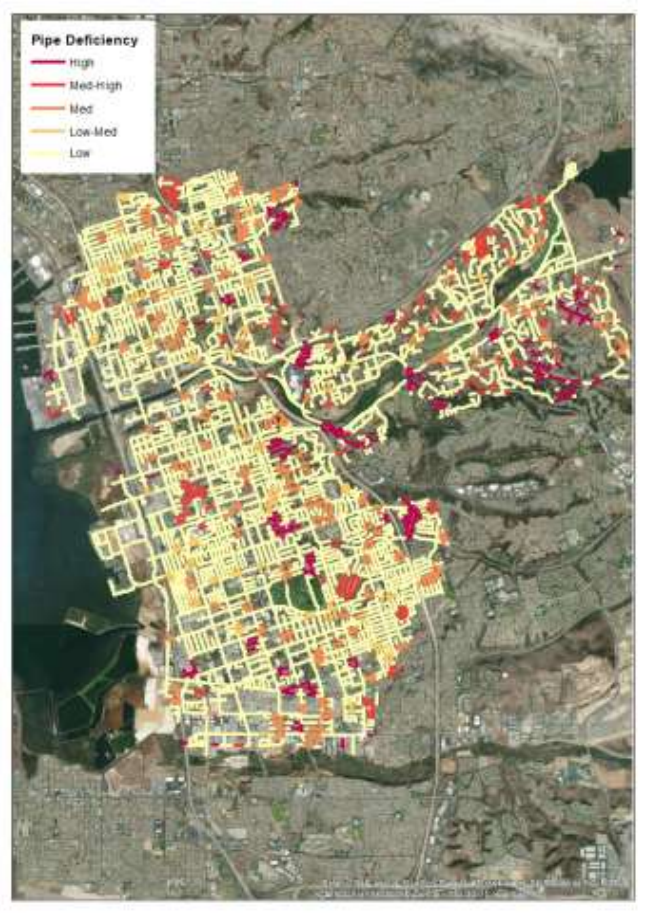
- Data input to forecast impacts
- Risk-based prioritization of pipe replacement
- Minimize asset lifecycle costs
- Long-term planning

ASTERRA
Technology by Utilis

Product in Detail

Deficiency Levels

- High
- Med-High
- Med
- Low-Med
- Low



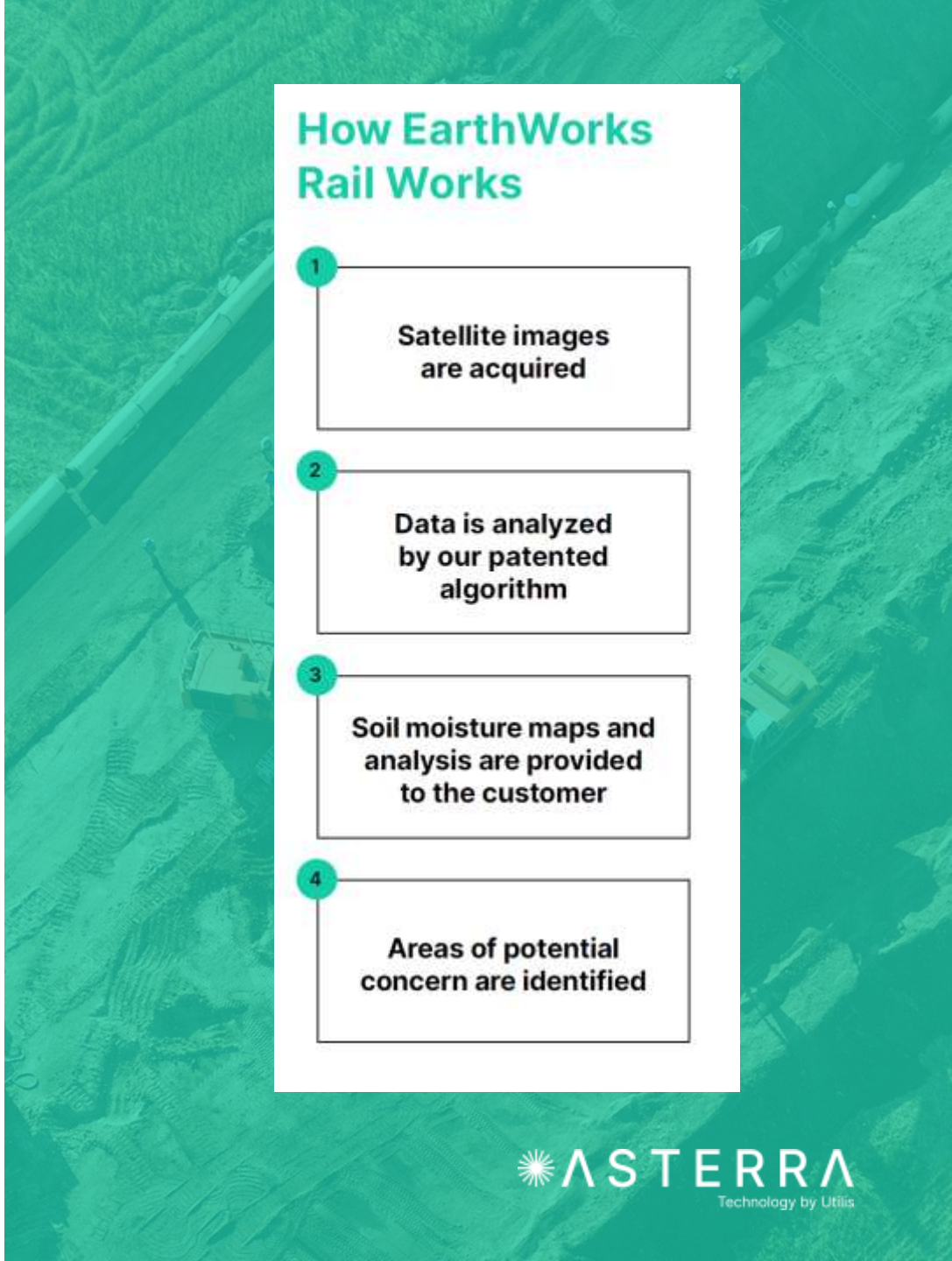
ASTERRA
Technology by Utilis

EarthWorks

What is EarthWorks?

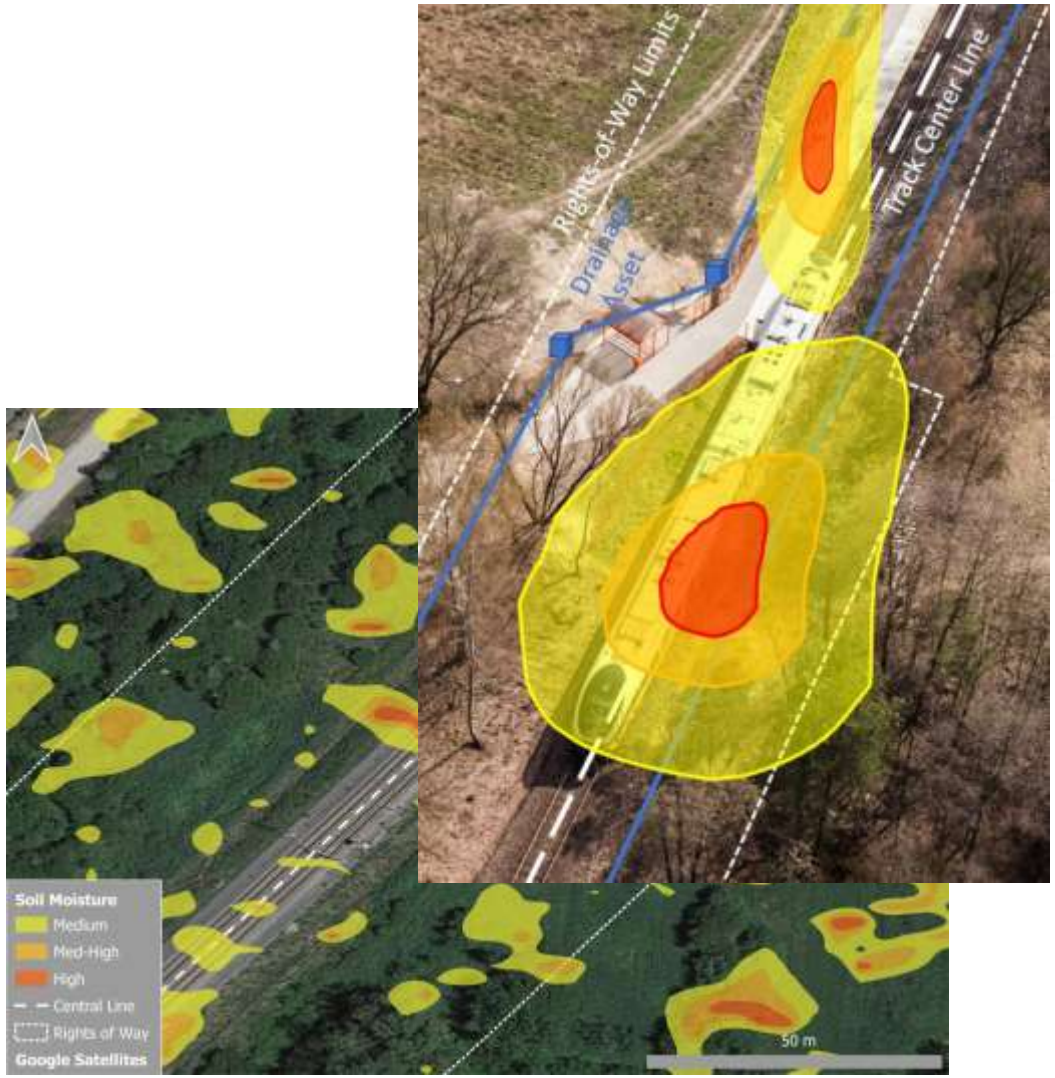
ASTERRA Product Line

- **Satellite-based identification of soil moisture below ground for railroad**



EarthWorks Rail

- Relative underground soil moisture levels around rail and rights-of-way
- Find the problem areas in time to avoid calamity or high-cost repairs
- Find problem areas to use more detailed measurement methods (increasing efficiency)
- reduce maintenance cost



ASTERRA
Technology by Utilis

Thank You