MundoGEO#Connect LatinAmerica

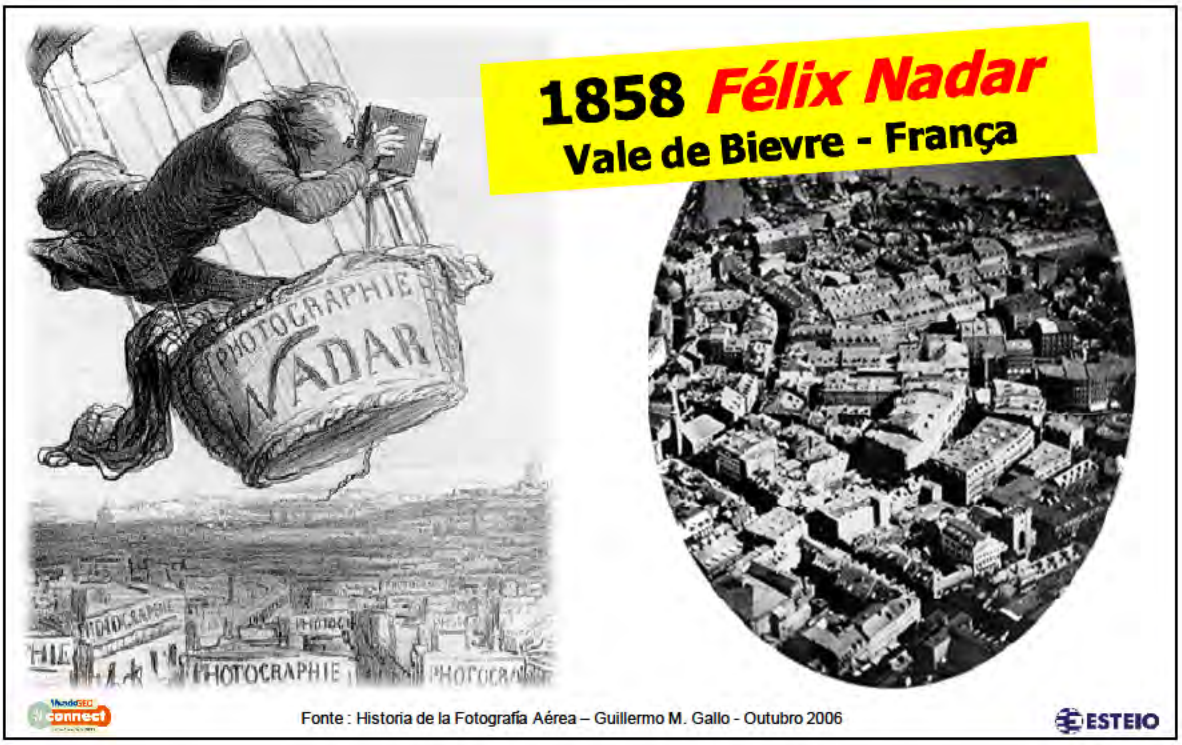
ESTEIO S.A.

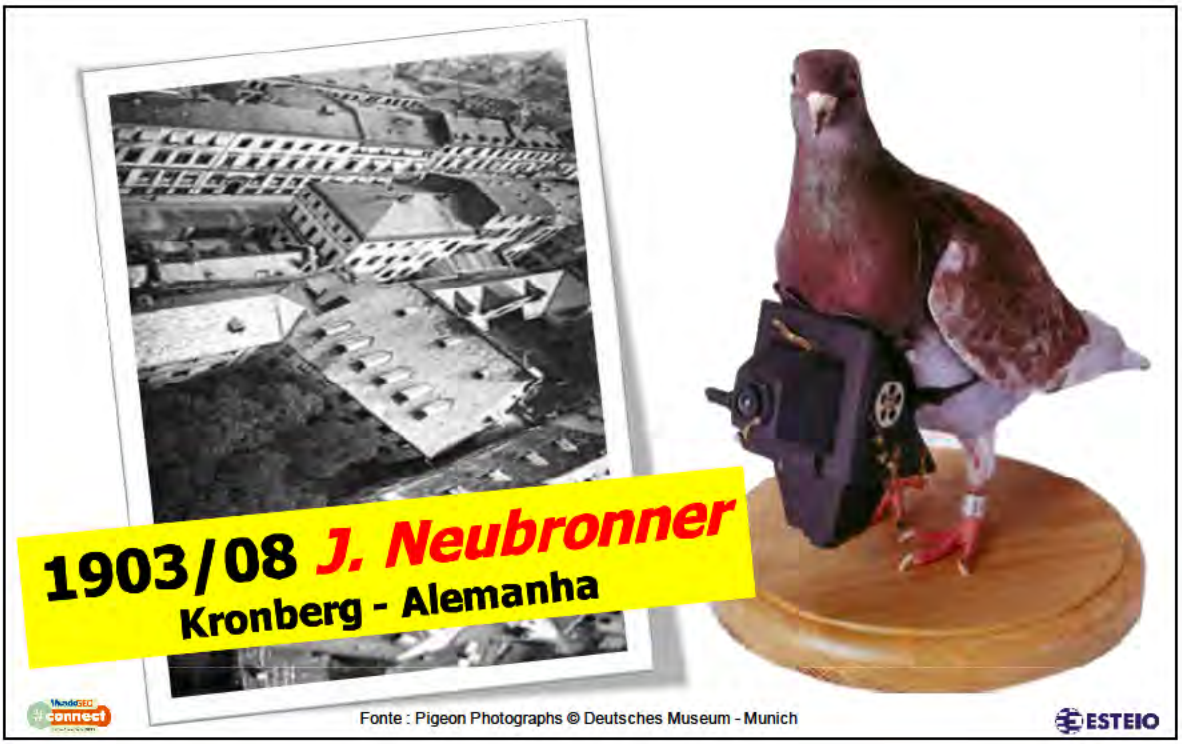
A ASSUSTADORA VERDADE SOBRE SENSORES !

Amauri Brandalize

MAIO de 2012

Aconteceu há 150, 100, 50, 10 anos ...





1. LENTES
2. FMC (Forward Motion Control)
3. PLATAFORMAS
4. GNSS e INERCIAL
5. ELETRÔNICA

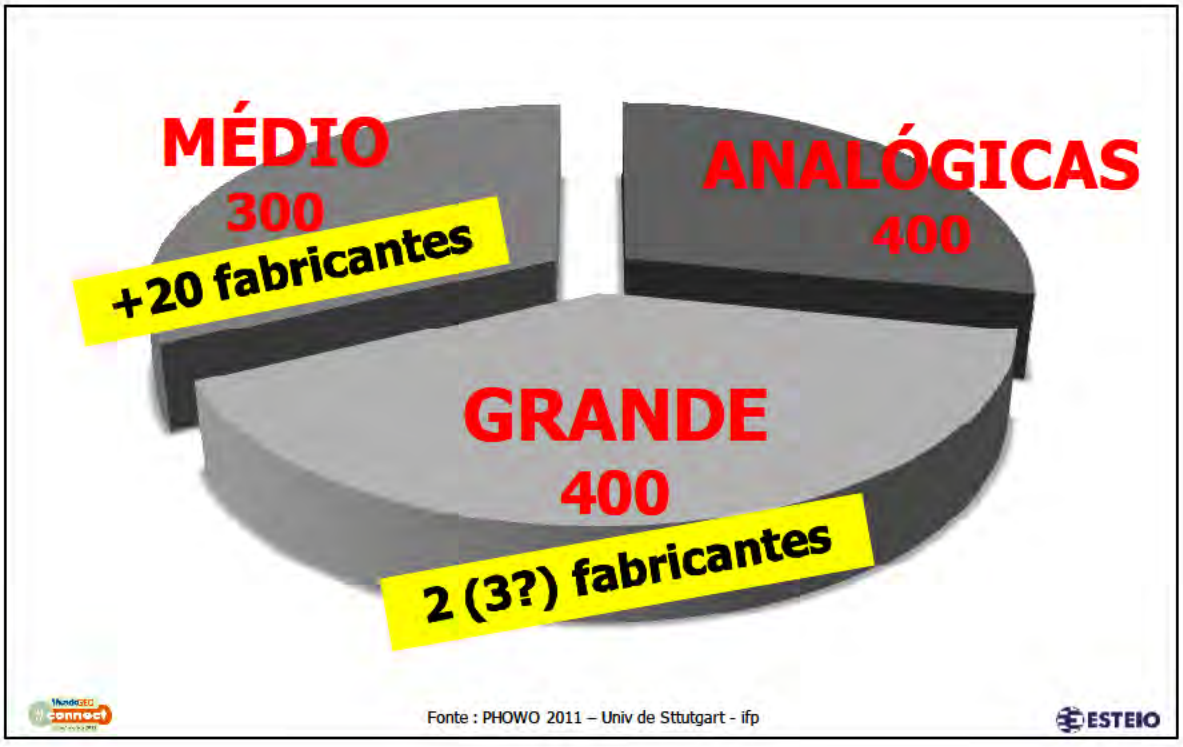
REVOLUÇÃO

~1.100

Câmaras Aéreas no Mundo

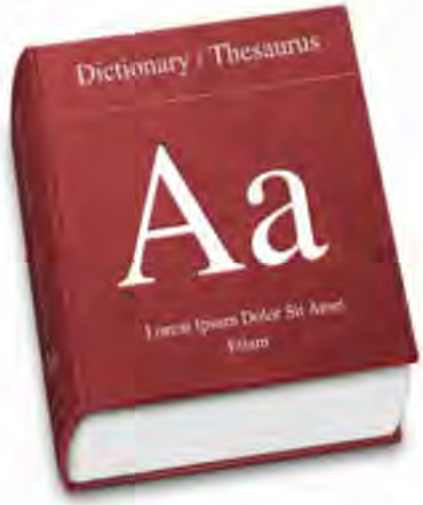
+ de 60% digitais !

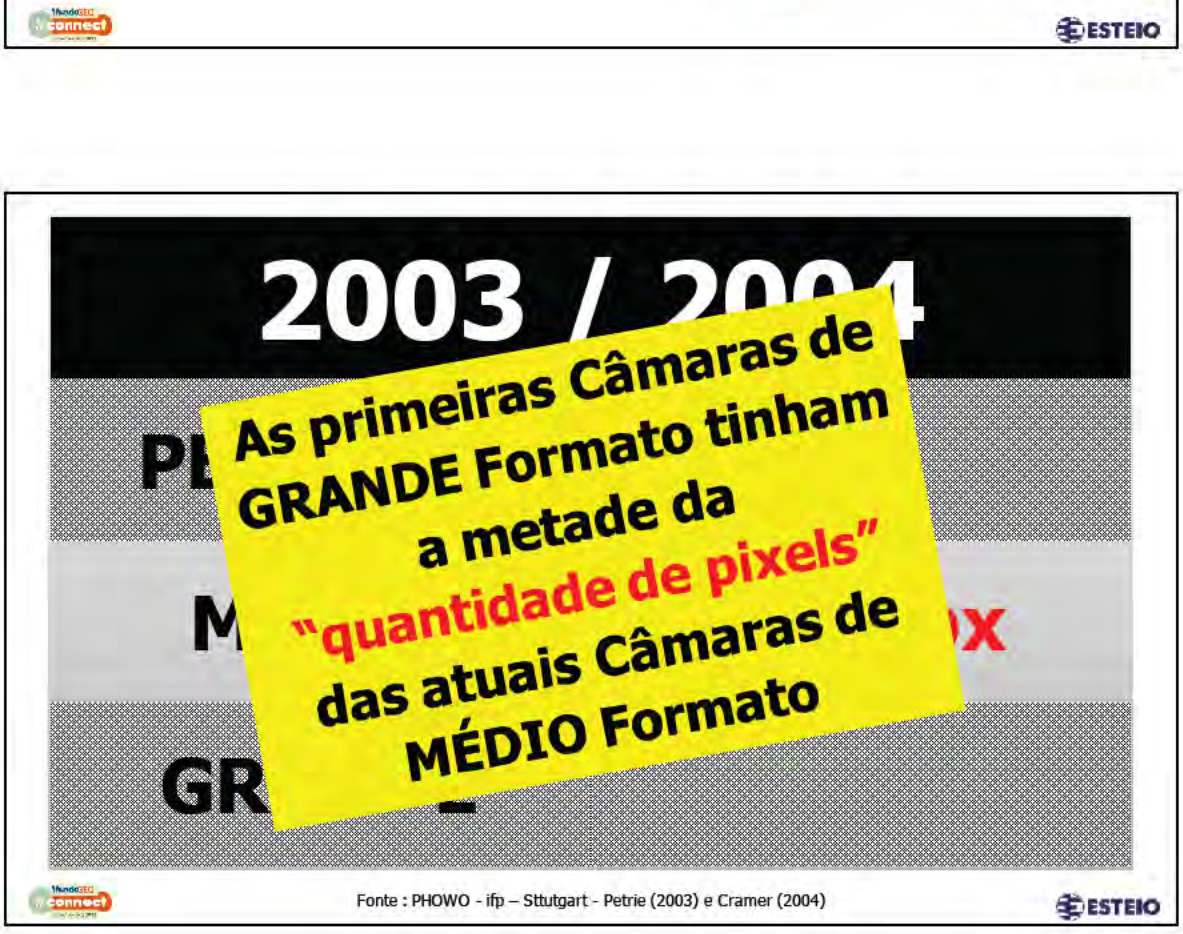
Fonte : PHOWO 2011 – Univ de Sttutgart - ifp



Fonte : PHOWO 2011 – Univ de Sttutgart - ifp

DEFINIÇÕES de FORMATO



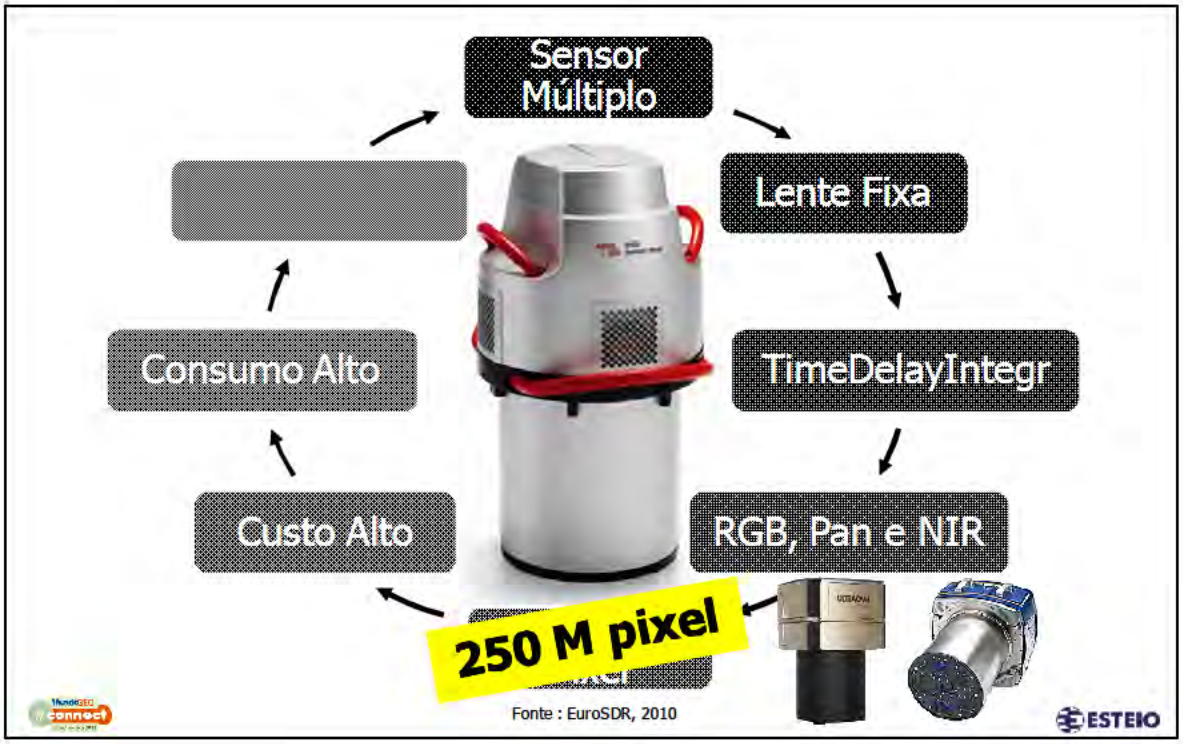


"Não se pode mais afirmar que Câmara Aérea de Médio Formato é a câmara de lente única e equipada com sensor CCD num magazine de 6 x 6 cm"

EuroSDR – European Spatial Data Research
Performance of Medium Format Digital Airborne Cameras
Novembro 2010

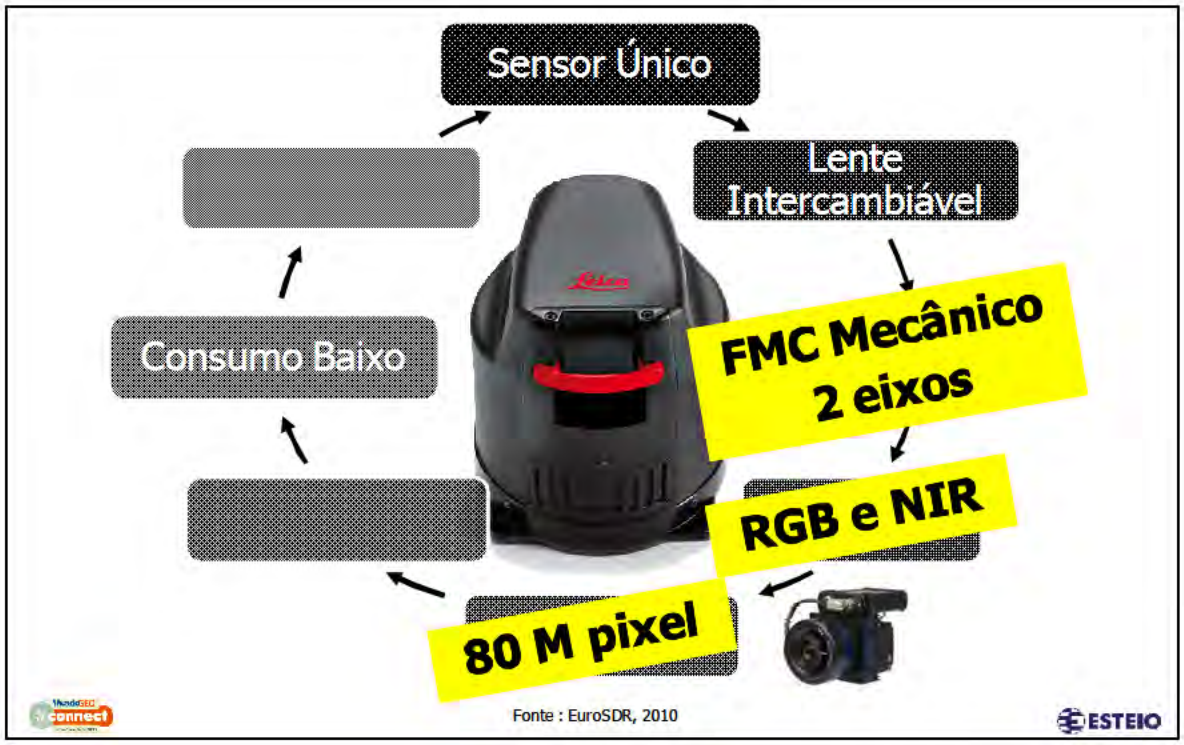
Fonte : EuroSDR, 2010

ESTEIO



Fonte : EuroSDR, 2010

ESTEIO



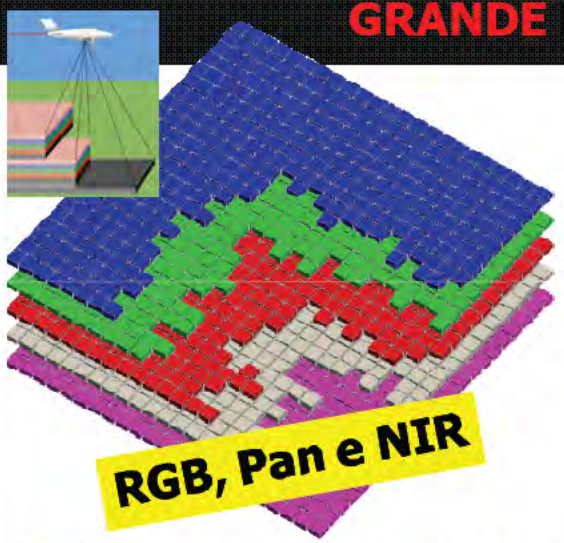
1 PADRÃO DE CORES

2 LENTES

3 SISTEMA INERCIAL

1 PADRÃO DE CORES

GRANDE FORMATO

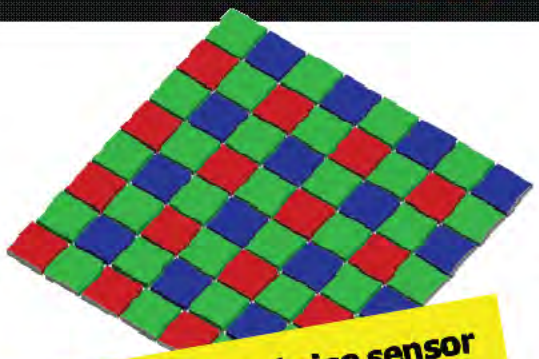


RGB, Pan e NIR

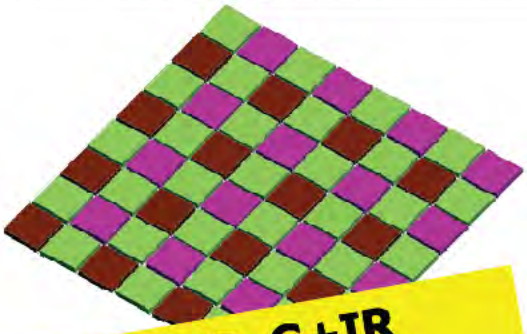
RGB e Pan
(pan-sharpening)

Fonte : Câmaras Aéreas Digitais, as de Médio Formato – Valther X. Aguiar - 2010

1 MÉDIO



R,G e B em único sensor (Bayer)



R+IR, G+IR (color infrared - CIR)

Fonte : Câmaras Aéreas Digitais, as de Médio Formato – Valther X. Aguiar - 2010

2 LENTES

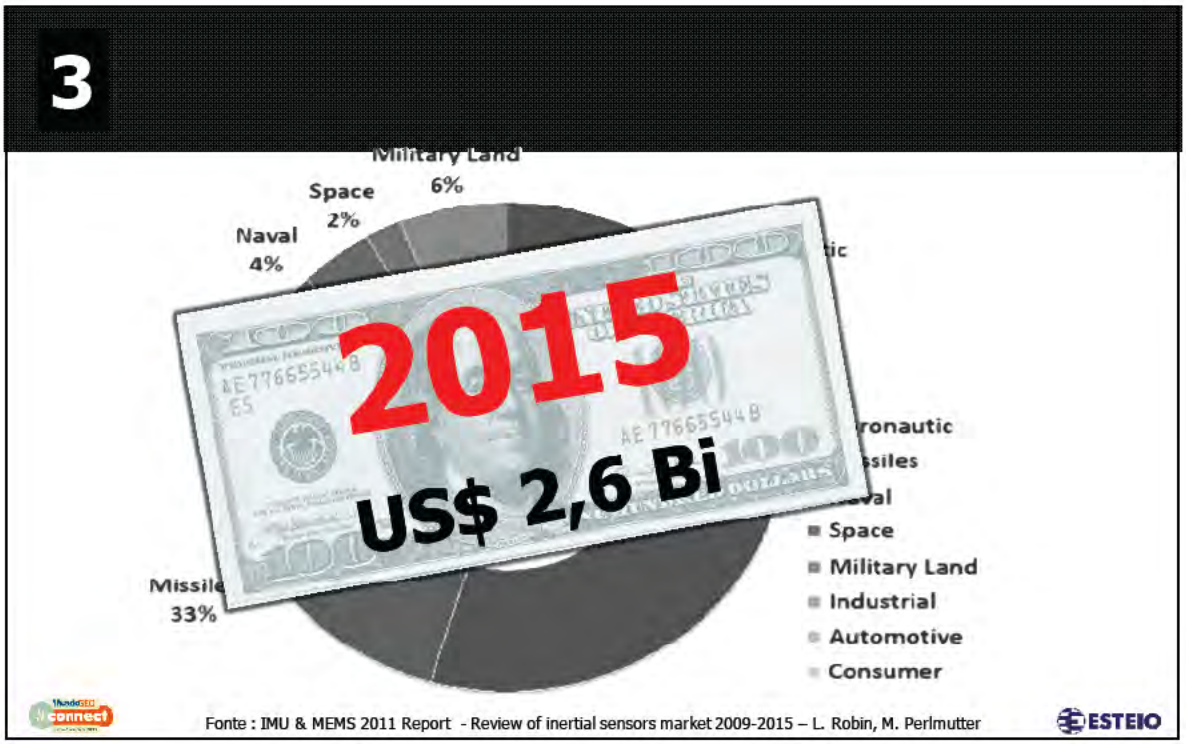
GRANDE

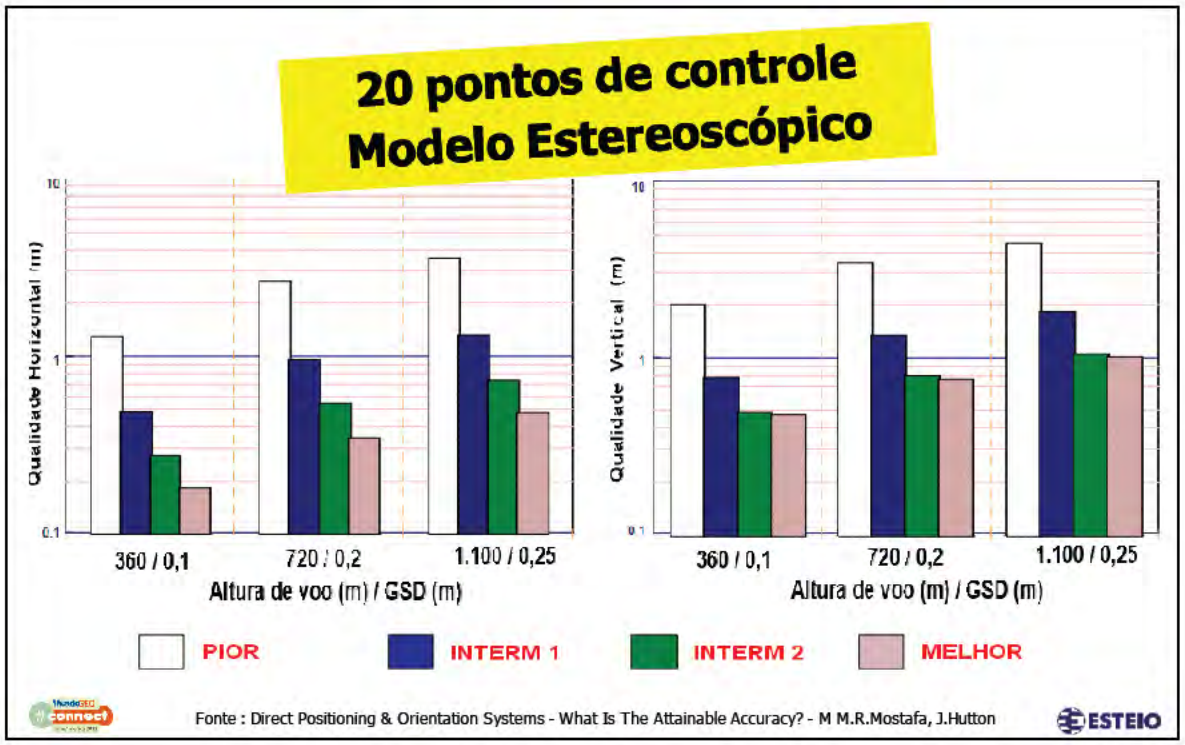
30 kg
US$ 330.000

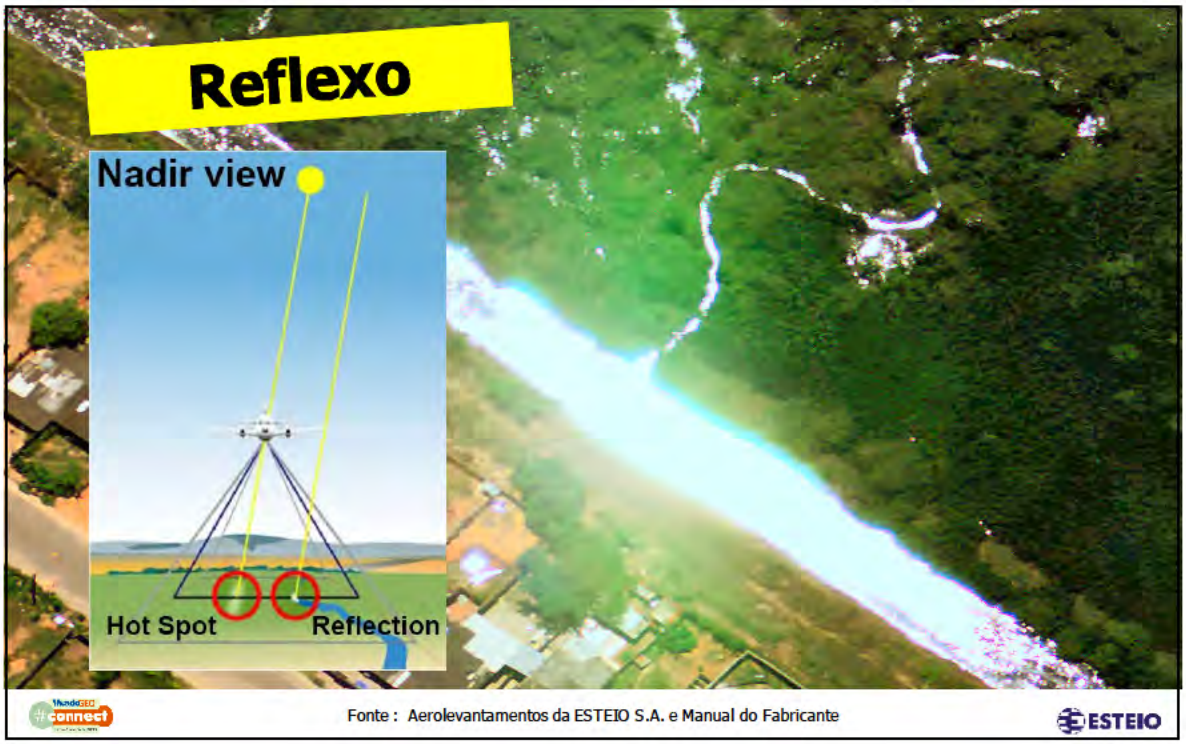
MÉDIO

3 kg
US$ 11.000

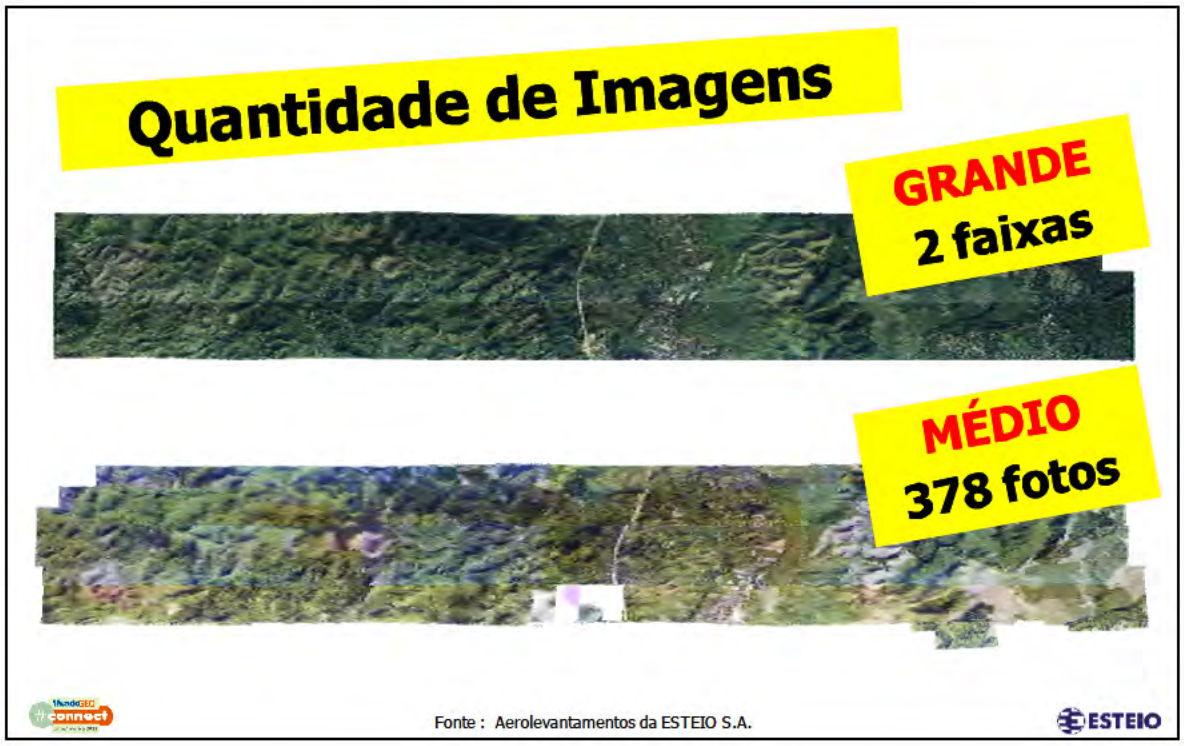
Fonte : Leica Geosystems specs



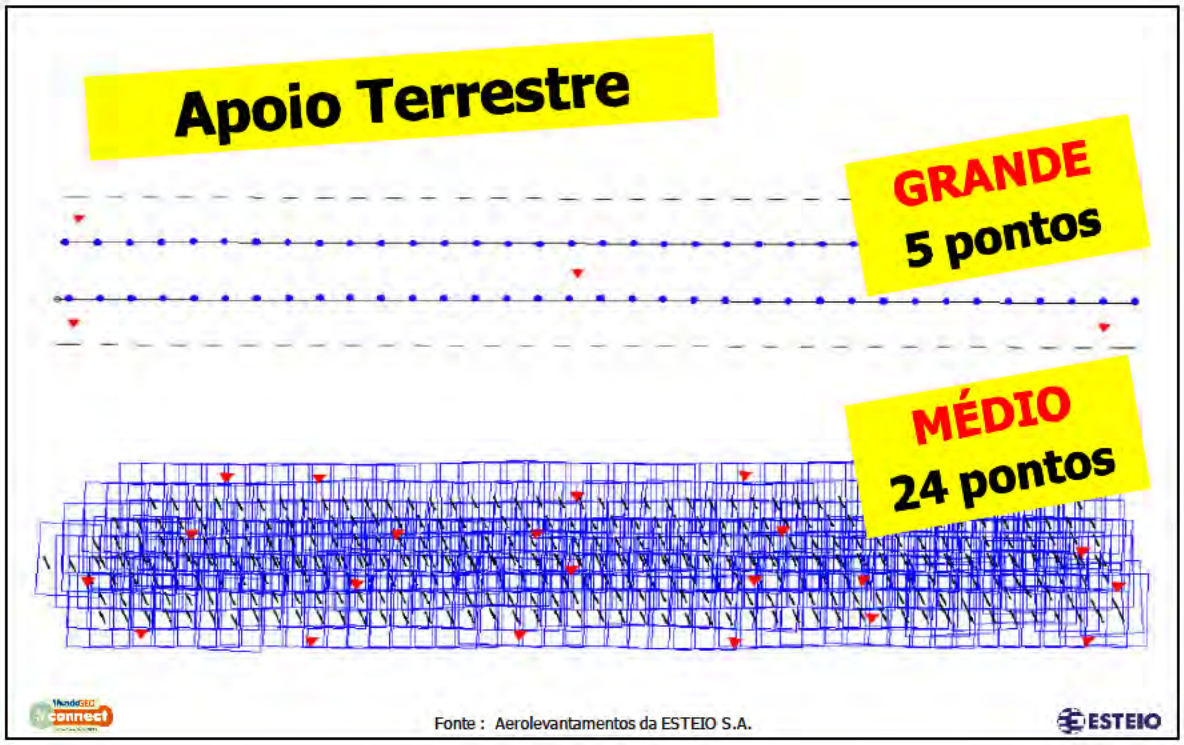


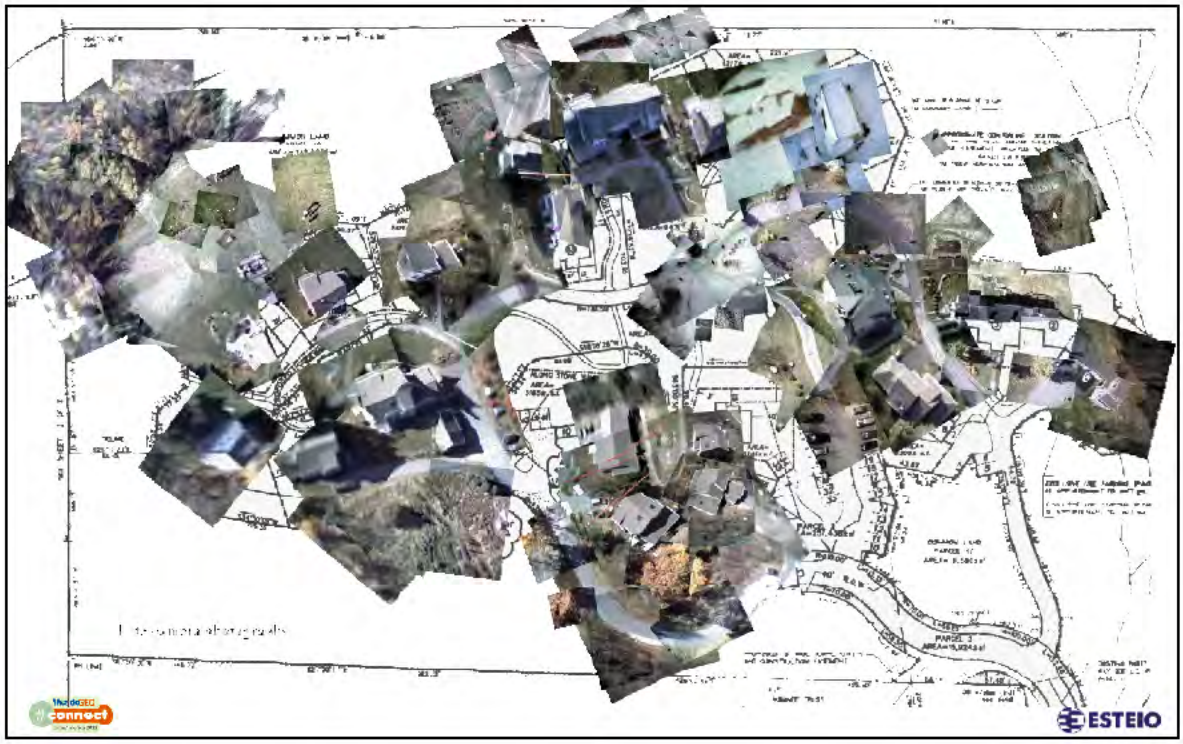


Fonte : Aerolevantamentos da ESTEIO S.A. e Manual do Fabricante

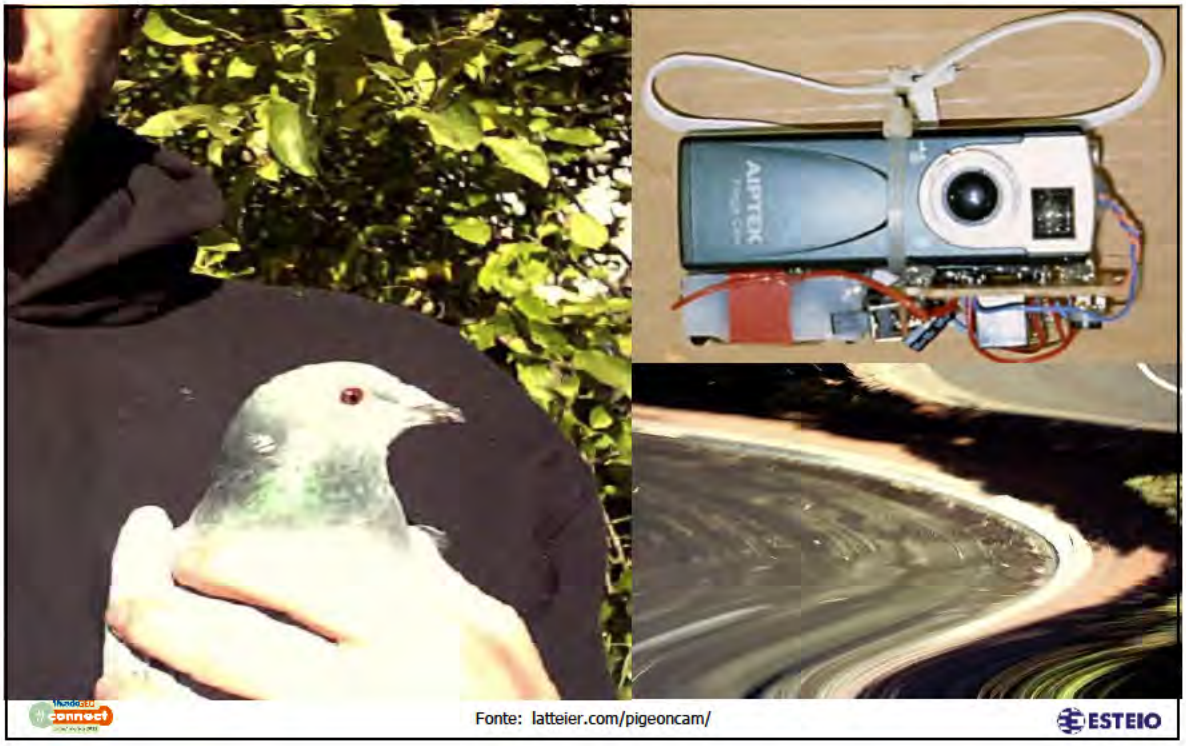


Fonte : Aerolevantamentos da ESTEIO S.A.





Fonte: Desconhecida



Fonte: latteier.com/pigeoncam/

2008...

UVS INTERNATIONAL

35 países

260 membros

Fonte: UVS INTERNATIONAL – The Current Situation – Bélgica - 2008

ESTEIO

MICRO

MINI

PEQUENO ALCANCE

Fonte: UVS INTERNATIONAL – The Current Situation – Bélgica - 2008

CURTO ALCANCE

MÉDIO ALCANCE

Fonte: UVS INTERNATIONAL – The Current Situation – Bélgica - 2008

LONGO ALCANCE

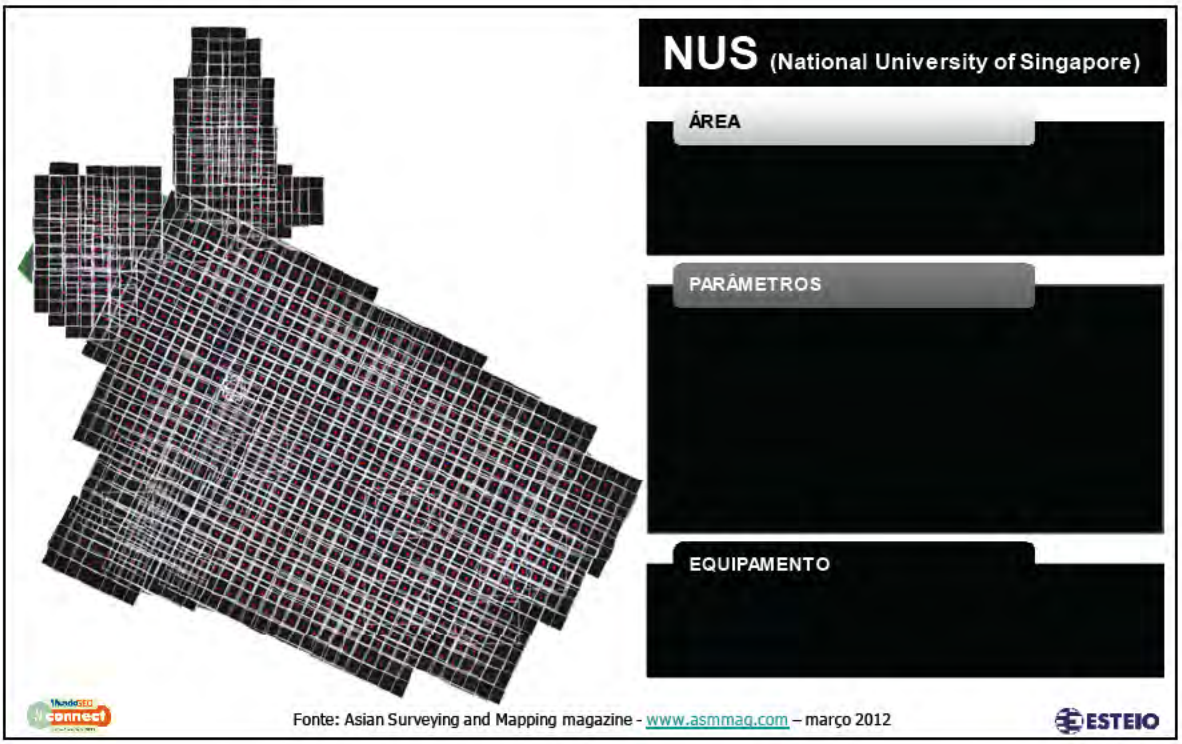
ESPECIAIS ou ESPACIAIS

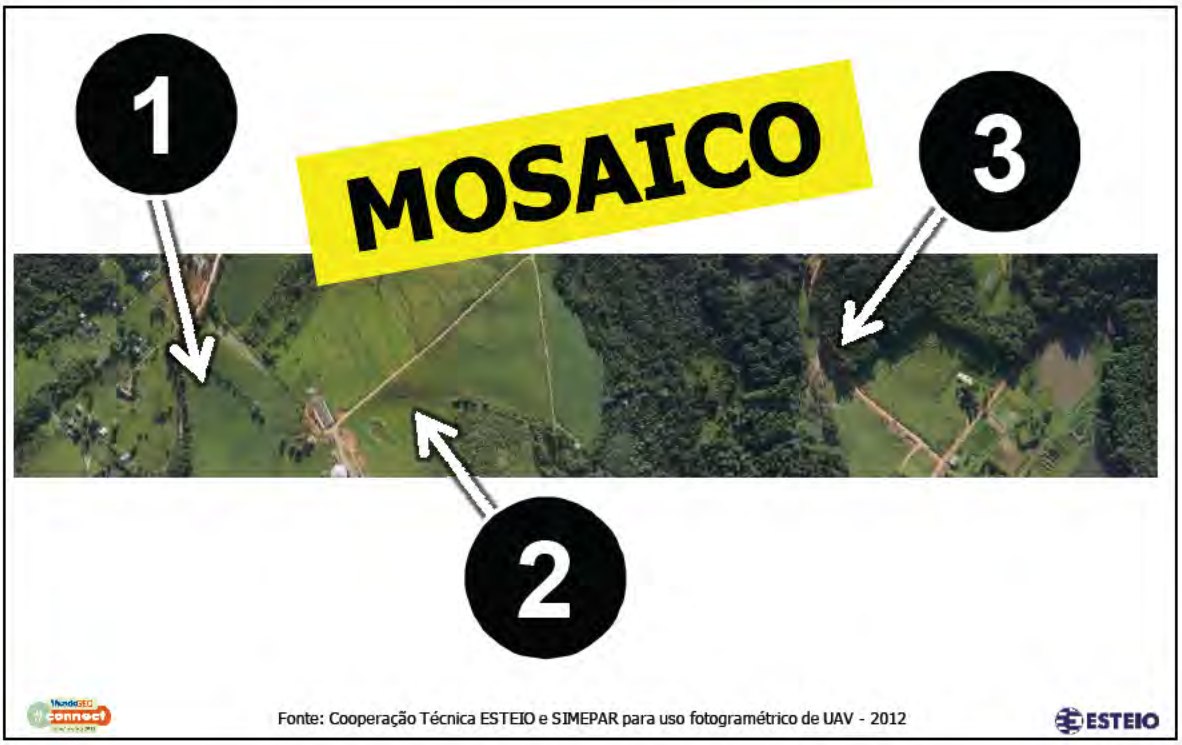
Fonte: UVS INTERNATIONAL – The Current Situation – Bélgica - 2008

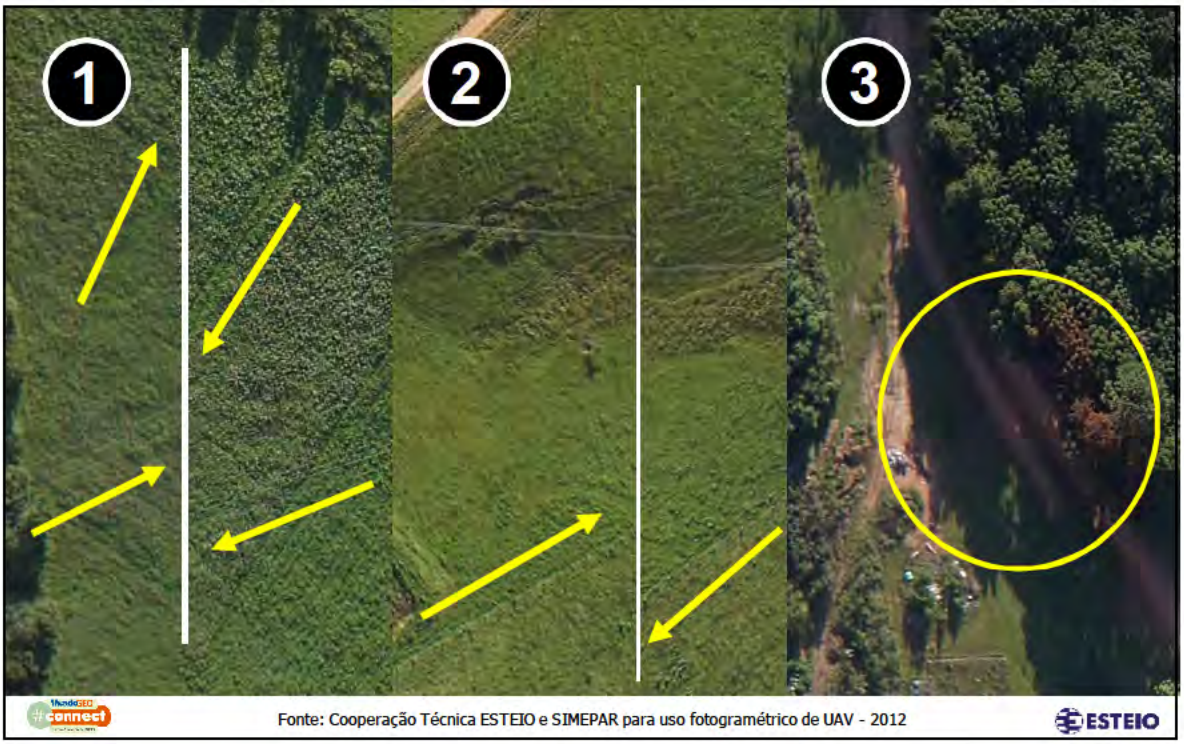
ESTEIO

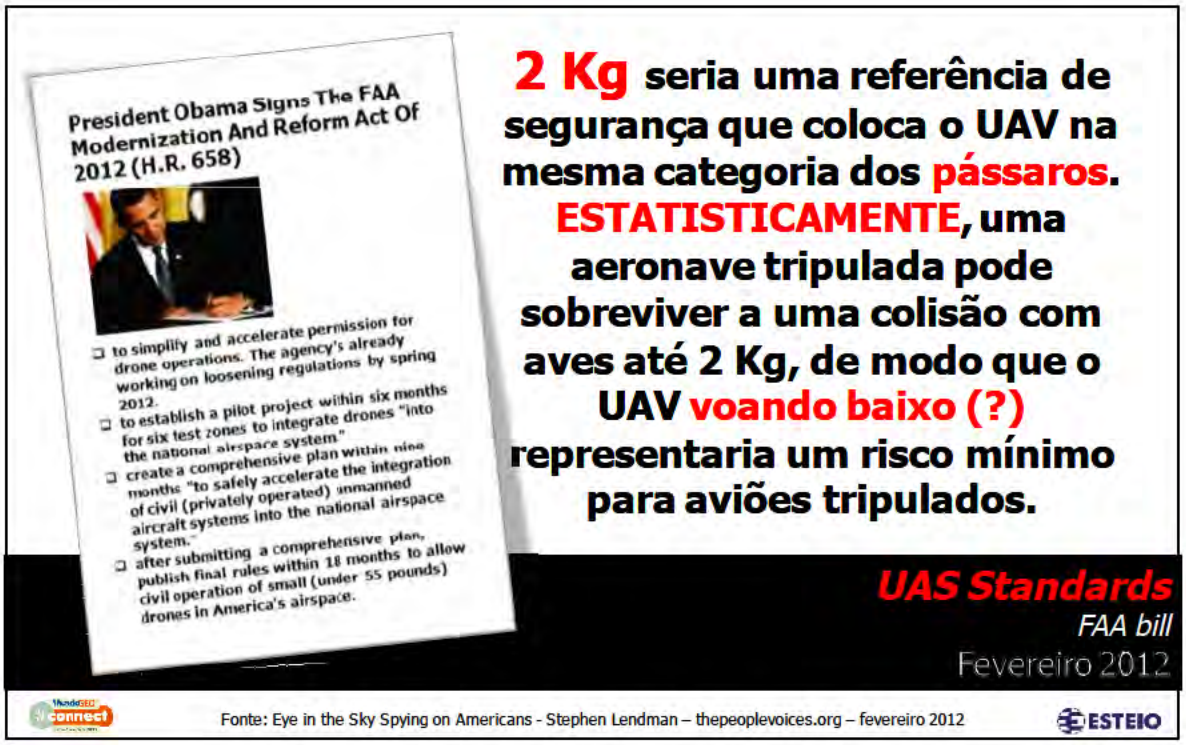
EXPERIÊNCIAS

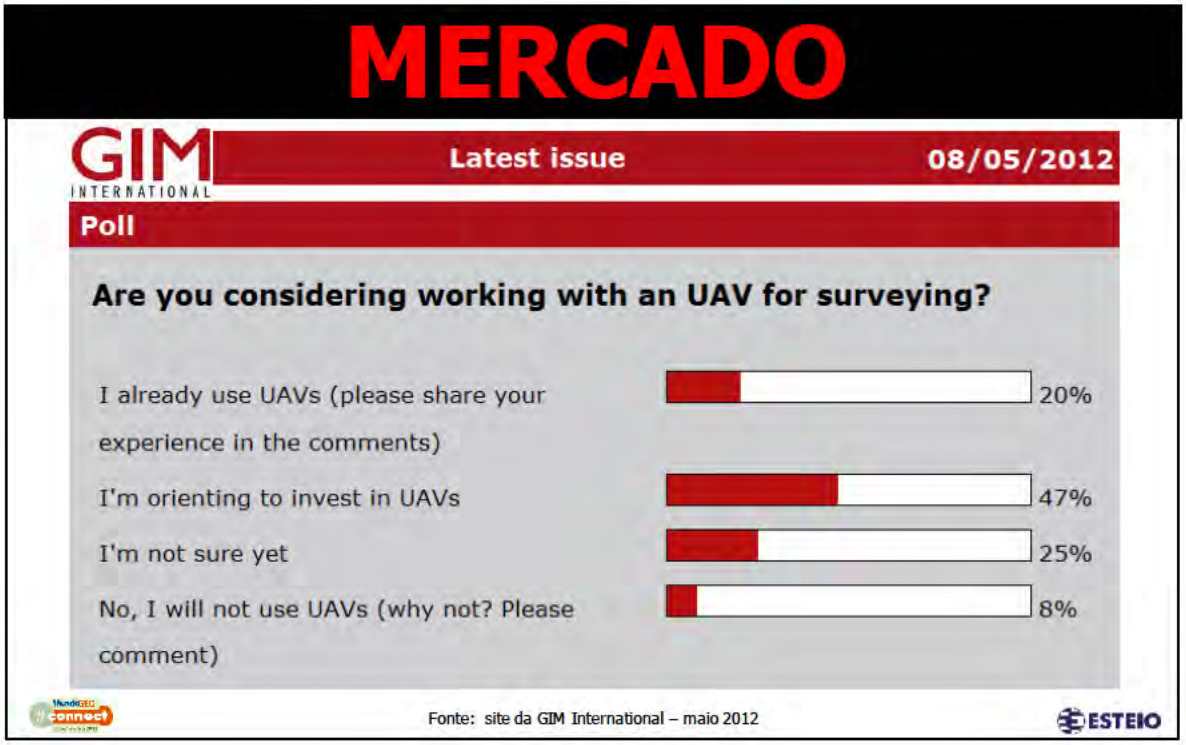
ESTEIO











Qual o impacto dos UAV na indústria do mapeamento ?

Lacuna entre o levantamento topográfico tradicional e da fotogrametria com elevada (?) altura de voo ...

Resposta rápida onde o tempo é condicionante como situações de desastre ...

Monitoramento de empreendimentos onde se deseja fazê-lo de maneira sistemática ...

Não é tão preciso como estações totais e GNSS, mas será bom o suficiente em alguns casos ...

Anders Rhodin

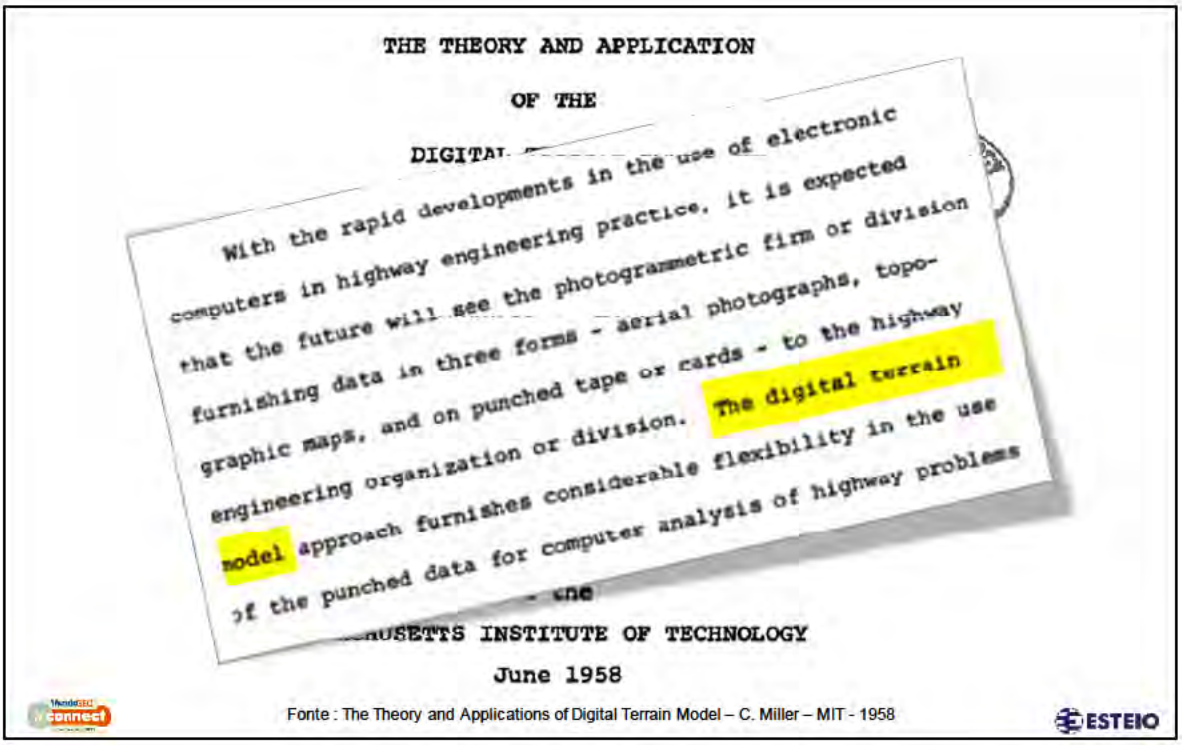
Chefe da Divisão de Levantamentos da TRIMBLE

Abril 2012

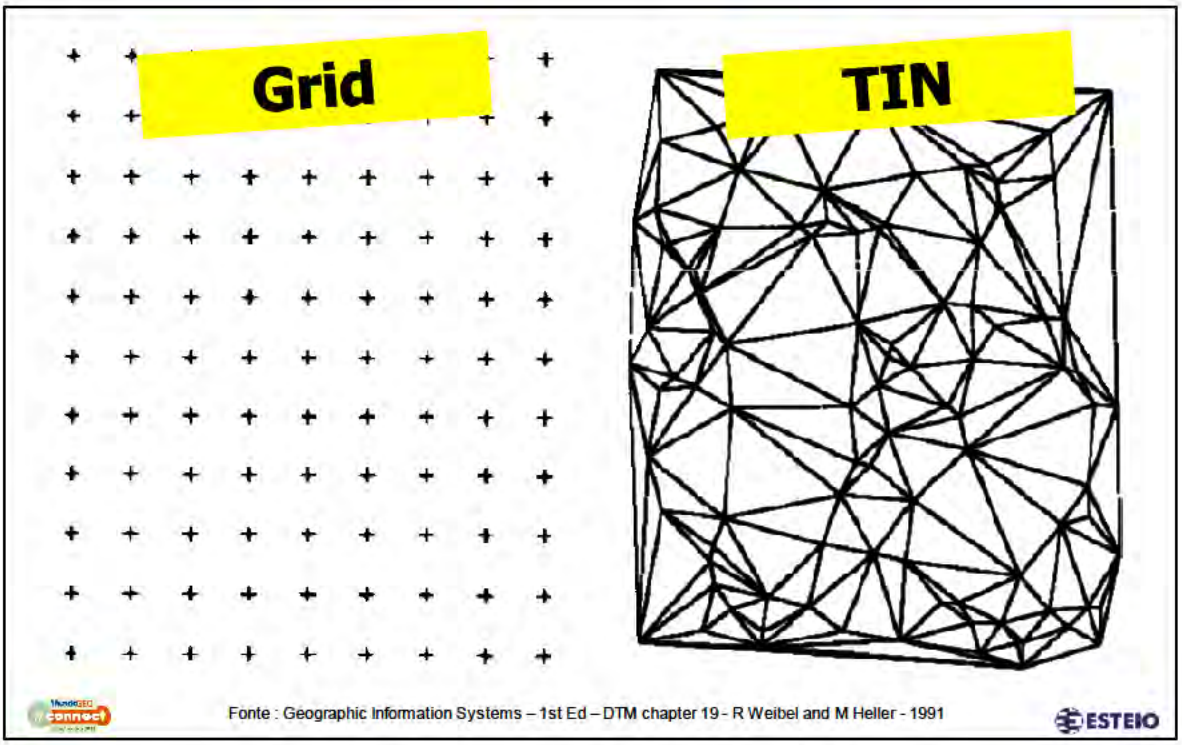
Fonte: Por que a TRIMBLE comprou uma empresa de UAV ? - Entrevista para Sam Pfeifle – Editor da SPAR Point Group

ESTEIO

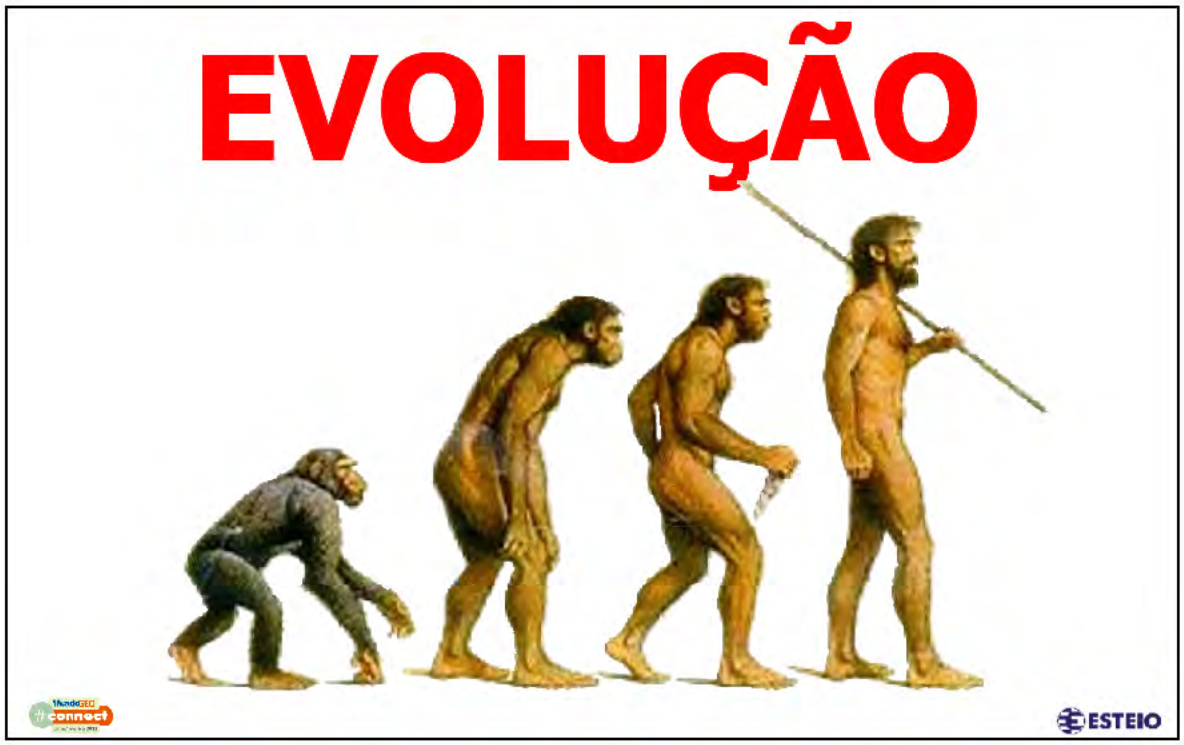
ESTEIO



Fonte : The Theory and Applications of Digital Terrain Model – C. Miller – MIT - 1958



Fonte : Geographic Information Systems – 1st Ed – DTM chapter 19 - R Weibel and M Heller - 1991



1980s

Atmospheric Oceanographic LiDAR (AOL)
Airborne Topographic Mapper (ATM)

1990s

Azimuth Co. (EUA)
Optech Inc. (Canadá)
TopEye (Suécia)

Fonte : Lidar Activities And Research Priorities In The Commercial Sector – Martin Flood – IAPRS - 2001

ESTEIO

1993

2011

18 anos

2 KHz @ 1.000 m ...

... 500 KHz @ 1.000 m !!

Fonte : Datasheet dos Fabricantes

ESTEIO

50% em operação ?

~400

ALS (Airborne LASER Scanning)

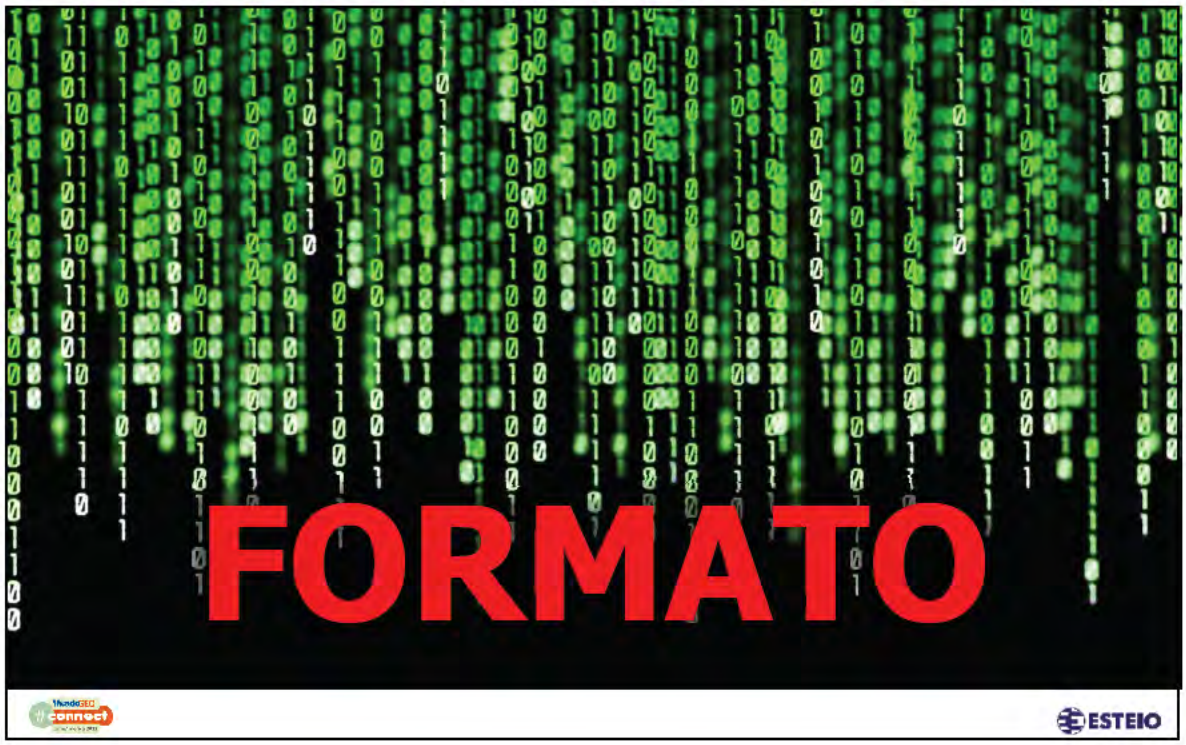
no Mundo ...

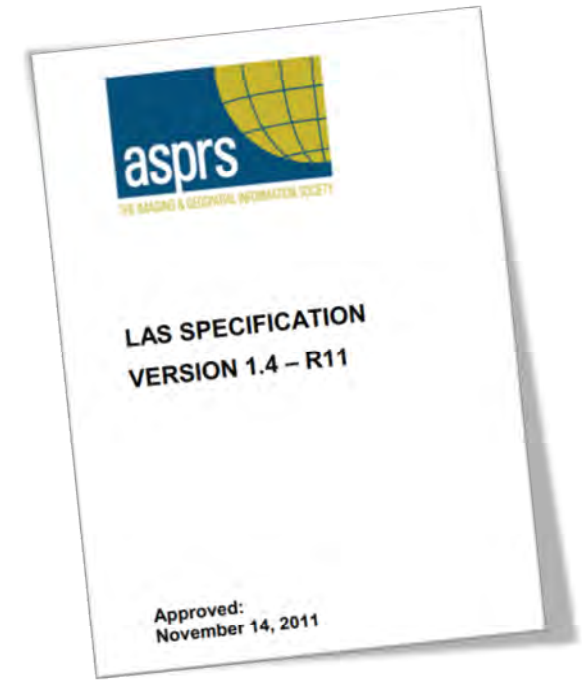
Fonte : GeoInformatics Magazine – Gordon Petrie – Universidade Glasgow - Jan-Fev 2011

ESTEIO

TECNOLOGIA

1. PERFILAMENTO
2. FREQUÊNCIA (SPiA e MPiA)
3. RETORNOS
4. INTENSIDADE
5. WAVEFORM

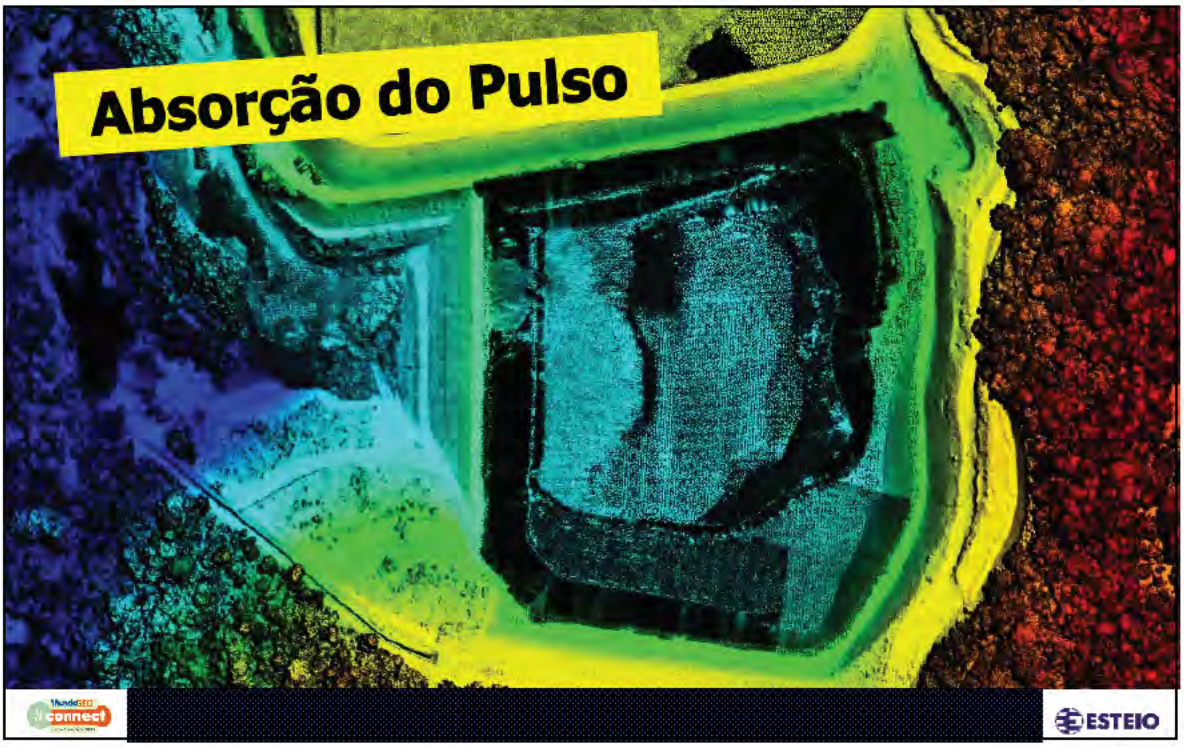


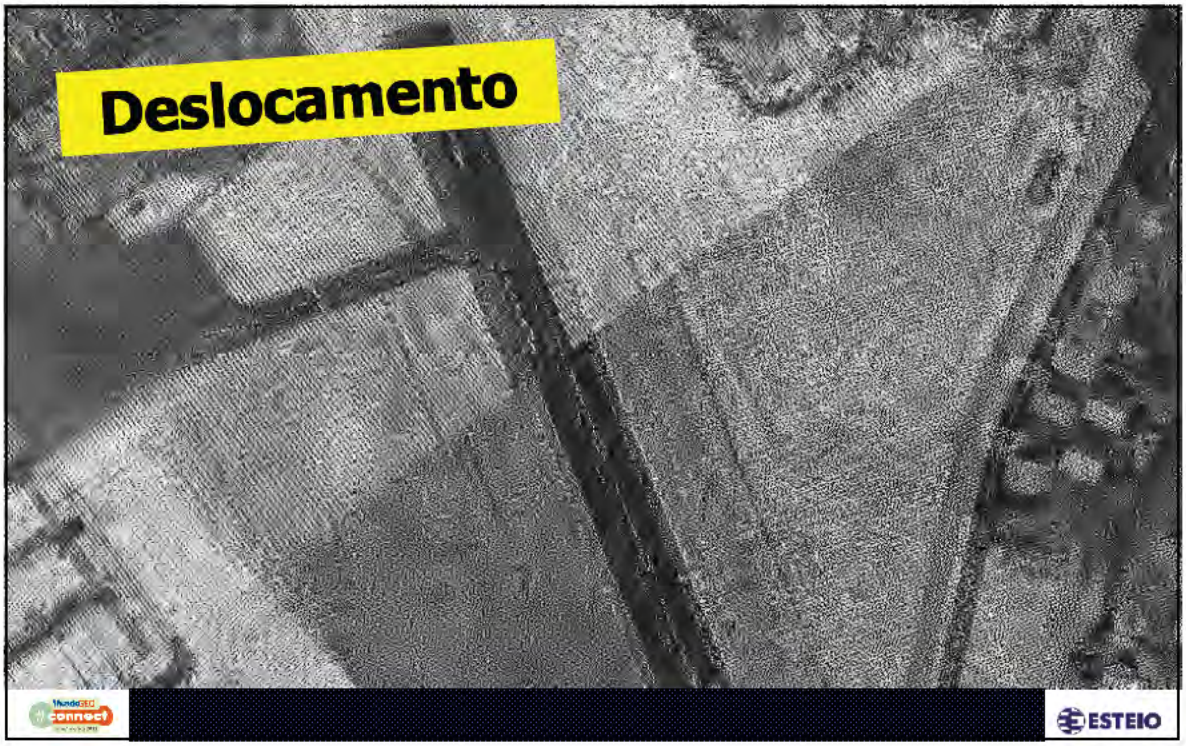


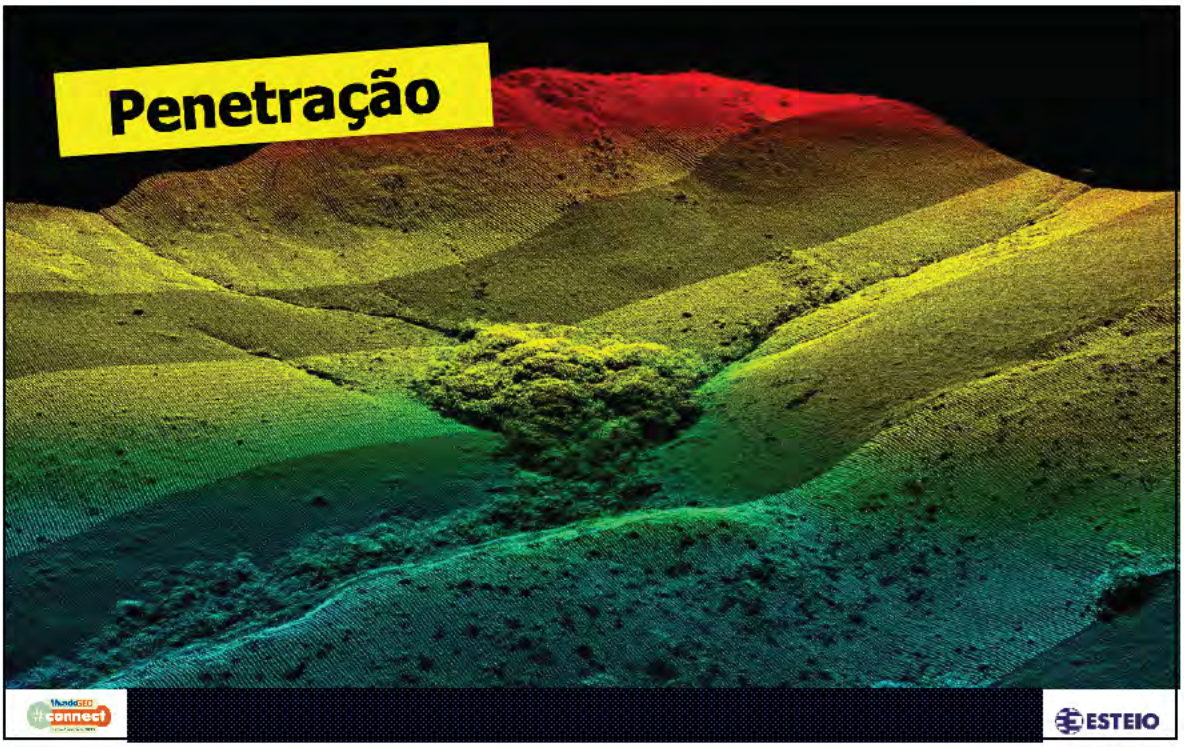
ASCII > BIN

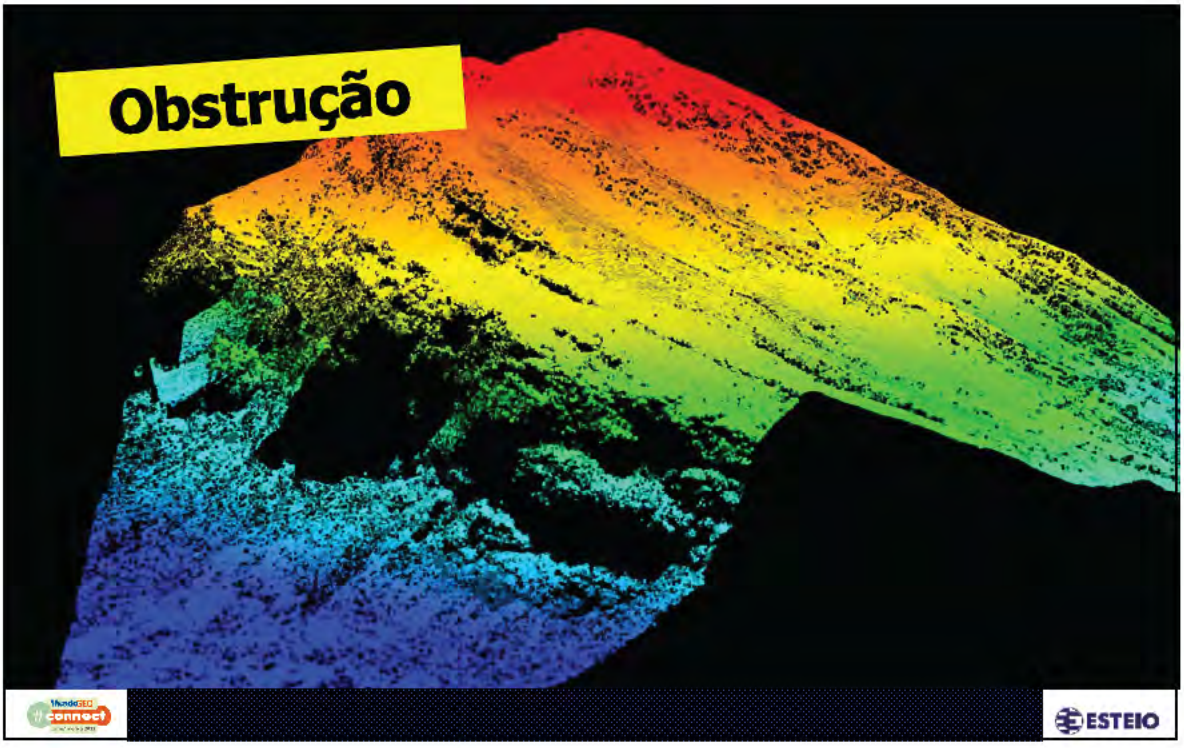
- … Executor
- … Equipamento
- … Programa
- … Datas
- … Parâmetros
- … Referencial
- … Dados XYZ
- … RGB e Class

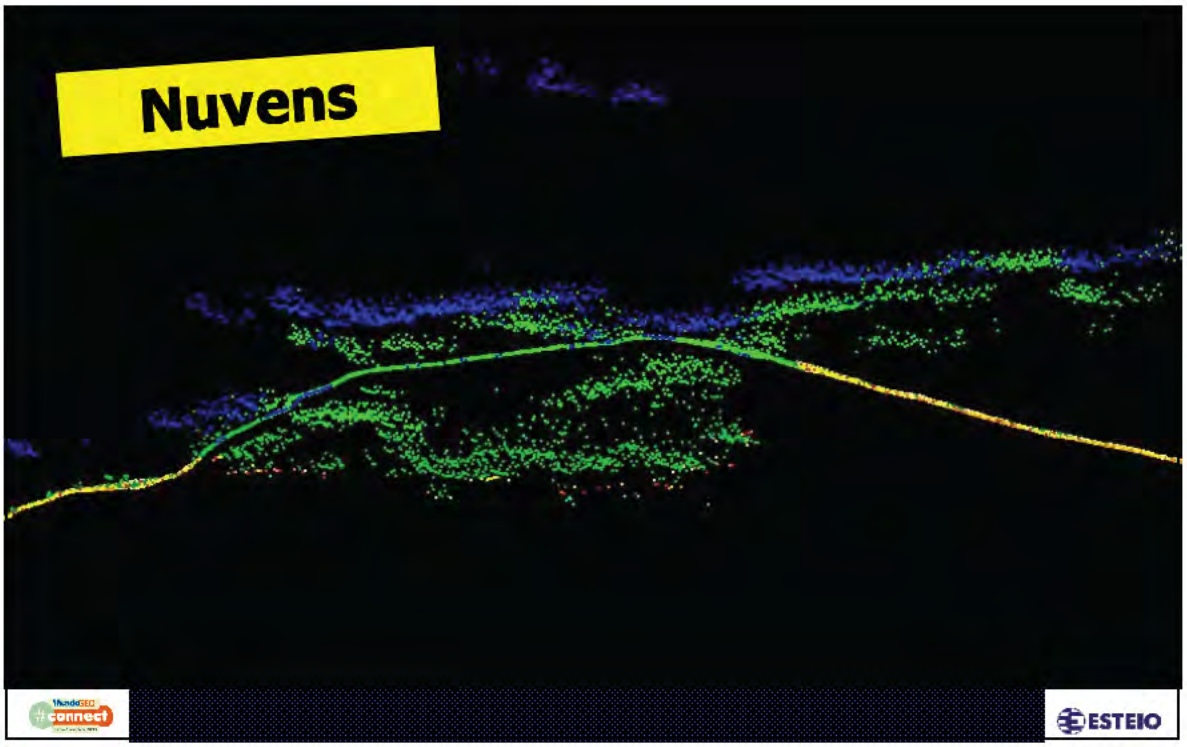
Fonte : LAS 1.4 Specification Released by ASPRS - www.asprs.org - 2012







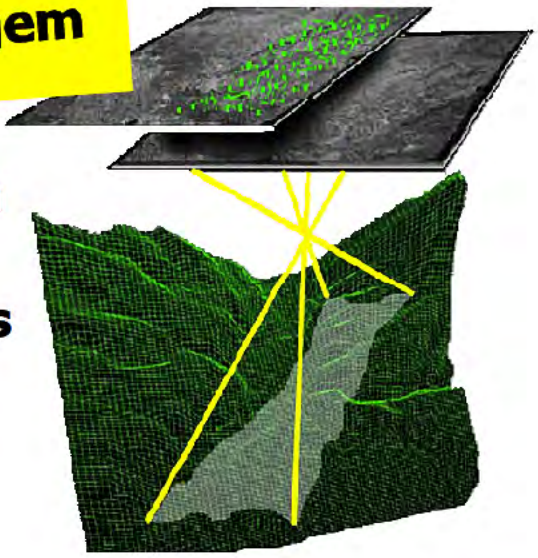




Nova abordagem

Correlação de Imagem

Hirschmüller (2005 ...)

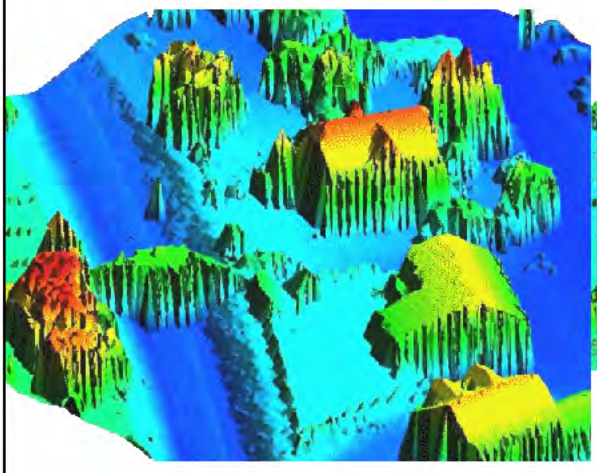


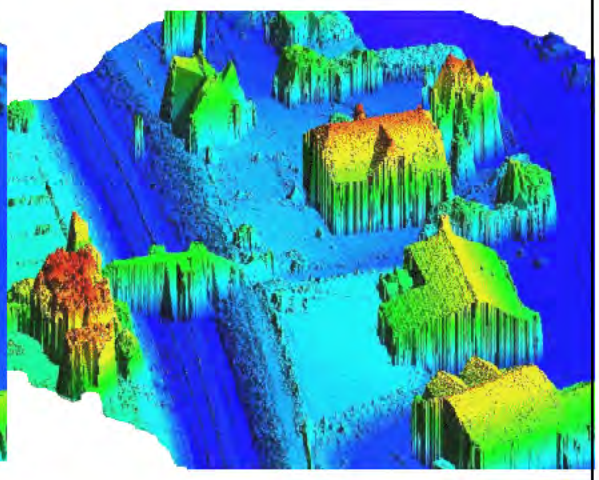
Mutual Information (MI)

Registro de imagens considerando a iluminação e a geometria

Fonte : Semi-Global Matching: An Alternative to LiDAR for DSM Generation? - S. Gehrke et al. – ISPRS, Calgary – Junho 2010

ESTEIO



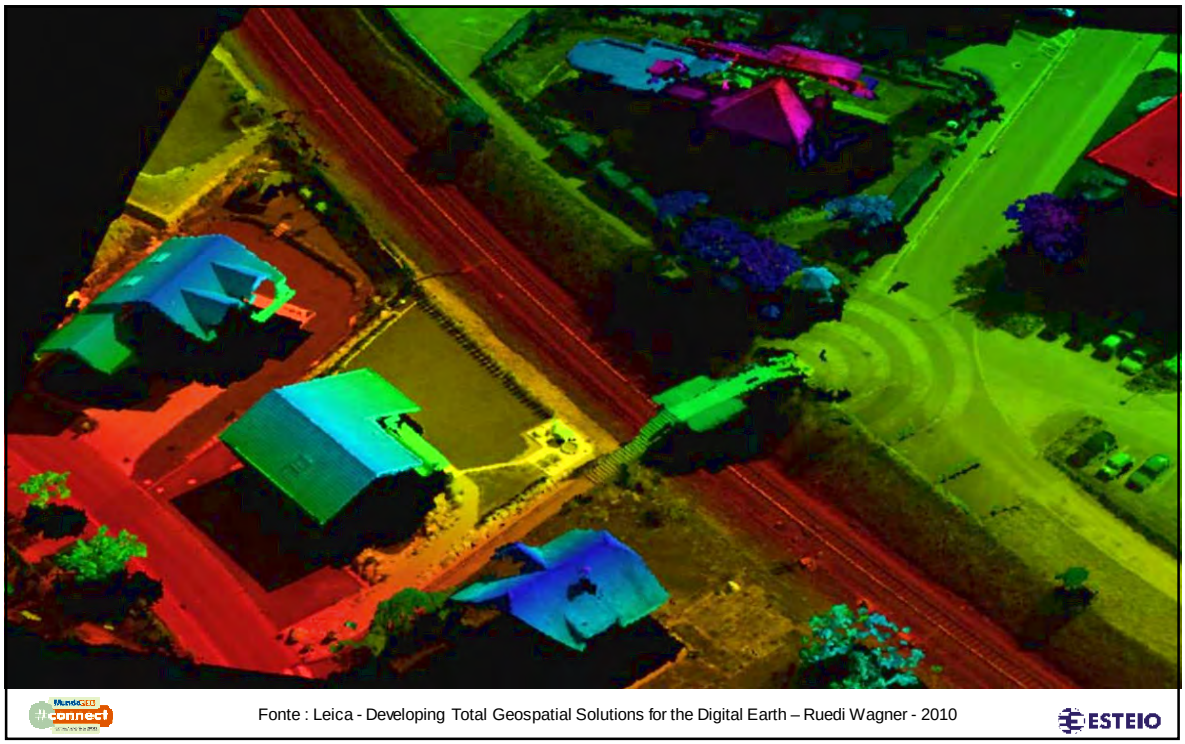


LiDAR

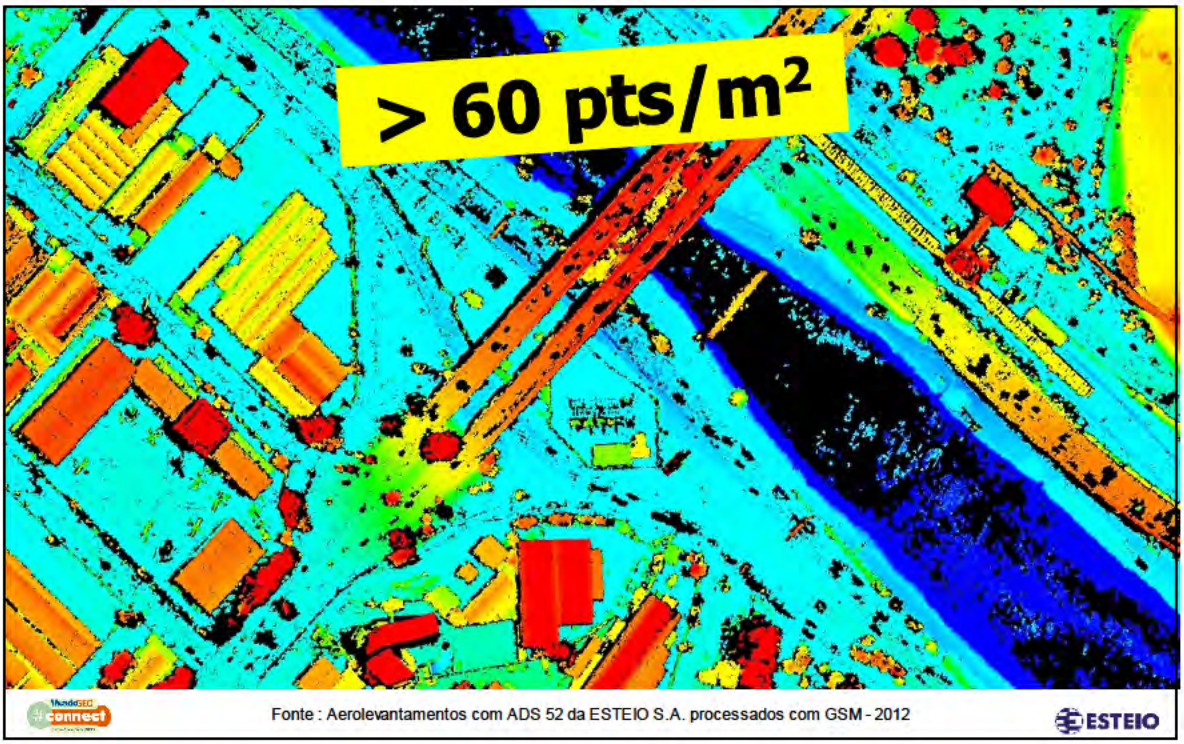
GSM

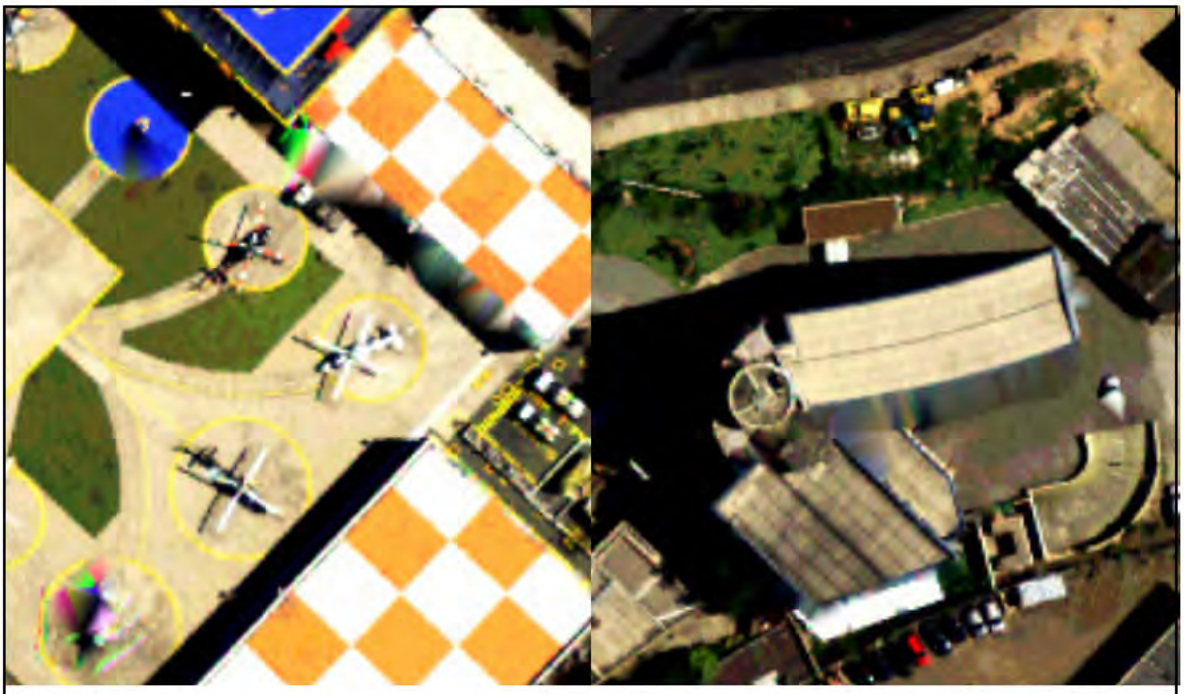
Fonte : Semi-Global Matching: An Alternative to LiDAR for DSM Generation? - S. Gehrke et al – ISPRS –Calgary - Junho 2010

ESTEIO



Fonte : Leica - Developing Total Geospatial Solutions for the Digital Earth – Ruedi Wagner - 2010





Fonte : Voo ADS52 – FunDeB – Processamento Xpro com GSM - 2012

Fonte: Posto de Combustível – Curitiba - PR