International Lithosphere Program (ILP)

Summary Report 2016-2019

accomplishments, meetings, activities, and products

I. TITLE OF CONSTITUENT BODY AND NAME OF REPORTERS

ILP – an IUGS and IUGG initiative established by ICSU (International Council of Scientific Unions) in 1980. The International Lithosphere Program (ILP) seeks to elucidate the nature, dynamics, origin and evolution of the lithosphere through international, multidisciplinary geoscience research projects in Task Forces (TF) and regional coordinating committees (CC) of interest to both the geological (IUGS) and geophysical (IUGG) communities. According to the Terms of Reference published in 2008 and renewed in 2011 ILP is a body of IUGG and IUGS and seeks to achieve a fine balance between addressing societal needs, e.g. understanding natural catastrophes and other solid earth processes that affect society as well as satisfying scientific curiosity. Website: https://www.scl-ilp.org/

Reporters:
Prof. Dr. Sierd Cloetingh, President (Utrecht University, 2016-2017))
Prof. Dr. Hans Thybo, President Istanbul Technical University, 2017-2019)
Prof. Dr. Magdalena Scheck-Wenderoth, Secretary General (GFZ Potsdam)
Dr. Alexander Rudloff, Executive Secretary (GFZ Potsdam)

II. Accomplishments

- **Bureau**: 2017 Sierd Cloetingh hands over to the new ILP president Hans Thybo, EGU's past president. On decision of the Bureau 2018 an Advisory Board to ILP has been established that includes the following members: Ö. Adiyaman Lopes (UNESCO), S. Dong (China), C. Ebinger (USA), D. Mueller (Australia), H. Sato (Japan). Dr. Alexander Rudloff, who acted as Executive Secretary for ILP from 2007 on, was elected Secretary General of IUGG at the General Assembly in Montréal, July 2019. Therefore, he steps down as Executive Secretary from 2020.
- **Science**: A new TF 1:Lithosphere structure and mineral resources (Chairs: I. Artemieva, Denmark; S. Dong, China; R. Ernst, Canada) and a CC-2 Lithospheric Seismicity and Tectonics in the Himalaya (Chair: M. Karplus, et al. USA) have been approved for the period (2019 - 2023). An open call for new TF and CC proposals resulted in submission of 10 proposals that currently are being evaluated.
- **Awards**: Flinn-Hart Award for Early Career Scientist awarded to Philippe Yamato (France) 2015, Mojtaba Rajabi (Australia) 2016, Fabio Luca Bonali (Italy) 2017 and Alexander Koptev (Germany) 2019. The first E. Burov medal was awarded 2018 to Francesca Funiciello (Italy) followed 2019 by awardee Luc Lavier (USA).
- **40 years of ILP**: dedicated sessions are organized 2020 at IGC, India and at EGU.

III. Meetings and Activities:

- Bureau and Business meetings of ILP at EGU in Vienna, Austria, 2016, 2017, 2018, 2019

- President attended the 2018 RFG (Resources for Future Generations) Conference in Vancouver, Canada and the 2019 DEEP (Deep Earth Exploration and Practices) in China. He also participated in the opening of the DDE Centre in Kunshan, China, as well as in the IUGS EC meeting in Beijing. SG attended 2018 EC meeting of IUGS in Potsdam, Germany, Past President Sierd Cloetingh gave a presentation on ILP at the 100 years' anniversary meeting of IUGG in 2019.
- ILP sponsored the 2018 SEISMIX meeting in Krakow, Poland, the 2018 RFG event, and the YES conference in Berlin, Germany.
- ILP TF and CC have been visible at the large international meetings of EGU, AGU, ISRM, Goldschmidt and EAGE. Also ILP had a strong presence at the IGC 2016 in Cape Town.
- TF and CC contributed to specific conferences within their thematic fields and held dedicated smaller international workshops, some examples are given below:
- TF2 organized a Geo-hazard Summer School in 2017 at University of Portsmouth (UK), and Volcanic Hazard Summer School on Santorini Island (Greece).
- TF4 organized and convened the session "Garnet Peridotites and Mantle Eclogites" at the 13th International Eclogite Conference, Eclogite-2019, Petrozavodsk, Karelia, Russian Federation – June 24 -27, 2019.
- TF 6 held annual workshops in Tokyo, Japan; Quebec, Canada; Cyprus and Heviz, Hungary.
- TF 8 co-organized a memorial session for Evgenyi Burov at EGU 2016 in Vienna, the 2016 Workshop on the Origin and Evolution of Plate Tectonics, Switzerland and GeoMod2016, France.
- TF TF9: organized an international conference "Subduction across scales: The Subduction Interface Processes in Barcelona, Spain, 2017.
- CC MEDYNA co-organized the First Atlas Georesources International Congress 2017 in Hammamet, Tunisia, the Medyna Shortcourse on Applied Geochronology 2017 in Granada, Spain, the 2017 Medyna Workshop and Geodynamic Seminars carried out a study of the seismicity of Algeria and the NW African Margin based on a new database of earthquake events, including historical and instrumental records and a morphological analysis and geochronological characterization of the Atlas and Rif mountain belts.
- CC TOPOEUROPE initiated the TOPO-TRANSYLVANIA Project, held the TOPO-TRANSYLVANIA meeting, Sopron, Hungary, 2019, a workshop in Granada, Spain in 2019, and organized a short course at University of Trieste, Italy 2019.

IV. Products All TFs and CCs published in high-level scientific outlets, here only seelcted publications are listed, more details can be found in the ILP annual reports

TF2:

Albert, H. et al. 2016.Years to weeks of seismic unrest and magmatic intrusions precede monogenetic eruptions, Geology, 44(3), 211-214.

Avouris, D.M., et al. 2017 Triggering of volcanic degassing by large earthquakes. Geology.

Breard, E. C.; et al., 2016 Coupling of turbulent and non-turbulent flow regimes within pyroclastic density currents, Nature Geoscience.

Mueller, S.B., et al. 2017 Stability of volcanic ash aggregates and break-up processes. Sci. Rep. Nature.com.

Tibaldi, A., Bonali, F.L. 2017 Intra-arc and back-arc volcano-tectonics: Magma pathways at Holocene Alaska-Aleutian volcanoes. Earth-Science Reviews.
Tibaldi, A., & Bonali, F. L., 2018 Contemporary recent extension and compression in the central Andes. Journal of Structural Geology, 107, 73-92.
Song, W. et al., 2016 Volcanic ash melting under conditions relevant to ash turbine interactions Nat.Com.7.

TF 3:

World Stress Map database: a new release went online 2016: http://www.world-stress-map.org/
Heidbach, O. et al. 2018 The World Stress Map database release 2016: Crustal stress pattern across scales. Tectonophysics, 744,484-498. doi: 10.1016/j.tecto.2018.07.007.
Bohnhoff, M., Wollin, C., Domigall, D., Küperkoch, L., Martinez-Garzon, P., Kwiatek, G., Dresen, G., Malin, P.E. (2017): Repeating Marmara Sea Earthquakes: Indication for fault creep. GJI, 210, 332-339.
Bohnhoff, M. et al. 2017 GONAF–A borehole Geophysical Observatory around the North Anatolian Fault in the Eastern Sea of Marmara. Sci. Dril. 5, 1–10, doi:10.5194/sd-5-1-2017.
Li, S. et al. 2017 Postseismic uplift of the Andes following the 2010 Maule earthquake: Implications for mantle rheology. GRL, 44, 1768–1776. doi:http://doi.org/10.1002/2016GL071995.
Najdahmadi, S. et al., 2016: Bimaterial interfaces at the Karadere segment of the North Anatolian Fault, northwestern Turkey. - JGR, 121, 2, p. 931-950.

TF 4:

Dobrzhinetskaya, L.F. et al. 2018. Moissanite (SiC) with metal-silicide and silicon inclusions from tuff of Israel: Raman spectroscopy and electron microscope studies. Lithos, 310-311:355-368.
Machev, P. et al. 2018. Not all moissanites are created equal: New constraints on moissanite from metamorphic rocks of Bulgaria. Earth and Planetary Science Letters. 498: 387–396.
Shi, F. et al. 2018. Lower-crustal earthquakes in southern Tibet are linked to eclogitization of dry metastable granulite. Nature Communications, doi:10.1038/s41467-010-05964-1.
Wang, L. et al. 2018 On the survival of intergranular coesite in UHP eclogite. Journal of Metamorphic Geology, doi:10.1111/jmg.12288.
Zhang, L., et al., 2016. Metamorphic P-T-water conditions of the Yushugou granulites form the southeastern Tianshan orogen: implications for Paleozoic accretionary orogeny. Gondwana Research, 29: 264-277.

TF 6:

Andrić, N. et al. 2018. Variability of orogenic magmatism during Mediterranean-style continental collisions: A numerical modelling approach. Gondwana Research 56, 119-134.
Balázs, A. et al. 2017 Tectonic and Climatic Controls on Asymmetric Half-Graben Sedimentation: Inferences From 3-D Numerical Modeling. Tectonics 36, doi: 10.1002/2017TC004647.
Capella, W. et al. 2018. Palaeogeographic evolution of the late Miocene Rifian Corridor (Morocco): Reconstructions from surface and subsurface data. Earth-Science Reviews 180, 37-59.
Matenco, L., et al., 2016 The interplay between tectonics, sediment dynamics and gateways evolution in the Danube system from the Pannonian Basin to the western Black Sea. Sci.Tot. Env. 543, 807-827
Sato, H., Ishiyama, T., Matenco, L., Nader, F.H. 2017 Evolution of fore-arc and back-arc sedimentary basins with focus on the Japan subduction system and its analogues. Tectonophysics Special Issue 710–711, 2017, dedicated to the ILP Sedimentary Basins Tokyo 2015, doi: 10.1016/j.tecto.2017.02.021
Scheck-Wenderoth, M. et al. 2017 Progress in understanding passive continental margins. Tectonophysics Special Issue 716, doi: 10.1016/j.tecto.2017.04.018
van Wyk de Vries, et al. 2018. A global framework for the Earth: putting geological sciences in context. Global and Planetary Change 171, 293-321.

TF 8:

Buiter, S.J.H. et al. 2016Benchmarking numerical models of brittle thrust wedges, Journal of Structural Geology, 92, 140-177, doi:10.1016/j.jsg.2016.03.003
Fischer, R.; Gerya, T., Early Earth plume-lid tectonics: A high-resolution 3D numerical modelling approach, Journal of Geodynamics, 100 Pages: 198-214, DOI: 10.1016/j.jog.2016.03.004, 2016.

Koptev, A. et al. 2016 Contrasted continental rifting via plume-craton interaction: Applications to Central East African Rift, Geoscience Frontiers, 7/2, 221-236, DOI: 10.1016/j.gsf.2015.11.002
Chowdhury, P., Gerya, T., Chakraborty, S. (2017): Emergence of silicic continents as the lower crust peels off on a hot plate-tectonic Earth. Nature Geoscience, 10, 698-703.
Le Pourhiet, L. et al. 2017 A genetic link between transform and hyper-extended margins. EPSL, 465, 184-192.
Naliboff, J.B. et al. 2017 Complex fault interaction controls continental rifting. Nat. Com., 8, 1179.
Stern, R., Gerya, T. (2017): Subduction initiation in nature and models: A review. Tectonophysics, https://doi.org/10.1016/j.tecto.2017.10.014.
Marques, F.O., et al. 2018 Understanding geological processes through modelling - A Memorial Volume honouring Evgenii Burov. Tectonophysics, Volume 746, Pages 1-716

TF 9:

Agard P. et al. 2016 Plate interface rheological switches during subduction infancy: control on slab penetration and metamorphic sole formation. Earth and Planetary Science Letters, 451, 208-220, 2016
Agard P., et al. 2018 The subduction plate interface: rock record and mechanical coupling (from long to short timescales). Lithos, 320–321, 537-566.
Bayet L., John T., Agard P., Gao J., Li J. (2018): Massive sediment accretion at ~80 km depth along the subduction interface: evidence from the southern Chinese Tianshan. Geology, 46, 495-498.
Bebout, G.E. et al. 2018 Twenty Years of Subduction Zone Science: Subduction Top to Bottom 2 (ST2B-2). GSA Today, v. 28, doi: 10.1130/GSATG354A.
Gerya T. et al. 2015 Plate tectonics on the Earth triggered by plume-induced subduction initiation, Nature, 527, 221–225, 2015
Stern RJ., Gerya T. 2018 Subduction initiation in nature and models: A review. Tectonophysics 746, 173-198.

CC 1 TOPO-EUROPE:

Cloetingh S., Tibaldi A., Dobrzinetskaya L., Matenco L., Nader F. and Van Wijck de Vries B. (Eds). (2018): From the Deep Earth to the Surface. Global and Planetary Change, v. 171, p.1-321
Matenco L. (Ed) (2018): TOPO-TRANSYLVANIA- a multididciplinary Earth Science initiative in Central Europe to tackle local and global challenges. Acta Geodaetica et Geophysica, v. 53, 323-553.
Limberger J. et al. 2018 Geothermal energy in deep acquifers: a global assessment of the resourcebase for direct heat utilizitation. Renewable Sustainable Energy Reviews, 82, 961-975.
Koptev A. et al. 2018 Non-uniform splitting of a single plume by double-cratonic roots. Terra Nova, 30.
Francois T. et al 2018 Plume-lithosphere interactions in rifted margin tectonic settings. Tectonophysics746.

CC 1 MEDYNA:

Abbassene, F. et al. 2016 A 17 Ma onset for the post-collisional K-rich calc-alkaline magmatism in the Maghrebides: Evidence from Bougaroun (northeastern Algeria) and geodynamic implications. Tectonophysics 674, 114-134. http://dx.doi.org/10.1016/j.tecto.2016.02.013.
Kechiched R. et al. 2018 Glauconite-bearing sedimentary phosphorites from the Tébessa region (eastern Algeria): Evidence of REE enrichment and geochemical constraints on their origin. Journal of African Earth Sciences, 145:190-200. doi.org/10.1016/j.jafrearsci.2018.05.018.
Mahjoubi, E.M. et al. 2016. Structural, mineralogical, and paleoflow velocity constraints on Hercynian tin mineralization: the Achmmach prospect of the Moroccan Central Massif. Min. Deposita 51, 431-451
Setti-Belaroui L. et al. 2018 Adsorption of linuron by an Algerian palygorskite modified with magnetic iron. Applied Clay Science. doi.org/10.1016/j.clay.2018.03.021
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Varas-Reus, M.I. et al. 2017 Sr-Nd-Pb isotopic systematics of crustal rocks from the western Betics (S. Spain): Implications for crustal recycling in the lithospheric mantle beneath the westernmost Mediterranean. Lithos 276:45-61.